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Orthopaedie

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Voorwoord

In dit voorwoord wilde ik het eens hebben over discriminatie. “Je mag niet discrimineren” wordt veelal gezegd. Maar de waarheid ligt toch net als altijd weer net even anders. Discriminatie betekent letterlijk “het maken van onderscheid”. De huidige betekenis van het woord discriminatie is in maatschappelijk en juridisch opzicht gaan afwijken van de oorspronkelijke, letterlijke betekenis; in die context wordt onder discriminatie verstaan: “het onrechtmatig onderscheid maken tussen mensen of groepen”.

Het maken van onderscheid is iets waar wij als orthopeden dagelijks mee te maken hebben. Wat voor de ene patiënt goed is, is niet per se goed voor een andere patiënt. Het gaat om de context waarin die patiënt zich bevindt. De rokende patiënt met een pseudarthrose van het scaphoid heeft minder kansen op een succesvol herstel dan de niet-roker. Dit onderscheid is duidelijk en dient gemaakt te worden.

Ook leeftijd wordt zeer vaak als discriminerende factor gebruikt als het gaat over al dan niet in aanmerking komen voor een operatie (cuff herstel, arthroscopie knie, etc). De vraag is of dit onrechtmatig is. Gezien de overdaad aan literatuur op dit vlak waarschijnlijk niet. Deze discriminatie mag dus niet alleen maar moet.

Afgelopen zomer werd duidelijk onderscheid gemaakt tussen ‘vrouwenvoetbal’ en ‘voetbal’. Daar waar de dames zich met het voetbalspel bezig houden wordt de term ‘vrouwen’ toegevoegd aan de naam van het spel, terwijl als de heren zich bezig houden met hun veldspel, de term ‘mannen’ eigenlijk nooit wordt toegevoegd. Het leek er toch op dat het vrouwenvoetbal ten opzichte van het mannenvoetbal als iets anders werd (en wordt) gezien, zoals pupillenvoetbal, G-voetbal en tafelvoetbal. Het woord ‘voetbal’ wordt dus als *toto pro pars* gebruikt als het om mannenvoetbal gaat. Enerzijds werd door de dames geklaagd over dit onderscheid (“het is toch ook gewoon voetbal en misschien wel leuker dan mannenvoetbal”), anderzijds werd het shirt met daarop de Nederlandse Leeuw verbouwd tot een getailleerd leeuwinnen shirt met een logo zonder manen. De discriminatie was dus enerzijds ongewenst, maar anderzijds gewenst. Overigens heb ik het hier niet over vrouwenvoetbal en voetbalvrouwen, dat verschil is voor een andere keer. Dit discriminerende fenomeen beperkt zich overigens niet alleen tot het voetbal, want ook damestennis en dameshockey zijn ingeburgerde woorden. Waarschijnlijk is het onderscheid niet onrechtmatig met de verschillende behandeling ten gevolge.


Binnen de orthopedie wordt er overigens ook onderscheid gemaakt tussen de dames en de heren. Niet alleen zijn er bepaalde aandoeningen die vaker voorkomen bij een van beide seksen maar ook in organisatorisch opzicht is er de Dutch Orthopaedic Ladies Society (DOLS) en bestaat er geen tegenhanger als bijvoorbeeld een Dutch Orthopaedic Gentlemen Society (DOGS). Gelukkig mogen dames, heren en pupillen, maar tegenwoordig ook andere beroepsbeoefenaren in de orthopedie lid zijn van de NOV en wordt daar geen onderscheid gemaakt.

Een voorwoord over discriminatie kan gevaarlijk zijn en kan verkeerd opgevat worden door sommigen. Tegen hen die aanstoot namen aan bovenstaande wil ik zeggen dat vrouwen en mannen gelukkig niet gelijk zijn, maar dat een verschil juist onderscheidend kan zijn.

Uw (mannelijke) hoofdredacteur, Taco Gosens


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Dr. Walter van der Weegen

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Mw. Sue Morrenhof-Atkinson

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Dr. Job L.C. van Susante
Dr. Peer van der Zwaal

UITGEVER & REDACTIESECRETARIAAT

Serendipity Publishing
Dorpsweg 81
1676 GE Twisk
Telefoon: 0651-174410
E-mail: ntvo@serendipity-publishing.nl

RICHTLIJNEN VOOR AUTEURS

www.ntv-orthopaedie.nl

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- Het bevorderen van studie en het verbreiden van kennis van de conservatieve en operatieve orthopedie onder artsen.
- Het behartigen van de sociale belangen van de artsen die de orthopedie uitoefenen, zowel binnen de vereniging als daar buiten.

Het Nederlands Tijdschrift voor Orthopaedie is het officiële orgaan van de Nederlandse Orthopaedische Vereniging. Het heeft ten doel de leden van de Vereniging en andere geïnteresseerden te informeren over ontwikkelingen op orthopedisch gebied, waarbij zowel klinische als fundamentele aspecten worden belicht. Deze doelstelling wordt verwezenlijkt in de vorm van oorspronkelijke artikelen, editorials en verslagen van wetenschappelijke vergaderingen, met name die van de NOV. Naast verenigingsnieuws wordt ook aandacht besteed aan recent verschenen literatuur en proefschriften. Voorts worden congressen, symposia en workshops op het gebied van de orthopedie aangekondigd.

Beweringen en meningen, geuit in de artikelen en mededelingen in deze publikatie, zijn die van de auteur(s) en niet (noodzakelijkerwijs) die van de redactie. Grote zorgvuldigheid wordt betracht bij de samenstelling van de artikelen. Fouten (in de gegevensverwerking) kunnen echter niet altijd voorkomen worden. Met het oog hierop en omdat de ontwikkelingen in de medische wetenschap snel voortschrijden, wordt de lezer aangeraden onafhankelijk inlichtingen in te winnen en/of onderzoek te verrichten wat betreft de vermelde diagnostische methoden, doseringen van medicijnen, enz. De redactie wijst elke verantwoordelijkheid of aansprakelijkheid voor (de juistheid van) dergelijke gegevens van de hand en garandeert noch ondersteunt enig produkt of enige dienst, geadverteerd in deze publikatie, noch staat de redactie garant voor enige door de vervaardiger van dergelijke produkten gedane bewering.

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Patient Reported Outcome Measures in clinical practice - Results of a local registry

Nienke Wolterbeek, M. Remmelt Veen and Martijn Van Dijk

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Introduction: Patient Reported Outcome Measures (PROMs) are used to evaluate and manage the treatment of individual patients. The health care industry are progressively interested in using these measuring instruments as an indicator of the quality of care. The goal of this article is to describe the design of our local registry system, present the results of the first 3 years and describe encountered problems when using PROMs for registry purposes.

Patients and Methods: The registry included three patient groups: primary total hip arthroplasty (THA), primary total knee arthroplasty (TKA) and anterior cruciate ligament reconstruction (ACL) patients. Each patient group had their own trajectory of questionnaires using standard evaluation moments (preoperatively, 3, 6, 12 and 24 months). Patients received an automatically generated invitation by e-mail directly after registration in the system. Postoperative invitations were automatically generated and were triggered by the date of surgery. For each patient group, specific questions were linked to an alert. When an answer was given below or above a cut-off value the patients' orthopaedic surgeon was automatically notified by e-mail.

Results: 1111 patients were included and 3191 measurements were filled out. In general, 55.5% of patients were approached to participate and 28.4% of these patients declined or could not participate. The overall preoperative response rate, in respect to the total number of performed surgeries, varied between groups: THA 35.1%, TKA 34.9% and ACL 28.9%. The amount of postoperative alert notifications were comparable between groups: THA 8.7%, TKA 13.1% and ACL 7.7%.

Discussion: When setting up this local registry, impasses had to be resolved and decisions had to be made, sometimes without decisive evidence. Adjustments have been made to improve logistics, response rates and reliable outcomes. Optimal measuring points, time windows, the response rate, case-mix variables, norm values, comparison strategies, interpretation of outcomes, thresholds for alert notifications, minimal detectable change and other measurement properties of the used questionnaires, is just a selection of items that must be analysed and evaluated to further develop a reliable and useful national registry.

Conclusion: Local and national registries take time to develop. More health institutions should publish their results and ideally we need to combine them to reach a consensus, achieve reliable norm values and realistic goals in terms of response rates, interpretation of outcomes and the treatment success.

Introduction

Patient Reported Outcome Measures (PROMs) are measuring instruments (questionnaires) emanating from the perspective of the patients. An enormous amount of questionnaires are available to assess general health outcomes (e.g. quality of life), disease- or joint-specific outcomes (e.g. pain, function).^{1,2} PROMs measure, for example, perceived health or the subjective results of treatment. Originally PROMs were mainly used in clinical research as an adjunct to outcome measures such as morbidity, mortality, infection, revision or the surgeons opinion of success.³ Nowadays, PROMs are increasingly used by clinicians to evaluate and manage the treatment of individual patients and

the health care industry becomes progressively interested in using these measuring instruments as an indicator of the quality of care. This fits in well in the substantial changes in health policy and regulations which were implemented in The Netherlands aiming to ensure quality, accessibility and affordability of healthcare by enhancing regulated market competition.⁴ Patients are given more freedom in their choice of treating physicians, and therefore, differences between health care providers and insight in the quality of provided healthcare should be transparent and available.⁴ This trend to transparency can also be seen worldwide and is marked by the increasing number of national total knee and total hip arthroplasty registries.^{5,6} In The Netherlands, the Dutch Orthopaedic Association (NOV) and the Dutch Arthroplasty Register (LROI) have taken the first steps to implement PROMs for total hip and total knee patients into the national arthroplasty register. When PROMs from the health institutions are collected with the aim of comparing the results or using the data for benchmarking, it is important that the setting and methods of collecting data are well described and unambiguous.

