3

MEMO RAD

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SUPPLEMENT

12E NEDERLANDSE RADIOLOGENDAGEN
27 EN 28 SEPTEMBER 2007
DE DOELEN, ROTTERDAM

Nederlandse Vereniging voor Radiologie
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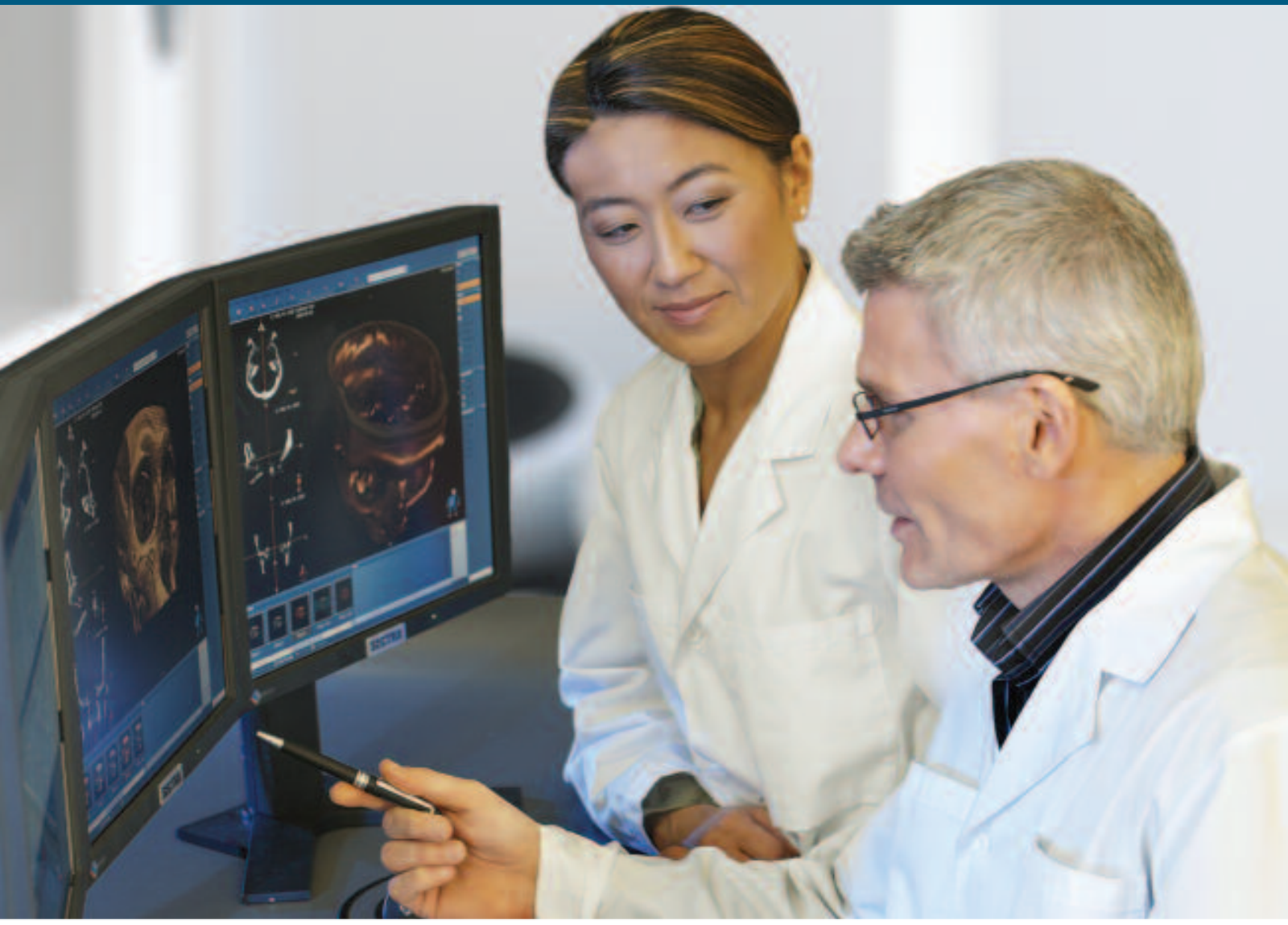

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VOORWOORD

JAN ALBERT VOS

Dames en heren leden van de NVvR,

Voor u ligt het Memorad supplement, met het programma en de abstracts van de Radiologendagen 2007.

Na het spetterende lustrum in 'de Efteling' vorig jaar, is het programma thans traditiegetrouw weer over twee dagen verdeeld. De Radiologendagen worden geopend met een sessie over de organisatie van de radiologische praktijk, waarbij ook het onderwerp teleradiologie voor het voetlicht zal worden gebracht. Er zijn dit jaar maar liefst acht Refresher Courses, met een breed scala aan interessante onderwerpen: Rotsbeen, Acute Arteriële Pathologie, Pancreas, Enkel/Pols, Epilepsie, Abdominale Cysten, HoRa en Nucleaire Geneeskunde. Verder worden de parallelsessies weer ingeluid door een key-note speaker over het onderhavige onderwerp. De steeds hoog gewaardeerde quiz heeft een nieuw jasje gekregen en op vrijdag staat een aantal richtlijnsessies gepland, met belangrijke aanwijzingen voor de praktijk van elke dag.

Naast deze voor een belangrijk deel bekende elementen zijn er ook enkele veranderingen doorgevoerd. Het meest in het oog springend is natuurlijk de nieuwe locatie: 'de Doelen' in Rotterdam. Een prachtig congrescentrum met alle denkbare faciliteiten, dat als belangrijk voordeel heeft dat het vanuit het hele land, zowel met de auto als met het openbaar vervoer, zeer goed te bereiken is.
Minder in het oog springend, maar niet onbelangrijk, is de wijziging van congres organisatie bureau. Dit jaar werken we voor het eerst samen met Congress Care, een zeer ervaren speler in de markt, die o.a. ook de Chirurgendagen, de Internistendagen en de Vaatdagen organiseert. Het Organiserend Comité hoopt met deze omzetting een nog betere service voor de deelnemers aan de radiologendagen te kunnen waarborgen.

Al met al denken we een ijzersterk en uiterst boeiend vakinhoudelijk programma te hebben, waarbij er tevens uitgebreid gelegenheid is om u in de expositieruimte op de hoogte te stellen van allerlei wetenswaardigheden, die onze relaties van de industrie u te bieden hebben.
Met name zou ik bij dezen de beide hoofdsponsors Siemens Medical Solutions en Philips Medical Systems willen bedanken voor hun ondersteuning.

Rest ons nog u een buitengewoon leerzaam, gezellig en aangenaam verblijf in Rotterdam toe te wensen!

Het Organisatie Comité

Jan Albert Vos, voorzitter
Saskia Kolkman
Digna Kool
Birgitta ter Rahe
Henk-Jan van der Woude

Donderdag 27 september 2007

Tijdstip	Onderwerp	
09.00-09.45	Inschrijving en koffie	
09.45-10.00	**Opening**	
	Drs. J.A. Vos	
10.00-11.00	**Plenaire sessie: Organisatie Radiologische praktijk**	
	Voorzitter:	Prof.dr. C. van Kuijk, VUMC, Amsterdam
	Sprekers:	Dr. E.J. Vlieger, Plexus Medical Goup, Amsterdam
		Prof.dr. J.G. Blickman, UMC St Radboud, Nijmegen
11.00-11.30	Koffiepauze	
11.30-13.00	**Parallelsessies:**	
	I Gastrointestinale radiologie	
	Voorzitters:	Prof.dr. J. Stoker, AMC Amsterdam
		Drs. T.L. Bollen, St. Antonius Ziekenhuis, Nieuwegein
	Key-note speaker:	Prof.dr. J. Stoker, AMC Amsterdam
	II Thoraxradiologie en Hoofd-Hals radiologie	
	Voorzitters:	Dr. F.A. Pameijer, Antoni v Leeuwenhoek Ziekenhuis, Amsterdam, UMCU, Utrecht
		Dr. J.P.M. van Heesewijk, St. Antonius Ziekenhuis, Nieuwegein
	Key-note speaker:	Dr. F.A. Pameijer, Antoni v Leeuwenhoek Ziekenhuis, Amsterdam, UMCU, Utrecht
	III Acute radiologie en Kinderradiologie	
	Voorzitters:	Prof.dr. J.G. Blickman, UMC St Radboud, Nijmegen
		Mw. A. Devos, Erasmus MC, Rotterdam
	Key-note speaker:	Prof.dr. J.G. Blickman, UMC St Radboud, Nijmegen
	IV Interventieradiologie en Nucleaire radiologie	
	Voorzitters:	Dr. J. Fütterer, UMC St Radboud, Nijmegen
		Drs. J.G. van Unnik, OLVG, Amsterdam
	Key-note speaker:	Dr. J. Fütterer, UMC St Radboud, Nijmegen
	V Neuroradiologie en Onderwijs/opleiding	
	Voorzitters:	Prof.dr. F. Barkhof, VUMC, Amsterdam
		Dr. J.C. de Groot, UMCG, Groningen
	Key-note speaker:	Prof.dr. F. Barkhof, VUMC, Amsterdam
13.00-14.15	Lunch	
14.15-15.30	**Refresher Courses:**	
	I: ROTSBEEN	
	Overzicht anatomie mastoïd en rotsbeen	
	Spreker:	Dhr. R.B.J. de Bondt, AzM, Maastricht
	Beeldvorming	
	Spreker:	Prof.dr. J.W. Casselman, AZ St-Jan AV, Brugge, België
	Correlatie kliniek en beeldvorming	
	Spreker:	Prof.dr. E. Offeciers, UZ Antwerpen, Antwerpen, België

Donderdag 27 september 2007

Tijdstip	Onderwerp	
	II: ACUTE ARTERIËLE PATHOLOGIE	
	Voorzitter:	Dr. H. van Overhagen, HagaZiekenhuis, Den Haag
	Het acute ischemische been	
	Spreker:	Dr. L.C. van Dijk, Erasmus MC, Rotterdam
	Het acute aneurysma van de abdominale aorta	
	Spreker:	Dr. R. Balm, AMC, Amsterdam
	De acute aortadissectie	
	Spreker:	Dr. M.W. de Haan, azM, Maastricht
	III: PANCREAS	
	Voorzitter:	Dr. M.S. van Leeuwen, UMCU, Utrecht
	Kliniek en beleid bij pancreatitis	
	Spreker:	Drs. T.L. Bollen, St. Antonius Ziekenhuis, Nieuwegein
	MRI bij pancreatitis	
	Spreker:	Mw. Dr. M. Bali, Hôpital Erasme, Brussel, België
	CT pancreas	
	Spreker:	Dr. C.Y. Nio, AMC, Amsterdam
	IV: ENKEL-POLS	
	Enkel: Kliniek en beeldvorming	
	Sprekers:	Dr. M. Maas, AMC, Amsterdam
		Dr. R.A.W. Verhagen, Tergooiziekenhuizen, Hilversum
	Pols: Kliniek en beeldvorming	
	Sprekers:	Dr. C.F. van Dijke, MCA, Alkmaar
		Prof.dr. S.E.R. Hovius, Erasmus MC, Rotterdam
15.30-16.00	Theepauze	
16.00-16.15	**Uitreiking Philipsprijs en lezing prijswinnaar**	
16.15-17.15	**Quiz**	
17.15-18.00	**Diploma en prijsuitreiking**	
18.00-19.30	Borrel	
19.30-02.00	Diner & feest	

Vrijdag 28 september 2007

Tijdstip	Onderwerp	
08.00-08.30	Inschrijving en koffie	
08.30-09.30	Sportief evenement	
09.45-11.00	**Refresher Courses:**	
	V: EPILEPSIE	
	Beeldvorming bij epilepsie	
	Sprekers:	Mw. Dr. L.C. Meiners, UMCG, Groningen en Dr. P.A.M. Hofman, azM, Maastricht
	VI: ABDOMIALE CYSTEN	
	Voorzitter:	Dr. J.B.C.M. Puylaert, MC Haaglanden, Den Haag
	Cysten in de lever	
	Spreker:	Prof.dr. J.S. Laméris, AMC, Amsterdam
	Cysten in de nier	
	Spreker:	Drs. R.H.M. Smithuis, Rijnland Ziekenhuis, Leiderdorp
	Cysten in het ovarium	
	Spreker:	Mw. Dr. A.M. Spijkerboer, AMC, Amsterdam
	VII: HORA	
	Voorzitter:	Dr. M.W. de Haan, azM, Maastricht
	HORA – achtergronden, opzet en uitwerking	
	Spreker:	Dr. M.W. de Haan, azM, Maastricht
	HORA en hoe nu verder?	
	Spreker:	Dr. A.D. Montauban van Swijndregt, OLVG, Amsterdam
	HORA – leiden we op voor de praktijk of voor de regelgevers?	
	Spreker:	Dr. J.P.M. van Heesewijk, St. Antonius Ziekenhuis, Nieuwegein
	VIII: NUCLEAIRE RADIOLOGIE	
	Voorzitter:	Drs. J.G. van Unnik, OLVG, Amsterdam
	Diagnostiek van de loslating van heupprothesen	
	Spreker:	Dr. P. Raijmakers, VUMC, Amsterdam
	De diagnostiek van Osteomyelitis	
	Spreker:	Dr. M.F. Termaat, VUMC, Amsterdam
	Schildklierscintigrafie	
	Spreker:	Drs. J.G. van Unnik, OLVG, Amsterdam
11.00-11.30	Koffie pauze	
11.30-13.00	**Parallelsessie:**	**VI Gastrointestinale radiologie en Uroradiologie**
	Voorzitters:	Dr. C.Y. Nio, AMC, Amsterdam
		Mw. H.M. Dekker, UMC St Radboud, Nijmegen
	Key-note speaker:	Dr. C.Y. Nio, AMC, Amsterdam
		VII Interventieradiologie
	Voorzitters:	Prof.dr. W.P.Th.M. Mali, UMCU, Utrecht
		Dhr. M. Meier, AMC, Amsterdam
	Key-note speaker:	Prof.dr. W.P.Th.M. Mali, UMCU, Utrecht
		VIII Cardiovasculaire radiologie
	Voorzitters:	Dr. H.J. Lamb, LUMC, Leiden
		Prof.dr. P.M.T. Pattynama, Erasmus MC, Rotterdam
	Key-note speaker:	Dr. H.J. Lamb, LUMC, Leiden

Vrijdag 28 september 2007

Tijdstip	Onderwerp	
	IX Mammadiagnostiek en Skelet radiologie	
	Voorzitters:	Mw. Dr. M. Reijnierse, Maartenskliniek, Nijmegen
		Mw. H.L.S. Go, MCA, Alkmaar
	Key-note speaker:	Mw. Dr. M. Reijnierse, Maartenskliniek, Nijmegen
	X Neuroradiologie	
	Voorzitter:	Dr. A. van der Lugt, Erasmus MC, Rotterdam
		Dr. J.C.J. Bot, VUMC, Amsterdam
	Key-note speaker:	Dr. A. van der Lugt, Erasmus MC, Rotterdam
13.00-14.15	Lunch	
14.15-14.30	**Uitreiking Radiologendagen prijs**	
14.30-16.00	**Richtlijnsessies:**	
14.30-15.00	**Mammadiagnostiek**	
	Spreker:	Mw. Dr. H.M. Zonderland, AMC, Amsterdam
		Prof.dr. G.J. den Heeten, AMC, Amsterdam
15.00-15.30	**KNO tumoren**	
	Spreker:	Dhr. R.B.J. de Bondt, AzM, Maastricht
15.30-16.00	**Contrastmiddelen**	
	Spreker:	Dr. R. van Dijk Azn., CWZ, Nijmegen
	Spreker:	Dr. L.J.M. Reichert, Ziekenhuis Rijnstate, Arnhem
16.00-16.30	Afscheidsborrel	

Nb.: meer praktische informatie vindt u op www.radiologen.nl

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Genomineerde abstracts voor de Radiologendagen prijs 2007

NR. 2.8 **NEW MRI CRITERIA IMPROVE THE DETECTION OF LYMPH NODE METASTASES IN HEAD AND NECK SQUAMOUS CELL CARCINOMA (HNSCC): MULTIVARIATE LOGISTIC ANALYSIS OF MRI FEATURES OF CERVICAL LYMPH NODES**

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NR. 3.4 **ARM RAISING IN TUBE CURRENT MODULATED TRAUMA CT OF THE TRUNK: HIGHER IMAGE QUALITY, LOWER EFFECTIVE RADIATION DOSE**

M. Brink, F. de Lange, L.J. Oostveen, H.M. Dekker, D.R. Kool, J. Deunk, M.J.R. Edwards, C. van Kuijk, R.L. Kamman, J.G. Blickman

NR. 3.5 **ULTRASONOGRAPHY OF SUSPECTED APPENDICITIS IN CHILDREN: A NEW ULTRASONOGRAPHIC CLASSIFICATION**

F. Wiersma, B.R. Toorenvliet, J.H. Allema, H.C. Holscher

NR. 5.1 **RADIOLOGIE ALS DEEL VAN EERSTEJAARS GENEESKUNDE ONDERWIJSBLOK: DE 3-DIMENSIONALE MENS: INTEGRATIE VAN RADIOLOGIE, FYSISCHE DIAGNOSTIEK EN ANATOMIEONDERWIJS IN HET MEDISCH CURRICULUM. EERSTE RESULTATEN**

S. Kolkman, K.H. de Jong, P. Roodenberg, M. Maas, A.F. Moorman

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NR. 10.8 **BRAIN ACTIVATION CHANGES OF WORKING MEMORY IN MINOR HEAD INJURY PATIENTS MEASURED WITH FUNCTIONAL MAGNETIC RESONANCE IMAGING (FMRI)**

M. Smits, D.W.J. Dippel, G.C. Houston, P.A. Wielopolski, P.J. Koudstaal, M.G.M. Hunink, A. van der Lugt

Auteursindex

Sessie 1 - Gastrointestinale radiologie

Donderdag 27 september 2007, 11.30 - 13.00 uur

Abstractnr. : 1.1

DOES SECOND READ CAD ENHANCE EXPERIENCED READER PERFORMANCE IN CTC OF INCREASED RISK INDIVIDUALS ?

A.H. de Vries[1], M.H. Liedenbaum[1], J. Florie[1], C.Y. Nio[1], R. Truyen[2], J. Stoker[1]

[1]AMC, AMSTERDAM

[2]Philips Medical Systems, BEST

Purpose: To prospectively evaluate the additional value of CAD when used in a second reader paradigm in CT colonography (CTC) of individuals at increased risk for colorectal cancer (CRC).

Method and materials: 138 consecutive patients at increased risk for CRC underwent CTC 3 hours prior to colonoscopy. All patients underwent extensive bowel preparation and fecal tagging (4 * 50ml oral Iodine contrast). After CTC evaluation by an experienced reader (>100 CTC), the candidate lesions detected by CAD were unblinded to the reader. All reader findings and approved CAD findings ≥ 6mm were evaluated at colonoscopy by segmental unblinding. Per-polyp sensitivity of the observer for large (≥10mm) and medium sized (6-9mm) adenomatous polyps was determined as well as the effect of CAD. The results were stratified for morphology. The per-patient sensitivity and specificity was determined for both size categories.

Results: In 41 patients 22 large polyps (13 polypoid, 9 flat) and 38 medium polyps (32 polypoid, 6 flat) were detected. For large polyps observer sensitivity was 55% (polypoid 11/13 (85%); flat 1/9 (11%)) without CAD and 64% (polypoid 12/13 (92%); flat 2/9 (22%)) with CAD as second reader. For medium sized polyps observer sensitivity was 84% (polypoid 28/32 (88%), flat 4/6 (66%)) without and with CAD as second reader. The per-patient sensitivity for large polyps for the observer without and with CAD was 67% (14/21) and 76% (16/21) respectively. For polyps ≥ 6mm this was 81% (34/42) and 83% (35/42) respectively. The specificity of the observer for large polyps without and with CAD was 94% (110/117). For polyps ≥ 6mm this was 84% (81/96) without and 83% (80/96) with CAD.

Conclusion: Second read CAD has a positive influence on reader performance in CTC of an increased risk population. Flat lesions can be relatively prevalent in increased risk populations. This negatively influences observer performance with and without CAD in our study.

Clinical Relevance/Application: CAD for the detection of polyps in CTC in a second read paradigm enhances reader performance.

Abstractnr. : 1.2

CT COLONOGRAPHY WITH LIMITED BOWEL PREPARATION AS TRIAGE FOR COLORECTAL CANCER IN A FOBT POSITIVE SCREENING POPULATION

M.H. Liedenbaum, A.F. Van Rijn, A.H. De Vries, P. Fockens, E. Dekker, J. Stoker

AMC Amsterdam, AMSTERDAM

Aim of this study was to determine whether CT-colonography (CTC) is an accurate triage method for the detection of colorectal cancer (CRC) and polyps ≥10 mm and polyps ≥ 6mm after a positive fecal occult blood test (FOBT), to decrease the number of colonoscopies.

100 consecutive FOBT positive individuals (22 guiac FOBT (Hemoccult), 78 immunochemical FOBT (OC-Sensor)) were included. All participants underwent a CTC with limited bowel preparation, which was read by two independent observers. Reference standard was colonoscopy with segmental unblinding. PPV and NPV were calculated on a per patient basis with two cut-off points: patients with CRC and/or at least one polyp ≥ 10 mm (category 1) and patients with CRC and/or at least one polyp ≥ 6mm (category 2).

In total 6% of FOBT positive patients had CRC; all identified at CTC, no false positive CRC finding (PPV and NPV:100%). 50% of FOBT positives had a category 1 lesion (OC Sensor PPV 47%; Hemoccult PPV 64%) and 70% a category 2 lesion (OC-Sensor PPV 68%; Hemoccult PPV 82%).

In category 1, CTC was positive in 47 patients (PPV 87%) and negative in 53 patients (NPV 83%). However of the 9 false negative patients, 7 patients had a matched polyp between 6.5 mm and 9.9 mm at CTC. In category 1 for patients with a positive OC-sensor, CTC had a PPV of 88% and a NPV of 86%. For Hemoccult for category 1, CTC had a PPV of 85% and a NPV of 67%.

In category 2 CTC was positive in 72 patients (PPV 92%) and negative in 28 patients (NPV 86%). In category 2 CTC had for patients with a positive OC-Sensor a PPV of 89% and a NPV of 90%. For Hemoccult for category 2 CTC had a PPV of 100% and a NPV of 67%.

Conclusion: CTC with limited bowel preparation can be used as triage technique in FOBT positives to reduce the number of colonoscopies. It is an accurate triage technique for CRC in this population, but in patients with polyps ≥ 6mm CTC might be more useful in triage for OC-sensor, than for Hemoccult test positives.

Abstractnr. : 1.3

LIMITED BOWEL PREPARATION IN CT COLONOGRAPHY (CTC): IMAGE QUALITY AND PATIENT ACCEPTANCE OF FOUR REGIMES WITH DIFFERENT AMOUNTS OF LAXATIVES

S. Jensch[1], A.H. De Vries[2], J. Peringa[3], S. Bipat[2], R.E. Gelder[2], J.F. Florie[2], L.C. Baak[3], J.F.W.M. Bartelsman[2], A. Heutinck[2], A.D. Montauban van Swijndregt[3], J. Stoker[2]
[1]OLVG / AMC, AMSTERDAM
[2]AMC, AMSTERDAM
[3]OLVG, AMSTERDAM

Limited bowel preparation with only minimal amounts of laxatives might increase patient willingness to participate in a screening setting for colorectal carcinoma. Therefore we prospectively evaluated image quality and patient acceptance of CTC using different levels of catharsis at a given tagging regime.
Forty consecutive patients were randomized into four groups. Group 1 received 20mg bisacodyl; group II: 30mg bisacodyl; group III: 20mg bisacodyl and 8.2mg magnesium citrate; Group IV: 30mg bisacodyl and 16.4mg magnesium citrate. Fecal tagging consisted of 110ml diatrizoate meglumine (200mg/ml) and 80ml barium (40% w/v) for all patients. Evaluated were subjective image quality (homogeneity, amount of fecal material, luminal distension, image readability) and numerical homogeneity (attenuation (HU) and standard deviation of fecal material). Furthermore, patient acceptance (burden related to diarrhea, abdominal pain, flatulence, overall burden) was evaluated. Ordinal regression and (non)-parametric tests were used for analysis.
All examinations were scored as good or excellent image readability except for one in group II (non-diagnostic) and two in group III (moderate). Group II scored significantly worse on homogeneity, amount of residual feces and image readability when compared to groups I and IV (p-values≤ 0.006). No other differences were found in subjective image quality between groups. Standard deviation of tagged material significantly decreased; group I: 107HU; group II: 99HU; group III: 85HU; group IV: 48HU indicating better homogeneity with more catharsis($p<0.001$). Group I and II experienced significantly less severe diarrhea in comparison to group IV ($p=0.042$,$p=0.031$). Overall burden was significantly higher in group IV than in group I and III ($p=0.002$,$p=0.02$).
Conclusion: The mildest preparation with 20mg bisacodyl provided good subjective image quality of CTC images. Increasing amounts of laxatives improved numerical indices of homogeneity but did not significantly improve subjective image quality and was associated with higher patient burden.

Abstractnr. : 1.4

EXTRA-COLONIC FINDINGS IN CT-COLONOGRAPHY IN AN INCREASED RISK POPULATION

S. Jensch[1], , A.H. De Vries[2], J. Peringa[3], S. Bipat[2], L.C. Baak[3], J.F.W.M. Bartelsman[2], A. Heutinck[2], A.D. Montauban van Swijndregt[3], J. Stoker[2]
[1]OLVG / AMC, AMSTERDAM
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[3]OLVG, AMSTERDAM

To evaluate extra-colonic findings in CT-colonography (CTC) in a population at increased risk for colorectal cancer.
168 consecutive patients (average age 56 years; male/female 105/63) with a personal or family history of colorectal polyps or cancer were included. Examinations were performed on a 4-slice CT scanner with 120 kV; 50 or 70 mAs; 4 x 2.5 mm, no intravenous contrast medium. An abdominal radiologist evaluated all data. Lesions were categorized in 3 groups: 1. high clinical importance, further work-up needed (e.g. aortic aneurysm), 2. moderate clinical importance, no direct work-up needed (e.g. gallstones) and 3. low clinical importance. Institutional review board approval and informed consent for all patients was obtained.
19 findings with high clinical importance were reported in 18 patients (11%). 1 patient had an adrenal metastasis of a previously unknown non-small cell lung carcinoma. 5 patients had a previously unidentified aortic aneurysm (3-5 cm). 1 patient had an iliac artery aneurysm. 11 patients (7%) proved to have benign lesion(s) at follow-up: liver cysts (5); adrenal adenoma(1); non-progressive (2 year follow-up) pancreas lesion(1): non-progressive (1.5 year follow-up) retroperitoneal adenopathy (1); focal liver non-steatosis (1); kidney cyst (1), non-progressive (1.5 year follow-up) solitary lung nodule of 8 mm (1) and a intestine tumor not visible at follow-up CT (1). 29 findings of moderate clinical importance were detected in 24 patients (14%) comprising 17 kidney- or gallstones, 6 adrenal adenomas (<2cm), 2 pancreas calcifications, 2 hiatus hernia, 1 small inguinal hernia and 1 small abdominal hernia. In the category of low clinical significance 85 findings were detected in 69 patients.
Conclusion: The prevalence of extra-colonic findings in CTC with a high clinical importance was 11% in a population at increased risk for colorectal cancer. Most lesions were considered benign at follow-up resulting in a 4% prevalence of clinical significant lesions.