N. Wolterbeek, PhD¹, M.R. Veen, MD, PhD²,
M. Van Dijk, MD, PhD²

¹ Research Coordinator,

² Orthopaedic Surgeon, Department of Orthopaedic

Surgery, St. Antonius Hospital, Utrecht, The Netherlands

Corresponding author: Nienke Wolterbeek, PhD

Email: N.Wolterbeek@antoniusziekenhuis.nl

Furthermore, factors such as case-mix variables, norm values, minimal detectable change and other measurement properties of the used questionnaires should be included in the analysing strategy.^{7,8}

The department of Orthopaedic Surgery of the St. Antonius hospital started collecting PROMs in 2013 in order to evaluate and manage the treatment of individual patients. This could increase the efficiency by preventing unnecessary hospital visits and enable faster response times when treatment is not proceeding as desired. This paper describes the design of the local registry and the results of the first 3 years and thereby contributing to the first steps towards the creation of reliable Dutch norm values. Secondary objective was to explore issues such as optimal measuring points, time windows, response rates and case-mix variables in order to facilitate discussion and thereby improve local and national registries.

Patients and Methods

On January 1st, 2013 a local PROMs registry was established at the department of Orthopaedic Surgery of the St. Antonius Hospital, The Netherlands. The registry included three clearly delineate patient groups, namely primary total hip arthroplasty (THA), primary total knee arthroplasty (TKA) and anterior cruciate ligament reconstruction (ACL) patients. The registry was designed and integrated

into an external software package (NetQ Healthcare, Amsterdam, The Netherlands). The registry was approved by our institutional review board.

At the outpatient clinic patients eligible for one of the selected surgeries were approached and asked to participate by one of the orthopaedic surgeons or physician assistants. If they gave their consent, their e-mail address was recorded. The corresponding PROMs trajectory was started by an orthopaedic secretary. It was decided, to avoid confusion, that patients could only participate in a single trajectory. Therefore, when a patient was included in, for example, the THA trajectory and was selected for a contralateral THA or a TKA, the second prosthesis was not registered. Patients who were not able to participate (e.g. no computer, no internet access, language barrier) or declined to participate were separately recorded for data analysis. It was decided to exclude the patients with no computer or internet access from the registry, and no paper questionnaire were sent because of logistical problems and excessive administrative workload. Patients that missed their outpatient clinic appointment were contacted by e-mail (when known) or by telephone and were informed and asked for participation. In this way we strived to reach 100% patient participation. If after several attempts (at least 3) a patient could not be reached, the patient was listed as lost to follow-up.

Table 1. Questionnaires and questions per patient group.

	Total hip arthroplasty	Total knee arthroplasty	Anterior cruciate ligament reconstruction
General health	EQ-5D	EQ-5D	EQ-5D
Pain	Pain at rest	Pain at rest	
	Pain during activities	Pain during activities	
Group specific	HOOS-PS	KOOS-PS	IKDC
	Oxford Hip Score		Tegner Activity Scale
	Forgotten Joint Score	Forgotten Joint Score	
Anchor	Expectations/ Satisfaction	Expectations/ Satisfaction	Expectations/ Satisfaction

EQ-5D: EuroQol- 5 dimensional health questionnaire; HOOS-PS: Hip disability and Osteoarthritis Outcome Score - Physical Function Short Form; IKDC: International Knee Documentation Committee; KOOS-PS: Knee Injury and Osteoarthritis Outcome Score - Physical Function Short Form.

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Registry system

Each patient group had their own trajectory of questionnaires (Table 1). The standard evaluation moments were preoperatively and 3, 6, 12 and 24 months postoperatively, with a maximum responding window of 90 days for the preoperative evaluation, 45 days for the 3 and 6 months evaluation and 90 days for the 12 and 24 months evaluation. A literature search was performed to clarify which questionnaires were available for which patient group and which questionnaires were officially translated and validated in Dutch. This literature search was used to compile a set of questionnaires for each group. This included a general health questionnaire measuring aspects concerning, for example, self-care and mobility, pain questions and for at least one patient- group specific questionnaire measuring the symptoms and impact on the function of a specific condition. Our set of selected questionnaires included all questionnaires which were at a later stage recommended by the Dutch Orthopaedic Association (NOV).

General health was measured using the EQ-5D-3L health state scale (0-100).⁹ Pain at rest and during activity was scored on a 0-10 visual analogue scale (VAS). For the specific outcome measures the Hip disability and Osteoarthritis Outcome Score - Physical Function Short Form (HOOS-PS: range 0-20),¹⁰ the Knee Injury and Osteoarthritis Outcome Score - Physical Function Short Form (KOOS-PS: range 0-28),¹¹ the Oxford Hip Score (OHS: range 0-48),¹² the International Knee Documentation Committee (IKDC: range 0-100),¹³ the Tegner Activity Scale (range 0-11)¹⁴ and Forgotten Joint Score (FJS: range 0-100)¹⁵ were used. Scoring of the HOOS-PS, KOOS-PS and OHS were converted to a scoring range of 0-100 for interpretation. Most questions were mandatory to prevent missing data.

Participating patients received an automatically generated invitation by e-mail directly after registration (preoperative measurement). Postoperative invitations were also automatically generated

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Table 2. The number of surgeries of eligible patients, approached patients, filled out measurements and response rates per patient group.

	THA	TKA	ACL
Performed Surgeries	1256	1042	499
Approached patients	740 (58.9%)	610 (58.5%)	202 (40.5%)
Declined participation	230 (18.3%)	199 (19.1%)	12 (2.4%)
Included patients	510	411	190
Completed measurements:			
Preoperatively	441 (86.5%)	364 (88.6%)	144 (75.8%)
3 Months postop	372 (79.0%)	296 (77.9%)	116 (62.0%)
6 Months postop	338 (73.8%)	288 (76.4%)	95 (50.5%)
12 Months postop	319 (79.0%)	255 (78.7%)	65 (45.1%)
24 Months postop	52 (100%)	37 (100%)	9 (100%)
Alert notifications †	94 (8.7%)	115 (13.1%)	22 (7.7%)
Unique patients with alerts	68 (75% female)	74 (70% female)	17 (47% female)
Age (SD; range)*	68.2 (9.5; 32-95)	68.3 (8.1; 44-91)	25.9 (9.3; 13-59)
Gender (male)*	36.3%	37.8%	63.9%
Body Mass Index (kg/m ²) (SD; range)*	27.4 (4.3; 18-43)	29.6 (4.7; 17-46)	23.8 (2.9; 18-37)

* Based on preoperative measurements; SD: standard deviation
 † Percentage is based on all postoperative measurements.

Table 3. Patient reported outcomes of the total hip arthroplasty group (mean and standard deviations) at different times.

THA	Preop	3 Months postop	6 Months postop	12 Months postop	24 Months postop
EQ-5D health state	62.8 (21.5)	66.9 (24.0)	65.7 (25.0)	67.8 (23.4)	70.4 (15.9)
FJS	10.7 (11.4)	53.0 (28.3)	57.5 (29.7)	61.2 (30.1)	56.5 (27.8)
OHS	45.2 (16.7)	79.4 (16.3)	82.4 (16.1)	84.7 (17.2)	85.3 (14.2)
HOOS-PS	47.5 (17.4)	22.5 (14.9)	22.9 (16.6)	21.3 (16.8)	21.1 (14.8)
Pain at rest	4.9 (2.4)	1.2 (1.8)	1.3 (2.0)	1.0 (1.9)	0.9 (1.4)
Pain during activity	7.0 (1.9)	2.2 (2.4)	2.1 (2.5)	1.8 (2.4)	1.9 (2.2)

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and were triggered by the date of surgery. If the questionnaire was not completed by two weeks after the initial invitation, an automatically generated reminder was sent. After another two weeks the last reminder was sent; therefore, the patient would receive a maximum of 3 e-mail invitations for each evaluation moment.

Alert notifications

For each patient group, specific questions were linked to an alert. When the total score of a questionnaire or an answer was below or above a specific cut-off value, the orthopaedic surgeon was automatically notified by e-mail. The surgeon checked the alert and when necessary contacted the patient for a telephone consultation or an additional consult at the outpatient clinic. For pain at rest and pain during activity an alert was set for a pain score of ≥ 7 . For the group specific questionnaires, alerts were set for total scores on the Oxford Hip Score ≤ 29 , HOOS-PS ≥ 14 , KOOS-PS ≥ 20 and IKDC ≤ 40 . Two questions from the IKDC, questions 2 ("how often have you had pain?") and 3 ("how severe is it?"), had a separate alert for scores ≥ 7 . These cut-off values were based on the guidelines of the questionnaires and otherwise on a combination of outliers (5-10%) and expert opinion.

Statistics

Statistical analysis was performed using the statistical program SPSS® (Statistical Package for the Social Sciences, Chicago, IL, Version 22.0). Continuous data were described by mean and standard deviation (SD). Categorical data were described as frequencies and percentages. Repeated-measurement ANOVA was used for the pre- and postoperative data and when needed was further analysed using a Tukey's post hoc test. Multiple regression analyses (enter method) was used to evaluate the effect of gender, age and the follow-up moment on the outcome measures. Results were considered significant at $p < 0.05$.

Results

Between January 1st 2013 and December 31st 2015, 1111 patients were included in our local registry (Table 2). In total, 3191 measurements were filled out and 40.5%-58.9% of patients were approached to participate. In the first year the percentage of approached patients was substantially lower than in the last year. Due to adapting processes and providing more guidance and control in the last year the amount of approached patients increased to an average of 82%. Of the approached patients, 441 (28.4%) patients declined or could not participate due to no internet or e-mail (70%), no sufficient knowledge of the Dutch language (2%), too many comorbidities and therefore too complicated to reliably complete the questionnaires (2%), and 20% declined to participate because they found it too much of a hassle.

The number of completed preoperative measurements in respect to the total number of performed surgeries varied between groups: THA 35.1%, TKA 34.9% and ACL 28.9%. If only the included patients were taken into consideration the overall preoperative response rates were considerably higher: respectively 86.5%, 88.6% and 75.8%. The postoperative response rate seemed to decline during the trajectories. The largest decrease was seen in the ACL group (Table 2). Two years postoperatively the response rate was 100% in all three groups, therefore, all patients that reached this point in time filled-out their questionnaire.

Total hip arthroplasty

The preoperative measurements were completed at an average of 6 weeks before surgery (range -71 - 5 weeks). Eight patients completed the preoperative measurement 1 to 5 weeks postoperatively. This was technically possible in the registry system. In two of these patients the time window between the first e-mail invitation and surgery was only one week, in the other 6 patients the time window was

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Table 4. Patient reported outcomes of the total knee arthroplasty group (mean and standard deviations) at different times.

TKA	Preop	3 Months postop	6 Months postop	12 Months postop	24 Months postop
EQ-5D health state	63.9 (22.5)	63.9 (25.9)	64.3 (26.0)	62.9 (24.0)	63.4 (19.1)
FJS	12.1 (13.0)	36.1 (24.5)	43.6 (27.7)	48.1 (28.4)	57.9 (29.5)
KOOS-PS	48.0 (15.5)	33.4 (13.8)	32.6 (13.9)	32.1 (15.0)	28.8 (14.0)
Pain at rest	4.8 (2.5)	2.2 (2.3)	2.0 (2.4)	1.6 (2.2)	1.3 (1.8)
Pain during activity	7.1 (2.1)	3.2 (2.5)	3.0 (2.7)	2.7 (2.8)	2.5 (2.7)

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at least 2 weeks. 11% of the patients completed the preoperative measurement more than 12 weeks before surgery. The perceived health state (EQ-5D) of patients improved from 62.8 points to 70.4 points 2 years postoperatively (Table 3). The functional scores and pain scores showed large improvements 3 months postoperatively ($p < 0.001$) compared to preoperatively. The only other significant improvements were seen between 3 months and 12 months postoperatively for the FJS and OHS (respectively $p = 0.001$ and $p < 0.001$). Regression analyses showed that gender and the follow-up moment were significant predictors for the FJS, OHS, HOOS-PS and both pain scores. Women scored worse on all outcome measures. Age was also a significant predictor for the FJS ($p < 0.001$), OHS ($p = 0.020$) and the two pain scores ($p < 0.001$), however, not for the HOOS-PS ($p = 0.532$). Patients in the age category 71-80 years seemed to score better, compared to patients below 71 and above years.

Total knee arthroplasty

The preoperative measurements were filled out at an average of 8 weeks before surgery (range -93 - 3 weeks). Three patients filled out the preoperative measurement 1 to 3 weeks postoperatively. In two of these patients the time window between the first e-mail invitation and surgery was only one week, in the other patient the time window was more than 3 weeks. The perceived health state (EQ-5D) of patients did not change (Table 4). The functional scores and pain scores showed large improvements 3 months postoperatively ($p < 0.001$) compared to preoperatively. The FJS also improved significantly from 3 months to 6, 12 and 24 months, and between 6 and 24 months. Pain at rest also significantly improved between 3 and 12 months. Regression analyses showed that gender, age and the follow-up moment were significant predictors for the FJS, KOOS-PS and both pain scores. Women scored worse on all outcome measures. Regarding age, patients between 71 and 80 years seemed to score higher on the KOOS-PS and FJS compared to patients below 71 and above 80 years. Further-

more, for the pain scores it seemed the older the patient, the lower the pain scores.

Anterior cruciate ligament reconstruction

The preoperative measurements were completed at an average of 4 weeks before surgery (range -30 - 3 weeks). Four patients completed the preoperative measurement 1 to 3 weeks postoperatively. In one of these patients the time window between the first e-mail invitation and surgery was only 4 days, in another patient the time window was more than 2 weeks. The perceived health state (EQ-5D) of patients did not significantly change (Table 5). The IKDC was at 6, 12 and 24 months significantly improved compared to preoperatively and 3 months postoperatively ($p < 0.001$). From 6 months on, there were no further significant improvements. The Tegner Activity Scale fluctuated more. The only significant changes were between preoperatively and 3 months ($p = 0.043$), 6 months ($p = 0.006$) and 12 months ($p < 0.001$). Regression analyses showed that for the IKDC only the follow-up moment was predictive for the outcome ($p < 0.001$). Age ($p = 0.079$) and gender ($p = 0.139$) were not. Regarding the Tegner Activity Scale, age and the follow-up moment were predictive ($p < 0.001$), however, gender was not ($p = 0.618$). In general, younger patients had higher scores.

Alert notifications

The amount of postoperative alert notifications were comparable between groups: THA 8.7%, TKA 13.1% and ACL 7.7%. The number of unique patients with an alert and the percentage of females are presented in Table 2. All alerts were checked by the treating surgeon. Most alerts originated from the 3-monthly postoperative measurements and were related to high pain scores. As patients returned to the outpatient clinic for their regular postoperative follow-up after 3 months, no additional actions were performed for these alerts. For the remaining alerts, in only a few exceptional cases, when the treating surgeon could not explain the alert based on the patient file and known com-

Table 5. Patient reported outcomes of the anterior cruciate ligament group (mean and standard deviations) at different times.

ACL	Preop	3 Months postop	6 Months postop	12 Months postop	24 Months postop
EQ-5D health state	74.2 (20.0)	71.1 (23.0)	76.7 (19.1)	77.8 (19.6)	78.9 (7.3)
IKDC	55.8 (14.5)	63.7 (12.6)	75.1 (12.9)	80.1 (15.8)	86.8 (12.2)
Tegner Activity Scale	4.4 (3.0)	5.3 (2.8)	5.6 (2.4)	6.0 (2.4)	5.3 (1.7)

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plaints/symptoms, the surgeon found it necessary to call the patient for more information or to plan an additional consult at the outpatient clinic.

Discussion

In the last years, more and more hospitals have started their own local registry. Some using pen and paper, others digitally using e-mail or web-forms. When we started, there were no guidelines for setting up a registry or what should be measured and how. Impasses had to be resolved and decisions had to be made, sometimes without decisive evidence. During the last three years adjustments have been made to improve logistics, response rates and reliable outcomes. In general, orthopaedic surgeons are positive about the usefulness of collecting PROMs for local improvement efforts and research purposes. At the same time, one is able to recognize the benefits of a national registry collecting PROMs for, for example, predictors of both good and bad outcomes after joint arthroplasty.⁷ However, at this stage, the purpose of benchmarking is questioned because the success of health registries depends on having a previously defined strategic plan including clear objectives, goals, methods of data collection and a analytic plan, which should be piloted and reviewed at an early stage.^{7,8,18} For example, what are the optimal measuring points and what are the corresponding time windows? In our case the preoperative measurement was performed as soon as the patient received the surgical indication. This means that there could be a large variability in time between the preoperative measurement and surgery, depending on the waiting lists or patient's preference for their surgery date. This variability could be reduced by always performing the preoperative measurement 1 or 2 weeks before surgery. However, this must be technically possible and the probability of missing data increases due to less time to complete the questionnaires and less time to send reminders.¹⁹ Another aspect of discussion was the amount of follow-up moments. Too many follow-up moments increases the burden for the patient, while not enough or not well-considered follow-up moments might lead to insufficient data. In our reg-

istry, not all included follow-up moments seemed equally useful. If the goal of the registry is determining treatment success, the postoperative measurement after 3 months can be considered an end point for treatment in THA patients. On the other hand, if the goal of the registry is collecting safety or survival data, a much longer follow-up is needed.