Abstractnr. : 1.5

LESION CONSPICUITY AND EFFICIENCY OF CT COLONOGRAPHY WITH ELECTRONIC CLEANSING BASED ON A THREE-MATERIAL TRANSITION MODEL

I.W.O. Serlie[1], A.H. de Vries[2], Y. Nio[2], R. Truyen[3], J. Stoker[2], F.M. Vos[2]
[1]Eindhoven University of Technology, EINDHOVEN
[2]AMC, AMSTERDAM
[3]Philips Medical Systems B.V., BEST

To target of the research was to evaluate the effect on the conspicuity of polyps of an electronic cleansing algorithm for CT colonography and its practical efficiency.
Patients were included from public study data from the Walter Reed Army Medical Center. All patients had undergone bowel preparation and fecal tagging. We used an enhanced 3D visualization (unfolded cube display) with 2D problem solving. Patient group I consisted of patients with polyps > 6 mm. This group served to assess the effect of the algorithm on the conspicuity of polyps. There were 129 polyps; 59 partly/completely in tagged material. Based on 3D, an experienced observer rated polyps from this group regarding their conspicuity on a 5-point scale: Inadequate, Moderate/questionable, Average, Good and Excellent. Patient group II consisted of 19 randomly chosen patients from the same database to test the algorithm's efficiency: 10 with polyps larger than 5 mm and 9 without such polyps.
Two experienced observers evaluated all patients from this group before and after cleansing. The observers rated the assessment effort and confidence per colon on an ordinal scale.

The conspicuity was rated identically for polyps that were uncovered by electronic cleansing and polyps bordering on air that did not need cleansing (p>0.08). On average 20% of the colon volume contained tagged material. Median evaluation time per patient for the cleansed data was significantly shorter for both observers than for the original data (12 minutes versus 17-20 minutes per patient; p
The conspicuity of polyps bordering on air and 'cleansed' polyps that were partly or fully covered by tagged intraluminal remains is identical. The proposed evaluation method sustains a lower evaluation time, lower assessment effort and larger observer confidence than an evaluation method without cleansing.

Abstractnr. : 1.6

POLYP DETECTION IN A COLON PHANTOM OF POLYPS IMMERSED IN TAGGED MATERIAL WITH DIFFERENT DENSITIES; IS THE DETECTION OF COLORECTAL POLYPS INFLUENCED BY THE CT NUMBER OF TAGGED FECAL MATERIAL?

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Purpose: To determine the minimal mAs-value to visualize a 6 mm sessile polyp in four contrast levels of tagged material (300, 500, 800,1000HU) and in air.
Method and materials: First (Study I), three experienced observers determined the visibility of sessile polyps (6mm) in a lucite phantom colon filled with five levels of iodine contrast (300, 500, 800,1000HU and air) and five mAs levels (10, 14, 20, 28 and 40mAs) in the center of a 34 cm diameter water-filled cylinder (scanned with 120kV, 64*0.625mm collimation, 0.9mm slice-thickness). For efficiency purposes, each polyp was present in one of 8 possible locations. The mAs-threshold for 90% correctly identified polyps was determined for each contrast level. Then (Study II), three virtual colons (each 120cm long) were evaluated in a more realistic setting for each contrast/mAs combination starting above the 90% correct mAs-value of study I. In Study II also scans at 56 and 80mAs were included. A colon contained on average six polyps at random locations. Blinded and independent 2D readings were performed. The mAs-threshold for 90% polyp-sensitivity was determined for all evaluated contrast levels.
Results: In Study I the mAs-threshold for 300 and 500HU was 24 and 16 mAs respectively. At all other contrast levels and in air all polyps were detected at 10 mAs (which was the lowest mAs available). In Study II the mAs-threshold for 90% polyp-sensitivity at 300HU and 500HU was 71 mAs and 36 mAs respectively. The thresholds for 800HU, 1000HU and air were less than 20mAs.
Conclusion: The detection of colorectal polyps is dependent on the CT number of tagged fecal material. When the contrast of the fecal tagging is low one should be careful with low dose scan protocols. Clinical Relevance/Application: CTC with reduced bowel preparation requires other scan protocols than those developed for CTC with extensive bowel preparation

Abstractnr. : 1.7

EXTRACOLONIC FINDINGS REPORTED AT LOW DOSE TRIAGE CT COLONOGRAPHY IN A FOBT POSITIVEPATIENT POPULATION

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CT-colonography (CTC) is a potential triage technique in fecal occult blood test (FOBT) positives. Aim was to determine the frequency and clinical importance of extracolonic findings in a FOBT positive population using low dose CTC without intravenous contrast medium.
150 consecutive FOBT positive patients (50-75 y) underwent CTC. A low dose protocol was used without intravenous contrast; 64 x 0.625mm collimation, 120 kV, 40 ref mAs with automatic tube current selection and z-axis dose modulation, rotation time 0.4s, pitch 1.2. All extra-colonic findings were reported and categorized as not relevant, relevant but without consequences or relevant with consequences. Patients with relevant findings with consequences were followed-up with reporting of additional investigation. The ten patients with CRC had an additional CT with intravenous contrast for staging (not reported here). 107 patients (71%) had one or more extra-colonic findings; 43 (29%) patients without extracolonic findings; 49 patients (33%) had a relevant extra-colonic finding without consequences. In total 11 relevant findings with consequences were reported in 8 patients (5% of total), including 2 patients with CRC. Relevant findings with consequences were: 2 aneurysmatic dilations (aorta 70mm; splenic artery 15mm), 2 patients with lung nodules (chest CT: 1 patient colorectal metastases; other patient scar tissue), 1 renal mass (histopathology: renal cell carcinoma), 1 adrenal mass (PET CT: non malignant), 3 patients with skeletal lesions (SI ankylosis (patient had no symptoms), lytic lesion (MRI: non malignant) and femoral head necrosis), 1 large uterine myoma and 1 patient with enlarged lymph nodes (known CLL). In eventually 4 patients further investigation was performed.
Conclusion: In a preselected patient group with high risk for CRC, CTC with low dose protocol without intravenous contrast has low prevalence of extracolonic findings, resulting in minimal extra investigations.

Abstractnr. : 1.8

CT COLONOGRAPHY AFTER FECAL TAGGING WITH TWO DIFFERENT VOLUMES OF IODINATED WATER-SOLUBLE CONTRAST AGENT AS TRIAGE FOR COLORECTAL CANCER IN A FOBT POSITIVE SCREENING POPULATION: EVALUATION OF IMAGE QUALITY, OUTCOME OF DIAGNOSTIC PERFORMANCE AND PATIENT ACCEPTABILITY

C.I.B.F. Gouw[1], M.H. Liedenbaum[1], A. De Vries[1], S. Bipat[1], A.F. Van Rijn[1], P. Fockens[1], H. Dekker[2], E. Dekker[1], J. Stoker[1]
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Aim of this study was to compare 350 mL to 200 mL iodinated water-soluble contrast agent as bowel preparation for computed tomography colonography (CTC) in a Fecal Occult Blood Test (FOBT) positive screening population. Quality of fecal tagging, colorectal polyp and tumor detection and patient acceptance were evaluated.
100 FOBT positive, consecutive patients (mean age 60.5 years) underwent CTC and colonoscopy. The first 50 patients (group 1) ingested in total 350 mL of iodinated water-soluble contrast agent (meglumine ioxithalamate) two days before CTC in combination with a low-fiber diet. The latter 50 patients (group 2) ingested 200 mL of this contrast agent one day before CTC combined with a low-fiber diet. Per colonic segment measurements of residual stool attenuation and homogeneity were performed and a subjective evaluation of the amount of residual stool and fecal tagging was done. Independently, two reviewers read CTC examinations. Reference standard was colonoscopy with segmental unblinding.

Diagnostic performance of CTC was determined on a per polyp and per patient basis by matching CTC findings with colonoscopic results. Patient acceptance for bowel preparation was assessed.
Overall, no significant differences in image quality were noted between the two groups: the tagging density was 637 HU and 624 HU and homogeneity 90 and 92 HU for group 1 and 2, respectively. The amount of residual stool and tagging quality was nearly equal in all colonic segments. Sensitivity for lesions ≥ 6 mm was 72 % and 77% in group 1 and 87% and 91% in group 2 for reviewer 1 and 2 respectively. Sensitivity per patient, identifying polyps ≥ 6 mm was 82% and 85% in group 1 and 97% for both reviewers in group 2. Specificity per patient, identifying patients without polyps ≥ 6 mm, was 81% and 94% in group 1 and 100% and 92% group 2 for reviewer 1 and 2, respectively. Patients acceptability concerning the burden of diarrhea was significantly improved for patients in group 2.
Conclusion: 200 mL meglumine ioxithalamate results in an improved patient acceptability compared to 350 mL meglumine ioxithalamate and has a comparable, excellent image quality and diagnostic performance.

Sessie 2 - Thoraxradiologie / Hoofd- hals radiologie

Donderdag 27 september 2007, 11.30 - 13.00 uur

Abstractnr. : 2.1

PERCUTANE TRANSTHORACALE CT GELEIDE LONG BIOPSIE: DIAGNOSTISCHE ACCURAATHEID EN COMPLICATIES VAN 318 PROCEDURES

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CT differentiatie tussen benigne en maligne intra-thoracale laesies is veelal niet mogelijk. Met percutane transthoracale long biopsie wordt meestal een histologische diagnose verkregen. Deze studie evalueert op lokaal ziekenhuis niveau de diagnostische accuraatheid en complicaties.
Patiënten met een intra-thoracale laesie zonder histologische diagnose en waarbij biopsie technisch mogelijk was, werden ge?ncludeerd. De patiënten werden aangeboden door longartsen. Bij anamnestisch abnormale bloedingstatus of anticoagulantia gebruik, werd de medicatie tijdelijk gestaakt en de stollingsstatus gecontroleerd.
De CT (zonder fluoroscopie) geleide biopsien werden verricht met een 18G ASAP biopt naald (Boston Scientific). Direct na de procedure werd met CT bepaald of er een pneumothorax of bloeding was opgetreden. Bloeddruk en hartfrequentie werden gedurende twee uur na de procedure gecontroleerd en voor vertrek werd nog een controle X-thorax gemaakt.
Zowel ten aanzien van eventuele pneumothorax als bloeding werd de ernst geclassificeerd met een vijf puntsschaal (tav pneumothorax: 1=geen, 2=gering, 3=intermediair, 4=groot en 5=spanningspneu; tav bloeding: 1=geen, 2=parenchymale longbloeding, 3= hemoptoe, 4=bloeding in de thoraxwand, 5=hematothorax). Een inconclusief biopt werd gedefinieerd als biopt waarbij hernieuwd biopt of ander aanvullend onderzoek nodig was.
Tussen 30 januari 2002 en 1 mei 2007 werden 318 opeenvolgende patiënten geïncludeerd (gemiddelde leeftijd 58 ± 22 jaar, spreiding 19-88 jaar, 210 mannen). Vijfenzeventig van de 318 biopten (23.6%) werden gecompliceerd met een pneumothorax. In 4 (1.3 %) gevallen ging het om een grote pneu en in 3 (0.9%) andere gevallen om een spanningspneu. Zestig van de 318 biopten (18,9%) werden gecompliceerd met een bloeding. Meestal betrof het een verwaarloosbare bloeding in het punktie traject door het longparenchym. Tweemaal (0,6%) ontstond een kleine hematothorax waarvoor geen therapie noodzakelijk was. In totaal werd acht maal (2.5 %) een thoraxdrain geplaatst. Twee maal (0.6%) werd een patiënt een dag extra opgenomen ter observatie zonder plaatsing van een thoraxdrain. In 22 gevallen was het pathologisch anatomisch onderzoek inconclusief (6.9 %). In de meerderheid van de inconclusieve biopten was er te weinig materiaal voor een histologische diagnose.
Conclusie: Ruim 90% van de percutane transthoracale CT geleide long biopsieën in deze serie zijn diagnostisch. Complicaties waarvoor thoraxdrainage of extra opname noodzakelijk was, kwamen in 3% voor.

Abstractnr. : 2.2

CT-GUIDED CORE NEEDLE BIOPSIES OF THE CHEST; TECHNIQUE AND RESULTS IN A LARGE TEACHING HOSPITAL

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[2]*MCA, ALKMAAR*

Purpose: The purpose of our study was to review the technique in a large teaching hospital and evaluate the diagnostic accuracy and the complication rate of percutaneous CT-guided coaxial core needle biopsy of suspected thoracic lesions.
Method and materials: The records of 135 consecutive patients over the course of 3 years (80 men, 55 women, mean age 65, range 31-83) who underwent percutaneous CT-guided coaxial core needle biopsy (CNB) of a suspected thoracic lesion were reviewed.
(note: minimum 50 additional patients expected to be included before Sep 2007)
Results: Of all the specimens at CNB (145 laesions in 135 patients) 91% (132/145) were considered sufficient for diagnosis by the histopathologist. The diagnostic accuracy was 87.6% (127/145) because of 5 false negative diagnoses on histopathology. In total there were 98 malignancies and 34 benign lesions. There were no false positive results when histology after surgery was compared to the histology at CNB. Local hemorrhage was seen in 22% (32/145), all of which resolved spontaneously. Pneumothorax occurred in 39% (56/145), of which 7 patients (5%) required treatment by placement of a chest tube.
Conclusion: CT-guided percutaneous coaxial CNB of suspected thoracic lesions in a large teaching hospital has a low complication rate and is an accurate procedure for specific histological diagnosis.

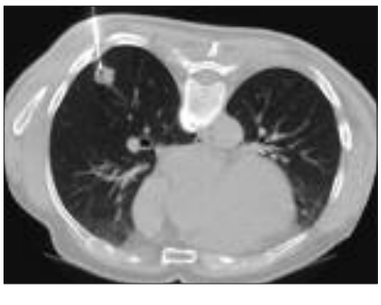

FIGURE 1: NEEDLE POSITIONED CORRECTLY IN THE LESION

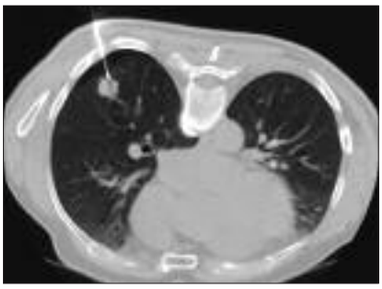

FIGURE 2: SMALL PNEUMOTHORAX

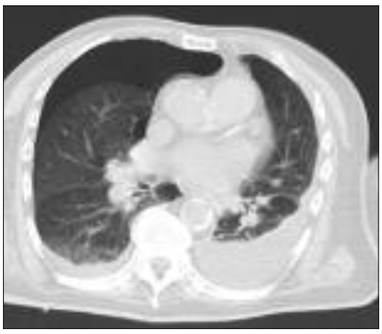

FIGURE 3: LARGE PNEUMOTHORAX REQUIRING PLEURAL DRAINAGE

Abstractnr. : 2.3

MOBILE DIRECT RADIOGRAPHY VERSUS COMPUTED RADIOGRAPHY FOR BEDSIDE CHEST IMAGING: EVALUATION OF IMAGE QUALITY AND READER AGREEMENT

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AMC - UvA, AMSTERDAM

To compare performance with a mobile direct detector unit (DR) and computed radiography (CR) for bedside chest radiography with respect to image quality and reader agreement, and to assess the potential for dose reduction with the mobile DR system.

Three groups of age-, weight- and disease-matched ICU patients (n=50 each) underwent clinically indicated bedside chest radiography obtained either with CR (single read-out powder plates) or mobile DR (GOS-TFT detectors) at identical exposure settings or with DR at 50% reduced dose (DR50%). Delineation of anatomic structures and monitor materials, overall image quality and presence of four types of abnormalities were scored on a 3 point scale (3 = best) by three readers of varying experience. In 36 patients pairs of follow-up CR and DR images, and in 38 patients pairs of CR and DR50% images were available. In these pairs overall image quality was compared side-to-side.

Delineation of anatomy in the mediastinum (trachea, carina, retro-cardiac vessels and spine) was scored better with DR (2.4, $p<0.05$) or DR50% (2.2, $p>0.05$) than with CR (1.9). Monitoring materials were seen best with DR, but differences did not reach statistical significance. In the side-to-side comparison of follow-up images in the same patient, overall image quality of DR and DR50% was rated better than that of CR in 94% (34/36) and 81% (31/38), respectively. Imaging technique had no impact on reader agreement (kappa < 0.4) for the assessment of abnormalities.

Mobile DR units offer better image quality than CR for bedside chest radiography and allow for 50% dose reduction over CR without loss of image quality. Inter-observer agreement is low and not improved by better image quality.

Abstractnr. : 2.4

OPEN ESOPHAGUS ON HR-CT SCAN IS PREDICTIVE FOR SYSTEMIC SCLEROSIS

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Objective: Is an 'open' esophagus on the HRCT scan of the chest, ordered for interstitial lung diseases, predictive for SSc?

Systemic sclerosis (SSc) is a generalized disorder of connective tissue. Assumed is that in 75-95% of the patients dysmotility of the esophagus occurs. In our prospectively followed cohort of SSc patients a yearly HRCT scan of the chest is part of the protocol for early detection of internal organ involvement. Often an open esophagus is described in our patients.

HRCT scans of the chest performed of patients with SSc in the period of 2004 and 2003 of our hospital were collected and an equal amount of control patients were included.

These HRCT scans of patients and controls were presented in a random order to two radiologists who were unaware of the diagnosis. The two radiologists evaluated independently the HRCT scans for the presence of esophageal dilatation. In accordance with the findings of Pitrez et al, an esophageal dilatation was defined as the occurrence of a luminal diameter >4 mm above the aortic arch, and > 10 mm under the aortic arch. In case of doubt, the two radiologists came to a consensus. Positive and negative predicting values were calculated.

In total 205 HRCT scans of the chest were selected and all were accessible for evaluation. The population consisted of 101 controls and 104 patients with SSc. Controls were patients diagnosed with: pulmonary fibrosis 7, sarcoidosis 8, leukemia 46, COPD 15, Kahlers disease 4, other 21. For the measurements below the aortic arch, the positive predictive value and negative predictive value for the diagnosis of SSc was 83% and 69% respectively.

Conclusion: If on an HRCT-scan of the chest from a patient with an unknown diagnosis an open esophagus is observed, the chance of the diagnosis SSc could be as high as 83%. So if this phenomenon is observed in a patient with an unknown disease causing fibrosis in the lungs, the diagnosis SSc should be considered and evaluation in this direction should be conducted.

Abstractnr. : 2.5

DETECTION OF CERVICAL LYMPH NODE METASTASES IN HEAD & NECK CANCER: ACCURACY OF SHORT TAU INVERSION RECOVERY (STIR) MRI

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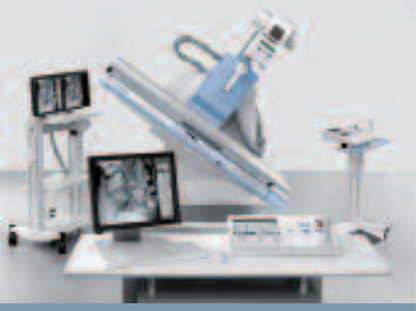
AzM, MAASTRICHT

The aim of this study was to determine the incremental value of Short Tau Inversion Recovery (STIR) MRI to detect cervical nodal metastases in head and neck squamous cell carcinoma (HNSCC).

A series of 36 patients with cervical nodal metastases of clinically unknown HNSCC underwent MR imaging preceding a one-sided radical neck dissection. Conventional MR images and subsequently combined with STIR were evaluated separately by two observers, blinded for other clinical information and histological results.

Observer agreements for detecting normal and metastatic lymph nodes were determined per neck level. Differences in kappa between conventional MRI and MRI with STIR were tested using a bootstrap technique. Sensitivities and specificities for detecting at least one lymph node metastasis per level were deter-



Flexibele AXIOM Luminos dRF

Interne diagnostiek en buckykamer in één met flatpanel detector technologie

De AXIOM Luminos dRF is ontworpen met een volledig nieuwe detector die naast dynamische beelden (interne diagnostiek) ook statische beelden (bucky onderzoeken) kan vervaardigen in een hoge 3K matrix resolutie.
Met de toepassing van flatpanel detector technologie kan de tafel een bijzonder lage opstaphoogte behalen van slechts 48 cm – een ideale opstaphoogte voor patiënten die wat slechter ter been zijn. De nieuwe flatpanel detector met de afmetingen van 43 cm bij 43 cm biedt altijd de mogelijkheid voor een maximale overzichtsopname, zoals bijvoorbeeld een overzichtsopname bij een colon onderzoek.
Het Catharina Ziekenhuis Eindhoven heeft inmiddels gekozen voor dit nieuwe systeem, de Axiom Luminos dRF.

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mined. Differences in sensitivity and specificity between conventional MRI and MRI with STIR were tested (McNemar test). A linear regression model was used to determine the performance of MRI with STIR in detecting the correct number of normal nodes and metastases. Differences in fit, expressed by R2 between the two test modalities, were tested with a bootstrap technique. Histological examination was the reference standard.
Histological examination revealed 36 specimens representing 180 neck levels; 962 lymph nodes of which 156 showed metastases. A significant better kappa for the different neck levels was found regarding detection of nodal metastases in MR with STIR (range 0.89-1) in contrast to MRI alone (range 0.62-0.79). For normal lymph nodes kappa's ranged from 0.85-0.99 and 0.73-0.92, respectively. MRI alone overestimated the number of lymph nodes as well as the number of metastases (slopes >1 range 1.60-1.24 for metastases, range 1.25-1.24 for normal lymph nodes). In contrast, the prediction of the total number of lymph nodes and metastases on MRI with STIR is more accurate (slopes ≈1, range 1.12-1.06 for metastases, range 1.07-1.04 for normal lymph nodes). Sensitivity and specificity of the correct diagnosis of at least one nodal metastasis per level in the neck was 25-96% and 20-100% for MRI alone and 93-100% and 100% for MRI with STIR, respectively. In conclusion, adding STIR to the MRI protocol improves significantly the detecting of cervical lymph node metastases.

Abstractnr. : 2.6

EYE SIZE IN RETINOBLASTOMA: MR IMAGING MEASUREMENTS IN NORMAL AND AFFECTED EYES

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Purpose: To evaluate the use of MR imaging in performing measurements of axial length (AL), equatorial diameter (ED) and eye volume (EV) in a large group of retinoblastoma patients and investigate the possible effect of retinoblastoma on eye size.
Material and methods: MR images of 100 patients with retinoblastoma (50 girls, 50 boys; mean age 19 months, range 9 days-68 months) were scored by one observer (AL, ED, EV and tumor volume measurements), with a review of all measurements by the second observer. Normal eyes of unilateral retinoblastoma patients served as control subjects. Interobserver measurement reliability was evaluated in a random subset of 50 eyes by using intraclass correlation coefficients (ICCs). Linear mixed model analysis was used with adjustments for age, laterality and gender.
Results: Measurement reliability assessment revealed good results (ICCs >0.89). Retinoblastoma eyes presented a significantly shorter AL (95% confidence interval [CI], -0.57, -0.16; P=0.001), shorter ED (CI, -1.01, -0.66; P<0.001), and a shorter EV (CI, -336.4, -151.3; P<0.001) than did normal eyes. Within patients, a significantly negative relationship was found between tumor volume and EV (P<0.001).
Conclusion: MR imaging measurements of AL, ED and EV in normal and retinoblastoma eyes showed a significant negative effect of retinoblastoma on eye size. In addition, within retinoblastoma patients, the degree of growth arrest is greater in eyes with more severe disease. These outcomes suggest that using eye size as an additional parameter on MR images to differentiate between retinoblastoma and (benign) simulating lesions should be considered carefully and a decreased eye size should not be used to exclude retinoblastoma, nor to favour simulating lesions.

Abstractnr. : 2.7

HAS DEGREE OF CONTRAST ENHANCEMENT WITH MR IMAGING IN LARYNGEAL CARCINOMA ADDITIONAL VALUE TO ANATOMICAL PARAMETERS REGARDING PREDICTION OF RESPONSE TO RADIATION THERAPY?

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VU Medisch Centrum, AMSTERDAM

Purpose: To retrospectively investigate the prognostic significance of the degree of contrast enhancement in tumors and its additional value to previously considered MR imaging parameters with regard to local control of laryngeal cancer treated with radiation therapy alone.
Methods: Pre-treatment MR images of 64 consecutive patients with supraglottic and glottic cancer were retrospectively reviewed on clinical and previously considered MR imaging parameters such as tumor involvement of specific laryngeal anatomic subsites including laryngeal cartilages, tumor volume, extralaryngeal tumor spread and in addition degree of contrast enhancement. Clinical and MR parameters were associated with regard to local control at 2 years using Cox regression model. Local control was defined as absence of primary tumor recurrence.
Results: When using a threshold of the mean average contrast enhancement of 77%, the 2-year local control rate in the groups of patients with degree of enhancement below and above this threshold was 57% and 70%, respectively (p=0.3). Enhancement of tumor tissue in pre-epiglottic space is low, most probably due to its adipose tissue and poor vascular content, while tumor tissue involving paraglottic space does enhance. Results of multivariate analysis indicated that the degree of contrast enhancement yielded the prognostic information (p=0.07) with 2 independent prognostic factors: primary tumor volume (p=0.007) and subglottic extension (p=0.002) with regard to local control. Using these above mentioned three MR parameters as potential risk factors, 4 categories were defined, resulting in the following local control rates respectively: 90% for the group without risk factors, 73% for the group with one, 60% for the group with two and finally 0% for the group with three risk factors that was significantly lower than the rates in previous risk groups (p<0.001).
Conclusion: Pre-epiglottic space has a lower degree of contrast enhancement than the paraglottic space and may correlate with the worse outcome. Including a low degree of contrast enhancement as a parameter to primary tumor volume and subglottic extension may increase the predictive value of MR imaging for local outcome and may be helpful to identify a subset of patients which all recurred locally within 2 years after primary radiotherapy.

GENOMINEERD

Radiologendagen Prijs 2007

Abstractnr. : 2.8

NEW MRI CRITERIA IMPROVE THE DETECTION OF LYMPH NODE METASTASES IN HEAD AND NECK SQUAMOUS CELL CARCINOMA (HNSCC): MULTIVARIATE LOGISTIC ANALYSIS OF MRI FEATURES OF CERVICAL LYMPH NODES

F.C.H. Bakers, P.J. Nelemans, R.G.H. Beets-Tan, B. Kremer, C. Peutz-Kootstra, R.B.J. de Bondt

AzM, MAASTRICHT

MR staging of nodal metastasis in head and neck squamous cell carcinoma (HNSCC) based on size only remains difficult. Therefore, new MR criteria where evaluated to assess improvement of the detection of cervical lymph node metastases.
A series of 44 consecutive patients (2002 - 2006) with HNSCC underwent MR imaging followed by a radical (modified) neck dissection. Two radiologists (one general and one experienced in head and neck radiology), blinded for histological results, determined of all detectable lymph nodes the location per level and recorded the following characteristics; common criteria as short-axis diameter and presence of necrosis; new criteria as borders (smooth, lobulated, spiculated or indistinct) on T2-WI, homogenous or heterogeneous appearance on T2-WI and pattern of enhancement on T1-WI. At histological examination all palpable lymph nodes were located per neck level and short axial diameters were measured. Lymph nodes on MRI were matched to lymph nodes at histological examination, based on location and size. Inter observer agreement to the criterion nodal size and the new criteria were expressed by Cohen's kappa-coefficient (κ). Sensitivity, specificity and diagnostic odds ratio (DOR) with 95% confidence interval (95% CI) were evaluated for nodal size and the new criteria. Multivariate logistic regression analysis was used to evaluate differentiation between metastasis and normal nodes and to examine additional diagnostic value of the new criteria.

Nodal metastases were present in 33 patients (prevalence= 80.5%). Inter observer agreement was κ=1 for size, κ=0.61 for border irregularity on T1-WI, κ=0.51 for inhomogeneous enhancement on T1-WI and κ=0.51 for inhomogeneous signal intensity on T2-WI. Sensitivity and specificity for size, border irregularity, inhomogeneous enhancement and inhomogeneous signal intensity were 43%/92%, 63%/84%, 71%/66%, 67%/77% respectively for observer 1 and 42%/92%, 87%/94%, 61%/65% and 93%/68% respectively for observer 2.
Regression coefficients/DOR/95% CI for size, border irregularity, enhancement and inhomogeneous signal intensity were 1.06/2.89/1.25-6.70, 0.96/2.61/1.12-6.08, 0.37/1.45/0.67-3.14 and 1.09/2.97/1.42-6.18 respectively for observer 1 and 0.02/1.02/0.25-4.18, 4.20/66.2/20.4-217, 0.68/1.97/0.70-5.59 and 3.12/22.6/6.40-80.1 respectively for observer 2.