For our registry, about 40-60% of the patients were approached and up to 19% in the TKA group declined participation mostly because of no internet access (70%). Beforehand, it was decided that no paper questionnaires would be send because this is time-consuming, costly, introduces the risk of data entering errors and enhances missing data.⁷ However, this has a large effect on the response rate. The number of approached patients increased over the years due to logistic improvements, however, the percentage of declining patients remained unchanged. If only the included patients were taken into consideration, the overall preoperative response rates were between 75% and 89%, meaning that not every patient that committed to the registry completed the questionnaires. The response rates were lower for the different postoperative measurements and were dependent on the specific patient group. To avoid selection bias, a high response rate is pursued.⁶ When the response rate is determined from the percentage of patients completing the PROMs out of the total number of patients who were sent an invitation, a response rate of 80% is considered to be sufficient.⁶ Unfortunately, even using this more forgiving definition, the response rates of the current registry were, at the most follow-up moments, not sufficient. The response rate might be influenced by different variables such as age, body mass index,²⁰ diagnosis, location of the hospital, mental status,²¹ cultural background,²² socioeconomic status²³ and collecting method and is therefore not easily comparable between hospitals.⁶

There are an enormous amount of questionnaires available, some of which have been extensively validated and translated and are used worldwide whereas others are only used locally or by their

own developers. As each condition or disease is different, every patient group or situation requires other properties and items (content validity) which explain the proliferation of questionnaires in the healthcare sector.^{1,2,16,17} Alviar et al.¹⁶ showed that PROMs in arthroplasty rehabilitation do not fully address the relevant areas of activity, participation and environment, suggesting limited clinical applicability. Therefore, used PROMs should be evaluated for their usefulness and for every questionnaire norm values should be determined taking into account important case-mix variables. The same accounts for alert notifications. Most cut-off values were based on the guidelines of the questionnaires or on a combination of outliers (5-10%) and expert opinion. We should learn from our own data and adapt the alerts when we have gained new insights to treat and facilitate the patients as effectively as possible.

This article presents just a selection of items that must be analysed and evaluated to further develop a reliable and useful national registry. We must take into consideration the goal of measuring PROMs. In our opinion the most important reason for measuring PROMs should be evaluating and managing treatment of individual patients. Subsequently, data can be used within the department and hospital to improve local policy and processes. Benchmarking is least important, as measuring 'quality' could lead to strategic behaviour of healthcare providers. The goal should not be to reach certain response rates or outcomes, but to achieve better patient care. In conclusion, local and national registries take time to develop. More health institutions should publish their results and ideally we need to combine them to reach a consensus, achieve reliable norm values and realistic goals in terms of response rates, interpretation of outcomes and treatment success.

Disclosure statement

The authors declare that they have no conflict of interest.

Institutional Review Board

The registry was approved by our institutional review board. According to Dutch Law on Medical Research with Humans, the PROMs registry did not have to be reviewed by a medical ethics board.

This article was reviewed by the editor-in-chief and one deputy-editor, and it underwent open review by one or two outside experts. The deputy-editor reviewed each revision of the article, and it underwent a final review by the editor-in-chief prior to publication. Final corrections and clarifications occurred during one or more exchanges between the author(s) and the language corrector

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Latissimus dorsi transfer for irreparable posterolateral rotator cuff tears

i www.ntv-orthopaedie.nl/weening2403/

Alexander A. Weening, W. Jaap Willems, Ludolf D.J. Barendregt, Michel P.J. van den Bekerom and Derek F.P. van Deurzen

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A latissimus dorsi tendon transfer for the treatment of an irreparable posterolateral rotator cuff tear was performed in the right shoulder of a 63-year old man. Impaired shoulder function and pain were the main complaints before surgery. Rotator cuff tears are common and massive irreparable tears form a significant part, of which treatment is a complex problem. Physical examination is important to diagnose the problem, but ultrasound and/or MRI scan are indispensable. Treatment depends on the tear characteristics of the rotator cuff. Tendon transfers with the latissimus dorsi tendon are increasingly performed with satisfying results.

Important for successful treatment, are the level of activity of the patient, the type of injury, the possibility of treatment and the patient's expectations.

Introduction

The prevalence of rotator cuff tears ranges from 11 up to > 20% and increases from the age of 50.^{1,2} Ageing of the current population will likely increase the incidence of this problem.

There are different types of rotator cuff tears and their treatment and success depend on the type of tear. A rotator cuff tear with a traumatic cause can often be repaired with generally good results. For degenerative tears the initial treatment consists of non-operative options such as physiotherapy, pain medication and infiltrations.^{3,4} Massive rotator cuff tears consist of at least two affected rotator cuff tendons, at least 5 cm in size and have a prevalence that ranges from 10-40% (\pm 25% anterosuperior, \pm 75% posterolateral) of the total rotator cuff tears.⁵

Non-traumatic massive rotator cuff tears ("wear") are often associated with functional limitation and chronic disabling pain, despite extensive non-operative treatment. Treatment of these massive posterolateral rotator cuff tears is challenging. Direct surgical repair is associated with less good results and significant failure/retear rates when reattachment is mostly not possible because of the degree of tendon retraction and fatty infiltration.⁶ Treatment is then focused on pain medication, physiotherapy, change in daily activities and ster-

oid injections yielding acceptable results in mostly low-demanding patients.⁷ However, untreated massive tears may lead to glenohumeral incongruence displayed by high riding of the humeral head, which can result in a so-called cuff tear arthropathy.⁸

With this report, we discuss several treatment strategies for the treatment of posterolateral rotator cuff tears and specifically aim to create more awareness for the use of the latissimus dorsi transfer (LDT).

Patient

A 63-year old non-smoking man was referred to our orthopaedic department for evaluation of a massive rotator cuff tear of his right shoulder. Medical history did not show any relevant comorbidity. In daily life, he worked as an event coordinator and was keen on cycling and working out in the gym. A year before, he fell from a ladder on his right dominant side. Evaluation with ultrasound revealed a posterolateral rotator cuff tear in the right shoulder with pain and a pseudoparalysis, which was treated conservatively; due to lack of improvement after six months an arthroscopic repair was performed. After six months of physiotherapy, there was no improvement, and the patient suffered from pain and difficulty with everyday use of the right arm. Physical examination revealed mild atrophy of the supraspinatus and infraspinatus muscles of the right shoulder. Active shoulder function tests showed an anteflexion of 100°, elevation of 60°, external rotation of 20° and absent active external rotation in 90° of elevation. There was a full passive range of motion. The empty can test and the external rotation lag sign were positive. The belly press and lift-off tests were negative. Neurological assessment revealed no abnormalities. An X-ray of the shoul-

A.A. Weening, MD¹, W.J. Willems, MD, PhD²,
L.D.J. Barendregt, MD¹, M.P.J. van den Bekerom, MD¹,
D.F.P. van Deurzen, MD¹

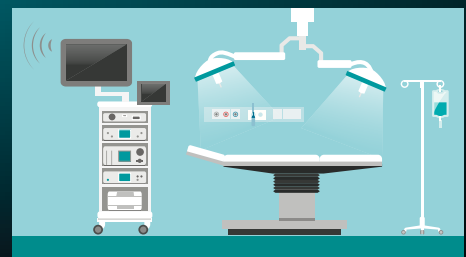
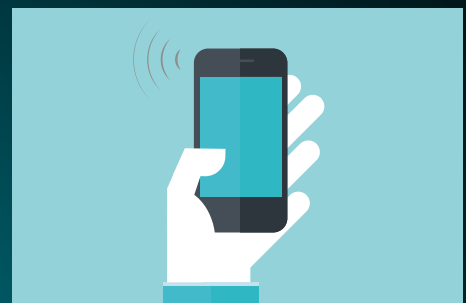
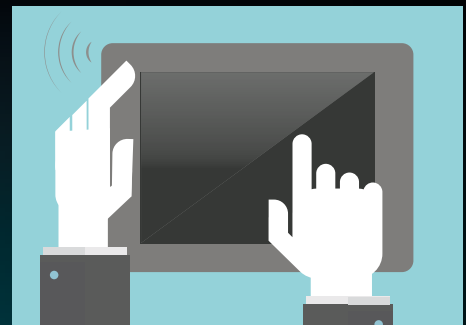
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2 Department of Orthopaedic Surgery, DC Klinieken,
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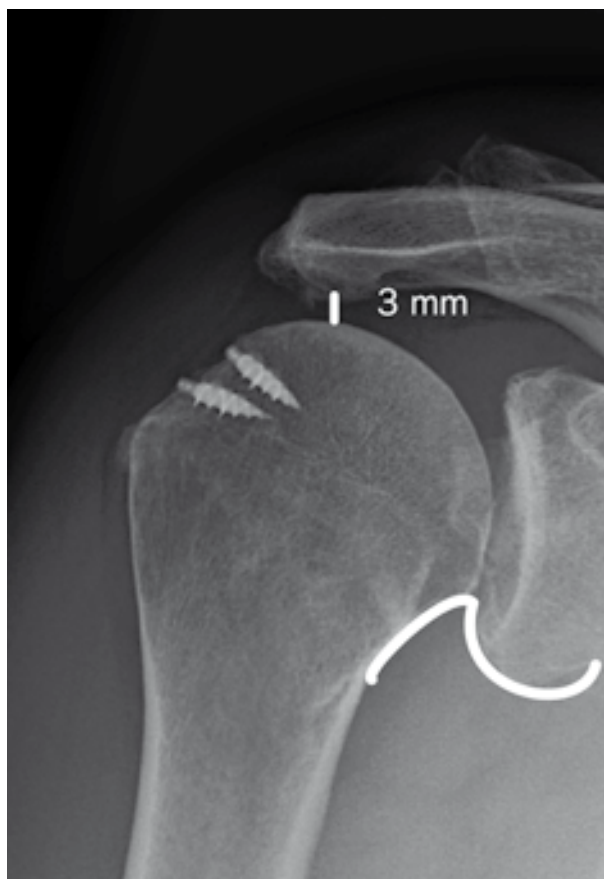


Figure 1. X ray preoperative right shoulder (AP view). White curved line = disrupted Shenton's line which implies change in glenohumeral congruence. White line = decreased acromiohumeral interval (3 mm). Two anchors are situated in the humeral head which were placed during first surgical cuff repair. ■

der showed a decreased acromiohumeral interval of 3 mm without degenerative changes (Figure 1). An MRI scan of the right shoulder confirmed a full thickness rupture of the supraspinatus and infraspinatus tendon (Figure 2). The muscles were atrophied, fatty infiltrated (Goutallier classification grade II) and retracted (Patte classification grade III).^{9,10} The two previously placed anchors were well positioned. The teres minor and subscapularis tendons were intact.