In conclusion, in addition to the size criterion, new criteria, like spiculated and indistinct borders and inhomogeneous signal intensity on T2-wI, improved the detection of cervical lymph nodes metastases in HNSCC.

Sessie 3 - Acute radiologie / Kinderradiologie

Donderdag 27 september 2007, 11.30 - 13.00 uur

Abstractnr. : 3.1

RULING OUT PNEUMOTHORAX: CHEST ULTRASOUND PERFORMS MUCH BETTER THAN SUPINE CHEST X-RAY AND IS EASILY FEASIBLE

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St. Antonius Ziekenhuis, AMSTERDAM

Pneumothorax can be life threatening, therefore it is important to rule out pneumothorax in patients quickly. In supine patients (unstable and trauma patients) pneumothorax is located anterior. These pneumothoraxes are easily missed on supine chest x-ray. Ultrasound would be an ideal alternative in these patients. However: 1) Is chest ultrasound a more sensitive technique to rule out pneumothorax compared to supine chest x-ray? 2) Is chest ultrasound as fast and feasible as chest x-ray?

Literature study: Ovid Medline, February 2007: 'Pneumothorax, ultrasound and sensitivity': 86 hits, 6 useful (Table).

Pilot study: Before using chest ultrasound in our hospital a pilot study was performed. After 1 day practice on patients with and without pneumothorax a radiology and emergency medicine resident were able to recognize the two typical signs of chest ultrasound (Figure). In 2 months 7 patients in a crash room setting suspected for pneumothorax which wasn't visible on supine chest x-ray underwent chest ultrasound before CT scan. In 5 patients ultrasound ruled out pneumothorax successfully, in 2 patients ultrasound could not rule out pneumothorax. In both patients pneumothorax was detected on CT scan. Ultrasound took only a few minutes in each patient and did not delay any further workup.

Conclusion: Three high quality studies with CT as golden standard proof that ultrasound is more sensitive in ruling out pneumothorax than supine chest x-ray. (Level of recommendation: 1).

Our small pilot study shows that with little training chest ultrasound can be performed by radiology and emergency medicine residents.

Comments: 1) Most evidence on the use of ultrasound is based on trauma patients. 2) The practical availability of ultrasound in some hospitals is not 24-7. In those hospitals it may be easier to use ultrasound in case there is high suspicion of pneumothorax only. 3) In most hospitals physicians are not trained to do chest ultrasound and might therefore miss the typical signs that rule out pneumothorax. 4) Our pilot study was very small.

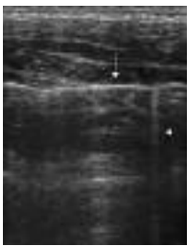

FIGURE 1: LUNG SLIDING AND COMET TAIL ARTEFACT

Abstractnr. : 3.2

COMPUTED TOMOGRAPHY AND ULTRASONOGRAPHY IN ACUTE DIVERTICULITIS: A META-ANALYSIS OF TEST ACCURACY

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Background: Computed tomography (CT) and ultrasonography (US) are the initial radiological investigations in acute diverticulitis. Although studies evaluating the diagnostic value of both modalities report comparable diagnostic performance it is unclear whether they have similar diagnostic accuracy.

Method: We performed a meta-analysis of the accuracy of CT and US in diagnosing acute diverticulitis. Electronic databases were searched from January 1966 till Jan 2007. Summary sensitivities and specificities were calculated using a bivariate random effects model. Post-test probabilities after CT and US were calculated for the mean and for the lower and upper range prevalence values of diverticulitis in the included studies.

Results: Two head-to-head comparative studies and 11 studies evaluating US or CT separately were identified: 7 US studies evaluating 877 patients and 8 CT studies evaluating 684 patients. Mean prevalence of diverticulitis in the US studies was 52 % (range 36 to 68%) and in CT studies 53% (range 36 to 68%). Summary sensitivity estimates were 89% (95% CI: 72% to 96%) for US versus 94% (95%CI: 87.1%-97.0%) for CT (p=0.4). Summary specificity estimates were 92% (95%CI: 85% to 96%) for US versus 99% (95%CI: 90% to 100%) for CT (p=0.1). Post-test probabilities in the reported range of prevalences resulted in positive post-test probabilities ranging between 87% and 96% for US and between 98% and 99% for CT.

Conclusion: Although the accuracy of US is not significantly different from that of CT in diagnosing acute diverticulitis, CT is likely to yield higher post-test probabilities after a positive test result.

Clinical relevance/application: Both US and CT can be used as initial radiological investigation in diagnosing acute diverticulitis.

Abstractnr. : 3.3

INTEROBSERVER COMPARISON OF ABDOMINAL CT IN PATIENTS WITH ACUTE ABDOMINAL PAIN

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Purpose: Computed Tomography (CT) use has increased substantially over the last decade in diagnostic work-up of patients with acute abdominal pain, although reproducibility of its results is not known. The aim of this study was to perform an interobserver study of abdominal CT in a broad spectrum of patients with acute abdominal pain.

Method and materials: 200 consecutive patients were prospectively included (mean age 46 years; range, 19 to 94; 107 women). Multi-slice CT scan was performed with intravenous contrast; no oral contrast. Evaluation was performed by three independent radiologists with different levels of experience (12 year; 12 year; 2 year). Diagnoses were specified and divided into urgent and non-urgent diagnoses. Interobserver agreement was measured according to percentage agreement and kappa statistics.

Results: Most common diagnoses were appendicitis (40), diverticulitis (20) and non-specified abdominal pain (43). Overall agreement was good: kappa 0.63 for observers 1 and 2, 0.62 for observer 1 and 3, 0.58 for observer 2 and 3. For urgent diagnoses: kappa 0. 67 for observers 1 and 2, 0.57 observers 1 and 3, and 0.62 for observers 2 and 3. Diverticulitis had the highest interobserver agreement (median kappa: 0.91).

Conclusion: Abdominal CT has good interobserver agreement in patients with acute abdominal pain at the ED, and excellent interobserver agreement on selected diagnosis.

GENOMINEERD

Radiologendagen Prijs 2007

Abstractnr. : 3.4

ARM RAISING IN TUBE CURRENT MODULATED TRAUMA CT OF THE TRUNK: HIGHER IMAGE QUALITY, LOWER EFFECTIVE RADIATION DOSE

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Purpose: To evaluate the effect of arm position on effective radiation dose and image quality in an automated tube current modulated (TCM) multi-detector row computed tomography (MDCT) protocol of thorax and abdomen in trauma patients.

Methods and materials: A total of 177 trauma patients were scanned following a TCM (Care Dose 4D) 16 row thoraco-abdominal CT protocol. Scan parameters were 120 kV, 16 x 1.5 mm collimation and a reference value of effective tube current time product of 200 mAs. Patients were scanned either with both arms raised above the shoulder region (standard-position-group), with one arm down (1-arm-group) or with two arms down (2-arms-group), depending on to what extent patients were able to raise their arms. Individual effective radiation dose was calculated directly from the effective tube current time product per exposed slice. For this purpose, slice-location dependent conversion factors were derived using a CT dosimetry calculator (ImPACT, London, UK). The effect of arm position on effective dose was quantified after correction for patient volume and attenuation. Phantom studies were performed for verification purposes. In addition, both objective and subjective image quality were assessed.

Results: Median (volume and attenuation corrected) effective dose in the standard-position-group (132 patients) was 18.6 mSv. In the 1-arm-group (27 patients), this was 18% (95% CI 11-25%) higher and in the 2-arms-group (18 patients) this was 45% (95% CI 34-57%) higher. In both arm-groups image quality decreased, but remained within acceptable diagnostic limits.

Conclusion: Omitting arm raising results in a substantially higher effective radiation dose and in an acceptable, but lower image quality. Serious effort should be made to position the upper extremities above the shoulder in scanning trauma patients as this will result in higher image quality and a lower effective radiation dose.

GENOMINEERD

Radiologendagen Prijs 2007

Abstractnr. : 3.5

ULTRASONOGRAPHY OF SUSPECTED APPENDICITIS IN CHILDREN: A NEW ULTRASONOGRAPHIC CLASSIFICATION

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HagaZiekenhuis, DEN HAAG

Purpose: Evaluation of a new classification in diagnosing appendicitis with ultrasound in children.

Material and methods: From May 2005 to June 2006 212 consecutive pediatric patients with suspected appendicitis were examined with ultrasound. Depiction of appendix was classified in four groups; 1: normal appendix, 2: appendix not depicted, no secondary signs of appendicitis, 3: appendix not depicted with secondary signs of appendicitis (inflamed fat or fluid), 4: depiction of inflamed appendix. Patients of group 3 and 4 were treated surgically. Ultrasonographic diagnoses were correlated with histopathologic results or clinical follow-up. Negative appendectomy rate, perforation rate and predictive values of this classification were calculated. For statistical analysis, Mc Nemar test was applied for comparison of predictive values of this classification with classification used in literature.

Results: Group1: 96, group 2: 41, group 3: 9 and group 4: 66 patients. US classification was false positive in 4 patients and false negative in one. Prevalence of appendicitis was 34%. This classification had a sensitivity of 99%, specificity of 97%, positive predictive value of 93%, negative predictive value 99% and accuracy of 97%. Negative appendectomy rate was 5% and perforation rate, 16%. Sensitivity of this classification was significantly higher than the one used in previous studies (p=0.02). No statistical difference in specificity (p=0.05).

Conclusion: This classification of the ultrasonographic depiction of the appendix and surrounding area has high predictive values in children with suspected appendicitis and prevents a high rate of negative appendectomy and complications of unrecognized appendicitis.

Abstractnr. : 3.6

RADIOLOGISCHE BEELDVORMING BIJ VERMOEDEN KINDERMISHANDELING ONDER DE LEEFTIJD VAN 2 JAAR IN NEDERLAND: EEN RETROSPECTIEVE ANALYSE

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Doel: Kindermishandeling is, zowel door de leek als ook door medici, een onderschat probleem. Recente onderzoeken spreken van 107.000 tot 160.000 gevallen van kindermishandeling per jaar. Naar schatting overlijden hiervan 40-50 kinderen. Het is welbekend dat radiologie een belangrijke rol kan spelen bij zowel de vroege detectie van kindermishandeling als ook bij het verzamelen van bewijsmateriaal. Echter hiervoor is het van groot belang dat de kwaliteit van het röntgenonderzoek optimaal is. In deze studie is de radiologische beeldvorming bij vermoeden van kindermishandeling in Nederland geanalyseerd.
Materiaal en Methoden: Dit is een retrospectieve analyse van conventioneel radiologisch onderzoek verricht bij kinderen onder de leeftijd van twee jaar. Onderzoeken verricht tussen 1-1-2004 en 31-12-2006 welke door de officier van justitie aan Forum Educatief zijn aangeboden voor herbeoordeling zijn ge?ncludeerd. Omdat het radiologisch onderzoek deel uitmaakt van het justitiële dossier kan ervan uit worden gegaan dat het onderzoek compleet is.
Resultaten: In totaal warden 29 skeletstatus van 26 kinderen (15 jongens en 11 meisjes) geïncludeerd in deze studie. De mediane leeftijd ten tijde van het onderzoek was 3 maanden (1-24 maanden). Ten tijde van het onderzoek waren vier kinderen overleden. Gemiddeld bestond de skeletstatus uit 11,3 röntgenfoto's. Slecht 3 skeletstatus voldeden aan de ACR criteria. Een vaak waargenomen afwijking van het ACR protocol was het afbeelden van een extremiteit op een enkele foto. Vijf skeletstatus (17%) bestonden uit minder dan 5 röntgenfoto's. Op 58 van de in totaal 330 röntgenfoto's waren artefacten aanwezig. Hiervan waren er 35 zo storend van aard dat zij de beoordeelbaarheid van de foto negatief beïnvloedde.
Conclusie: In eerdere onderzoeken, in de VS en Engeland, is aangetoond dat de praktijk met betrekking tot radiologische beeldvorming bij kindermishandeling sterk wisselt. Deze studie toont voor de Nederlandse praktijk eenzelfde beeld. Incomplete of technisch inadequate studies kunnen ertoe leiden dat ten onrechte de diagnose kindermishandeling wordt gesteld of verworpen. In beide situaties kan dit tot ernstige psychische, emotionele en sociale problemen van zowel het kind als de verzorger leiden. Mogelijk kan invoeren van een Europese richtlijn voor radiologische beeldvorming bij vermoeden van kindermishandeling de kwaliteit van het onderzoek verbeteren.

Abstractnr. : 3.7

RADIOLOGISCHE BEELDVORMING BIJ VERMOEDENS KINDERMISHANDELING ONDER DE LEEFTIJD VAN 2 JAAR IN NEDERLAND: RESULTATEN VAN EEN ENQUTE ONDER NEDERLANDSE RADIOLOGEN

R.R. van Rijn[1], N. Kieviet[1], R. Hoekstra[1], H. Nijs[2], R.A.C. Bilo[2]
[1]*AMC, AMSTERDAM*
[2]*Forum Educatief, UTRECHT*

Doel: Kindermishandeling is, zowel door de leek als ook door medici, een onderschat probleem. Recente onderzoeken spreken van tussen de 107.000 en 160.000 slachtoffers per jaar. Naar schatting overlijden hiervan 40-50 kinderen. Het is bekend dat radiologie een belangrijke rol kan spelen bij de vroege detectie van kindermishandeling als ook bij het verzamelen van bewijsmateriaal. Hiervoor is het echter van groot belang dat de kwaliteit van het röntgenonderzoek optimaal is. In deze studie is de radiologische beeldvorming bij vermoedens van kindermishandeling in Nederland geanalyseerd.
Materiaal en Methoden: Via een mailing aan Nederlandse radiologen (116 ziekenhuizen) werd medewerking aan een on-line anonieme enquête gevraagd. Er werd verzocht werd om de enquête in te laten vullen door die radioloog die als aandachtgebied kinderradiologie had of diegene die het meest waarschijnlijk een skeletstatus zou moeten superviseren en rapporteren.
De enquête omvatte algemene vragen met betrekking tot de werkomgeving en ervaring van de radioloog. Hiernaast werd er specifiek ingegaan op het gebruik van een protocol voor kindermishandeling en de aanwezigheid van een team kindermishandeling. Tevens werden een vijftal multiple choice casus voorgelegd.
Resultaten: In totaal retourneerde 45 (39%) de enquête. In 10% werd de ACR richtlijn gevolgd.. Bij het afbeelden van de extremiteiten werd relatief vaak afgeweken van de ACR richtlijn door deze op 1 foto af te beelden (35%). 27% van de respondenten gebruikt gemaakt van een protocol. Bij een klinisch vermoeden op kindermishandeling en afwijkingen op het röntgenonderzoek, bespreekt 51% dit vermoeden telefonisch en meldt dit in het verslag, 22% meldt het alleen in het verslag en 18% uitsluitend telefonisch. Wanneer een voor kindermishandeling verdachte afwijking wordt gevonden zonder klinisch vermoeden van kindermishandeling, bespreekt 44% dit telefonisch met de aanvragende arts en vermeld het ook in het verslag. Daarnaast vermeld 11% het alleen in het verslag en 29% uitsluitend telefonisch. 62% volgden tenminste één cursus met betrekking tot kindermishandeling.
Conclusie: Er blijkt een grote verscheidenheid te zijn in de radiologische beeldvorming bij vermoedens op kindermishandeling. Ook bij het rapporteren worden verschillen gevonden. Educatie op het gebied van radiologie bij kindermishandeling lijkt noodzakelijk te zijn.

Sessie 4 - Interventie radiologie / Nucleaire radiologie

Donderdag 27 september 2007, 11.30 - 13.00 uur

Abstractnr. : 4.1

PERCUTANE INTRA-ABDOMINALE EN RETROPERITONEALE ABCESDRAINAGES: RESULTATEN 2005 & 2006

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Gelre Ziekenhuizen, UTRECHT

Intra-abdominale en retroperitoneale abcessen worden in ons ziekenhuis bij voorkeur radiologisch gedraineerd. Onbekend was bij welk percentage patiënten deze percutane drainage primair curatief is geweest en bij hoeveel procent secundaire behandeling nodig was.
Retrospectief zijn alle radiologisch geleide interventies met betrekking tot vochtcollecties uit 2005 & 2006 geanalyseerd. Van de in totaal 80 interventies waren 54 intra-abdominale of retroperitoneale abcesdrainages. De overige 26 interventies betroffen voornamelijk ascites drainages of diagnostische puncties uit vochtcollecties, welke allen werden geëxcludeerd. De gegevens van de abcesdrainages zijn verkregen uit PACS en het Elektronisch Patiënten Dossier. De abcessen werden percutaan gedraineerd onder echo of CT geleiding. Alle patiënten kregen voorafgaand aan de drainage protocollair antibioticaprofylaxe. De drainages werden uitgevoerd volgens de Seldinger methode met een 8, 10 of 12 French drain.
Bij 47 patiënten (28 mannen, 19 vrouwen, 57+22 jaar) zijn in totaal 54 abcesdrainages verricht; 50 intra-abdominaal en 4 retroperitoneaal. Tweeëndertig abcessen ontstonden postoperatief, 22 zonder dat een voorafgaande operatie was verricht. In deze laatste groep waren de meest voorkomende oorzaken appendicitis perforata, diverticulitis perforata en leverabcessen. Postoperatief kwamen de meeste abcessen voor na appendectomie, laparoscopische cholecystectomie of na partiële colectomie. Van de 54 abcessen zijn 48 onder echo/fluoroscopische begeleiding en 6 onder CT geleiding gedraineerd.
Van de 54 drainages zijn er 45 (83%) met een goed resultaat gedraineerd (43 primair, 2 secundair) zonder verdere chirurgische behandeling. Zeven abcessen (13%) waren technisch weliswaar adequaat primair percutaan gedraineerd, doch hadden deze patiënten een abcesonderhoudende oorzaak welke alsnog chirurgisch werd verholpen (onder andere een necrotische appendixstomp, persisterende lekkage van duodenumstomp, diverticulitis en necrotiserende pancreatitis). Bij 2 abcessen (4%) is het radiologisch niet gelukt om het abces adequaat te draineren, waarna secundaire chirurgische drainage is verricht met goed resultaat.
De gemiddelde drainageduur was 5+4 dagen. Van alle 54 drainages trad 1 complicatie op: drainpositie in het sigmoïd.
Het merendeel van de patiënten (83%) met een intra-abdominaal of retroperitoneaal abces is met percutane drainage primair curatief behandeld. Bij 17% van de abcessen was nog aanvullende chirurgische behandeling nodig.

Abstractnr. : 4.2

VROEGE POST-EVAR CT-ANGIOGRAFIE VOOR ONTSLAG UIT HET ZIEKENHUIS: NOODZAKELIJK OF NIET?

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De noodzaak van een vroeg post-EVAR CT-angiografie (CTA) voor ziekenhuisontslag is onduidelijk en kent nadelen zoals extra contrast belasting, logistieke problemen en extra kosten. Het doel van deze studie is het evalueren van de waarde van deze vroeg post-EVAR CTA.
Alle patiënten behandeld voor een AAA middels EVAR tussen 1996-2006 met een beschikbare vroeg post-EVAR CTA, alsmede 3mnd follow-up CTA, werden geïncludeerd. Alle CTAs werden geanalyseerd op EVAR-gerelateerde complicaties zoals endoleak, migratie en endoprothese-trombose. Secundaire interventies en overige complicaties gedurende 3mnd post-EVAR werden geanalyseerd.
291 patiënten werden geïncludeerd. Het betrof met name mannen (n=275) met een gemiddelde leeftijd van 71 jaar. Op de vroeg post-EVAR CTA werden 93 endoleaks (8 type I, 84 type II en 1 type III) en 1 endoprothese trombose gezien. O.b.v. deze bevindingen werden er 4 secundaire interventies gedaan (2 proximale extensie cuffs, 1 interpositie cuff en 1 conversie na een niet-succesvolle coiling). Deze re-interventies werden gedaan in een electieve setting. Nog eens 5 re-interventies werden in het 3mnd interval gedaan o.b.v. klinische symptomen van acute ischaemie of infectie, alle na ontslag uit het ziekenhuis (3 Fogarty procedures, 1 fem-fem cross-over bypass en 1 abces drainage). Gedurende de eerste 3 maanden follow-up overleden er 8 patiënten. De doodsoorzaken waren niet gerelateerd aan het AAA of aan de endovasculaire operatie (4 cardiaal, 2 pulmonaal, 1 maagbloeding, 1 carcinoom).
Op de 3 maanden CTA werden 43 endoleaks (3 type I, 40 type II), 3 asymptomatische partiele endoprothese tromboses and 1 proximale endoprothese migratie gezien. Bij 2 patiënten werd een nieuw type II endoleak gezien. De drie patiënten met een prox. type I endoleak ondergingen in electieve setting een secundaire interventie.
Conclusie: Bij 287 vd 291 geïncludeerde patiënten (99%) heeft de vroege post-EVAR CTA geen consequenties gehad in ons beleid na endovasculaire AAA uitschakeling. Meer dan de helft van alle endoleaks die worden gezien kort na EVAR waren self-limiting en in twee patiënten (<1%) werd een nieuw endoleak gezien op de 3mnd CTA.
De waarde van een vroege post-EVAR CTA na een succesvolle EVAR procedure is minimaal. Het lijkt verantwoord deze scan uit het follow-up schema weg te laten.

Abstractnr. : 4.3

RESULTATEN VAN EMBOLISATIE VOOR ACUTE GASTROINTESTINALE BLOEDINGEN IN 105 PATIËNTEN

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AMC, AMSTERDAM

Introductie: Patiënten met acute arteriële gastro-intestinale bloedingen, bij wie met endoscopische behandeling geen haemostase bereikt kan worden, worden in ons ziekenhuis in principe als volgende behandelstap met embolisatie behandeld. Pas wanneer embolisatie niet succesvol is, wordt tot chirurgische behandeling overgegaan.

Patiënten en methoden: Aan de hand van de nazorgformulieren werden opeenvolgende patiënten geïdentificeerd, die in de periode 1999-2006 in ons ziekenhuis opgenomen waren en een embolisatie ondergingen voor een acute gastrointestinale bloeding. Met behulp van gegevens uit het ziekenhuisinformatiesysteem, status en electronisch patiëntendossier werd gekeken naar de resultaten van embolisatie (initieel succes, lange termijn succes, recidiefbloedingen, complicaties en overlijden).

Resultaten: Er werden 105 patiënten (gemiddelde leeftijd 62,6 jaar (range 0 - 91 jaar), 39 (37%) vrouw) geïdentificeerd.

Bloedingsoorzaken waren ulcuslijden 30%, post-operatieve bloedingen 20%, maligniteit 12%, post-ERCP bloedingen 7%, divertikel bloedingen 4%.

Bij 100 patiënten werd een bloedingsfocus tijdens de angiografie gezien, 5 patiënten kregen een preventieve embolisatie van de a. gastroduodenalis zonder dat een actieve bloeding zichtbaar was.

Met embolisatie werd hemostase verkregen in 94 van de 100 patiënten bij wie een bloedingsfocus zichtbaar was. Van deze 94 patiënten kregen er 31 (33%) één of meer recidiefbloedingen. Bij 10 van deze 33 patiënten kon uiteindelijk de bloeding door middel van èèn of meer hernieuwde embolisaties tot staan worden gebracht. Definitief succes van de embolisatie werd hierdoor bereikt in 78 van de 105 (74%) patiënten.

Er waren ernstige complicaties bij 3 (3 %) patiënten (1 x ischemie van het been door punctieplaatscomplicatie, 1 x darmperforatie door ischemie waarvoor laparotomie nodig was, 1 x anafylactische shock na contrastmiddeltoediening), waarvan er uiteindelijk 2 overleden zijn. Van de 105 patiënten zijn er binnen 3 maanden na de embolisatie nog eens 16 overleden aan recidiefbloedingen (10) of ernstige co-morbiditeit (6).

Conclusie: Embolisatie is in ons ziekenhuis een effectieve techniek voor de behandeling van acute gastrointestinale bloedingen, waarbij endoscopische behandeling faalt of onmogelijk is. Gezien het hoge succespercentage en het aanvaardbaar lage aantal complicaties dient deze techniek altijd als volgende behandelstap overwogen te worden, wanneer endoscopische therapie niet succesvol is. Hiermee kunnen veel operaties voorkomen worden.

Abstractnr. : 4.4

UTERUS EMBOLISATIE BIJ ADENOMYOSIS: KLINISCHE RESULTATEN OP MIDDELLANGE TERMIJN

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Introductie: Uterus embolisatie is controversieel als behandeling bij vrouwen met symptomatische adenomyosis. Het doel van deze studie is de evaluatie van de klinische resultaten op middellange termijn na uterus embolisatie voor symptomatische adenomyosis bij 56 vrouwen.

Patiënten en Methode: Bij 56 vrouwen met symptomatische adenomyosis werd de uterus geëmboliseerd. Zestien vrouwen hadden uitsluitend adenomyosis en 40 hadden adenomyosis met myomen. Bloedingen, pijn en mechanische bezwaren werden vergeleken vóór en na de embolisatie. Aanvullende behandelingen en patiënt tevredenheid werden bepaald.

Resultaten: Er waren geen complicaties van de embolisatie. Van de 56 vrouwen werden 47 vervolgd, gedurende gemiddeld 30 maanden (mediaan 23, 3-79 maanden). Aanvullende behandelingen waren nodig bij 5 vrouwen (11%): hysterectomie bij 4 vrouwen en tweede embolisatie bij 1 vrouw. Bloedingen verminderden bij 36/37 (97%), pijn bij 28/36 (78%) en mechanische bezwaren bij 21/33 (64%). Van de 47 vrouwen waren 40 (85%) tevreden of zeer tevreden over de embolisatie behandeling.

Conclusie: Uterus embolisatie voor adenomyosis is veilig en effectief. Op de middellange termijn, hebben verreweg de meeste vrouwen verlichting van klachten en zijn tevreden over de behandeling. Hysterectomie kan meestal worden voorkomen.

Abstractnr. : 4.5

PERCUTANEOUS EMBOLIZATION IN 12 PATIENTS WITH HEREDITARY HEMORRHAGIC TELANGIECTASIA AND SEVERE OPISTAXIS

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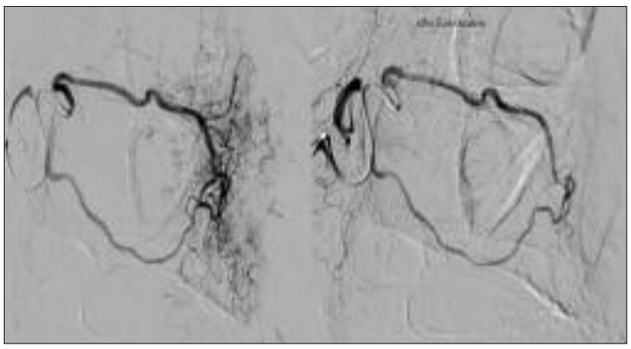
Background: Hereditary hemorrhagic telangiectasia (HHT) is an autosomal dominant vascular disease, characterized by mucocutaneous telangiectases, epistaxis, and visceral arterioveneous malformations. The prevalence of HHT is estimated about 1:10.000. Epistaxis is the most common symptom in HHT and occurs 90-96%. Epistaxis usually begins in childhood and becomes heavier and more frequent in middle age. The purpose of this study was to evaluate the results of embolization in patients with HHT because of sever epistaxis.