Intervention

Surgical treatment was considered, because pain and disability persisted despite the use of painkillers, physiotherapy, and steroid injections. As the MRI scan showed a retracted and fatty posterosuperior rotator cuff, a re-repair was not considered possible and the choice was made for a latissimus dorsi transposition as described by Codsí et al.¹¹ The patient was placed in the lateral decubitus position and by using an incision posterior to the axilla area,



Figure 2. MRI-scan right shoulder preoperative (coronal view, T2 setting). G = glenoid. H = humeral head. White star = location of the retracted supraspinatus tendon, situated above the glenoid (Patte III). White line = reduced distance (2mm) between humeral head and acromion. ■

the insertion of the latissimus dorsi on the humerus was explored and mobilized (Figure 3). Subsequently, the tendon was directed between the triceps muscle and the deltoid muscle and then, through a separate small mid-deltoid incision, fixated on the footprint of the supra- and infraspinatus area of the greater tuberosity (Figure 4, 5). Both wounds were closed in layers and a sling was applied.

Comparison

To compare the latissimus dorsi transposition with other available treatment options, we searched Pubmed, Embase, www.kwaliteitskoepel.nl and the CBO website, for literature reporting on the treatment of massive cuff tears.

Table 1. Patient preoperative and postoperative scores and active motion (degrees).

	Preop	Postop
Pain (0 - 15)	10	0
Anteflexion	100	170
Abduction	60	170
External rotation	20	70
Constant Score	41	78

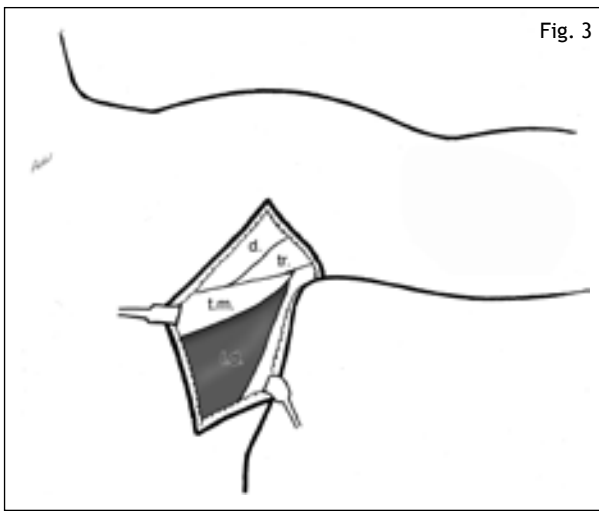


Fig. 3

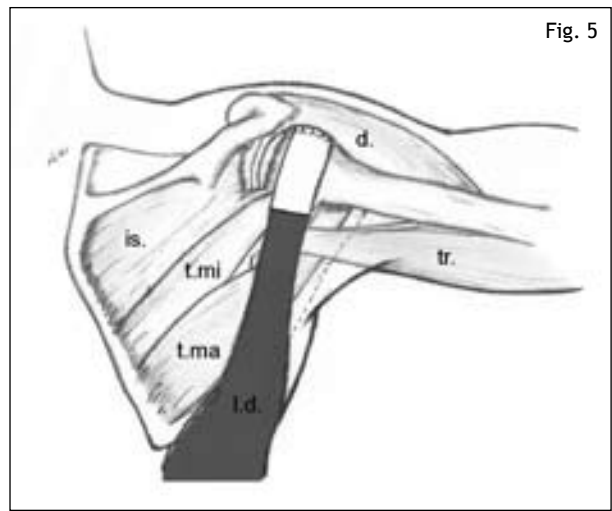


Fig. 5

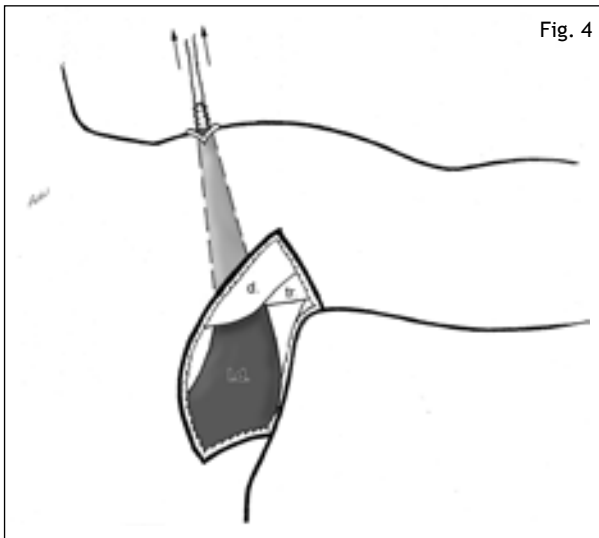


Fig. 4

Figure 3. By an incision posterior to the axilla area, the insertion of the latissimus dorsi is explored and mobilized. The deltoid muscle (d.), triceps muscle (tr.), teres major muscle (t.m.) and the latissimus dorsi muscle (l.d.) are identified. ■

Figure 4. The latissimus dorsi muscle is being led between the long head of the triceps muscle and the deltoid muscle towards the shoulder incision. ■

Figure 5. Visualization of the posterior aspect of the posterosuperior rotator cuff tear and the transferred latissimus dorsi tendon that has been fixated on the greater tuberosity. The deltoid muscle (d.), infraspinatus muscle (is.), triceps muscle (tr.), teres major muscle (t.ma.), teres minor muscle (t.mi.) and the latissimus dorsi muscle (l.d.) are identified. ■

Outcome

Rehabilitation after the LD transfer consisted of wearing a sling for 6 weeks with the arm in neutral position. During the first weeks, the arm was moved passively under the supervision of a physiotherapist. After 6 weeks, biofeedback training started. After a few weeks the pain was gone. The range of motion improved to almost full active function after 11 months (Table 1). Carrying out tasks and activities of daily life such as painting an object or taking a cup out of a cabinet almost returned to the level of before the trauma. Strength did not improve during the first year of rehabilitation. The absolute Constant Score improved from 41 preoperative to 78 postoperative.

Relevant literature

Ainsworth et al and Greenspoon et al systematically reviewed conservative treatment of massive

cuff tears but found the data to be limited.^{12,13} Some evidence supports the use of physiotherapy but this is solely based on low-level observational studies. These studies describe moderate results for a couple of years but overall a high risk of tear size progression and worsening of glenohumeral osteoarthritis is seen.¹⁴ Arthroscopic repair was reviewed by Henry et al revealing promising results, but with high retear rates. Debridement or partial repair is only advised in patients with low physical demands.⁵ Gerber et al described the latissimus dorsi transfer to be a valuable treatment option for irreparable posterosuperior tears in patients with an intact subscapularis and teres minor.¹⁵ Alternative surgical treatments consist of rotator cuff repair with an allograft, transposition of the teres major tendon, suprascapularis nerve decompression (in combination with rotator cuff repair), insertion of a balloon spacer, and recently there has been a shift towards the use of the reverse shoulder prosthesis. The technique of RSA is reproduc-

ible and yields predictable functional results.^{16,17} However, long-term follow up is still limited and complication, re-operation and revision rates are relatively high. Zumstein et al reveals in a systematic review a fairly high complication rate of 24% and a 10% revision rate with instability and infection as the main concerns.¹⁸ Therefore this procedure is generally reserved for mostly elderly, less functional demanding patients with massive cuff tears, and for patients with massive cuff tears with signs of glenohumeral degeneration. Possibly, the unfamiliarity with the LDT and the absence of alternative viable treatment options has led to the increased use of the RSA.

The LDT is indicated in patients with loss of functionality, and pain due to a massive irreparable posterolateral rotator cuff tear, without cuff-tear arthropathy. In order to counterbalance the forces of the transferred latissimus dorsi it is mandatory to select patients with an intact subscapularis tendon.¹⁹ The concept of the tendon transposition is based on two thoughts. The first theory is that the latissimus dorsi muscle takes over the function of the rotator cuff as a new active external rotator and suppressor of the humeral head.²⁰ The second theory is that the LD achieves a tenodesis effect that improves the balance and congruence of glenohumeral joint during motion performed by the deltoid muscle. An early study showed promising results in a small group.²¹ A systematic review on LDT by Namdari et al analyzed 10 studies between 1992 and 2010.²² The mean follow-up was 45.5 months. The mean adjusted Constant score improved from 45.9 preoperatively to 73.2 postoperatively, and active anteflexion, abduction and external rotation all improved (Table 1). The complication rate was 9.5%, which included infection, neuropraxia, tears of the transferred tendon, and wound dehiscence. In addition, in more than half of the shoulders, glenohumeral arthritis progressed and superior migration of the humeral head occurred. The authors concluded that an LDT results in improvement in shoulder functionality, motion, and pain relief. A full recovery of the range of motion of the shoulder is usually not achieved and poor functional outcomes are more likely after revision surgery (e.g. failed primary cuff repair).²² Recent studies show improvement in PROMs, pain and function in 44 patients with > 10 years FU after an LDT, and a significant improvement in external rotation and abduction in 16 patients with a mean FU of over 2 years after LDT.^{7,21} Other studies have recently demonstrated that a pseudo paralysis is not to be considered as a contra-indication for this type of surgery.²³

Compliance regarding the after treatment is considered essential for an optimal result. Recommended is the guidance of physiotherapists with experience in treatment of shoulder injuries and biofeedback training.