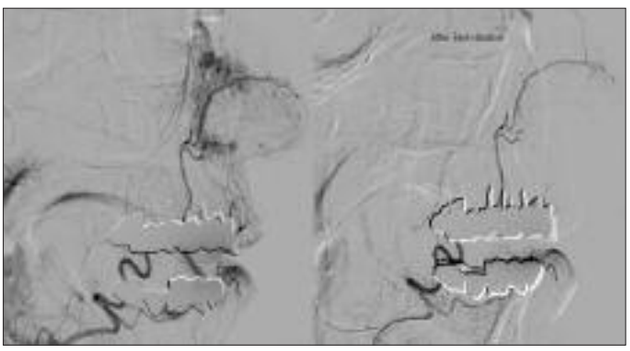
Methods: A questionnaire was used about the frequency and severity of epistaxis, haemoglobin 1 month before and 1 month/1 year after embolization and quality of life. Between November 1992 till July 2006 all patients with definite HHT and embolization were asked to participate in this retrospective study. During this period we included 12 patients (out of 18) who had in total 19 procedures.

Intervention: Percutaneous transfemoral catheterization and angiography of the internal maxillary arteries and the collateral arteries. Embolization of the most distal branches with polyvinyl alcohol particles on the site of the pathological enhancement.

Results: In 18 embolizations the impactfactor (daily frequency x severity (in 3 grades)) of epistaxis improved the first month. After one year 12 embolizations led to subjective improvement of nosebleeds. Mean haemoglobin rose from 6.4 to 7.4 mmol/l after 1 year. Quality of life did improve in 13 embolizations and was equal in 6 embolizations.

Conclusion: The direct effect of the embolization is good (94,7%), but temporarily in 66,7%. The indication should be made carefully, because there are possible (major) complications.





Abstractnr. : 4.6

SPOED OP DE ANGIOKAMER: EEN ANALYSE VAN SPOEDEMBOLISATIES VAN HET BUIK/BEKKEN GEBIED BINNEN EEN ACADEMISCH ZIEKENHUIS

M.J.A. Gondrie, F.J.A. Beek, W.P.Th.M. Mali
UMC Utrecht, UTRECHT

Embolisaties van het buik/bekken gebied zijn de meest voor komende spoedeisende embolisaties. Deze analyse heeft als doel inzicht te krijgen in de aard, aantallen en follow-up van deze spoedembolisaties, die in de afgelopen 6 jaar zijn gedaan.
Ten eerste zijn uit een lijst van alle embolisaties, die tussen 2001 en 2006 zijn verricht, de spoed embolisaties van het buik/bekkengebied geselecteerd. Met behulp van PACS, Mirador en het onderzoeksverslag is daarna inzicht verkregen in de volgende onderwerpen: aantal, geslacht, leeftijd, afkomst, anesthesie, indicatie, tijdstip, materiaal, follow-up, slagingspercentage en complicaties.
Totaal werden er 129 spoedembolisaties van het buik/bekkengebied aangevraagd bij 117 patiënten.
De vrouw-man-ratio was 3:2.
De gemiddelde leeftijd was 49 jaar.
Bij 25% van de spoedembolisaties kwamen de patiënten vanuit een ander ziekenhuis.
Bij 47% van de embolisaties waren de patiënten onder anesthesie.
De indicaties waren: 30 maal uterus wegens post-partum bloeding, 62 maal tractus gastrointestinalis bloeding, 23 maal retroperitoneale bloeding en 14 maal bekkenbloeding na trauma.
77 maal werd de procedure buiten reguliere werktijd verricht.
Er werd vooral gebruik gemaakt van coils en gelfoam.
46 van de 117 patiënten waren binnen 2 weken na de ingreep weer thuis. 22 patiënten waren binnen 2 weken overleden. De overige lagen om verschillende redenen nog in het ziekenhuis.
32 maal werd er na angiografie geen embolisatie verricht; indien er wel werd geëmboliseerd was dit bij 73 van de 97 procedures direct succesvol, 10 maal was een herembolisatie nodig om de bloeding alsnog te stoppen en 14 maal een operatie. 2 maal trad een grote complicatie op.
Op grond van het aantal direct succesvolle procedures, de weinige complicaties en het aantal patiënten dat binnen 2 weken weer thuis is, kan geconcludeerd worden dat een spoedembolisatie van het buik/bekken gebied in dit specifieke academische ziekenhuis een nuttige en veilige procedure is.

Abstractnr. : 4.7

EARLY IN-STENT LESIONS AFTER CAROTID ARTERY STENTING

L.M. Jongen, J. Hendrikse, A. Waaijer, H.B. van der Worp, V.J. Leijdekkers, T.H. Lo, W.P.Th.M. Mali, M. Prokop
UMC Utrecht, UTRECHT

Morphologic information about early in-stent lesions after carotid artery stenting is scarce. We used multi-detector row computed tomography (MDCT) to assess the prevalence and possible risk factors of early in-stent lesions in patients treated for symptomatic carotid artery stenosis.
In 69 consecutive patients with symptomatic carotid artery stenosis ≥ 50%, carotid stenting was performed under antithrombotic prophylaxis. MDCT angiography of the carotid arteries was performed 1 month after stenting. In-stent lesions were defined present if a hypodense or hyperdense structure was observed on the stent wall between the struts and in-stent lumen. Univariate analysis was performed on patient, angiographic, and procedural variables.
At one month, 14 patients (20%) were found to have in-stent lesions. In one patient the stent was occluded. The other 13 in-stent lesions did not result in significant lumen reduction. In-stent lesions occurred more frequently in nitinol stents (27%) than in stainless steel stents (5%; p =0.052). No other differences were found in patient, angiographic or procedural variables.
Conclusion: In-stent lesions one month after carotid stenting were found with MDCT in 20% of cases. The risk of such early in-stent lesions appears to be higher with nitinol stents compared to stainless steel stents.

Abstractnr. : 4.8

DETECTION OF INTRACRANIAL METASTASIS BY IV-CONTRAST ENHANCED PET/CT

F. Hulsebosch, B.M. Wiarda, M.A. Heitbrink, P.R. Algra, F. van het Zant, H. Reigman
MCA, ALKMAAR

Purpose: In this study the detection of (clinically occult) brainmetastasis with intravenous contrast enhanced PET/CT is evaluated.
Method and materials: PET/CT studies were performed in a large teaching hospital after administration of negative oral contrast and iv contrast media, and scanning from groin to crown. All consecutive PET/CT's in a nine month period, from april 2006 to january 2007, were retrospectively reevaluated for clinically relevant intracranial findings, and malignant lesions in particular. Patient population consisted mainly of oncological patients.
Results: In a nine month period 640 PET/CT's were performed. Of all 640 patients 607 (95%) where referred for oncologic staging. Of these oncologic patients 246 (41%) where evaluated for a lung malignancy. Another large group of patients was referred for follow-up scanning (n=139, 23%). In 43 patients clinically relevant intracranial findings were found of which 31 (5.1%) were malignant lesions. Of these 31 lesions 27 (4.5%) were metatstases. Of all 27 metastatic lesions 16 (59%) were found in patients evaluated for a lungtumour, 17

lesions (63%) were clinically occult. Advent, clinically relevant findings consisted of cerebral aneurysms (n=5), large meningiomas (n=5) and vascular malformations (n=2).

Conclusion: PET/CT scanning of the brain after iv-contrast administration detected malignant lesions in 5.1% (n=31) of patients. Of these 31 lesions 27 were metastases, altering treatment, and 17 (63%) lesions were clinically occult.

Clinical relevance: Contrast enhanced PET/CT-scanning of the brain can detect additional clinical relevant findings and is recommended in an oncologic population being evaluated for extend of disease.

Sessie 5 - Neuroradiologie / Onderwijs en opleiding

Donderdag 27 september 2007, 11.30 - 13.00 uur

GENOMINEERD

Radiologendagen Prijs 2007

Abstractnr. : 5.1

RADIOLOGIE ALS DEEL VAN EERSTEJAARS GENEESKUNDE ONDERWIJSBLOK: DE 3-DIMENSIONALE MENS: INTEGRATIE VAN RADIOLOGIE, FYSISCHE DIAGNOSTIEK EN ANATOMIEONDERWIJS IN HET MEDISCH CURRICULUM. EERSTE RESULTATEN

S. Kolkman, K.H. De Jong, P. Roodenberg, M. Maas, A.F. Moorman
AMC, AMSTERDAM

Inleiding: Samenwerking tussen de afdeling Radiologie, Anatomie & Embryologie en Huisartsengeneeskunde heeft geleid tot een 4-weeks eerstejaars geneeskunde onderwijsblok. Het doel van dit blok is de student de structuren van de romp te leren gezien vanuit 3 verschillende perspectieven: de anatomie, de radiologie en de fysische diagnostiek, door deze 3 perspectieven met elkaar te integreren in het onderwijs.

Opzet: Het blok bestaat grotendeels uit kleinschalig onderwijs en een aantal hoorcolleges. Het halve jaar cohort (n= 195) heeft geparticipeerd. Op snijzaal wordt in groepjes van 5 studenten de organen en structuren van de romp zelfstandig ontleed (practicum). Elk snijzaalpracticum anatomie heeft als ingangseis een minimale score van 80% voor een digitale ingangstoets anatomie / radiologie. Op deze manier wordt de student gedwongen al vroeg in het blok te beginnen met studeren. Voorafgaand aan deze practica zijn er hoorcolleges embryologie waar de ontwikkeling van de structuren wordt behandeld die tijdens de practica aan bod komen. De opgedane anatomische kennis wordt vervolgens gebruikt bij het radiologieonderwijs (COO's, hoorcolleges en nabesprekingen) waarin de student de anatomische structuren via verschillende beeldvormende technieken leert zien en ook grote verstoringen in de normale anatomie leert herkennen. Vervolgens wordt de opgedane topografisch anatomische kennis gecorreleerd met de anatomie in vivo tijdens 2 practica fysische diagnostiek verzorgd door de afdelingen huisartsgeneeskunde en chirurgie. Er is hierbij in tweetallen geoefend en de bevindingen werden afgetekend en echografisch gecontroleerd. Het blok wordt afgesloten met een uit twee delen bestaand tentamen, een stationstoets anatomie en een computertoets radiologie / medische fysica / fysische diagnostiek, beiden meetellend voor 50% van het eindcijfer.

Resultaat: Het blok is zeer positief geëvalueerd door de studenten en docenten. Alle studenten behaalden de ingangstoetsen, wat leidde tot een goede voorbereiding van het contactonderwijs.

Het percentage geslaagden voor het tentamen ligt zeer hoog (>95%).

Conclusie: Het doel om de student een '3 dimensionaal' inzicht te geven in de structuren van de romp gezien vanuit een integratie van anatomie, radiologie en fysische diagnostiek is gehaald.

Een goede integratie van klinische en pré-klinische disciplines leidt tot goed gemotiveerde studenten, een goede kennisoverdracht en een hoog rendement van het gegeven onderwijs.

Abstractnr. : 5.2

DIGITALE TOETS RADIOLOGIE ALS ONDERDEEL VAN EEN EERSTEJAARS GENEESKUNDEBLOK TENTAMEN. EERSTE ERVARINGEN

S. Kolkman, D.V. Oey, R. Sijstermans, S.S.K.S. Phoa, M. Maas
AMC, AMSTERDAM

Inleiding: In het nieuwe medische curriculum aan onze faculteit is een onderwijsblok 'de 3D mens' ontwikkeld waarin de radiologie klinisch coördinator is. In dit blok verwerft de student '3 dimensionaal' inzicht in de structuren van de romp. Dit blok is ontstaan door samenwerking tussen de afdelingen Radiologie, Anatomie & Embryologie en Huisartsengeneeskunde. Als afsluiting van het blok wordt het onderdeel radiologie digitaal getoetst. Op deze manier kan beeldvorming van zo hoog mogelijke kwaliteit worden gebruikt. Tevens kunnen MC vragen direct worden nagekeken en konden essay antwoorden duidelijk worden ingevuld. Echter middels deze tentamenvorm was binnen het curriculum nog geen ervaring.

Opzet: Het halve jaar cohort (n=195) werd in 5 subgroepen van 40 studenten computer gestuurd getoetst. Het computergedeelte van het tentamen bestond uit ongeveer 20 radiologie vragen, 2 medische fysica vragen en 1 fysische diagnostiek vraag. De vragen zijn gecontroleerd op inhoud en formulering door een onderwijskundige en een collega. De vragen kwamen per student in een at random volgorde op waarbij tevens de antwoord alternatieven konden wisselen om de kans op fraude te minimaliseren.Voor het computergedeelte van het tentamen hadden de studenten 1 uur de tijd. De toets is gemaakt in het programma QMP en aangeboden via het intranet. Deze computers zijn zo ingesteld dat alleen de betreffende student hierop kan inloggen. Gedurende de gehele toets is op de computer alleen de toets toegankelijk en geen andere programma's / internet.

Om een vlekkeloze ICT te garanderen, was er ICT backup.

Resultaat: Er deden zich enkele kleine problemen voor gerelateerd aan het computergebruik, die door de ICT back up snel tijdens het tentamen verholpen konden worden. Het tentamen kon door elke student goed binnen de vastgestelde tijd worden verricht. Alle groepen deden er gemiddeld even lang over (40 min) om het computer tentamen af te ronden.

Fraude is niet gedetecteerd.

Het tentamen was makkelijk na te kijken, de multiple choice vragen werden

direct door de computer gescoord en de antwoorden op de essay vragen waren goed leesbaar doordat de antwoorden zijn ingetypt.

Conclusie: Digitaal toetsen van Radiologie onderwijs in het medisch curriculum is goed mogelijk. ICT backup is wel noodzakelijk.

Abstractnr. : 5.3

ASSESSMENT OF THE QUALITATIVE AND QUANTITATIVE CONTRIBUTION OF THE EXTERNAL CAROTID ARTERY TO BRAIN PERFUSION IN PATIENTS WITH SYMPTOMATIC INTERNAL CAROTID ARTERY OCCLUSION

P.J. van Laar[1], J. van der Grond[2], W.P.Th.M. Mali[1], J.P. Bremmer[1], C.J.M. Klijn[1], J. Hendrikse[1]

[1]1UMC Utrecht, UTRECHT

[2]LUMC, LEIDEN

The aim of the study was to prospectively investigate the qualitative and quantitative contribution of the ipsilateral external carotid artery (ECA) to cerebral perfusion in patients with symptomatic internal carotid artery (ICA) occlusion. Institutional review board approval and informed consent were obtained. Thirty functionally independent patients (24 men, 6 woman; mean age 63 years) with symptomatic unilateral ICA occlusion were included. Grading of the qualitative ECA contribution was performed with intraarterial digital subtraction angiography (DSA). The quantitative contribution of the ECA to regional cerebral blood flow (rCBF) was assessed with selective arterial spin labeling (ASL) MRI (Figure 1). Differences in rCBF were analyzed with Student's t-test.

Twenty percent of the patients had ECA grade 1 collateral flow (no filling of carotid siphon), 20% grade 2 (filling of carotid siphon), and 60% grade 3 (filling of anterior or middle cerebral artery) as demonstrated on DSA. In patients with grade 2 ECA collateral flow, the perfusion territory of the ECA was smaller compared with patients with grade 3 ECA collateral flow (Figure 2). No significant difference (P = .70) was found in mean rCBF values of the perfusion territories supplied by the ECA between patients with grade 2 (57 ± 16 ml/min/100gr) and patients with grade 3 (60 ± 12 ml/min/100gr).

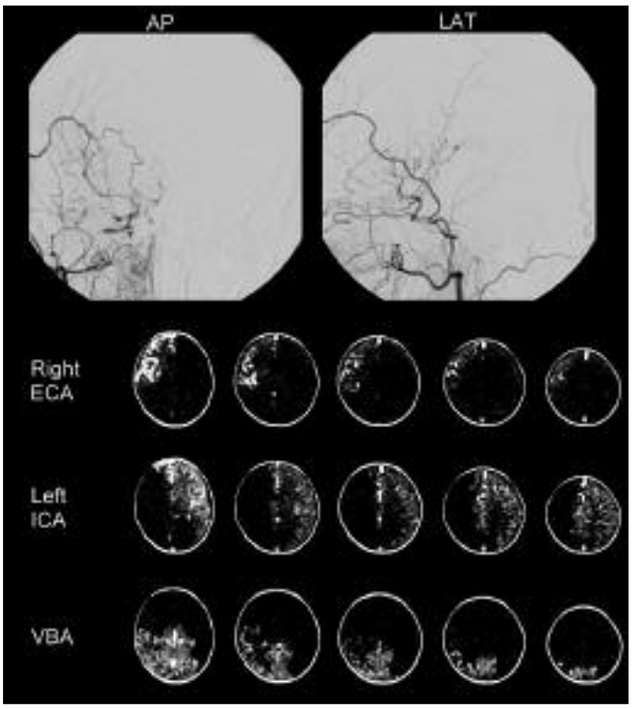


FIGURE 1: DSA AND ASL OF PATIENT WITH RIGHT ICA OCCLUSION.

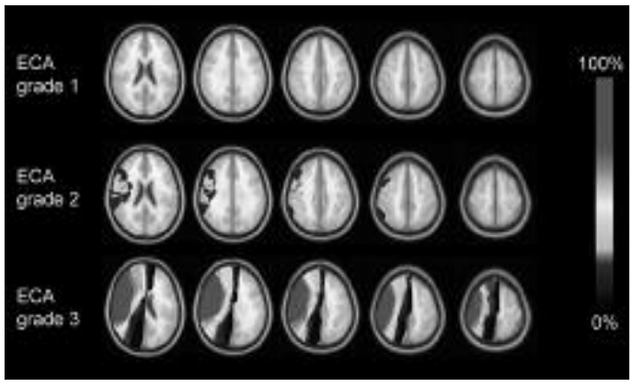


FIGURE 2: ASL PERFUSION TERRITORY MAPS OF ECA IN PATIENTS.

In conclusion, we showed that in patients with symptomatic ICA occlusion focal brain regions may strongly depend on the contribution to cerebral perfusion of the ECA ipsilateral to the side of the ICA occlusion, even in patients with a limited ECA collateral supply on intraarterial DSA. The contribution of the ECA to rCBF as assessed by ASL MRI could be taken into account when considering endarterectomy of an ECA stenosis in patients with symptomatic ICA occlusion.

Abstractnr. : 5.4

CHANGES IN CEREBRAL HEMODYNAMIC REACTIVITY AFTER CAROTID REVASCULARIZATION AS MEASURED WITH VASCULAR SPACE OCCUPANCY (VASO) MRI

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[2]Johns Hopkins University, BALTIMORE, USA

Recently, a noninvasive MRI approach for measuring cerebral blood volume (CBV) changes in vivo has been introduced called vascular-space-occupancy (VASO; Lu et al, MRM 2003). Here, VASO measurements are perfomed during a functional MRI breath-hold task to obtain regional CBV measurements of cerebrovascular reactivity in patients with symptomatic ICA stenosis before and one month after carotid revascularization and control subjects.

VASO MRI works by exploiting the fact that the longitudinal relaxation time of tissue water is slightly shorter than that of blood water. More specifically, a 180° nonselective adiabatic radiofrequency pulse is applied, after which an image is acquired at a pre-calculated inversion time (TI) when blood water signal is zero. Since blood and tissue water relax at different rates, TI can be chosen to equal the precise time when the blood water signal is zero, whereas the residual tissue water signal is slightly positive. All experiments were performed on a 3.0T MRI scanner (Philips Medical Systems, Best, The Netherlands). Ten patients (6 male, 4 female) were scanned one week before and one month after carotid revascularization, either carotid angioplasty with stent placement (CAS) or carotid carotid endarterectomy (CEA). Ten age-matched control subjects were scanned. VASO scans consisted of three breath-hold tasks each comprising 56s normal breathing, followed by 4s exhalation, and 14s breath-holding. In all scans, a single slice was acquired. Scan parameters were TR/TI/TE=5000/1054/15 ms, FOV=240 mm, spatial resolution=3x3x5 mm3, SENSE=2.5, with single-shot gradient echo EPI readout. .

The VASO signal change during breath-holding is more negative in patients with ICA stenosis compared to control subjects ($p<0.05$), suggesting elevated baseline CBV in the hemisphere ipsilateral to the stenosis. Furthermore a normalization of the VASO signal change ($p<0.05$) compared to control subjects is observed after carotid revascularization in patients with unilateral ICA stenosis

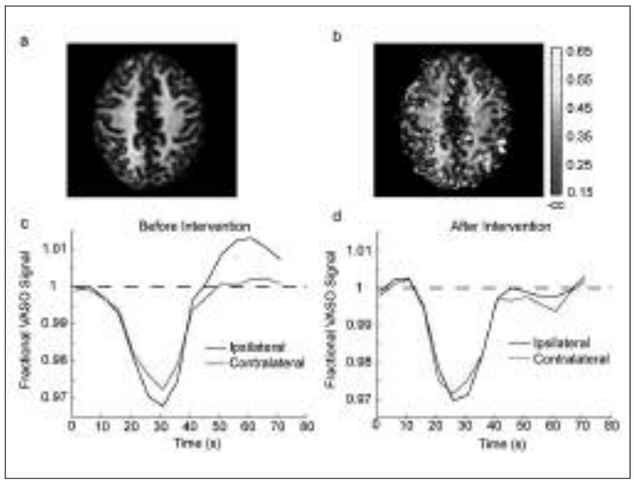

FIGURE 1: VASO SIGNAL CHANGE BEFORE AND AFTER CAROTID STENT

with no post-procedure complications. This effect is most pronounced ipsilateral to the stenosis, but also exists, to a lesser degree, contralateral to the stenosis.

In conclusion, with VASO MRI differences in CBV reactivity were found in patients with ICA stenosis which normalized in a subgroup of patients after revascularization.

Abstractnr. : 5.5

HETEROGENEITY IN ARTERIAL SPIN LABELING MRI MEASUREMENTS OF REGIONAL BRAIN HEMODYNAMICS ASSOCIATED WITH COLLATERAL BLOOD FLOW PATTERNS IN PATIENTS WITH UNILATERAL CAROTID ARTERY OCCLUSION

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UMC Utrecht, UTRECHT

Purpose: The aim of the present study was to assess regional heterogeneity of cerebral hemodynamics with arterial spin labeling (ASL) MRI in patients with a unilateral internal carotid artery (ICA) occlusion.

Method and materials: Institutional review board approval and informed consent were obtained. Seventeen patients (15 male, 2 female, mean age 57) with a symptomatic unilateral ICA occlusion and twenty-nine sex and age-matched control subjects were investigated. An ASL MRI method with image acquisition at a multiple delay times was used to quantify regional cerebral blood flow (CBF), and the time at which the end of the labeled volume arrived at the brain tissue (trailing edge). Intra-arterial DSA and MRI angiography was used to grade collateral blood flow. Differences in regional hemodynamic parameters were analyzed with Students's t-test and one-way ANOVA, with Bonferroni correction.

Results: In the hemisphere ipsilateral to the ICA occlusion the CBF was lower than in the control subjects with respect to the frontal lobe (31±17 and 47±16 ml/min/100gr; p<0.01), fronto-parietal lobe (39±18 and 55±12 ml/min/100gr; p<0.01), and the parietal lobe (49±14 and 61±14 ml/min/100gr; p=0.04). The trailing edge of the occipital-parietal lobe was prolonged in the ipsilateral hemisphere to the ICA occlusion compared with the control subjects (2140±785 and 1953±361 ms; p< 0.01). In patients with leptomeningeal collaterals (n=8) the trailing edge was prolonged in the frontal lobe (2436±779 and 1648±604 ms; p=0.03) and decreased in the occipital lobe (1815±363 and 2388±609 ms; p=0.04) compared with patients without leptomeningeal collateral flow.

Conclusion: Regional assessment of cerebral hemodynamics with ASL MRI in patients with unilateral ICA occlusion demonstrated heterogeneity of CBF and timing parameters. In patients with leptomeningeal collaterals, impaired cerebral hemodynamics was found in the frontal lobe.

Abstractnr. : 5.6

SELECTING ACUTE STROKE PATIENTS FOR TROMBOLYSIS WITH CT PERFUSION AND ANGIOGRAPHY

A.M. Tiehuis, F. Nap, G.J. Biessels, L.M.P. Ramos, L.J. Kappelle, B.K. Velthuis, W.P.Th.M. Mali
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Imaging criteria, based on CT or MR perfusion and angiography, can be used to select suitable candidates for trombolysis in acute cerebral ischemia. We summarize the prevalence of CT perfusion (CTP) and angiography (CTA) findings in 73 stroke patients, presenting within 9 hours of symptom onset, who visited our hospital in the past year.

All patients were diagnosed with cerebral infarction, based on follow-up imaging or clinical diagnosis when follow-imaging was not possible. Infarct core and penumbra were visually evaluated on CBV and MTT perfusion maps. Four criteria were defined (a, b, c and d) to identify potential candidates for rtPA in an extended time-window (3-9 hours):

a) Significant penumbra (penumbra/infarct ratio >20%);
b) Cortical ischemic involvement;
c) Infarct core not >1/3 of middle cerebral artery (MCA)-territory;
d) Absence of internal carotid artery (ICA) occlusion without additional anterior (ACA), middle (MCA) or posterior (PCA) artery occlusion on ipsilateral side of ischemic hemisphere.

41 patients arrived within 3 hours and 32 patients within 3-9 hours after symptom onset.

Of the 3-9 hours group, 69% had a significant penumbra and cortical ischemic involvement was present in 66%. In 13% the infarct core was >1/3 of the MCA-territory, and in 16% an ICA occlusion without ACA/MCA or PCA occlusion was present. All criteria for extended treatment with trombolysis were met in 11 patients (34%).

29 of the 41 patients that arrived within 3 hours received trombolytic therapy. 8 patients that received rtPA died within 3 days. 7 of these patients already had severe perfusion defects on presentation (>2/3 MCA infarct core in 7 patients; penumbra/infarct ratio <20% in 6 patients). Severe perfusion defects were observed in 88% of patients who died within 3 days vs. 7% of patients who survived (p<0.0005).

Conclusion: Trombolysis within 3 to 9 hours could have been possible in 11 of 32 patients based on CTP and CTA findings. This could have increased the percentage of patients eligible for treatment with 27%. Moreover, with CTP we could identify patients presenting within 3 hours after onset of symptoms, in whom treatment with rtPA had no beneficial effect.

Abstractnr. : 5.7

EVALUATION OF SYMPTOMATIC ATHEROSCLEROTIC CAROTID PLAQUES: RELATIONSHIP BETWEEN MDCT-ASSESSED PLAQUE VOLUME AND BRAIN INFARCTS

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Erasmus MC, ROTTERDAM

Cortical strokes are assumed to be caused by embolisms from proximally located atherosclerotic plaques. In lacunar strokes arteriopathy of the perforating arteries is regarded as the most common cause. Atherosclerotic plaque volume (PV) measurement can be assessed by multidetector computed tomography angiography (MDCTA). We hypothesize that PV is related to the presence and type of brain infarctions on CT.

We studied 100 consecutive patients (61 male; mean age 61 ± 15.3 years), who had cerebrovascular symptoms in the carotid artery territory with MDCTA. Patients with a likely cardioembolic stroke were excluded (n=13). CT brain images were reviewed for the presence of recent and old infarct. Infarcts were subdivided in cortical (with or without lacunar infarcts) and solely lacunar infarcts. We assessed PV by manually drawing contours on axial images with a custom-made software tool. Severity of stenosis on MDCTA was measured according to the NASCET criteria. Mann-Whitney U test was applied for statistical analysis.

Atherosclerotic disease was present in 54 of the 87 (62%) patients. Brain infarcts were present in 43 of the 87 (49%) patients. PV in the symptomatic carotid artery of patients with a brain infarct (768 mm3 ± 706 mm3) was significantly larger than in patients without an infarct (238 mm3 ± 515 mm3 p = 0.001). PV in the symptomatic carotid artery of patients with a cortical infarct (1031 mm3 ± 755 mm3) was not significantly larger than in patients with a lacunar infarct (642 mm3 ± 656 mm3 p = 0.09).

Stenosis was more severe in patients with than without infarcts (28% ± 34% versus 6.6% ± 16% p = 0.001). There was no significant difference in severity of stenosis between patients with cortical (43% ± 43%) and lacunar infarctions (20% ± 27% p = 0.11).

Conclusions: The severity of atherosclerotic disease (PV and stenosis) in the symptomatic carotid artery of patients is related to the presence of brain infarct. No relation was found with the type of brain infarct. Considering the associations between PV and brain infarcts, measurement of PV may prove to be a useful diagnostic tool in the evaluation of stroke risk.

Abstractnr. : 5.8

COMPARISON OF 3D SUSCEPTIBILITY WEIGHTED IMAGING AND 2D T2*GRE IMAGING FOR THE DETECTION OF CEREBRAL MICROBLEEDS

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Erasmus MC, ROTTERDAM

Cerebral microbleeds (CMB) are recognized as an important new marker of microangiopathy. In clinical studies, their presence is related to an increased risk of recurrent spontaneous hemorrhage. They are traditionally imaged using 2D T2*-weighted gradient-echo (T2*GRE) magnetic resonance imaging. Imaging at higher resolution and using more susceptibility weighting may increase their conspicuity.

We investigated whether 3D susceptibility weighted imaging (SWI) is more sensitive to detect CMBs than a conventional 2D T2*GRE sequence.

In 200 persons from a large population-based study (mean age 79.2 yrs), both conventional 2D T2*GRE imaging (TR 775ms, TE 20ms, flip angle 25, matrix 256*256, 5.0 mm slices) and custom-made 3D SWI with long echo time and small voxel size (TR 45 ms, TE 31ms, flip angle 13, matrix 320*224, 1.6 mm slices zero-padded to 0.8 mm) were performed at 1.5T. Two experienced neuroimagers rated the presence, number and location of CMBs on each sequence, blinded to the other sequence and to clinical information and with 1week gap between rating of the two sequences. Inter-observer reliabilities were very good (κ=0.8 both for T2*GRE and for SWI). An experienced neuroradiologist confirmed all CMBs and post hoc both sequences were compared to assess dissimilarities.

CMBs were detected in significantly more persons ($p < 0.001$) with SWI (35.5%), compared with 2D T2*GRE (21.0%; Figure 1). There were no CMBs visualized on the 2D T2*GRE sequence that were not detected on the 3D SWI sequence. Moreover, in persons in whom CMBs were visible on both sequences (n = 42), significantly more CMBs were visualized on the SWI sequence than on the conventional 2D T2*GRE sequence (mean difference 2.3; $p < 0.001$).

Conclusion: The 3D SWI sequence is more sensitive than a conventional 2D T2*GRE sequence for the detection of CMBs. This is important in view of potential clinical consequences such as future risk stratification for therapy-induced complications.

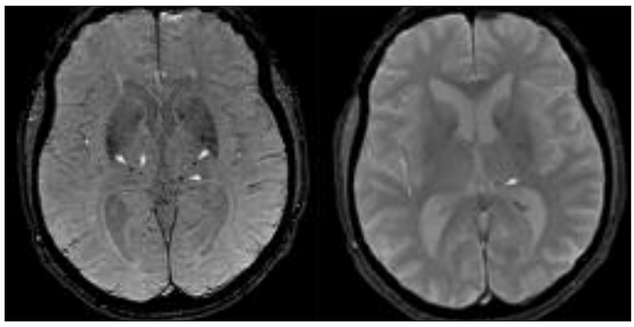

FIGURE 1: 3D SWI (LEFT) AND 2D T2*GRE SEQUENCE (RIGHT)

Sessie 6 - Gastrointestinale radiologie / Uroradiologie

Vrijdag 28 september 2007, 11.30 - 13.00 uur

Abstractnr. : 6.1

THE ACCURACY OF MRI FOR PREDICTING THE T-STAGE AND CIRCUMFERENTIAL RESECTION MARGIN ON PRE AND POST CHEMORADIATION MRI IN RECTAL CANCER: A MULTICENTER STUDY IN EXPERT AND REGIONAL CENTERS.

M.J. Lahaye[1], G.L. Beets[1], S.M.E. Engelen[1], P. Post[2], J. Dohmen[3], L. Opdenakker[4], J.M.A. van Engelshoven[1], R.G.H. Beets-Tan[1]

[1]University Hospital Maastricht, MAASTRICHT

[2]VieCuri, VENLO

[3]St. Jans Gasthuis, WEERT

[4]Laurentius Ziekenhuis, MAASTRICHT

The purpose of this study was to determine the accuracy of MRI for predicting T-stage and Circumferential Resection Margin (CRM) on pre-and postchemoradiation MRI and to evaluate interobserver variability between an expert and 3 regional centers.

From July 2005 till April 2006, 191 patients with primary rectal cancer were enrolled in 3 regional and 1 university center. Patients underwent 1.5T/1.0T MRI 24hr. after i.v. administration of USPIO(SineremÂ[RSYMBOL]). Sequences: axial 2DT2WFSE, 3DT1WGRE & 3DT2*.

The local radiologists (nonexperts) and an expert MR-radiologist prospectively predicted the T-stage and CRM blinded for each otherâ?™s results. The expert radiologist double read each MRI of the regional-study-patients on which treatment strategy was based. Surgery for early, 5x5Gy+TME for non-locally advanced and chemoradiation+surgery for locally advanced tumors. The latter underwent a postchemoradiation MR, which was read the same way. Gold standard was histology.

Histological results were available for 80/191. 33/80 were locally advanced. See table 1&2 for the results. The interobserver agreement between the nonexperts and expert radiologist for predicting the T-stage was substantial (K=0.79),as well as for downstaging postchemoradiation (K=0.74).

The AUC for predicting an involved CRM was 0.97 for expert & nonexperts. The AUC for predicting tumorregression from the mesorectal fascia on postchemoradiationMRI was 0.89 for expert, 0.88 for nonexperts.

The interobserver agreement for the prediction of the CRM between nonexperts and expert was substantial(K=0.79); likewise after chemoradiation(K=0.60).

Conclusion:

1. Although MRI is known to be inaccurate for distinguishing between T0,T1 or T2, it can predict tumors limited to the bowel wall(T0/1/2) with high PPV for expert as well as nonexperts. Nonexperts however tend to overstage early tumors(T0/1/2) more often.
2. Downstaging after chemoradiation to ypT0/1/2 is less accurate with many overstaging errors due to the problem of interpreting fibrosis on MRI.
3. Conform MERCURY-Study our results show that CRM is accurately predicted independent of the readerâ?™s experience. A striking finding is that on postchemoradiation MRI expert and nonexperts perform equally high in predicting tumorregression from the mesorectal fascia. This suggests that a postchemoradiation MRI could be useful in surgical decision-making whether or not to limit the resection in responding patients.

	T0/1/2		yT0/1/2	
	Expert	Non experts	Expert	Non experts
Sens	74% (26/26+9)	61% (11/11+7)	44% (8/8+10)	50% (7/7+7)
Spec	75% (9/9+3)	71% (5/5+2)	87% (13/13+2)	75% (6/6+2)
PPV	90% (26/26+3)	85% (11/11+2)	80% (8/8+2)	78% (7/7+2)
NPV	50% (9/9+9)	42% (5/5+7)	57% (13/13+10)	46% (6/6+7)

FIGURE 1: TABLE 1.

	T3		yT3	
	Expert	Non experts	Expert	Non experts
Sens	75% (9/9+3)	71% (5/5+2)	64% (9/9+5)	43% (3/3+4)
Spec	74% (26/26+9)	61% (11/11+7)	47% (9/9+10)	60% (9/9+6)
PPV	50% (9/9+9)	42% (5/5+7)	47% (9/9+10)	33% (3/3+6)
NPV	90% (26/26+3)	85% (11/11+2)	64% (9/9+5)	69% (9/9+4)

FIGURE 2: TABLE 2.MESORECTALE KLIEREN ZIJN ZELDZAAM, MAAR KUNNEN VOORKOMEN IN PATIËNTEN MET EEN DISTAAL RECTUMCARCINOOM.

Abstractnr. : 6.2

GEEN TOEGEVOEGDE WAARDE VAN DE ROUTINE SLIKFOTO NA OESOPHAGUSRESECTIE TER BEOORDELING VAN DE CERVICALE OESOPHAGOGASTRISCHE ANASTOMOSE

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Een slikfoto met waterig contrast wordt routinematig vervaardigd na oesophagusresecties ter detectie van lekkage van de cervicale anastomose. Het doel van de huidige studie was de diagnostische nauwkeurigheid en de klinische waarde van deze routine procedure te onderzoeken.
Patiënten met een oesophaguscarcinoom die een oesophagusresectie met buismaagreconstructie ondergingen in de periode Januari 1989 - Juni 2003, zijn retrospectief onderzocht. De uitkomst van de routine slikfoto werd vergeleken met het optreden van een klinische naadlekkage.
Een routine slikfoto werd uitgevoerd in 207 (82%) van de 252 patiënten op postoperatieve dag 8 (spreiding 3-15). In 45 (18%) patiënten werd geen routine slikfoto verricht, voornamelijk ten gevolge van een lang verblijf op de Intensive Care Unit. In 18 (9%) patienten kon op basis van de slikfoto geen uitspraak omtrent lekkage worden gedaan. In 11 van de 163 patiënten waarbij geen radiologische lekkage werd gedetecteerd, trad postoperatief een klinische naadlekkage op. Van de 26 patiënten met een radiologische lekkage, ontwikkelden 14 patiënten geen klinische lekkage. Hiermee bleek de vals positieve ratio van deze test 8.5%, de vals negatieve ratio 47.8%, de sensitiviteit 52.1%, de specificiteit 91.6%, de positief voorspellende waarde 46.1% en de negatief voorspellende waarde 93.3%.
In 24 (67%) van 36 patiënten die postoperatief een klinische lekkage ontwikkelden, was een routine slikfoto uitgevoerd. In 7 (29%) van deze 24 patiënten, was de klinische lekkage reeds aanwezig voordat de routine slikfoto werd uitgevoerd. In 12 (50%) van de 24 slikfoto's werd een klinische lekkage bevestigd of opgespoord. In 12 (33%) van de 36 patiënten met een klinische lekkage was geen routine slikfoto uitgevoerd, aangezien de lekkage zich klinisch had gemanifesteerd alvorens de routine slikfoto was uitgevoerd (n=10) of omdat naadlekkage was gedetecteerd middels een andere diagnostische modaliteit (n=2).
Concluderend heeft de routinematig uitgevoerde slikfoto na oesophagusresectie ter detectie van lekkage van de cervicale anastomose een lage positief voorspellende waarde en sensitiviteit. Deze test wordt in ons ziekenhuis dan ook niet meer toegepast. Lekkage van de cervicale anastomose wordt beoordeeld door klinische observatie.

Abstractnr. : 6.3

THE ACCURACY OF CONVENTIONAL AND USPIO MRI FOR PREDICTING THE NODAL STATUS IN RECTAL CANCER IN EXPERT AND REGIONAL SETTING: A MULTICENTER STUDY

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The purpose of this study was to determine the accuracy of conventional and USPIO MRI for predicting nodal metastases in primary non-locally advanced rectal cancer and to evaluate interobserver agreement between an expert and 3 regional centers.
From July 2005 till April 2006, 191 patients with primary rectal cancer were enrolled in this prospective multicenter study. The patients underwent 1.5T/1.0T high-resolution MRI 24hr. after i.v. administration of USPIO (Sinerem®).
Sequences: axial 2DT2WFSE, 3DT1WGRE & 3DT2*.
The local radiologists (non experts) and an expert MR radiologist prospectively predicted the nodal status twice; on T2WTSE (conventional) MRsequence first, followed by a combined reading of T2WTSE and 3DT2* (conventional+USPIO sequences), blinded for each other's results. The expert radiologist prospectively double read each MR of the regional-study-patients, on which treatment strategy was based. Surgery for early, 5x5Gy+TME for non-locally advanced and chemoradiation+surgery for locally advanced tumors. Golden standard was histology.
Histological results were available for 80/191. 47/80 were non-locally advanced and used for analysis (22/47 were regional inclusions).11/47 were pN+.
For the expert radiologist the sensitivity, specificity, PPV and NPV for the detection of nodal metastases on conventional T2WTSE were 90%,60%,38% and 96%, on USPIO 3DT2* 91%,68%,45% and 96% resp. The sensitivity, specificity, PPV and NPV for the non-expert radiologists taken as one group on conventional images were 50%,57%, 36% and 70%, on USPIO MRimages 83%,47%,33% and 90% resp.
The interobserver agreement between the expert and non-experts on conventional MRimages was moderate (K=0.42), likewise with USPIO MRimages (K=0.40)

Conclusion:

1. Conform literature conventional MRI for is not accurate for the detection of nodal metastases in rectal cancer.
2. USPIO MRI is better and has a high NPV however at the expense of false positives.
3. An expert reader performs better in nodal prediction than non-experts both on conventional and USPIO MRI, suggesting that a learning curve exists.

Abstractnr. : 6.4

CAN DYNAMIC CONTRAST-ENHANCED MRI BE USED AS INDICATOR OF DISEASE ACTIVITY IN PERIANAL FISTULIZING CROHN'S DISEASE?

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Purpose: Assessment of disease activity is important in perianal fistulizing Crohn's Disease (PFCD) and visual evaluation has limitations. The aim of our study was to assess the feasibility and added value of dynamic contrast-enhanced MRI (DCE-MRI) in PFCD.
Methods and materials: 24 patients with proven PFCD underwent pelvic 1.5 T MRI. Primary reference parameter was the MRI-based score of disease severity. Secondary reference parameters were the Perianal Disease Activity Index and C - reactive protein. A 2-D dynamic T1-weighted FSGE sequence (5 slices, 20 dynamic phases, temporal resolution 18 seconds) was performed during bolus injection of intravenous contrast medium. DCE-MRI data were analyzed off-line. A Region of Interest (ROI) was defined by the radiologist in the area around the perianal pathology. Time Intensity Curves (TIC) in the ROI were analyzed pixel by pixel using a classification flow-chart that placed each TIC in one of the 5 shapes described by Van Rijswijk. The average amount of enhancement

and the relative excess of each shape type were calculated in this area. Spearman correlation coefficients were calculated between the DCE-MRI parameters and the clinical indices.

Results: In all patients regions of increased enhancement were observed in the perianal area. In most enhanced pixels type 2 TICs were seen, indicating slow enhancement. However, in most patients areas showing quick enhancement were observed as well. A significant correlation was observed between the MRI-based score of disease severity and the relative counts of type 3 (r=0.44; p=0.03). A weak to moderate, but not significant correlation was found between the MRI-based score of severity and the relative counts of type 4 (r=0.40, p=0.053). No statistically significant correlations were seen between the relative amount of the different TIC patterns and the CRP and PDAI, respectively.

Conclusion: DCE-MRI is feasible and provides consistent results in patients with PFCD. TICs showed a weak to moderate correlation with the MRI-based score of severity.

Clinical Relevance/Application: Further insight in the pathophysiology of PFCD might be gained using DCE-MRI, such as heterogeneity in tissue permeability.

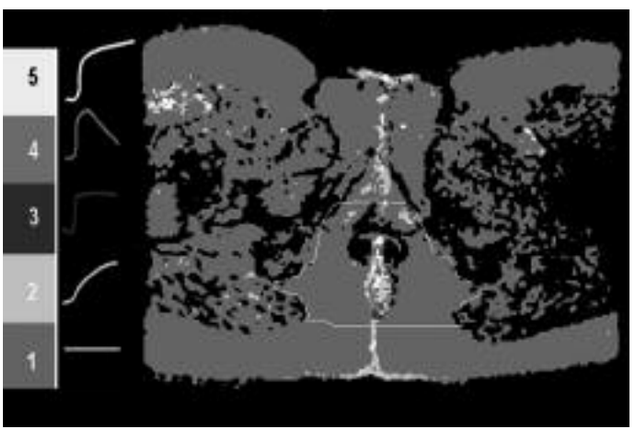

FIGURE 1: A COLOR-CODED MAP OF THE TIC PATTERNS

Abstractnr. : 6.5

DESCRIBING COMPUTED TOMOGRAPHY FINDINGS IN SEVERE ACUTE PANCREATITIS WITH DESCRIPTIVE TERMS: AN INTERNATIONAL INTEROBSERVER AGREEMENT STUDY

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Introduction: Severe acute pancreatitis is associated with pancreatic necrosis and a wide variety of intra-abdominal collections each requiring different treatment strategies. Computed tomography (CT) is used to differentiate between these complications. The current definitions (e.g. pseudocyst, pancreatic abscess) for CT findings in acute pancreatitis have recently shown very poor interobserver agreement, potentially leading to miscommunication and patient mismanagement. Objective descriptive terminology might be a valuable alternative but has unknown interobserver agreement. Aim of this study is to determine the interobserver agreement for descriptive terms for CT findings in acute pancreatitis.

Methods: 55 digital CT scans of patients with predicted severe acute pancreatitis were evaluated by 17 reviewers (8 radiologists and 9 clinicians) in 3 US and 5 European tertiary referral hospitals. Percentage agreement (PA) for 9 clinically relevant descriptive items was calculated among all reviewers and among radiologists and clinicians, separately.

Results: Overall agreement was very good to very good for the terms collection (PA = 1; interquartile range [IQR], 0.68-1), relation with pancreas (PA = 1; IQR, 0.68-1), content (PA = 0.88; IQR, 0.87-1) shape (PA= 1; IQR, 0.78-1), mass effect (PA = 0.78; IQR, 0.62-1) loculated gas bubbles (PA = 1; IQR, 1-1) and air fluid level (PA = 1; IQR, 1-1). Overall agreement was moderate for extent of pancreatic nonenhancement (PA = 0.60; IQR, 0.46-0.88) and encapsulation (PA = 0.56; IQR, 0.48-0.69). PA was significantly higher among radiologist than clinicians for the terms extent of pancreatic nonenhancement (PA = 0.75 vs 0.57, P = 0.008) encapsulation (PA = 0.67; vs 0.46, P = 0.001) and content (PA = 1 vs 0.78, P = 0.008).

Conclusion: Interobserver agreement for descriptive terms for CT findings in acute pancreatitis is good. Therefore, it is recommended to no longer use multi-interpretable definitions to describe CT findings in acute pancreatitis.

Abstractnr. : 6.6

X-SELLINK: INDICATIES EN OPBRENGST

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De X-Sellink is lange tijd de enige onderzoeksmodaliteit geweest voor de dunne darm. Nieuwe onderzoeken met een hogere sensitiviteit dan de X-Sellink, zoals capsule endoscopie, dubbel ballon enteroscopie, CT- en MRI-enteroclyse dringen de indicatiegebieden van de X-Sellink steeds verder terug.

Doel van dit onderzoek is te inventariseren bij welke indicaties de X-Sellink nog een bijdrage levert aan het diagnostisch proces.

Retrospectief werden alle X-Sellink onderzoeken in ons ziekenhuis uit het jaar 2005 geëvalueerd. De volgende gegevens werden uit het Elektronisch Patiënten Dossier verzameld: indicatie/klachten/symptomen, aanvullende onderzoeken (gastro- of colonscopie, MRI, CT of echografie) en definitieve diagnose. De indicaties werden gegroepeerd als volgt: exacerbatie IBD (Inflammatory Bowel Disease), verdenking IBD, stenose, RIP, fistelvorming, afbeelding van een bekende afwijking (bijvoorbeeld pre-operatief) en overige klachten (buikpijn, anemie, diarree en braken).

Er werden in totaal 74 X-Sellink onderzoeken verricht. Van de 74 onderzoeken waren 54 (73%) normaal. Eén onderzoek was niet diagnostisch. De onderzoeken met de indicatie RIP of poliep toonde geen afwijkingen (tabel 1). Een lage opbrengst hadden de onderzoeken met indicatie exacerbatie IBD en verdenking IBD en de groep overige klachten. De onderzoeken met de vraagstelling stenose lieten een intermediaire opbrengst zien. Afbeelden van een bekende afwijking en aantonen van een fistel gaven een hoge opbrengst.

In bijna alle gevallen werd er nog aanvullend onderzoek verricht (n=71, 96%) waarbij 61 (82%) patiënten twee of meer onderzoeken kregen. Bij 41% van de patiënten werden histologische biopten verkregen.

De definitieve diagnoses waren: geen dunne darm diagnose (n=38, 51%), IBD exacerbatie (n=8, 11%), stenose (n=4, 5%), IBS (n=5, 7%), fistel (n=3, 4%), adhesie (n=3, 4%) en anders (n=13, 18%). In 8 patiënten met een definitieve diagnose IBD exacerbatie waren 6 (75%) X-Sellink onderzoeken normaal. Van de 54 patiënten met een normaal X-Sellink onderzoek werden er uiteindelijk bij 18 (33%) een dunne darm diagnose gesteld.

De X-Sellink levert een beperkte bijdrage aan het stellen van een definitieve diagnose. De indicaties waarbij afwijkingen gevonden werden betroffen: aantonen van een fistel of stenose en pre-operatieve afbeelding fistel of stenotisch traject.

Tabel 1

Indicatie	Aantal	Afwijkingen conform indicatie (%, CI)
RIP/poliep	8	0 (0%)
Overige kindsten	19	2 (11%, 0-24%)
Verdenking of exacerbatie IBD	21	3 (14%, 0-29%)
Stenose	21	9 (43%, 22-64%)
Afbeelden bekende afwijking	4	4 (100%)
Fistel	1	1 (100%)
TOTAAL	**74**	**19 (26%, 16-36%)**

FIGURE 1: AFWIJKENDE X-SELLINK ONDERZOEKEN PER INDICATIE

Abstractnr. : 6.7

ASSESSMENT OF HEPATIC STEATOSIS WITH 3.0 TESLA MR-SPECTROSCOPY IN TYPE 2 DIABETIC PATIENTS WITH NON-ALCOHOLIC FATTY LIVER DISEASE

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Non alcoholic fatty liver disease (NAFLD) is characterized by hepatic steatosis and often associated with features of the metabolic syndrome, e.g. insulin resistance and dyslipidaemia. Liver biopsy still remains the gold standard for assessing hepatic fat accumulation but is accompanied by an increased risk of complications and sampling error. Proton Magnetic Resonance Proton Spectroscopy (1H-MRS) is a non-invasive alternative, but has not yet been used as a standard diagnostic tool. Studies until now have primarily evaluated 1H-MRS for hepatic steatosis at 1.5 Tesla. The aim of this study was to measure hepatic steatosis in type 2 diabetic patients with NAFLD using 1H-MRS at 3.0 Tesla.

1H-MRS was performed on a 3.0 Tesla Philips Intera scanner in twelve patients with type 2 diabetes mellitus and NAFLD. Clinical and biochemical characteristics were measured. Two ratios from the acquired 1H-MR spectra, representing hepatic fat content, were calculated: ratio 1 defined as the saturated (CH2) fat signal versus the reference H2O signal and ratio 2 the unsaturated (-CH=CH-) fat signal versus this reference. These two ratios were correlated with clinical parameters.

A large signal from saturated fat can be seen at 1.2 parts per million (ppm) arising from lipid methylene protons. Next to the suppressed water peak at 4.7 ppm, the spectrum contains a large signal at 5.4 ppm caused by unsaturated lipid protons. A tendency to statistical significance could be detected between saturated and unsaturated fatty acids with a correlation coefficient of 0.553 (p=0.062). The highest correlations were found between insulin resistance and hepatic fat content (ratio 1: r= 0,892 and ratio 2: r= 0,702) and between cholesterol and unsaturated hepatic fat content (ratio 2: r= 0,775).

Conclusion: 3.0 Tesla 1H-MRS seems well suited to measure hepatic fat content. This technique allows differentiation between saturated and unsaturated fat. In 83% of the patients with NAFLD unsaturated and saturated hepatic fat content was detected. A significant correlation could be detected between this fat content and insulin resistance and cholesterol. To our knowledge this is the first time the unsaturated fat peak was correlated with clinical parameters.

Abstractnr. : 6.8

OPTIMIZING MDCT OF KIDNEYS AND URINARY TRACT WITH TRIPLE-BOLUS CONTRAST INJECTION TECHNIQUE

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Objective: To evaluate the applicability and image quality of a MDCT protocol using a triple-bolus contrast material injection, acquiring renal parenchymal, excretory and vascular enhancement phases in a single acquisition.

Materials and methods: 110 patients with haematuria, flank pain and/or suspected urinary tract abnormalities were examined on 16-slice CT-scanner with a MDCT protocol consisted of two phases: unenhanced and triple-bolus contrast injection. 1)Patients were given 800ml water 20min. before the exam and low-dose unenhanced scan of the whole abdomen was acquired; 2)contrast material was split in three injections: 30ml 2ml/s was injected as a first bolus, 7min. later a second bolus of 50ml 1,5ml/s and 20 seconds after the second the third bolus of 65ml 3ml/s injected and a single contrast enhanced scan from diaphragm to symphysis was acquired. Two blinded readers rated opacification of upper urinary tract (UUT) divided into four segments. One reader assessed UUT distention and bladder opacification. Renal parenchymal and vascular contrast enhancement image quality was also evaluated. Interobserver agreement was assessed using kappa statistics. MDCT findings were correlated with clinical follow-up (3 to 24 months), operative and pathology findings.

Results: Complete opacification of intrarenal collecting system was achieved in 91 % (k=0,84) and in 74% (k=0,88) of proximal ureter. Middle ureter was completely opacified in 67% and not filled in 12,5% (k=0,94), distal ureter in 54% and 21% respectively (k=0,9). Mean distention was higher for proximal (3,9) compared to distal segments (3,67). Bladder was fully filled only in 33,6%, high quality parenchymal enhancement was received in 85,4% of cases. Arteries showed better contrast enhancement (89,1%) compared to veins (61,8%). Abnormal findings included: 24 urolithiasis, 17 congenital vascular and ureteral anomalies, 9 hydronephrosis, 29 renal cysts, 5 angiomyolipoma, 6 RCC and 5 uroepithelial malignancies. Radiation dose for triple-bolus scan was 9,8mSv.

Conclusion: Triple-bolus MDCTU is a dose efficient protocol acquiring renal corticomedulary-nephrographic-excretory and vascular enhancement phases in a single acquisition. It provides sufficient imaging scores in UUT, renal parenchymal and vascular opacification and may be used in the diagnosis of different urinary system pathologies, as well as in pre-surgical planning of partial nephrectomies and renal donation.

Sessie 7 - Interventieradiologie

Vrijdag 28 september 2007, 11.30 - 13.00 uur

Abstractnr. : 7.1

BASILAR TIP ANEURYSMS: INCIDENCE, CLINICAL PRESENTATION AND OUTCOME OF ENDOVASCULAR TREATMENT

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Purpose: the purpose of this study is to report mid- and long-term clinical and angiographic results of coiling of basilar tip aneurysms.
Materials and methods: Between January 1995 and August 2006, 154 basilar tip aneurysms were coiled. One hundred and fourteen (74%) had ruptured and 40 (26%) were unruptured. There were 42 men and 112 women with a mean age of 50.5 years (median 50, range 25-73 years). Mean aneurysm size was 11.1 mm (median 10, range 2-30 mm) and 71 (46%) were large or giant. Of 154 aneurysms, 40 (26%) were primarily coiled with a supporting device.
Results: Initial occlusion was (near) complete in 144 (94%) and incomplete in 10 aneurysms (6%). Combined procedural mortality and morbidity was 3.8% (6 of 154, 95% CI 1.4-8.3%). Mean clinical follow up of 144 surviving patients was 53 months (range 3-144 months, 637 patient years). Annual incidence rate for recurrent hemorrhage was 0.3 % (2 in 637 patient years, 95% CI 0.04-1.1%). During angiographic follow up of mean 34 months (range 6-122 months) in 138 patients (96%), 27 basilar tip aneurysms (17.5%) reopened over time and were additionally coiled. Of these, 11 repeatedly reopened and were repeatedly coiled. Aneurysm size > median 10 mm was the only significant predictor for retreatment at follow up (Odds Ratio 7.0, 95% CI 2.5-19.7).
Conclusion: Coiling of basilar tip aneurysms is safe and effective in preventing recurrent hemorrhage. Follow up angiography is mandatory to timely detect reopening, especially in large and giant aneurysms.