Conclusion and recommendation

A massive irreparable (posterolateral) rotator cuff tear does not mean the end of operative treatments: improvement in function, especially in daily use and above-shoulder activities can be expected by means of a latissimus dorsi transfer. A full recovery in terms of function and strength however is not to be expected. The LDT may be regarded as a viable alternative when non-operative treatment has failed and when reverse shoulder arthroplasty is not desired for reasons discussed above. An intact subscapularis is mandatory.

Disclosure Statement

No conflict of interests and no disclosures to mention.

This article was reviewed by the editor-in-chief and one deputy-editor, and it underwent open review by one or two outside experts. The deputy-editor reviewed each revision of the article, and it underwent a final review by the editor-in-chief prior to publication. Final corrections and clarifications occurred during one or more exchanges between the author(s) and the language corrector.

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Costoclavicular pseudarthrosis caused by osteophyte formation - a case report

Lotte Wakkie, Nienke Wolterbeek, Jacco A.C. Zijl and Ronald N. Wessel

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We present a case report of an otherwise healthy 36 year- old man, who presented with chronic pain and a blocking sensation localized over the left sternoclavicular joint, making overhead activities impossible. He was initially treated for sternoclavicular posttraumatic degenerative arthritis. Thorough diagnostic testing was performed because of persistent complaints. CT imaging showed a pseudarthrosis between the first rib and the clavicle caused by osteophyte formation, which was surgically excised. Three months postoperatively, pain and the blocking sensation had disappeared and he had returned to his previous activities without complaints. One year after surgery, physical examination showed a full range of motion. This is a rare phenomenon, only reported once before in the literature. This recent case shows sternoclavicular complaints resulting from a non-sternoclavicular origin.

Introduction

Sternoclavicular complaints are relatively common and frequently caused by sternoclavicular degenerative, posttraumatic septic or rheumatoid arthritis.^{1,2} Sometimes, however, sternoclavicular discomfort is not, as would be presumed, of a sternoclavicular origin. We present a case of chronic blocking sensation in the sternoclavicular region and restricted scapulothoracic mobility caused by costoclavicular pseudarthrosis.

Patient

A healthy 36 year- old man, currently working as a car refinisher, presented with chronic pain and a blocking sensation localized over the left sternoclavicular joint, making overhead activities impossible. He reported to have been in a motor scooter accident twenty years previously, colliding - thorax first - into a tree. At that time he did not seek medical attention and did not receive any treatment. He first presented in 2012 with complaints of restricted shoulder movement and a blocking sensation, which had started some years previously with no recent trauma and reacted insignificantly to physiotherapy. Physical examination showed slight protraction of the scapula and tenderness and hypertonia of the superior margin of the trapezius muscle. Active and passive eleva-



Figure 1. Preoperative restriction of active left shoulder motion.

tion and abduction was limited to 100° (Figure 1). Passive motion summoned a blocking sensation in the sternoclavicular region. Glenohumeral range of motion was normal. Specific cuff, acromioclavicular and instability tests were normal. MRI of the shoulder showed no abnormalities. Based on these findings, we concluded that our patient's complaints most likely resulted from movement restriction in the scapulothoracic, and not the glenohumeral joint. Bone scintigraphy was performed, which showed increased activity in the sternoclavicular region. His complaints were classified as sternoclavicular degenerative arthritis, for which he was treated with intraarticular infiltration of lidocaine and cortisone, temporar-

L. Wakkie, MSc¹, N. Wolterbeek, PhD², J.A.C. Zijl, MD³, R.N. Wessel, MD³,

¹ Medical intern, ² Research coordinator, ³ Orthopaedic surgeon, Department of Orthopaedic Surgery, St. Antonius Hospital, Nieuwegein, The Netherlands
Corresponding author: R.N. Wessel, MD

Email: Orthopedie-research@antoniuziekenhuis.nl



Figure 2A. Preoperative transverse CT image showing pseudarthrosis between the first rib and the medial aspect of the left clavicle.



Figure 3A. Preoperative coronal CT image showing pseudarthrosis between the first rib and the medial aspect of the left clavicle.

ily relieving the pain. Despite a second infiltration and a prolonged period of rest, the patient's complaints persisted. Subsequent CT imaging was performed which revealed pseudarthrosis between the first left rib and the medial aspect of the left clavicle (Figure 2A and 3A). Because physiotherapy and corticosteroid infiltration were insufficiently effective, excision of the pseudarthrosis was planned. Preoperative Constant Score (a semi-objective, semi-subjective scoring system based on range of motion, daily activities and strength with a maximum of 100 points) was 49.5 for the affected arm and 100 on the contralateral side.³ Preoperative DASH score (fully subjective score based on daily functioning ranging from best score 0 to worst score 100) was 55 on the affected side and 0 on the contralateral side.⁴

Intervention

Excision of the osteophytes causing the pseudarthrosis was performed by an orthopaedic and a thoracic surgeon with an open approach. The patient was positioned in beach chair position with the arm draped free in order to test shoulder mobility during the procedure. A horizontal incision inferior to the sternoclavicular joint was used to expose the medial clavicle, the first rib and sternoclavicular joint itself. Abundant osteophyte formation was seen. This osteophyte formation could certainly have impaired shoulder function. Resection of os-

teophytes was performed with an oscillating saw and osteotome on both the clavicular and the costal surface. In order to protect vital structures, a mini Hohmann retractor was used. An adequate costoclavicular space was created, enabling full shoulder function as tested in the operating theatre.

Comparison

There are no guidelines published by the Dutch Orthopaedic Association (Nederlandse Orthopaedische Vereniging) on sternoclavicular or costoclavicular disorders. A search in Pubmed for papers relating to the subject resulted in one case report,⁵ but no (systematic) reviews.

Outcome

Immediately after surgery the patient was instructed to do scapulothoracic exercises guided by a physiotherapist. Our patient was seen for follow-up after two and five weeks, 3 months and one year. After five weeks the DASH score was 9.5. CT imaging at that time confirmed an adequate costoclavicular space (Figure 2B and 3B). After 3 months the patient was very satisfied. He scarcely had any complaints, especially compared to his preoperative status. The DASH score was 2.5 and the Constant Score was 98. He was advised to continue physiotherapy in order to achieve full range of motion and improve scapular coordination. One year after surgery, the DASH score was 0 and the Constant Score was 100 for both sides. Full range of motion was nearly reached, with minor lagging of the scapula (Figure 4).

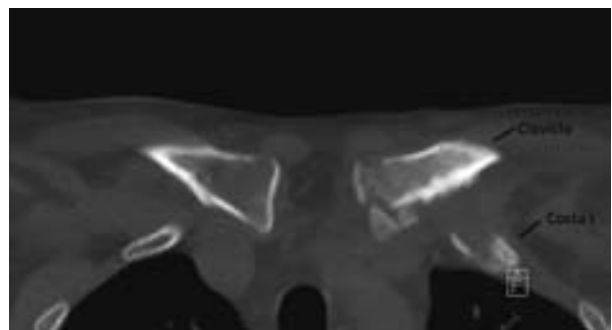


Figure 2B. Postoperative transverse CT image showing an adequate costoclavicular space.

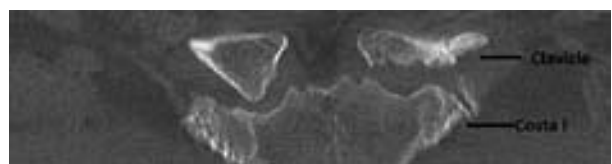


Figure 3B. Postoperative coronal CT image showing an adequate costoclavicular space.



Figure 4. One year postoperatively, full range of motion is nearly reached with minor lagging of the scapula.

Discussion

Besides rare, this case is interesting because it illustrates that not only glenohumeral, but also scapulohoracic mobility is essential for adequate, smooth shoulder function. The only bony connection between the scapula and the rest of the skeleton is the clavicle.⁶ The clavicle rotates and translates, however slightly, in the acromioclavicular joint.⁷⁻⁹ This enables motion of the scapula, which in turn facilitates maximum range of motion of the humerus. If the clavicle is blocked on the medial end, either by the first rib or the sternum, scapular movement may be restricted, disturbing fluent and full shoulder motion. This case is an elucidation of how a small hinge in this linking system may affect shoulder function as a whole.

The only other paper on this phenomenon, published in 1984, reported on a 29 year-old woman with chronic left shoulder pain, exacerbated by overhead activities.⁵ Her symptoms ultimately appeared to have been caused by an osteochondroma originating from the first rib and forming an articulation with the clavicle, restricting clavicle rotation. As in our case, physicians were misled by complaints indicative of another diagnosis and thorough non-routine diagnostic imaging had to be performed in order to reveal the true cause of the complaints. Our case differs from the one in 1984, because costoclavicular pseudarthrosis was probably due to posttraumatic osteophyte formation in light of the traumatic collision the patient experienced some twenty years earlier.

Conclusion

This case concerned chronic sternoclavicular pain and a blocking sensation, originating from pseu-

arthrosis of the first rib and the medial aspect of the clavicle, secondary to osteophyte formation. It is recommended to always keep in mind the less likely possibility that sternoclavicular complaints may not originate from the sternoclavicular joint. In such cases non-routine diagnostic testing may be necessary to identify the source of complaints. Considering the excellent postoperative results in our patient, surgical excision is a worthy treatment option for symptomatic costoclavicular.

Disclosure statement

The authors declare there was no conflict of interest in writing this case report.

This article was reviewed by the editor-in-chief and one deputy-editor, and it underwent open review by one or two outside experts. The deputy-editor reviewed each revision of the article, and it underwent a final review by the editor-in-chief prior to publication. Final corrections and clarifications occurred during one or more exchanges between the author(s) and the language corrector.

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PICO: To brace or not to brace? The type-II odontoid fractures in the elderly

Koen Vincenten, Joost H. Kuipers, Andy B. Spoor, Carel H. Diekerhof and Taco Gosens

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Introduction

Odontoid fractures are the most common cervical spine fractures in the elderly and their prevalence is expected to increase progressively.¹ These fractures are classified according to Anderson and d'Alonzo (Figure 1) based on the fracture pattern. Type-II fractures occur at the base of the odontoid, between the level of the transverse ligament and the body of the axis with a high incidence of pseudoarthrosis in the elderly. Most of these injuries are attributed to a simple low energy fall.² Contributing factors are osteoarthritis, cervical stenosis and osteoporosis. These are more common in elderly patients and make the spine more vulnerable to fracture.³

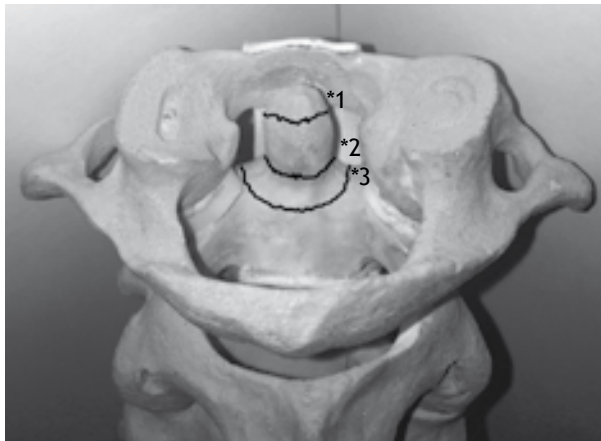


Figure 1. The Anderson D'Alonzo classification: type 1(*1), type 2 (*2) and type 3(*3).

For the odontoid fractures there are three main types of treatment: halo-vest immobilisation, hard cervical collar immobilisation, and surgical treatment which includes an aggressive approach based on the fracture type.⁴ Without treatment or when treated inappropriately, the elderly patients may

suffer from an increased risk of non-union. Simultaneously, there is potential atlantoaxial instability.⁵ Still, due to the lack of evidence, the published treatment guidelines are indistinct.

We conducted a Patient Intervention Comparison Outcome (PICO) formed search to evaluate the current state of evidence. The goal of this PICO is to answer the following question with the best available evidence: "Type-II odontoid fractures in the elderly (P): does a hard cervical collar (I) compared to the halo-vest (C) improve the outcome (O)? The outcome is specified in consolidation, mortality and morbidity.

Patient

Case 1: a 75-year-old vital and healthy woman was admitted to the emergency department after she fell with her face on the doorpost. She presented with severe pain in the neck without neurological compromise or loss of consciousness. The trauma screening revealed a type-II odontoid fracture, no dislocation was seen (Figure 2).

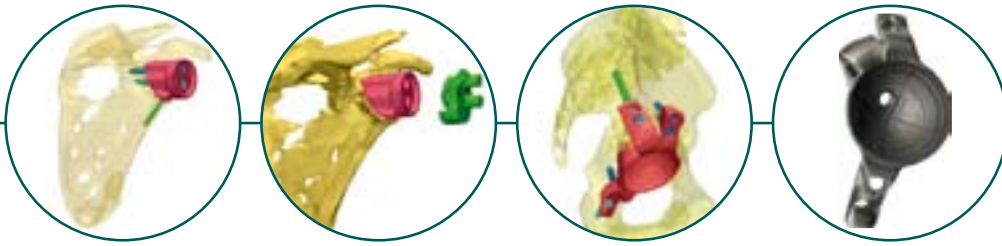
The patient was assigned to the orthopedic department. Because of the patients' age and the non-displaced fracture, primary management was conservative. Treatment consisted of a halo-vest for twelve weeks. Control X-rays after ten weeks showed no consolidation of the odontoid. Therefore, the conservative treatment was extended with the halo-vest for three more weeks and in addition three weeks with a hard cervical collar (Miami brace). Even after this extensive treatment, no solid consolidation was achieved. Besides stiffness of the neck the patient had a good functional outcome. There were no further complications.

Case 2: an 87-year-old man known with dementia was sent to the hospital by his general practitioner because of persistent neck pain. Two months earlier he had tripped over a curb stone while walking with his dog.

During the examination the X-Rays showed a type-II odontoid fracture (Figure 3).

The advised treatment was a Miami brace for 6 weeks, but the patient declined any immobilisation.

C.M. Vincenten, J.H. Kuipers MD, A.B. Spoor MD,
C.H. Diekerhof MD, T. Gosens Phd MD,
Department of Orthopedics. St. Elisabeth Tweesteden
Ziekenhuis, Tilburg, The Netherlands.
Corresponding author: C.M. Vincenten
Email: t.gosens@etz.nl



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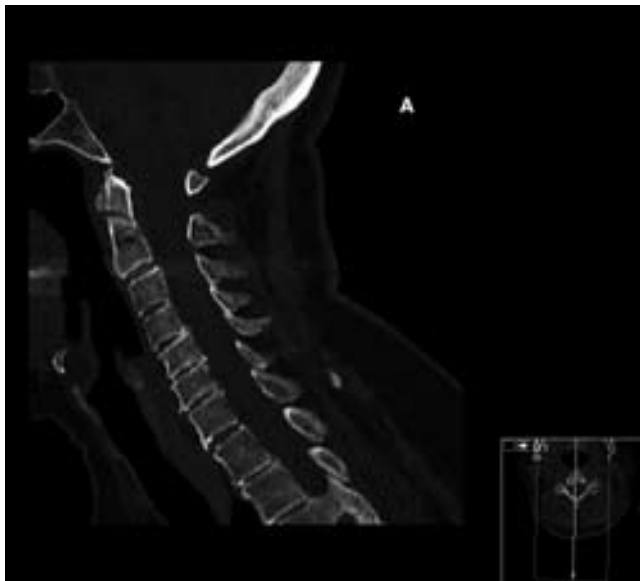


Figure 2. Computed Tomographic sagittal plane (A) and an open mouth view while wearing a halo-vest (B) illustrating a type-II odontoid fracture.

Two months later a new examination was done, due to another trauma. It was remarkable that the patient did not have any other complaints. No sequelae of his odontoid-fracture existed at that moment, non union was seen on the X-Ray. Even though he was not immobilized.

Intervention

The optimal management of a type-II odontoid fracture is unknown. The management options include supervised neglect, external immobilization with a hard cervical collar or a halo-vest and internal surgical fixation.⁶

The decision for operative or non-operative treatment is made on the basis of surgeons and patients' preferences. However, the decision between a hard cervical collar and a halo-vest is still not well defined.^{7,8,9,10} Guidelines from the Dutch Orthopaedic Society (NOV) and the Dutch Spine Society for optimal treatment of type-II odontoid fractures recommend a halo-vest for 12 weeks. When the patient is >50 years one should consider surgical treatment because of the increased risk of pseudoarthrosis.^{11,12}

Search strategy and method

A literature search was performed on June 1, 2016 (PubMed). The following inclusion criteria were used: Odontoid/dens, treatment/therapy, fracture(s), English/Dutch language and only articles up to 5 years old. The search resulted in 187 articles of which 27 were included based on title. Eventually, after reading all abstracts, 4 articles appeared to be useful for answering the questions.

Comparison

Treatment by supervised neglect is not mentioned in literature.

Halo-vest vs cervical collar

In this systematic review by Sime et al. (2013) the halo-vest and cervical collars were directly compared for union, mortality and complications. Thirteen studies met the inclusion criteria; these include only retrospective and observational studies. In the review they found that using a halo-vest there is a significantly greater rate of developing stable union (osseous and fibrous) (RR 1.27 CI= 1.03; 1.57; P=0.03).¹³ No functional outcome comparison was made. The use of a halo-vest was related with a significant greater risk of airway complications in the elderly (RR=7.5 CI 0.96-58.36 P=0.05).¹³

Union vs non-union

The difference in functional outcome was studied in a comprehensive systematic review by Robinson et al. (2014), in which 38 publications were included.⁸ One of the questions answered in this review is whether odontoid non-union is associated with worse clinical results in the elderly. Two of the included studies focused on the clinical results of non-union in the elderly.^{14,15} Both studies used the neck disability index as the major functional outcome. Beside the Neck Disability Index (NDI), Molinari et al. included pain score and patient satisfaction in the results as well and the AO Spine study used the SF-36 version 2. No significant differences in functional outcome with regards to non-union or union were found.