Abstractnr. : 7.2

ENDOVASCULAR TREATMENT FOR ILIAC ARTERY OCCLUSIVE DISEASE: NO PREDICTORS FOR OUTCOME

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To evaluate medium and long-term results of percutaneous treatment of iliac artery occlusive disease and risk factors influencing outcome.
We retrospective reviewed all patients treated with percutaneous transluminal angioplasty (PTA) or stent placement for iliac artery occlusive disease between January 1999 and January 2004. All patients presented with complaints of chronic limb ischemia, had proved significant iliac artery stenosis or occlusion and had not been treated to the same segment before.
In total, 280 patients (363 limbs) were treated. There were 184 men and 96 women with a mean age at time of treatment of 64 years (range 34-90). Associated risk factors were cigarette smoking (89%), hypertension (50%), hyperlipidemia (46%) and diabetes mellitus (20%). Indication for treatment was disabling claudication in 73% and critical limb ischemia in 27%. Level of the treated lesion was the common iliac artery (CIA) in 225 limbs (62%), the external iliac artery (EIA) in 95 (26.2%) and both CIA and EIA in 43 (11.8%). Stenotic lesions were present in 313 limbs, an occlusion in 50. Thirteen lesions could not be passed by a guide wire and were classified non-treated. A procedural success was achieved in 95.7%. Complication rate was 7.7% and 8 patients (2.9%) died within 30 days after treatment. In 132 limbs a PTA was performed and in 218 limbs a stent was placed. The mean and median follow-up were 31 months. Limb salvage rate at 5 years was 98%. Primary patency rates at 1, 3 and 5 years were 90%, 76% and 60%. There was no significant difference in primary and secondary patency between PTA alone and PTA with stent placement, but time to primary failure was significantly longer after stent placement (p= 0.046). None of the demographic variables influenced primary and secondary patencies.
Endovascular treatment of iliac artery occlusive disease is a safe and durable method in a population with diffuse atherosclerotic disease. There was no difference in patency between PTA and stent placement although time to primary failure was significantly longer after stent placement. No associated risk factors were identified to influence patency.

Abstractnr. : 7.3

TREATMENT OF ARTERIAL INFLOW STENOSES OF DYSFUNCTIONAL HEMODIALYSIS ACCESS FISTULAS USING A RETROGRADE VENOUS APPROACH

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Catharina Ziekenhuis, EINDHOVEN

Purpose: To determine the feasibility of outpatient endovascular treatment of inflow stenoses in arteriovenous fistulae (AVFs) through retrograde venous access catheterization.
Materials and methods: We consecutively included all 24 dysfunctional AVFs with arterial inflow stenoses suspected at Color Doppler Ultrasonography, Contrast-Enhanced Magnetic Resonance Angiography or Digital Subtraction Angiography (DSA) between January 2002 and April 2007. Following retrograde venous access puncture, an interventional radiologist aimed to cross the arteriovenous anastomosis and advance a catheter into the aortic arch. After depiction of the complete vascular access tree, angioplasty and/or stent placement was aimed for stenoses with a >50% luminal diameter reduction at DSA.

Results: In two radiocefalic AVFs, a catheter could not be positioned into the aortic arch after retrograde venous access puncture. DSA depicted 30 inflow stenoses in the remaining 22 patients (11 radiocefalic AVFs and 11 brachiocefalic AVFs). Clinical improvement was obtained in 19 out of 20 patients with a technically successful intervention (<30% residual stenosis after angioplasty or stent placement). Following endovascular therapy, access flow of twelve patients with a low flow access improved from 431 +/- 150 ml/min to 818 +/- 233 ml/min, and four patients with steal symptoms became symptom free. Two non maturing fistulas could be salvaged by angioplasty and access cannulation problems were solved in another patient following angioplasty. Brachial artery stent placement did not reduce steal symptoms in one case, whereas two patients, in whom stent placement was not thought desirable, showed a >30% residual arterial stenosis after angioplasty. No complications were observed at DSA and endovascular intervention.

Discussion: Outpatient retrograde venous access puncture and catheterization, as an alternative to a more hazardous brachial artery or more invasive femoral artery approach, should be considered for the visualization of the arterial inflow and endovascular treatment of inflow stenoses.

Abstractnr. : 7.4

TRANSJUGULAR INTRAHEPATIC PORTOSYSTEMIC SHUNT (TIPS) IN THE MANAGEMENT OF BUDD - CHIARI SYNDROME: LONG TERM RESULTS

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Background and purpose: Budd-Chiari syndrome (BCS) is a rare form of hepatic out flow obstruction and can lead to liver failure, variceal bleeding and ascites as complications of portal hypertension. Transjugular intrahepatic portosystemic shunt (TIPS) is an effective way to lower the portal blood pressure. Only few studies have evaluated the long term results of TIPS in patients with BCS.

The aim of this study was to retrospectively determine the long term results of TIPS in these patients.

Materials and methods: From January 1998 to January 2005, 8 consecutive patients (4 women, mean age 36 years) with BCS were treated with a TIPS procedure. Bare metal stents (Wallstent) were initially used in 3 patients, in 5 patients PTFE covered Viatorr stents were placed. Outcome was assessed by technical success, number of reinterventions, shunt patency, decrease in portosystemic pressure gradient, liver function and clinical outcome.

Results: TIPS procedure was technically successful in all 8 patients.

In all a porto- caval transhepatic tract was created. TIPS was performed in 5 patients with acute BCS and progressive deterioration of their liver function and in 3 patients for chronic BCS.

No procedure related complications were observed.

In 1 patient heparin-induced thrombopenia caused repeated stent occlusion. This patient underwent acute liver transplantation.

The mean portosystemic gradient was reduced after TIPS procedure from 17 mmHg to 8 mmHg.

Ascites resolved without recurrence and liver function improved at a mean follow-up of 6 years (range 2-9yrs).

In 3 patients the shunt remained patent without reinterventions.

TIPS dysfunction developed in 4 patients, in whom reinterventions were needed. The mean number of reinterventions for shunt dysfunction in patients with Wallstents was 4 (range 3-6) and for Viatorr stents 1 (range 0-2).

Six patients are alive with stable liver function. One patient died as a result of metastasized sigmoid carcinoma.

Conclusion: TIPS is a successful intervention in Budd -Chiari syndrome with an excellent long term clinical outcome.

Abstractnr. : 7.5

CRYOPLASTY VAN HET FEMOROPOPLITEAAL TRAJECT BIJ PATIËNTEN MET CLAUDICATIO INTERMITTENS

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Atherosclerose van de arteria femoralis superficialis (AFS) is een belangrijke oorzaak van morbiditeit. Bij patiënten met claudicatio intermittens is de initiële behandeling looptraining. Bij onvoldoende effect is een aanvullende behandeling noodzakelijk. Percutane transluminale ballonangioplasty (PTA) is dan een mogelijkheid. De patency van PTA is echter sterk afhankelijk van de ernst van stenose. 1-jaars patency varieert tussen 72% (korte stenosen) en 30% (lange occlusies). PTA van de AFS geeft minder goede resultaten vergeleken met PTA in andere vaten vanwege de elasticiteit en snelle vorming van neointima hyperplasie. Cryoplasty combineert de dilatiekracht van PTA met de afgifte van koude thermische energie aan de arteriële vaatwand. Dit bevordert 'positieve remodeling' van de vaatwand, waardoor restenose wordt beperkt en de patency verbetert.

Van eind 2005 tot begin 2007 hebben wij bij 35 achtereenvolgende patiënten met claudicatio intermittens, bij wie looptraining onvoldoende resultaat had, een cryoplasty van de AFS uitgevoerd. Patiënten hadden op de duplex, en vervolgens met angiografie bevestigde, TASC A laesies (i.e. ernstige stenosen, al dan niet verkalkt, en occlusies tot 10cm). Follow-up geschiedde middels duplex, enkel/brachialis index (ABI) en loopafstand na 2 weken en 3, 6 en 12 maanden. 1 procedure werd afgebroken wegens een perforatie. Bij 1 patiënt trombus in de trifurcatie als complicatie. Verder 1 bail-out stent wegens flow limiterende dissectie. Er zijn in totaal 55 laesies behandeld: 22 single levels, 12 multiple levels en 5 occlusies. Initiële angiografische succes was goed (<30% stenose) in 37, matig (30-50% stenose) in 12 en slecht (>50% stenose) in 5 laesies. 3 patiënten zijn lost-to-follow-up, 1 patiënt overleden en 1 been is geamputeerd. Patency middels EAI na 3, 6 en 12 maanden waren: 79%, 47% en 45%. Patency middels duplex respectievelijk 56%, 50% en 47%.

Geconcludeerd kan worden dat het initiële succes van cryoplasty in de AFS goed is, evenals de klinische 3 maanden patency. De patency na 6 en 12 maanden rond 50% benaderd die van conventionele PTA in de AFS. Een primaire patency van 70% bij duplex follow-up na 9 maanden, zoals bij een fase 3 trial van cryoplasty gerapporteerd, konden wij niet herhalen.

Abstractnr. : 7.6

FIRST EXPERIENCE WITH THE REEKROSS CATHETER: A ROBUST BALLOON CATHETER FOR SEVERE INFRAINGUINAL ARTERIAL OCCLUSIVE DISEASE

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[4]*AMC, AMSTERDAM*

The percutaneous treatment of severe stenotic and occlusive disease has limitations due to characteristics of balloon catheters. Heavy calcification can completely block balloon catheter passage or cause puncture. To overcome these limitations, there is a need for 'heavy duty' materials, with high pushability.
We assessed the technical performance of a new robust balloon catheter in the treatment of heavily calcified arterial disease below the inguinal ligament.
In our multicentre prospective registry, 58 patients were entered from December 2006 to May 2007.
Inclusion was infrainguinal occlusive disease with the need, as judged by the interventionalist, to use a heavy duty balloon catheter.
The recently developed Reekross catheter® (Clearstream, Irl) was used. This is a 5F balloon catheter (balloon lengths: 3, 5, 6 and 12mm) with a rigid shaft intended to improve pushability.
A Terumo 0.35' guidewire was used to cross the lesion (transluminal or re-entry), followed by the balloon catheter.
Only technical procedural outcome was recorded.
Treated lesions were located in the SFA, popliteal artery and crural arteries. There was intima involvement in 25 patients, media in 10, and a combination in 13. In 51 of 58 patients the lesion was characterized as an occlusion. Lesion calcification was present in 46 patients. Guidewire passage occurred subintimal in 53 patients and intraluminal in 5.
In 23 cases the first dilatation was attempted using a standard balloon catheter; 9 ruptured and 2 failed to cross the lesion. The Reekross catheter successfully crossed the lesions in 56 patients, which includes those failed with the standard balloon catheter.
After dilatation with the Reekross catheter, 43 patients had no or insignificant residual lesion. Of the 13 patients with >30% residual lesions, 8 lesions were not treated and 5 were stented. Primary technical success was 88% and primary assisted success 96.5%. There were no Reekross balloon ruptures.
Ease of passage through the lesion, guidewire trackability, and catheter pushability were perceived as excellent or good in all successful cases.
Conclusion: Our study indicates that dilatation of stenotic or occlusive lesions with the Reekross catheter could be a treatment of first choice in patients with heavily calcified arterial disease.

Abstractnr. : 7.7

FUNCTIONELE UITKOMST NA BEHANDELING VAN PERIFEER VAATLIJDEN: EEN PILOT-STUDIE MET EEN NIEUW MEETINSTRUMENT

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Het succes van behandeling van perifeer arterieel vaatlijden (PAV) wordt vaak uitgedrukt in fysiologische parameters zoals enkel/arm index. Er is de laatste tijd steeds meer aandacht voor patiënt-reported uitkomsten, vastgesteld met vragenlijsten. De VascuQoL is een vaak gebruikte, uitgebreide en gevalideerde vragenlijst voor patiënten met PAV. De AMC Linear Disability Score (ALDS) is een recent ontwikkelde generieke itembank op basis van de item-respons theorie. Hieruit kan een korte en eenvoudige vragenlijst worden samengesteld waardoor op efficiënte en gedetailleerde wijze het functionele niveau van een chronisch zieke patiënt kan worden vastgesteld op een schaal van 0-100 (100 is geen beperking in functioneren). Het doel van dit pilot-onderzoek is de ALDS te testen in de praktijk op vaatpatiënten.
De VascuQoL en de ALDS werden beide afgenomen bij patiënten met perifeer vaatlijden Fontaine graad II, III en IV (claudicatio intermittens en kritieke ischemie) die zich presenteerden op het vaatlaboratorium of op de afdeling vaatchirurgie.
Beide vragenlijsten werden afgenomen bij 34 patiënten met een gemiddelde leeftijd van 68 jaar (range 45-84), 71% (n = 24) was man. Binnen deze groep hadden 27 patiënten claudicatio intermittens en 7 kritieke ischemie. De gemiddelde VascuQoL in de claudicatio groep was significant hoger dan in de kritieke ischemie groep (4.5 versus 2.2; $p < 0.001$). De ALDS was ook significant hoger in de groep met claudicatio intermittens (81 versus 68; $p = 0.003$). De ALDS vertoonde een significante positieve correlatie met de VascuQoL, zowel voor de algemene VascuQoL score ($r = 0.64$) als voor het domein Activity ($r = 0.73$) alleen.
De resultaten van deze pilot-studie laten zien dat de ALDS lijkt te kunnen differentiëren tussen matig en ernstig perifeer vaatlijden. Tevens vertoont de ALDS een goede correlatie met de reeds gevalideerde VascuQoL. De ALDS is mogelijk een bruikbaar instrument voor het meten van het functionele niveau van patiënten met perifeer vaatlijden.

Abstractnr. : 7.8

REAL TIME 3D IMAGE GUIDED INTERVENTION WITH SOFT TISSUE IMAGING ON A FLAT PANEL DETECTOR SYSTEM

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Purpose: Demonstration of various cases of difficult percutaneous punctures using real time 3D image guiding after rotational soft tissue imaging.
Methods and materials: With the use of a flat panel detector system (2k matrix) rotating around the patient it is possible to obtain computer tomographic images in the intervention suite. This information can then be used to determine the optimal puncture path in 3D by calculating the required C-arm angles with dedicated software.
Results: After accurate lesion location on the CT images path planning for percutaneous biopsy was performed on a dedicated workstation coupled to the C-arm in the intervention suite. After an angled bullseye view of the puncture site needle angling support was provided by laser. The advancement of the needle and depth assessment was performed by 2D fluoroscopy after automatic angulation of the C-arm, projecting the fluoroscopy images on top of the planned path. Using this technique we have performed over 13 succesful procedures sofar: nephrostomy, kidney biopsies, cyst aspiration and sclerotherapy, bone biopsies of the vertebral column and vertebroplasty, lung biopsy and para-aortic tissue masses. When compared to conventional CT technique the intervention time is reduced with a factor 2 and the radiation dose is less than 75% compared with a CT directed procedure. The ability to perform fluoroscopy simultaneaously is a great advantage.
Conclusion: Real time 3D image guided percutaneous punctures are a promising new technique. The intervention time and radiation dose are significantly reduced, and the open architecture of the C-arc allowed for more optimal accessibility when compared to conventional CT guided punctures.
Clinical Relevance/Application: The intervention time and radiation dose are significantly reduced, and the open architecture of the C-arc allowed for more optimal accessibility when compared to conventional CT guided punctures.

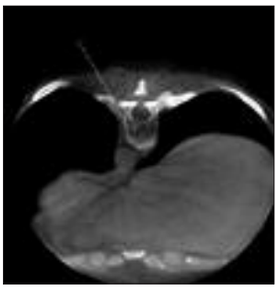


FIGURE 1: PLANNED PATH, TRANSVERSE VIEW

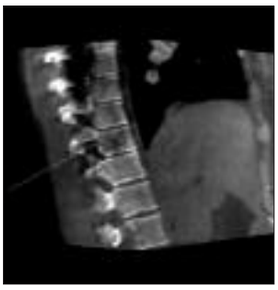
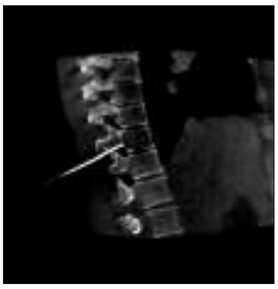


FIGURE 2: PLANNED PATH, SAGITTAL VIEW



ROGRESSION OF NEEDLE

Sessie 8 - Cardiovasculaire radiologie

Vrijdag 28 september 2007, 11.30 - 13.00 uur

GENOMINEERD

Radiologendagen Prijs 2007

Abstractnr. : 8.1

DIRECT THROMBUS IMAGING WITH MAGNETIC RESONANCE IN THE DISCRIMINATION BETWEEN ACUTE AND CHRONIC DEEP VEIN THROMBOSIS; A PROSPECTIVE PROOF-OF-PRINCIPLE STUDY

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Introduction: Accurate discrimination between acute and chronic thrombosis is relevant to avoid improper diagnosis and unnecessary treatment with anticoagulants in patients with clinically suspected deep-vein thrombosis (DVT) of the leg. Based on the amount of methaemoglobin in the thrombus, it may be possible to determine the age of thrombus by direct thrombus MR Imaging. The purpose of this prospective study was to determine the natural history of the MR signal in patients with acute deep vein thrombosis (DVT) during 6 months follow-up.

Design and Methods: This study was an observational prospective follow-up study of 43 consecutive patients with a first episode of acute proximal DVT demonstrated by compression ultrasound. All patients underwent T1-MR-imaging within 48 hours after the diagnosis. Serial follow up was performed with MR imaging and compression ultrasound at pre-defined time intervals at 3 and 6 months respectively. All data on ultrasound and MR-imaging were coded, stored and assessed by a panel of blinded observers.

Results: MRI identified acute DVT in 41 of 43 patients (95%). There were no false positive results by MRI in the contra lateral extremity or controls. In 39 patients 6month follow-up was possible (2 deaths, 1 withdrew consent, 1 recurrent DVT). In all patients MRI imaging did not show a T1 signal of acute DVT anymore, whereas compression ultrasound was still abnormal in 12 patients.

Conclusion: T1 MR-imaging may allow for accurate discrimination between acute and chronic thrombosis. Whether T1 MR imaging is feasible for managing acute suspected recurrent DVT has to be evaluated in a prospective study.

Abstractnr. : 8.2

FREE-BREATHING, FAST 2D DELAYED ENHANCEMENT: CLINICAL EVALUATION IN CHRONIC INFARCTS

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Introduction: Delayed contrast-enhanced (DE) MR Imaging is now routinely used for evaluation of (non-) viable myocardium in patients with chronic ischaemic disease. Image quality is highly dependent on the patient's ability of breathholding. However, in clinical routine not all patients are able to perform breathholding. Therefore, it would be clinically desirable to have a DE MR technique that is not dependent on repetitive breathholding.

Purpose: In this study we explore the potential of a 2D respiratory-triggered inversion recovery (IR) DE sequence allowing acquisition during free-breathing. Accordingly, the purpose of this study is to validate this free-breathing approach with the clinically accepted 3D DE Imaging technique.

Materials and method: In this study 32 consecutive patients were included with known chronic ischaemic myocardial disease. All imaging was performed on a clinical Philips Intera 1.5 T MR system. DE MR Imaging consisted of a 3D breathhold IR sequence and a free-breathing, respiratory-triggered 2D B-TFE IR sequence, both acquired in short axis plane.

Data analysis: DE images were visually analyzed independently and in random order by two experienced cardiac MR radiologists. Overall image quality was rated according a 4-point scale.

The 3D breathhold technique was considered standard of reference. Regional transmural extent of myocardial infarction was qualitatively assessed on a five-point scale. Quantitative measurement of infarction size was obtained and expressed as percent of left ventricular mass.

Results: In total 486 segments were analyzed. In 28 of 32 patients the image quality was good to excellent for both DE techniques. Excellent interobserver agreement was obtained for regional transmural extent of myocardial infarction in both DE Imaging techniques: weighted kappa for all segments varied between 0.70 and 0.96. Spearman's correlation revealed excellent correlation ($r^2 = 0.95$) between the free-breathing and the breathhold 3D acquisition, which was statistically significant ($P < .001$). Bland Altman plot showed good correlelation between both techniques.

Conclusions: The 2D free-breathing, respiratory-triggered DE MR Imaging sequence can be used as a reliable tool in a clinical setting. This technique may be a good alternative in a dyspnoic patient and in patients not capable of holding their breath.

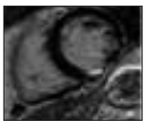

FIGURE 1: 3D BREATHHOLD

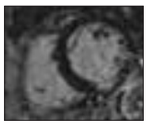

FIGURE 2: 2D FREE-BREATHING

Abstractnr. : 8.3

CARDIAC MR IMAGING OF THE ATHLETE'S HEART: PRELIMINARY RESULTS

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The increase in screening of athletes results in a growing demand for cardiac magnetic resonance (CMR) imaging if a cardiac abnormality is suspected. The physiological adaptation of the heart in athletes is difficult to distinguish from cardiomyopathies as CMR data of athletes, especially for the right ventricle (RV), are limited. Accurate reference values will prevent athletes from being barred from sports activities due to false positive findings and prevent unjustified reassurance if cardiac pathology goes unnoticed.
269 endurance athletes (209 stable top condition > 9h exercise per week) and 131 healthy controls have been included in this study. We present preliminary results of the first 68 athletes and 37 age and sex matched controls (39% women, mean age 25,8 years ± 4,34). Images were obtained with a 1.5T MRI. In addition an extensive questionnaire, echocardiography, and an ECG were performed. Experienced blinded observers performed CMR data analysis.
The results are presented in the table.
The athlete's heart is characterized by an increase in left ventricle (LV) and RV mass and volumes. Completion of the CMR analyses of all participants will provide reference CMR values for endurance athletes that will help to prevent unjustified MRI diagnoses.

CMR results

	Male Athletes	Male Controls		Female Athletes	Female Controls	
Parameters	Mean (sd)	Mean (sd)	P-values	Mean (sd)	Mean (sd)	P-values
LV Ejection Fraction	59.0 (5.20)	59.12 (7.04)	ns	56.5 (5.10)	59.4 (5.54)	ns
LV Stroke Volume	141 (23.2)	119 (18.2)	<0.001	103 (14.0)	91.6 (16.7)	<0.05
LV End Diastolic Volume	245 (39.2)	205 (28.2)	<0.001	177 (42.7)	155 (29.7)	ns-(0.07)
LV End Systolic Volume	104 (23.5)	86.6 (18.7)	<0.01	80.4 (17.5)	63.3 (17.3)	<0.005
LV End Diastolic Mass	141 (39.1)	103 (15.8)	<0.01	92.7 (24.7)	67.2 (11.8)	<0.001
RV Ejection Fraction	51.0 (5.39)	51.5 (6.05)	ns	52.0 (4.88)	55.4 (4.26)	<0.05
RV Stroke Volume	142 (22.6)	119 (17.4)	<0.001	105 (12.8)	91.7 (15.2)	<0.01
RV End Diastolic Volume	281 (48.6)	233 (35.2)	<0.001	205 (30.9)	166 (30.4)	<0.001
RV End Systolic Volume	139 (32.9)	114 (25.4)	<0.005	98.3 (22.3)	74.6 (18.5)	<0.001
RV End Diastolic Mass	26.3 (5.75)	23.0 (3.63)	<0.05	20.8 (3.32)	16.4 (3.15)	<0.001
Heart Rate	57.9 (10.4)	62.1 (10.1)	ns (0.14)	55.9 (8.96)	68.5 (10.3)	<0.001

ns = not significant

Abstractnr. : 8.4

METABOLIC MR IMAGING OF HUMAN MYOCARDIAL LIPOTOXICITY

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Type 2 diabetes mellitus (DM2) and obesity are associated with increased plasma non-esterified fatty acid (NEFA) levels and myocardial dysfunction.
The purpose of this study was to increase plasma NEFA levels in healthy subjects by a very low calorie diet (VLCD), to study the relation between plasma NEFA levels and myocardial lipid and high-energy-phosphate metabolism and cardiac function.
Fourteen healthy non-obese men underwent 1H-magnetic resonance spectroscopy (MRS) to determine myocardial and hepatic triglyceride content (%TG), 31P-MRS to assess myocardial high-energy-phosphate metabolism (PCr/ATP), and functional MR imaging of the heart at baseline and after a 3-day VLCD. After the diet-intervention, plasma NEFA levels increased significantly when compared to baseline (from 0.5 ± 0.1 to 1.1 ± 0.1 mmol/l, p< 0.05). In addition, myocardial %TG increased significantly when compared to baseline (from 0.38 ± 0.05 to 0.59 ± 0.06%, p< 0.05), whereas hepatic %TG decreased significantly during the VLCD as compared to baseline (from 2.2 ± 0.5 to 1.5 ± 0.4%, p< 0.05). In addition, the difference in myocardial %TG between the VLCD and baseline in the myocardium was negatively correlated to the difference of the %TG between the VLCD and baseline in the liver (Pearson r = -0.61, p< 0.05).The VLCD did not change myocardial PCr/ATP (2.33 ± 0.15 vs. 2.33 ± 0.08, p> 0.05) or left ventricular systolic function. Interestingly, deceleration of the early diastolic flow across the mitral valve decreased significantly after the VLCD as compared to baseline (from 3.37 ± 0.20 to 2.91 ± 0.16 ml/s2 ? 10-3, p< 0.05). This change in diastolic function was significantly correlated with the increase in myocardial %TG after the VLCD (Pearson r = -0.55, p< 0.05).
We therefore conclude that short-term VLCD induces accumulation of myocardial triglyceride content which is associated with altered left ventricular diastolic function, but has no impact on myocardial high-energy-phosphate metabolism.
Furthermore, short term caloric restriction exerts differential tissue specific effects on triglyceride contents. These observations stress the physiological flexibility of ectopic triglyceride pools.

Abstractnr. : 8.5

RIGHT AND LEFT VENTRICULAR FUNCTION IN ARRYTHMOGENIC RIGHT VENTRICULAR CARDIOMYOPATHY WITH MRI

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MRI imaging is often used to investigate arrhythmogenic right ventricular cardiomyopathy (ARVC). Although RV dilatation is one of the criteria for ARVC this is an aspecific finding and little is known of other functional parameters. The purpose of this study was to measure several functional parameters on MRI of the right and left ventricle in a group of ARVC patients.
Nine patients (6 men, 3 woman; mean age 40) diagnosed with ARVC using the Task Force criteria were examined by MRI. They were compared with nine age- and sex-matched healthy volunteers. The RV and LV volumes were measured on the short axis cine sequences.
The right ventricle showed a decrease of mean RV ejection fraction (RVEF) and an increase of both mean end-diastolic volume (RVEDV) and mean end-systolic volume (RVESV) in both male and female patient group compared to controls. In the left ventricle was a decrease of mean LV ejection fraction (LVEF) in both patient groups, but less severe than on the right. The mean end-diastolic volume (LVEDV) decreased, while the mean end-systolic volume (LVESV) increased. (see table below)
In patients with ARVC the described functional parameters measured by MRI

differ from healthy volunteers. The increase in mean RVESV was the most severe abnormality compared to controls and it may be a better discriminator for ARVC than the end-diastolic dilatation of the right ventricle.

Results Controls versus ARVC

	Control men (n=6)	ARVC men (n=6)	Difference of mean	Control women (n=3)	ARVC women (n=3)	Difference of mean
Variable	Mean (sd)	Mean (sd)	%	Mean (sd)	Mean (sd)	%
LVEF	62,33 (7,00)	53,62 (13,15)	-13,98	63,70 (5,09)	57,33 (10,46)	-9,99
LVSV	146,97 (2,73)	109,13 (16,91)	-26,42	108,33 (17,33)	88,70 (22,50)	-18,12
LVEDV	238,53 (22,76)	210,00 (48,90)	-11,96	171,60 (40,04)	153,90 (18,31)	-10,31
LVESV	91,57 (24,90)	101,87 (43,08)	11,25	63,23 (22,71)	65,17 (13,70)	3,06
RVEF	53,00 (8,83)	38,32 (13,78)	-27,70	57,60 (7,01)	33,97 (13,11)	-41,23
RVSV	111,73 (7,00)	97,00 (13,15)	-13,19	99,50 (44,22)	62,43 (15,32)	-37,25
RVEDV	213,42 (35,49)	270,77 (134,43)	26,87	168,10 (54,24)	193,80 (10,46)	15,29
RVESV	101,70 (30,46)	170,23 (126,69)	67,39	68,60 (10,11)	131,40 (52,96)	91,55

Abstractnr. : 8.6

COMPUTING THE LEFT ATRIUM VOLUME FROM THREE ORTHOGONAL DIMENSIONS MEASURED ON T1-WEIGHTED BB IMAGES IS NOT AN ACCURATE METHOD FOR MEASURING LEFT ATRIAL SIZE

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MRI represents a validated standard for left atrium volumetry (LAV). Accurate LAV with MRI requires manual tracing of the boundaries of the left atrium (LA) on consecutive slices through the left atrium since the anatomical shape of the LA makes it unsuitable for automatic tracing. It is therefore time-consuming. In our study we examined whether the LA volume could be accurately calculated from measurements of three orthogonal dimensions of the left atrium.
We studied 166 cardiac MRI-scans, which were performed before and after pulmonary vein antrum isolation (PVAI) in 79 patients with drug refractory atrial fibrillation. The scans were performed on a 1,5T scanner and consisted of T1 black blood (BB) images in the axial and coronal plane and a 3D gadolinium enhanced coronal T1-FFE MR angiography (CE-MRA) with 1.5mm slices. The longitudinal (L), transverse (T) and anteroposterior (AP) diameter of the LA was measured on the T1BB images and used to compute the LA volume using the ovoid volume formula ($\Pi/6(AP*L*T)$). This volume was compared to CE-MRA volume rendering obtained by manually tracing the boundaries of the left atrium. The relationship between the two volumes was analyzed using scatter plotting and Bland-Altman analysis.
There was a moderately strong linear correlation ($r = 0.6$) between the two methods of volume calculation. The volume computed from the three orthogonal dimensions of the LA measured on the T1BB images (Vol T1BB) was lower than that measured by volume rendering (Vol CE-MRA) in all but 4 cases. The ratio of mean Vol T1BB to mean Vol CE-MRA was 0,7:1 (68,5 ml (range 24-143 ml) vs. 98,0 ml (range 49-188 ml); $p<0.001$). Bland-Altman analysis showed poor agreement between the two methods. Adjusting for the bias of the Vol T1BB measurement (which could be caused by the ovoid formula not being fully applicable to the left atrium) still resulted in variance of Vol T1BB approximately 35% above and below the Vol CE-MRA values.
Computing the volume of the LA from three orthogonal dimensions of the LA measured on T1-weighted BB images can give an estimate of actual left atrial size, but is not accurate enough.

Abstractnr. : 8.7

CARDIALE MRI BIJ PATIËNTEN OPGENOMEN OP DE EERSTE HART HULP MET VERDENKING OP EEN NON-STEMI

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Deventer Ziekenhuis, DEVENTER

Heeft cardiale MRI aanvullende en/of diagnostische waarde bij patiënten opgenomen op de Eerste Hart Hulp onder verdenking van een non-STEMI en is het praktisch uitvoerbaar in een perifeer ziekenhuis?
Vanaf oktober 2006 - mei 2007 werd er bij patiënten, opgenomen met verdenking non-STEMI, aanvullend cardiale MRI verricht. Per week waren 3 vaste onderzoeksplaatsen beschikbaar. Het scanprotocol bestond uit Bright Blood-series (2ch, 4ch, SA base-apex and LVOT), rust-perfusie en Delayed Enhancement na Gadolinium bolus injectie. Retrospectief is via dossieronderzoek beoordeeld of de MRI-scan additionele informatie heeft opgeleverd voor de behandelend arts en of de ontslagdiagnose hierdoor gewijzigd is ten opzichte van de klinische diagnose bij opname.
Bij alle patiënten bleek het onderzoek goed uitvoerbaar. Bij 57% van de patiënten werd de klinische diagnose door MRI bevestigd. Binnen deze groep patiënten gaf MRI bij 40% klinisch relevante additionele informatie. In de overgebleven 43% was er wijziging van de klinische diagnose na MRI bij 89%. Binnen de totale patiëntengroep gaf MRI additionele informatie in 62%.
Conclusies: Cardiale MRI bij patiënten opgenomen op de Eerste Hart Hulp onder verdenking non-STEMI is goed uitvoerbaar in een perifeer ziekenhuis. In 62% levert MRI additionele informatie aan de behandelend specialist waardoor de ontslagdiagnose aangevuld wordt of wijzigt in vergelijking met de klinische diagnose bij opname.

Abstractnr. : 8.8

MR IMAGING OF THE CORONARY VESSEL WALL: COMPARISON OF VESSEL WALL CHARACTERISTICS IN PATIENTS WITH CORONARY ARTERY DISEASE AND AGE-MATCHED HEALTHY CONTROLS

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Purpose: To investigate differences in coronary vessel wall characteristics as seen with MR imaging in patients with angiographically proven coronary artery disease (CAD) and a control group of age-matched healthy volunteers.
Method and materials: 22 patients suffering from CAD (15M, 7F, mean age 60.4 yrs) and 26 healthy volunteers with no history of CAD (11M, 15F, mean age 56.1 yrs) were examined on a 1.5T clinical imager (Intera, Philips Medical Systems) using a 5-element phased array cardiac coil. Prior to vessel wall imaging, bright blood balanced SSFP imaging of the right coronary artery (RCA)

lumen was performed (TR/TE/FA: 6.2ms/3.1ms/120°, resolution: 0.98x0.98x3 mm). In the same orientation, a vessel wall scan was acquired (3D FFE, radial k-space sampling). Imaging parameters: TR/TE/FA: 8.0ms/2.0ms/30°, FOV: 300x300mm, matrix: 384x384, slice thickness: 2 mm. Minimal, maximal and mean vessel wall thickness and signal intensity (SI) were measured in the right coronary vessel. Data were compared using an unpaired student T-test.

Results: In 22/22 patients, stenoses detected on MRA corresponded to stenoses detected with IA-DSA (Figure 1). In 19/26 controls, stenoses and wall irregularities were also present on MRA (Figure 2). Non-uniform signal intensity was observed of the coronary vessel wall in both patients and volunteers. Minimal, maximal and mean SI of the vessel wall in patients were significantly higher compared to controls (respectively 0.15 vs 0.11; 0.40 vs 0.34, and 0.28 vs 0.22, all $p<0.03$). Maximum and mean vessel wall thickness in patients were also significantly higher (2.16 mm vs 1.92 mm, and 1.38 mm vs 1.22 mm, both $p<0.05$).

Conclusion: In this study, MR imaging of the coronary vessel wall demonstrated significant higher wall thickness and SI in patients with CAD compared to age-matched healthy volunteers. The difference in SI could be the result of different vessel wall morphology and atherosclerotic plaque components. However, this remains to be determined in further studies.

Clinical relevance: MR imaging can be used to non-invasively visualize the presence of (sub)clinical coronary vessel wall atherosclerosis. This might be useful for screening of (a)symptomatic populations at risk for CAD.

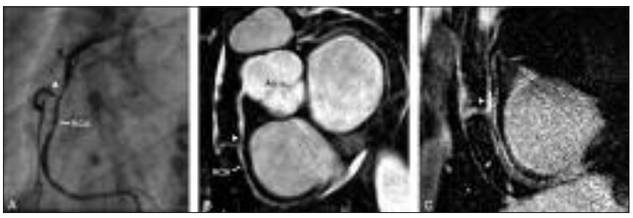

FIGURE 1: 40Y/O MALE WITH STABLE ANGINA

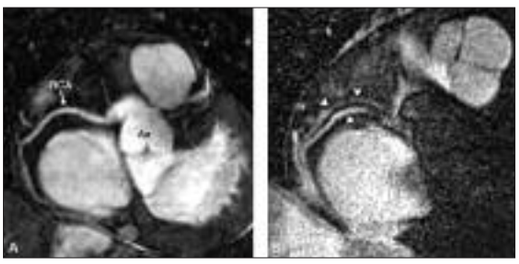

FIGURE 2: HEALTHY 54Y/O FEMALE, LOCAL VESSEL WALL THICKENING

Sessie 9 - Mammadiagnostiek / Skelet radiologie

Vrijdag 28 september 2007, 11.30 - 13.00 uur

Abstractnr. : 9.1

BREAST CANCER SCREENING IN THE NETHERLANDS: UTILIZATION AND COST OF DIAGNOSTIC IMAGING AND BIOPSIES FOLLOWING POSITIVE SCREENING MAMMOGRAPHY

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In the current study we assessed the workup costs of women with screen-positive mammograms in a nation-wide, biennial breast cancer screening program for women aged 50-75 years. We included all 1,823 positive screening examinations of 141,923 women who underwent biennial screening mammography in the southern breast cancer screening region of The Netherlands between 1 January 2000 and 1 January 2005. We collected data on all diagnostic examinations, interventional procedures and surgical consultations with two-year follow-up. For breast cancer cases, we included all diagnostic procedures as far as the confirmation of the malignancy at percutaneous or surgical biopsy. Costs of diagnostic imaging and pathology procedures were estimated according to 2005 national reimbursement rates. To estimate the costs of surgical consultation and diagnostic lumpectomy, we used the mean charge in the four regional hospitals accounting for 93.8% of follow-up. We observed an increased referral rate (RR) by 1.5 times from 1.05% in 2000 to 1.61% in 2004. Increased referral rates were associated with increased cancer detection rates (CDR, number of cancers detected per 1,000 women screened); a mean RR of 1.0% in 2000-2002 resulted in a mean CDR of 5.1, whereas a mean RR of 1.6% in 2003-2004 increased the mean CDR to 5.6. The increased referral rate was associated with a 2.3-fold increase of radiologic imaging procedures, a 2.4-fold increase of percutaneous biopsies, a 2.1-fold increase of outpatient surgical consultations and a 0.4-fold decrease of surgical biopsies. Altogether, the total workup cost increased by 1.3 times from € 221,000 to € 289,000. Per woman referred the total workup cost decreased from € 775 to € 550 over the years. The workup costs per breast cancer diagnosed varied between € 1200 (in 2002) to € 1625 (2003), with a mean of € 1500. We conclude that increased referral rates are not only associated with a favorable increase in cancer detection rate, but also with an increase in the number of workup procedures. The increased costs for imaging procedures and percutaneous biopsies are offset by decreased costs for surgical biopsies, and the cost per breast cancer diagnosed remained fairly stable over the years.

Abstractnr. : 9.2

FEASIBILITY OF A PORTABLE VACUUM ASSISTED BREAST BIOPSY DEVICE IN ULTRASONOGRAPHICALLY OCCULT NON-PALPABLE LESIONS

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Kennemer Gasthuis, HAARLEM

Purpose: To assess the feasibility of a vacuum assisted breast biopsy (VABB) system (Vacora®) in non-palpable ultrasonographically occult lesions with or without microcalcifications (BIRADS 4). Benefits of the VABB system include lower costs and versatility of the device.

Methods and materials: Fifty-eight consecutive patients who presented in our institution between March 2005 and March 2006 with microcalcifications or masses (BIRADS 4) on conventional mammography were included. Patients with palpable breast lesions and lesions that were visible on ultrasound imaging were excluded. In all patients just 4 10G samples were taken using a VABB device (Vacora®). Samples were evaluated by a senior pathologist. Technical success rate and pathological diagnoses were scored and compared with the results of the conventional stereotactic localization procedure (Mammotome®) in literature. All patients underwent repeat mammography after 12 months to exclude possible false-negative biopsies at baseline.

Results: Technical successrate was 57/58 (98%). 24/58 (43%) lesions were benign, while ductal carcinoma in situ (DCIS) was found in 20/58 (36%) lesions. Eight lesions were found to be invasive carcinomas (14%). The remaining lesions were atypical ductal hyperplasia (4/58, 7%). In 1 patient the samples were not representative. Short interval rebiopsy revealed DCIS in this patient. In another patient no representative sample could be obtained due to a too superficial localization of the lesion. No additional malignancies or DCIS lesions were detected at follow-up mammography. Complications occurred in 3 patients (5%) and consisted of excessive bleeding. Haemostasis was obtained in the examination room within 20 minutes. No late complications were reported. These results are in accordance with results of the Mammotome® as reported by other groups.

Conclusion: VABB using the Vacora® system is feasible in patients with non-palpable, ultrasonographically occult breast lesions. Results, technical successrate and missrate are comparable with that of the conventional biopsy device (Mammotome®).

Abstractnr. : 9.3

PROSPECTIEVE EVALUATIE VAN DE IMPLEMENTATIE VAN LOKALISATIE VAN NIET-PALPABELE MAMMATUMOREN MIDDELS RADIOACTIEF 125-JODIUM

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Doel: De standaard techniek voor het lokaliseren van niet-palpabele mammatumoren is draadlokalisatie. Er zijn echter forse nadelen inherent aan draadlokalisaties. Lokalisatie middels radioactieve 125-jodiumzaadjes is een nieuwere techniek. Resultaten van de implementatie van deze techniek in het Catharinaziekenhuis Eindhoven worden geëvalueerd.

Methode: Een prospectieve evaluatie van 230 vrouwen met histologisch bewezen mammacarcinoom is uitgevoerd tussen 2003 en 2006. Ter lokalisatie (echogeleid of stereotactisch) wordt een 4,5 x 0,8 mm titaniumzaadje ingebracht, gelabeld met 125-jodium en een 7KBq activiteit. Het zaadje moet zich binnen 1cm afstand van de afwijking bevinden. De chirurg gebruikt de Neoprobe 2000 gammadetector om het zaadje peroperatief te lokaliseren. Dezelfde probe wordt gebruikt voor de sentinel node biopsie.

Resultaten: Van de 230 ingebrachte 125-jodiumzaadjes zijn er 181 echogeleid ingebracht en 49 stereotactisch. De procedures zijn uitgevoerd door AIOS alsmede radiologen. Bij 36/ 230 procedures zijn meer dan een zaadje ingebracht; meestal vanwege uitgebreid microkalk of multifocale ziekte, in een minderheid vanwege technisch moeilijke procedure of materiaal falen. Bij 37/230 geopereerde patiënten (mammasparend) bleken de snijvlakken bij PA-onderzoek niet vrij van tumor; leidend tot reëxcisie of amputatie bij 23/37 patiënten. In 13/230 toonde PA-onderzoek een niet-maligne afwijking, bij 217/230 toonde definitieve PA-uitslag maligniteit. Alle patiënten ondergingen postoperatieve bestraling en chemotherapie volgens het protocol voor mammasparende behandeling. In een klein percentage (n=23) de 125-jodiumlokalisatie heeft plaats gevonden voorafgaand aan neoadjuvant behandeling, waarna een mammasparende operatie is uitgevoerd (n=19).

Conclusie: De radioactieve 125-jodiumlokalisatie heeft in deze grote groep patiënten bewezen om goed uitvoerbaar, praktisch en veilig te zijn. Het biedt de radioloog technische en logistieke voordelen. De afwijking kan op de meest praktische wijze worden benaderd. Er is geen risico meer op dislocatie van het lokalisatiemateriaal. Lokalisatie en operatie hoeven niet meer op dezelfde dag plaats te vinden. De chirurg kan het zaadje altijd via de kortste route benaderen en het is niet nodig om de resectievlakken aan te passen aan de positie van de lokalisatiedraad; een cosmetisch beter resultaat kan worden bereikt. Slechts in een klein percentage is vanwege irradicaliteit een reoperatie nodig geweest.

Abstractnr. : 9.4

COMPARISON OF THE INTERPRETATION OF FULL FIELD DIGITAL AND SCREEN-FILM MAMMOGRAMS

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Purpose: To compare the radiological interpretation of lesions seen on screen-film mammograms with soft copy reading of full-field digital mammography within the clinical routine.

The screen-film mammograms of 245 by the nationwide screening referred patients to this hospital between 2000 and 2004 were collected. These patients underwent a full-field digital mammography in this hospital during the same period. Five experienced radiologists read all the mammograms. For each patient, screen-film and full- field digital detected lesions were scored. Each lesion was characterized, measured, Bi-Rads classification was assigned and a percentage on a scale from 10-100% for chance of malignancy was given. Histology was obtained when there was a visible suspect lesion on the digital images. In case no histology was obtained, lesions were considered benign if patients were free of malignancy one year after the referral.

The total number of lesions was 147 (83 benign and 64 malignant) consisting of densities, micro calcifications, architectural distortion, focal and non-focal asymmetry or a combination of either one of these. ROC-analysis revealed better lesion qualification on digital images than on screen-film mammograms, although not statistically significant. The readers showed an AUC of 0.80, 0.85, 0.81, 0.77 and 0.75 for the screen-film and an AUC of 0.82, 0.88, 0.85, 0.83 and 0.83 for the digital images.

Conclusion: Full field digital mammography showed better lesion qualification results than screen-film mammography, although no statistically difference was found.

Abstractnr. : 9.5

HOE BETROUWBAAR IS HET ECHOGRAFISCH LOKALISEREN VAN MARKERS, DIE NA STEREOTACTISCHE MAMMABIOPTEN ZIJN INGEBRACHT?

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Alysis, locatie Rijnstate, ARNHEM

Echografisch occulte lesies kunnen na stereotactische biopten pro-diagnosi middels een ingebrachte marker toch echografisch gelocaliseerd worden, wat patiëntvriendelijker en sneller is dan röntgengeleid localiseren. Onderzocht werd in hoeverre deze manier van localiseren betrouwbaar is.

In de periode 26 januari tot 10 mei 2007 werden prospectief 43 niet-palpapele, echografisch occulte, mammografisch BIRADS III tot V, representatief gebiopteerde borstlesies in 42 patiënten geïncludeerd. De 43 lesies bestonden uit microkalk alleen (n=20: 47%), nodules met (n=6: 14%) of zonder kalk (n=14: 33%), of uit een scirrhus of distorsie (n=3: 7%) en waren benigne (n=24: 56%), A.D.H. (n=1: 2%), D.C.I.S (n=10: 23%) of invasief carcinoom (n=8: 19%). De gemiddelde afmeting van de lesies voor biopteren was 1,4 cm [range 0,2- 7,3] bij 0,9 cm [0,2- 3,3] bij 0,7 cm [0,2- 2,8]. Na 12 stereotactische, 11-gauge mammabiopten werd een echografisch en radiologisch zichtbare SenoRx Gel Mark® Ultra marker ingebracht na 1 cm terugtrekken van de naald (in 5 casus werd <1 cm teruggetrokken in verband met oppervlakkiger ligging van de lesie). Na biopteren was de lesie in 47 % verdwenen.

Bij 27 (63%) patiënten lag de marker in of binnen een afstand van 1 cm van het centrum van de (veronderstelde) lesie. Bij 16 (37%) patiënten lag de marker op meer dan 1 cm, gemiddelde afstand 2,5 cm [range 1,2- 5,6]. De marker lag in 91% proximaal van de gebiopteerde lesie in het biopsietraject en in 9% distaal.

Conclusie: Voordat besloten wordt tot echogeleide lokalisatie van de Ultra marker moet de juistheid van de ligging van de marker worden geverifieerd. Hiertoe kan men 2 dezelfde pre- en post-biopsie foto's maken, bij voorkeur 1 in de compressie- en 1 in de biopsierichting. Bij kleine lesies met kans op wegbiopteren is dit van groot belang omdat het bepalen van de juiste positie van de marker anders minder betrouwbaar is. Belangrijk is ook de vermelding van compressie- en biopsierichting in het biopsieverslag omdat de dislocatie van de marker vrijwel altijd in het biopsietraject plaatsvindt. Door inzicht in biopsietra-

ject en markerpositie kan (optimale richting van) echogeleide markerlocalisatie, danwel een stereotactische localisatie van de restlesie overwogen worden.

Abstractnr. : 9.6

MEASURING AND IMAGING OF IN VIVO DYNAMIC 3D MOTION OF THE WRIST JOINT

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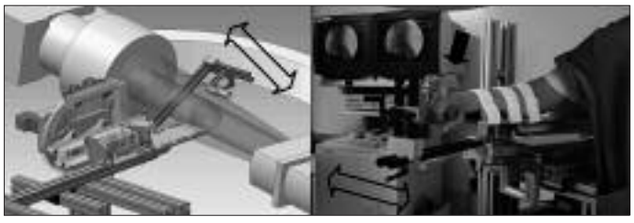
To understand the functioning of the wrist, the availability of dynamic 3D motion patterns of the carpal bones of the wrist joint is essential. Knowledge of in vivo dynamic motion patterns is expected to contribute to diagnosis, therapy development for wrist joint disorders. We present a method for in vivo measurement of dynamic carpal motion patterns. The method consists of a 4D-RX with improved image quality and image processing for accurate detection in vivo wrist motion measurements. A static and a dynamic 3D image is made of the same wrist. Dynamic 3D imaging yields a number of volume reconstructions of the wrist at different phases of an imposed cyclic motion, i.e. a 4D dataset. Next, the carpal reconstructions are registered to their static acquired and segmented counterpart in all phases. The registration procedure yields the translations and rotation of the carpal bones relative to the static image (motion parameters). With this information the relation between the applied motion and carpal kinematic behavior is acquired, i.e. the motion patterns. We investigated the precision and reproducibility of the image acquisition and processing. The current setup of mechanical enforced movement of the hand (see fig. 1) and 4D-RX imaging does not give in on 3D-RX imaging spatial resolution. The precision of the image acquisition, image processing, and retrospective synchronization is sub millimeter and sub degree which is better than existing systems and is expected to be sufficient for clinical investigations. Repeated measurements to determine the reproducibility show some more deviation (>1 degree). This method was tested on 4 human volunteers (fig. 2), illustrating hysteresis and change of motion patterns with and without axial load. In vivo motion pattern measurement with 4D-RX imaging and processing is accurate and non-invasive. The motion patterns potentially reveal dynamic disorders which could not have detected and quantified in either video fluoroscopy, CT, or MRI imaging.

FIGURE 1: FIG. 1. SETUP OF THE 4D-RX IMAGING.



Abstractnr. : 9.7

VOLUMETRIC COLOUR-CODED PIXEL-BY-PIXEL TIME INTENSITY CURVE SHAPE ANALYSIS DYNAMIC CONTRAST ENHANCED-MRI IN MSK : A USER-FRIENDLY GRAPHICAL USER INTERFACE

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AMC, AMSTERDAM

Dynamic Contrast Enhanced (DCE) MRI is a helpful diagnostic tool that has found a broad field of application. Besides the often used DCE-MRI parameters such as Maximum Enhancement (ME), Time to peak (TTP) or Initial Slope (IS) [1] the different enhancement TIC (Time intensity curve) patterns ('shapes') play an important role in diagnosis, as they may relate to different tissue behavior and /or to severity of disease [1]. The pattern analysis is usually performed by the radiologist through selected ROIs, and is thus subject to sampling errors. We present a new user-friendly GUI where we implemented our novel analysis and display method for DCE-MRI [2] where we created 'shape maps'using a colour-coded system that shows the uptake pattern distribution at pixel resolution in the whole FOV. In this way we visualize differences in enhancement patterns emphasizing the heterogeneity within the entire tumor or inflamed joint.
Material and methods: The algorithm we developed analyses any sort of DCE-MRI consisting of subsequent 3D or 2D dynamic Spoiled-GRE sequences during injection T1-enhancing contrast agent.
It automatically classifies the images into the 7 different classes representing the five characteristic curve shapes (I-II-III-IV-V) as described in [2], plus the arteries, and 'other' shapes. Each class is assigned a unique colour as displayed in figure 1.
The classification is displayed in colour coded 2-D maps within a friendly user interface (figure 2)

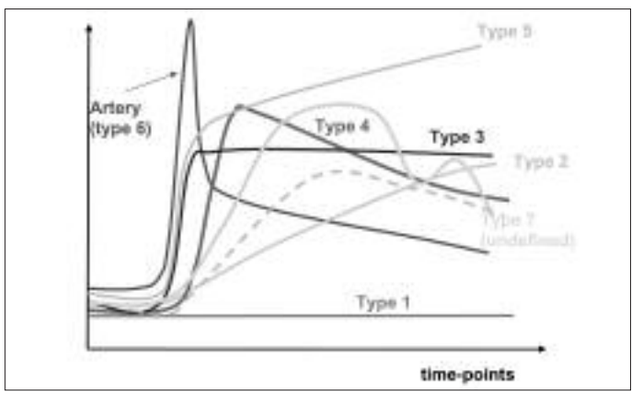

FIGURE 1: FIVE CHARACTERISTIC TIME INTENSITY CURVES

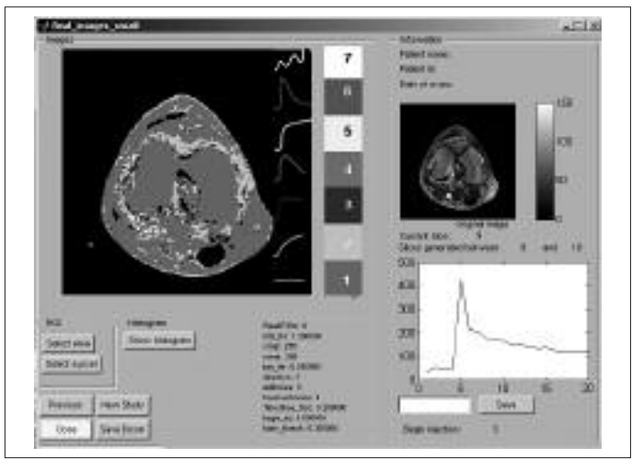

FIGURE 2: INTERFACE SHOWING ANALYSIS OF INFLAMMED KNEE JOINT

Results: This interface allows analysis of standard (ME, TTP, Slope) and TIC shapes in colour-coded maps (figure 2)and allows interactive selection of ROIs of pixel to visualize the TIC. Furthermore it allows statistical analysis of the outcome and easy saving in DICOM, text files or windows excel sheets. Heterogeneity of the lesion of interest is easily appreciated and biopsy can be guided by these measurements.

Conclusions: Multi-slice colour-coded Shape Maps in DCE-MRI reveal the heterogeneity of the TIC behavior within the affected tissue that is not seen on ROI analysis. This emphasizes that the use of ME maps only, and/or a ROI approach to identify the uptake pattern are not accurate enough, as they can miss the variations at microscopic level.

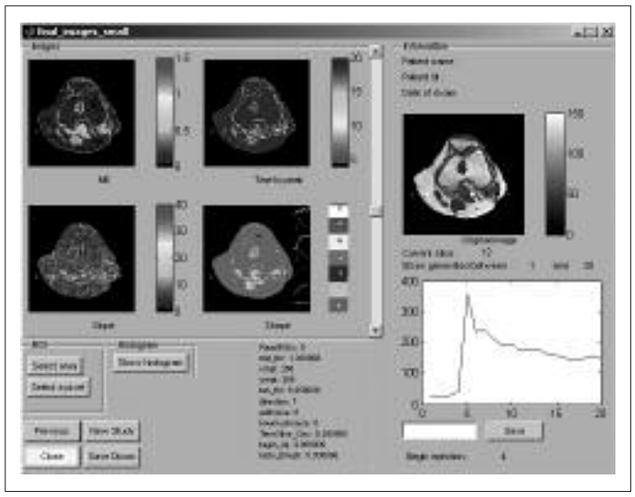

FIGURE 1: ME, SHAPE MAPS AND TIC IN A CHONDROSARCOMA

Abstractnr. : 9.8

PIXEL BY PIXEL CURVE SHAPE ANALYSIS IN DCE MRI: INITIAL EXPERIENCES

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AMC, AMSTERDAM

Dynamic contrast enhanced (DCE) MRI based on the observation 'by eye' of the TIC (time intensity curve) from an ROI chosen in the lesion by the radiologist is an important tool in the diagnosis of bone and soft tissue tumours. Sampling error in defining ROI is an important drawback. We have shown earlier that an overall pixel-by-pixel TIC analysis can add helpful information and highlight heterogeneity of tissue lesions.

This study illustrates the initial experiences of the use of colour-coded pixel-by-pixel TIC analysis in chondrosarcoma. We explore the variability of the TIC shape behaviour within the whole imaged area and compare the shape maps to the histological findings.

The DCE-MRI was performed with a 1.5 Tesla scanner (GE Signa) and consisted of 20 subsequent 3D-Spoiled GRE sequences (TE/TR/θ= 3.4/8.3/30), 20 slices, per volume, 20 sec per dynamic phase for a total of 7' 20'. Images were analysed using a user friendly graphical user interface program. We present the data of six adult patients with a chondroid lesion seen on conventional radiography and MRI, with a histopathology of grade 1 chondrosarcoma.

TIC analysis reveals that the tumour consistently show heterogeneous signal enhancement on DCE MRI, but on shape analysis it appears that this type of enhancement is mainly of type II curves (green, corresponding to slow enhancement), whereas type III and IV (fast enhancement followed by respectively a plateau and a wash-out) are only occasionally present. In figure 1, an example of the 'shape analysis' in one patient (bottom right) together with Maximum Enhancement, Time-to-peak and Slope images.

Colour-coded TIC analysis reveals a consistent behaviour in six low grade chondrosarcoma. Although on ME images intensity may vary, most of the pixels enhance with a slow pattern. Although the presented data is of a small group of patients, the lack of dominancy of type III and IV corresponds with the absence of high grade malignancy. The Volumetric analysis enables biopsy guidance , thus decreasing potential sample error. Future research is conducted in various areas of MSK pathology, such as tumours and inflammatory disease.

Sessie 10 - Neuroradiologie

Vrijdag 28 september 2007, 11.30 - 13.00 uur

Abstractnr. : 10.1

SINGLE-SLAB 3D MR IMAGING IN MULTIPLE SCLEROSIS: IMPROVED DETECTION AND CLASSIFICATION OF BOTH GRAY AND WHITE MATTER LESIONS

B. Moraal, S.D. Roosendaal, P.J.W. Pouwels, H. Vrenken, R.A. van Schijndel, J.J.G. Geurts, F. Barkhof

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MRI plays an important role in diagnosing and monitoring multiple sclerosis (MS) disease activity. Unfortunately, the clinico-radiological correlation between MRI indices and clinical disability is moderate at best. It might improve with high-resolution, multi-contrast, MR imaging that better depicts abnormalities in both white matter (WM) and gray matter (GM) structures. The purpose of this study was to prospectively assess the detection of GM and WM brain lesions in MS patients, comparing a high-spatial-resolution, single-slab 3D dataset with several contrasts (double inversion-recovery [DIR], fluid-attenuated inversion-recovery [FLAIR] and T2) plus a standard 3D T1-weighted magnetization prepared rapid acquisition gradient-echo [MPRAGE] to a conventional T2-weighted spin-echo (T2SE) sequence.

Single-slab 3D (DIR, FLAIR and T2) sequences plus a standard MPRAGE and a conventional T2SE were acquired in 16 MS patients (9 women, mean age 39.5 years), and 9 age-matched healthy controls (3 women, mean age 32.0 years). The entire single-slab 3D dataset was acquired within 26 minutes, featuring a high-spatial resolution and near isotropic voxel sizes (1.2 x 1.2 x 1.3 mm). The sequence parameters were, 3D-DIR (TR/TE/TI1/TI2 6500/349/2350/350 ms), 3D-FLAIR (TR/TE/TI 6500/349/2200 ms), 3D-T2 (TR/TE 4300/349 ms), 3D-MPRAGE (TR/TE/TI 2700/5/950 ms) and 2D-T2SE (TR/TE 2690/45/90 ms). Lesions were scored independently by two raters and characterized anatomically as: intracortical, mixed WM-GM, juxtacortical, deep GM, periventricular WM, deep WM and infratentorial. Two-tailed Bonferroni-corrected Student's t-tests were used to detect differences in lesion detection between the various sequences per anatomical area after log transformation.

The single-slab 3D-DIR showed the highest detection of intracortical and mixed WM-GM lesions (p=0.036 and p=0.019 respectively compared to T2SE) (Figure 1). The 3D-FLAIR showed the highest total number of WM lesions (p=0.002 compared to T2SE). Both DIR and FLAIR showed the highest number of infratentorial lesions due to the absence of flow artifacts (Figure 2).

Conclusion: Single-slab 3D-DIR and 3D-FLAIR allowed an improved detection and classification of both GM and WM lesions in MS patients and enabled an improved visualization of infratentorial lesions compared to T2SE. Furthermore, (intra)cortical lesions were also visualized with a 3D T1-weighted sequence.

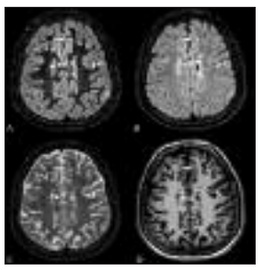

FIGURE 1. A: DIR, B: FLAIR, C: T2 AND D: MPRAGE

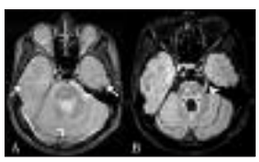

FIGURE 2. A: T2SE, B: FLAIR AND C: 3 DIR

Abstractnr. : 10.2

PERSISTENT TRIGEMINAL ARTERY (PTA) ASSOCIATED WITH TRIGEMINAL NEURALGIA

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The aim of this study was to determine the prevalence of a Persistent Trigeminal Artery (PTA), the most frequent persisting embryonic communication between the carotid and vertebrobasilar system, in patients presenting with trigeminal neuralgia (TN).

From January 1998 till January 2004, a series of 288 patients examined for trigeminal deficits were retrospectively evaluated. The MRI protocol (1.5 Tesla) consisted of a cerebral TSE T2-WI, contrast enhanced SE T1-WI and DRIVE (Intera) or CISS (Vision) images of the temporal bones, and a 3D TOF pre- and post contrast MRA of the head and neck. TN was defined as episodes of intense stabbing, electric shock-like pain in areas of the face supplied by the trigeminal branches. Neuro vascular compression (NVC) was defined as 1) the clinical features of TN, 2) contact between an artery and the trigeminal nerve on the affected side, 3) other pathology had to be excluded. The prevalence and confidence intervals were calculated (95% confidence intervals (95% CI) of the prevalence were based on the exact binomial distribution).

A total of 136 out of 288 patients matched the criteria of TN. In this series, contact between the trigeminal nerve and a PTA was detected in 3 patients, which corresponded in all cases with the side of the TN. The prevalence of a PTA in patients presenting with TN was 2.2%, with a 95%CI = 0.005 - 0.06.

In conclusion, previous results showed an incidental finding of a PTA ranging from 0.1 - 0.6% on cerebral angiograms. The prevalence of a PTA in patients

with TN is 2.2 %. With respect to the clinical significance, a PTA has to be included in the differential diagnosis in patients presenting with TN. The diagnosis of a PTA can easily been made by using MRI/MRA.

Abstractnr. : 10.3

VERY LONG-TERM FOLLOW-UP OF COILED INTRACRANIAL ANEURYSMS USING MR ANGIOGRAPHY AT 3.0-T

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Background and purpose: Long term angiographic results of coiled intracranial aneurysms are not yet established. We used MRA to assess the incidence of reopening of aneurysms 5 to 12 years after coiling. Moreover, we assessed incidence of growth of untreated additional aneurysms and the development of new aneurysms.
Patients and methods: Magnetic Resonance Angiography (MRA) at 3.0 T was performed 5-12 years after coiling in 94 patients with 100 coiled intracranial aneurysms that showed (near) complete occlusion at 6 months follow up angiography. Patients were selected from databases from three participating hospitals. MRA was compared with initial and follow up angiographic images for recurrence of the coiled aneurysm, growth of additional untreated aneurysms and new aneurysm formation.
Results: Cumulative incidence of reopening of the coiled aneurysm was 4.0 % (4 in 100, 95 % CI 1.2-10.2 %). Of four recurrences, one was major and three were minor. One aneurysm was additionally coiled.
Cumulative incidence of new aneurysm formation was 3.2% (3 in 94 patients, 95% CI 0.7-9.4 %). All three new aneurysms were small (2-3 mm). Of 8 untreated additional aneurysms one showed minimal growth.
Conclusion: Incidence of reopening after 5-12 years of a coiled aneurysm with (near) complete occlusion at 6 months was 4.3% and need for retreatment was 1.0 %. Incidence of growth of untreated additional aneurysms and development of new aneurysms was low and had no consequences in terms of treatment.

Abstractnr. : 10.4

DE DIAGNOSTISCHE WAARDE VAN CT ANGIOGRAFIE MET 'MATCHED MASK BONE ELIMINATION' VOOR DETECTIE VAN INTRACRANILE ANEURYSMA'S: EEN VERGELIJKING MET DIGITALE SUBTRACTIE ANGIOGRAFIE EN 3D ROTATIE ANGIOGRAFIE

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Doel: CT-angiografie (CTA) is de meest gebruikte diagnostische test voor detectie van intracraniële aneurysma's vanwege het minimaal invasieve karakter. De gouden standaard voor detectie en evaluatie van een intracranieel aneurysma is echter digitale subtractie angiografie (DSA). In deze studie wordt de diagnostische waarde van CTA in combinatie met 'matched mask bone elimination' (CTA-MMBE) vergeleken met digitale subtractie angiografie met 3D rotatie angiografie (3DRA).
Methoden: Tussen januari 2004 en februari 2006 ondergingen 108 patiënten met klinische verdenking op subarachnoïdale bloeding zowel CTA-MMBE als DSA. MMBE werd toegepast om bot te verwijderen van CTA beelden. Twee neuroradiologen scoorden onafhankelijk en in consensus, op CTA-MMBE per patiënt 27 vooraf gedefinieerde locaties op de aanwezigheid van een aneurysma. Daarnaast werd de kwaliteit van de MMBE techniek beoordeeld. DSA en 3DRA beelden werden gescoord door een interventie-neuroradioloog. De diagnostische waarde werd berekend per geobserveerde locatie en per patiënt. Interobserver variabiliteit werd berekend met kappa statistiek.
Resultaten: Op DSA werden bij 88 patiënten (81%) 117 aneurysma's gevonden (82 geruptureerde en 35 additionele aneurysma's). Met CTA-MMBE werden op één na alle geruptureerde aneurysma's gevonden. Specificiteit, sensitiviteit, positief voorspellende waarde en negatief voorspellende waarde van CTA-MMBE was 0.99, 0.90, 0.98 en 0.95 per patiënt en 0.91, 1.00, 0.97 en 0.99 per locatie. De sensitiviteit voor aneurysma's ≥ 3 mm was 0.99 en 0.38 voor aneurysma's < 3 mm. Interobserver variabiliteit voor de detectie van aneurysma's was uitstekend (κ waarde 0.92 per locatie en 0.80 per patiënt).
Conclusie: CTA-MMBE is een accurate manier om intracraniële aneurysma's te detecteren in projectie beelden zonder overprojectie van botstructuren. De sensitiviteit van CTA-MMBE is beperkt voor de detectie van zeer kleine aneurysma's. Uit onze data kan geconcludeerd worden dat na detectie van een geruptureerd aneurysma met CTA-MMBE, DSA en 3DRA voorafgaand aan de endovasculaire behandeling beperkt zou kunnen worden tot het vat met het geruptureerde aneurysma.

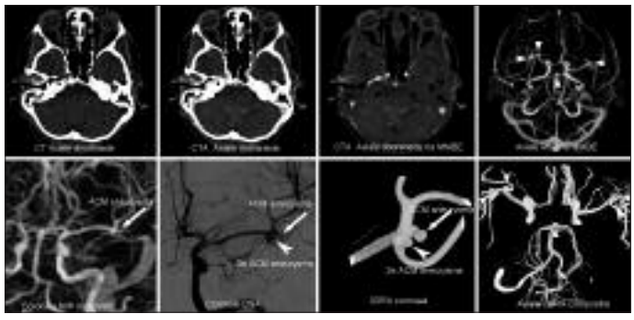

FIGURE 1: MMBE PROCEDURE BIJ EEN 44-JARIGE VROUW.

Abstractnr. : 10.5

MRI BIOMARKERS AS PREDICTORS OF MORTALITY IN A MEMORY CLINIC POPULATION

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VU Medisch Centrum, AMSTERDAM

Although MRI biomarkers play an increasingly important role in the diagnostic process of dementia, the value of commonly used visual rating scales in predicting outcome is less understood. We investigated to which extent simple MRI rating scales predict mortality in dementia.
Our study population consisted of 1179 consecutive patients attending our memory clinic. Included diagnostic categories were: Subjective Complaints (n:

228), Mild Cognitive Impairment (MCI; n: 165), Alzheimer's Disease (AD; n: 368), other dementia (n: 188) and other diagnosis (n: 230). Information about patients' survival was derived either from returned questionnaires sent out to patients' general practitioners, or from their clinical files. Baseline MRI scans were assessed using visual rating scales for Medial Temporal lobe Atrophy (MTA; range 0-4), Global Cortical Atrophy (GCA; range 0-3) and White Matter Hyperintensities (WMH; range 0-3). The number of microbleeds was counted and recoded into three categories (zero; one or two; three or more). Cox proportional hazard model was used to calculate risk of mortality for the four different measures.

In univariate analysis, all four measures predicted mortality. After correction for age, sex and diagnosis, only the measures related to small vessel disease (WMH and microbleeds) remained predictors of mortality (WMH: HR 1.2 (C.I. 1.0-1.4); microbleeds HR 1.5 (C.I. 1.1-2.0)). After stratification for age, we found that MTA and GCA had a predictive effect on mortality in younger subjects (MTA: HR 1.5 (C.I. 1.0-2.4); GCA: HR 1.7 (C.I. 1.2-2.6)), and not in older subjects. Microbleeds only predicted mortality in the older subjects (HR 1.5 (C.I. 1.1-2.1)), and had no predictive effect in the younger subjects.

Conclusion: In this heterogeneous population of memory clinic patients, the severity of small vessel disease, assessed by WMH rating scale and number of microbleeds on MRI, had an independent predictive effect on mortality. Stratification for age showed that neurodegenerative markers (MTA and GCA) had a predictive effect in younger subjects, and the effect of microbleeds was restricted to older subjects. These results suggest that simple MRI biomarkers, in addition to their diagnostic value, also have a prognostic value, since they are related to mortality.

Abstractnr. : 10.6

RATE OF WHOLE BRAIN ATROPHY IS ASSOCIATED WITH COGNITIVE DECLINE OVER TIME IN A MEMORY CLINIC SETTING

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[1]VU Medisch Centrum, AMSTERDAM

[2]UCL, LONDON, United Kingdom

We determined the rate of brain atrophy in mild cognitive impairment (MCI) and Alzheimer's disease (AD), and assessed associations with cognitive decline. Furthermore, we investigated the risk of progression to dementia, dependent on baseline brain volume and rate of atrophy in initially nondemented patients. For this purpose we included 65 patients with AD, 45 patients with MCI, 27 patients with subjective complaints and 10 normal controls from our memory clinic. For each patient two MR scans were acquired, with an average interval of 1.8 years (sd 0.7; range 0.9-4.2y). Baseline brain volume and rate of atrophy were measured from 3D T1-weighted MR imaging. Baseline brain volume was lowest in the AD group (mean±SD 1453±88mL) when compared to MCI (1483±78mL; p=0.09), subjective complaints (1536±91mL; p<0.001) and controls (1541±99mL; p<0.01). However, MCI, subjective complaints and controls did not differ significantly. Rates of atrophy were higher in AD (-1.9±0.9%/y) than MCI (-1.2±0.9%/y; p=0.003), who in turn had higher rates of atrophy than patients with subjective complaints (-0.7±0.7%/y; p<0.001) and controls (-0.5±0.5%/y; p<0.001). Subjective complaints and controls did not differ significantly. Rate of atrophy correlated better (r=0.47, p<0.001) than baseline brain volume with baseline MMSE (r=0.32, p<0.001). Rate of atrophy correlated with annualized MMSE change (r=0.47, p<0.001), while baseline volume did not (r=0.11, p=0.22). Cox proportional hazard models showed that 'after correction for age, sex, and baseline MMSE- a higher rate of atrophy was associated with an increased risk of progression to dementia (highest vs lowest tertile: hazard ratio 3.6 (confidence interval 1.2-11.4)). In conclusion, rate of atrophy can discriminate between diagnostic groups. Furthermore, the clinical relevance of whole brain atrophy rates was demonstrated by a strong association with cognitive decline. Finally, a high rate of brain atrophy is associated with an increased risk of progression to dementia.

Abstractnr. : 10.7

LONG-TERM OUTCOME AFTER COMPLICATED MINOR HEAD INJURY

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[4]AzM, MAASTRICHT

Purpose of this study was to assess functional outcome and postconcussive symptoms in minor head injury patients with neurocranial traumatic findings on CT, and to evaluate whether specific CT findings are predictive of poor functional outcome.

All patients from the CT in Head Injury Patients (CHIP) study with neurocranial traumatic CT findings were included. The CHIP study is a prospective, multicentre study of consecutive patients, aged >= 16 years, presenting within 24 hours of blunt head injury, a Glasgow Coma Scale (GCS) score of 13-14 or a GCS score of 15 and a risk factor: loss of consciousness, anterograde amnesia, amnesia for the traumatic event, post-traumatic seizure, vomiting, headache, intoxication with alcohol/drugs, coagulopathy, supraclavicular injury, neurological deficit. Primary outcome was functional outcome according to the Glasgow Outcome Scale (GOS). Other outcome measures were the modified Rankin Scale (mRS), Barthel Index (BI), and number and severity of postconcussive symptoms (Rivermead questionnaire). The association between CT findings and outcome was assessed using univariable and multivariable regression analysis. GOS was assessed in 237/312 patients (76%) at an average of 15 months after injury (range 0-56 months). There was full recovery in 150 patients (63%), moderate disability in 70 (30%), severe disability in 7 (3.0%), and death in 10 (4.2%). Outcome according to the mRS and BI was also favourable in most patients, but 82% (71/87) of patients had postconcussive symptoms. Evidence of parenchymal damage was the only independent predictor of poor functional outcome (odds ratio = 1.89; p=0.022)

Conclusion: Patients with neurocranial complications after minor head injury generally make a good functional recovery, but postconcussive symptoms may persist. Evidence of parenchymal damage on CT was predictive of poor functional outcome.

GENOMINEERD

Radiologendagen Prijs 2007

Abstractnr. : 10.8

BRAIN ACTIVATION CHANGES OF WORKING MEMORY IN MINOR HEAD INJURY PATIENTS MEASURED WITH FUNCTIONAL MAGNETIC RESONANCE IMAGING (FMRI)

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[2]GE Healthcare, 'S-HERTOGENBOSCH

After minor head injury (MHI) postconcussive symptoms such as memory and attention deficits commonly occur, while conventional imaging as well as neuropsychological testing are often normal. The purpose of this study was to compare brain activation seen with fMRI during a working memory task in MHI patients and healthy controls.

22 Patients 1 month after MHI and 11 healthy controls (matched for age, gender and educational level) were scanned on a 3.0T MRI scanner (GE Healthcare, US). For functional imaging, a T2*w gradient echo EPI sequence was used (TR/TE 2500/30 ms; voxel size 3.4x2.3x3.5 mm3; acquisition time 6:30 min). The stimulation paradigm consisted of an auditorily presented n-back task, with conditions of increasing working memory load: 0-back, 1-back and 2-back. For anatomical reference a high resolution 3D FSPGR IR T1 weighted sequence was used (TR/TE/TI 10.4/2.1/300 ms; voxel size 0.54x0.97x1.6 mm3; acquisition time 4:57 min). Postconcussive symptoms were evaluated using the Rivermead questionnaire (King et al. J Neurol 1995:587-92). Functional data analysis (SPM2: Wellcome Dept. London, UK) consisted of realignment, coregistration, normalization and smoothing (6x6x6 mm3) and of single subject and second level group analyses.

Subject age range was 18-45 yrs, 20 subjects were male. 12 (55%) MHI patients had postconcussive symptoms (Rivermead scores 8-46). Second level group analysis of all subjects combined showed significant ($p<0.05$, corrected) bilateral activation in the prefrontal cortex (Brodmann area (BA) 9,13,45,47), precuneus and superior parietal lobule (BA 7,19,40), and the left middle frontal gyrus (BA 6) for the 1-back versus 0-back and the 2-back versus 0-back comparisons (figure 1). In patients compared to controls and to asymptomatic patients, significant ($p<0.001$) activation was seen in the posterior cingulate gyrus (BA 23,31; figure 2), the isthmus (BA 29,30) and the parahippocampal gyrus (BA 27; figure 3).

Conclusion: Patients with postconcussive symptoms 1 month after MHI show recruitment of additional brain regions to perform a working memory task, that are functionally related to memory processing, and have been implicated in other cognitive disorders (Yetkin et al. Eur Radiol 2006;16:193-206). These differences in activation patterns may reflect injury-related changes, compensating for (otherwise undetectable) brain damage.

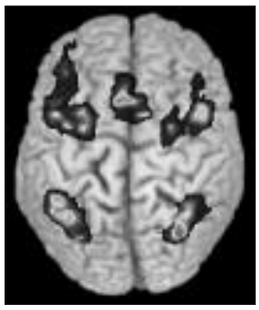

FIGURE 1: 2-BACK VS. 0-BACK (MAIN EFFECT)

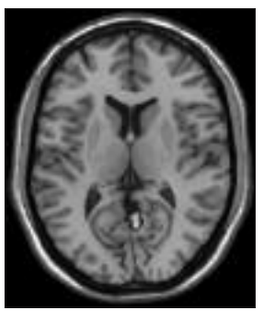

FIGURE 2: POSTERIOR CINGULATE GYRUS ACTIVATION

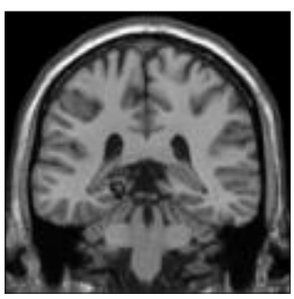

FIGURE 3: PARAHIPPOCAMPAL GYRUS ACTIVATION

AANTEKENINGEN

Routebeschrijving De Doelen

Trein, tram, bus en metro stoppen bij de Doelen voor de deur. Bovendien biedt de omgeving van de Doelen ruime parkeermogelijkheden.

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Trein - Rotterdam CS op 5 minuten loopafstand.
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Tram - halte Kruisplein 4, 7, 8, 20, 21, 23 en 25.
Bus - halte Centraal Station, lijn 33, 38, 44, 48 en 49.

Let op

Het Station en het Stationsplein worden op dit moment ingrijpend vernieuwd. Ook bezoekers van de Doelen hebben hiermee te maken. Zie www.rotterdam-centraal.nl voor meer informatie.

ROUTEBESCHRIJVING AUTO

Vanuit Amsterdam / Den Haag

A13 richting Rotterdam, bij Kleinpolderplein richting Centrum volgen, bij tweede stoplicht borden Euromast/Maastunnel volgen, na stoplicht rechtertunnel nemen, bij stoplicht links. U komt nu uit op het Weena. Zie verder de onderstaande plattegrond (route A).

Vanuit Utrecht

A20 richting Den Haag / Hoek van Holland, afslag Rotterdam Centrum / Schiebroek / Hillegersberg, bij einde afslag borden Centrum volgen (Schieweg / Schiekade). U komt nu uit op het Hofplein.
Zie verder de onderstaande plattegrond (route B).

Vanuit Breda / Dordrecht

Kies op de A16 de rechterbaan (volg Kralingen / Rotterdam Centrum). Rijd over de Van Brienenoordbrug, eerste afslag (Rotterdam Centrum). Onderaan de afslag linksaf (rotonde richting Centrum), de Maasboulevard op. Rechtdoor (langs de Boompjes). Bij Hotel Inntel (aan uw rechterhand) gaat u rechtsaf de Schiedamsedijk op. Volg deze tot aan de kruising Coolsingel-Westblaak. Ga op deze kruising naar links de Westblaak op of rijd rechtdoor richting Hofplein. Zie verder de onderstaande plattegrond (route C).

Parkeren

In de buurt van de Doelen zijn zes parkeergarages op loopafstand:

1. Parkeergarage Schouwburgplein.
2. Parkeergarage Groothandelsgebouw
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Voor en door Radiologen

Verkorte productinformatie **Vasovist®**
Samenstelling 1 ml Vasovist oplossing voor injectie bevat 244 mg (0,25 mmol) gadofosveset-trinatrium als werkzaam bestanddeel. *Hulpstoffen*: Fosveset, natriumhydroxide, zoutzuur en water voor injecties. **Indicaties** Dit geneesmiddel is uitsluitend voor diagnostisch gebruik. Vasovist is geïndiceerd voor contrast-versterkte MRA voor het zichtbaar maken van bloedvaten van het abdomen of van de ledematen bij patiënten met verdenking op of bekende vasculaire aandoeningen. **Contra-indicaties** Overgevoeligheid voor het werkzame bestanddeel of voor een van de hulpstoffen. **Speciale waarschuwingen en voorzorgen bij gebruik** *Waarschuwing voor overgevoeligheid* Men dient immer rekening te houden met te mogelijkheid van een reactie, waaronder ernstige, levensbedreigende, dodelijke, anafylactische of cardiovasculaire reacties, of andere idiosyncratische reacties, in het bijzonder bij patiënten met een bekende klinische overgevoeligheid, een eerdere reactie op contrastmiddelen, astma of andere allergische aandoeningen in de voorgeschiedenis. *Overgevoeligheidsreacties* Indien een overgevoeligheids-reactie optreedt, dient toediening van het contrastmiddel onmiddellijk te worden gestaakt en - indien nodig - specifieke veneuze behandeling te worden ingesteld. *Nierfunctiestoornissen* Omdat gadofosveset door het lichaam via de urine wordt uitgescheiden, dient voorzichtigheid te worden betracht bij patiënten met nierfunctiestoornissen (zie Rubriek 5.2). Dosisaanpassing bij nierfunctiestoornissen is niet noodzakelijk. Bij patiënten met ernstiger gestoorde nierfunctie (klaring <20 ml/min) die geen routine dialyse ondergaan, dienen de voordelen en de risico's zeer zorgvuldig te worden afgewogen. *Veranderingen op het ECG* Verhoogde spiegels van gadofosveset (bijvoorbeeld bij herhaald gebruik gedurende een korte periode (binnen 6-8 uur), of accidentele overdosering van > 0,05 mmol/kg kan in verband gebracht worden met een geringe QT prolongatie (8,5 msec bij Fridericia correctie). In het geval van verhoogde gadofosvesetspiegels of onderliggende QT-verlenging, moet de patiënt zorgvuldig worden geobserveerd met inbegrip van hartbewaking. *Vaatstents* In gepubliceerde studies is beschreven dat de aanwezigheid van metaalstents artefacten veroorzaakt bij MRA. De betrouwbaarheid van het met VASOVIST zichtbaar maken van het lumen bij vaten waarin een stent is geplaatst, is niet onderzocht. **Bijwerkingen** De meest voorkomende bijwerkingen waren pruritus, paresthesieën, hoofdpijn, misselijkheid, vasodilatatie, brandend gevoel en dysgeusie. De meeste ongewenste bijwerkingen waren van lichte tot matige intensiteit en traden binnen 2 uur op. Vertraagde reacties kunnen optreden (na uren tot dagen). Zie verder de SmPC-tekst. **Handelsvorm** 10 flacons à 10 ml **Registratienummer** EU/1/05/313/003 **Naam en adres van de registratiehouder** Bayer Healthcare, in Nederland vertegenwoordigd door Bayer Schering Pharma, Postbus 80, 3640 AB Mijdrecht – tel. (0297) 28 03 78. **Afleveringsstatus** UR. **Datum van goedkeuring/herziening van de SmPC** 3 oktober 2005. **Stand van informatie** maart 2006. Uitgebreide informatie (SmPC) is op aanvraag verkrijgbaar.

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