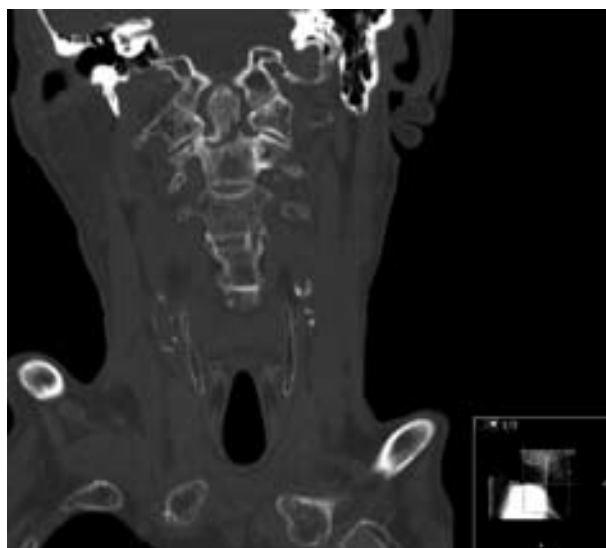


Figure 3. Computed Tomographic frontal plane illustrating a type-II odontoid fracture.

A prospective and retrospective cohort study by Patel et al. (2014) included 57 patients over sixty years old. Of them, 42 patients had type-II odontoid fractures and 15 patients type-III. Three patients required surgical fixation due to displaced fractures. 24 patients were managed with a halo-vest and 30 patients were managed in a hard cervical collar. At a mean follow-up of 25 weeks, 87% of type-II and 100% of type-III fractures had achieved bony union or stable, fibrous non-union. There was no significant difference in the time to reach union for fracture type, follow-up or neurological outcome and between the halo and collar groups ($p:0,29$ Kaplan-Meier analysis).²

The fracture type was the only predictor ($p=0,04$) of the time to reach union in favour of type-III odontoid fracture. Despite a higher proportion of fibrous-non-union in the collar group, there was no significant difference in outcome between the hard cervical collar and halo-vest for Type-II odontoid fractures (Fisher's exact test, $p=0,12$).²

Complications

Fourteen retrospective studies were included in a literature review by Delcourt et al. (2015). Six reported on all types of injuries of the upper cervical spine, and only eight odontoid fractures. Overall mortality rate was lower for the hard cervical collar (0-35%) compare to 0-42% for the halo-vest. Elderly patients with a halo-vest had a significantly higher rate of mortality than younger patients with halo-vest (40% vs 2%). Overall the cervical collar complication rate varied from 0-44,4%, and the halo-vest complication rate from 15,6%-90,9%.¹⁵ The halo-vest had the highest rate of complications. The most common complications were pin-site in-

Table 1. Search strategy.

Search	Syntax	Items found
1	(Odontoid [all fields] OR dens [all fields]) AND (treatment [All fields] OR therapy [All fields]) AND (fracture [All fields] OR fractures [All fields])	1068
2	<5years	249
3	Language: English, Dutch	222
4	Text Available	187
5	Selected by title	27
6	Included based on abstract	4

fection, osteomyelitis, nerve injury, dysphagia, restriction and respiratory disturbance.^{17,18}

Outcome

Based on this literature search, immobilization with the use of a halo-vest in elderly with a type-II odontoid fracture does not have a better result compared with a hard cervical collar.

No difference in functional outcome between union and non-union was seen.^{8,14,15} The time to reach union was the same when comparing halo-vest to hard collar.² However, the complication rate is larger for the halo-vest. Especially in the elderly, because of their increased rate of comorbidities and decreased functional reserves, care is needed to prevent complications.^{16,17,18}

The data found in our literature search should be interpreted cautiously because of a large selection bias in treatment options. Furthermore, the studies done on this topic were all retrospective observational studies. Because the group "elderly with type-II odontoid fractures" is very specific and the presence of these patients in studies is low, it is difficult to draw conclusions for these patients but the odds are against a halo-vest.

Our patient was treated with both a halo-vest and a hard cervical collar. The second patient actually refused the hard collar and was treated by (un) supervised neglect. Based on this literature search the halo-vest does not appear to offer any clear advantage over a hard cervical collar. Whether supervised neglect is preferable over a hard collar cannot be concluded from existing literature. However, in our case the result was satisfying and it questions the mechanical and healing effect of a hard collar in these fractures in this small and specific group of patients, showing that probably not all patients need to be treated with a cervical collar.

Personal recommendations

Based on the current literature, the hard cervical collar is the best conservative treatment for type-II odontoid fractures in the elderly. Functional outcome and the time to reach union is almost similar to the halo-vest. However, overall mortality and morbidity are larger for the halo-vest. A halo-vest after a type-II odontoid fracture in the fragile elderly can be seen as a death sentence. We therefore recommend treatment with a hard cervical collar for the type II odontoid fractures in the elderly population.

Disclosure statement

The authors declare that they have no competing interests. No benefits have been received or will be received from a commercial party related (in)directly to the subject of this article. No funds were received.

This article was reviewed by a member of the Editorial Board and one deputy-editor, and it underwent open review by one or two outside experts. The deputy-editor reviewed each revision of the article, and it underwent a final review by a member of the Editorial Board prior to publication. Final corrections and clarifications occurred during one or more exchanges between the author(s) and the language corrector.

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Nederlands onderzoek in buitenlandse tijdschriften

Fracture fixation in the operative management of hip fractures (FAITH): an international, multicentre, randomised controlled trial Fixation using Alternative Implants for the Treatment of Hip fractures (FAITH) Investigators¹

Complete list of collaborators online available¹. *The lancet*, vol 389, april 15, 2017, 1519-1527

Objective: To compare the reoperation rates (primary outcome) and other key outcomes; mortality, fracture healing, complications, including femoral head necrosis, non-unions, implant failure and infections, SF-12, EQ-5D and WOMAC, after a sliding hip screw (SHS) versus cancellous screws (CS) for the treatment of a low-energy femoral neck fracture during the 24 months follow-up period.

Location: The 81 participating clinical centres were located in USA, Canada, Australia, the Netherlands (N=14), Norway, Germany, UK and India.

Patients and procedures: Patients were eligible if they were >50 years, ambulatory before the surgery requiring low-energy femoral neck fracture. Exclusion criteria were major trauma, retained hardware or infection around the hip, bone metabolic disorders (osteoporosis excluded), moderate or severe cognitive impairment and Parkinson's disease. A centralised computer system randomised the patients by minimisation of fracture displacement, age, living status, pre-fracture functioning, ASA class and centre. Patients in the SHS-group were treated with a 8.0mm, partly threaded screw with a 2 to 4 hole side plate without other supplemental fixation. The CS- group received >2 screws (6.5mm) without injectable bone substitutes.

Results: The inclusion period for the 1108 included patients (SHS: 557/ CS: 551, sample size: N=1100) was between March 2008 and March 2014. Final analyses was performed with the data of 1079 patients. From the 923 living patients, data after 24 months follow-up were complete for 844 patients (91%). Baseline and fracture characteristics were equal between the two groups. Overall crossover was 2.0%. Rates of reoperations did not differ: SHS 107/542 (20%) versus 117/537 (22%), implant removal was significantly more frequent in CS-patients (25/557, 5% vs 49/537, 9%; hazard ratio (HR) 0.42; 0.25-0.70) and avascular necrosis was more seen in the SHS group: 50/ 542, 9% versus 28/537, 5%; HR 1.91; 1.06-3.44. Of these patients 54 (69%) required reoperation: 38/54 (70%) from the SHS group and 16/ 54 (30%) from the CS-group. Rates were equal for nonunion (6%), implant failure (8%), infections (2%), fracture shortening (27%), fracture healing (healed by month 24: 67%), mortality (14%) medical

adverse events (all: 23%) and health related quality of life. Subgroup analysis revealed an advantage of SHS for displaced fractures, fractures at the base of the femoral neck and in current smokers.

Conclusion: Reoperation rates did not differ between sliding hip screw and cancellous screws, current smokers, displaced and base of the femoral neck fractures might benefit from sliding hip screw technique.

Comments: This landmark study shows the importance and feasibility of intercontinental collaboration in orthopedic trauma research. The results can be important for individual pre-operative technique planning by taking fracture characteristics (displaced/ base of the neck fractures) and patient's smoking status into account. With these new data and the AO guidelines² in mind, it becomes questionable to leave the technique decision to the surgeons preference, as is still the case in clinical guidelines^{3,4,5}, including the Dutch⁶. On the other hand, also the costs have to be taken into account. The results can give guidance in managing patient's expectations, especially concerning reoperation, shortening and fracture healing and its consequences.

Paul T.P.W. Burgers

1. Collaborators: [https://www.ncbi.nlm.nih.gov/pubmed/?term=Fracture+fixation+in+the+operative+management+of+hip+fractures+\(FAITH\)%3A+an+international%2C+multicentre%2C+randomised+controlled+trial](https://www.ncbi.nlm.nih.gov/pubmed/?term=Fracture+fixation+in+the+operative+management+of+hip+fractures+(FAITH)%3A+an+international%2C+multicentre%2C+randomised+controlled+trial)
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AOSpine Thoracolumbar Spine Injury Classification System. Fracture description, Neurological Status, and Key Modifiers

Vaccaro AR, Öner FC, Kepler CK, Dvorak M, Schnake K, Bellabarba C, Reinhold M, Aarabi B, Kandziora F, Chapman J, Shanmuganathan R, Fehlings M, Vialle L, and for the AOSpine Spinal Cord Injury & Trauma Knowledge Forum. *Spine* 2013; 38(23): 2028-2037

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Objective: to fulfill the need for a universally accepted thoracolumbar injury classification, usable for clinical practice and research.

Location: i.a. Thomas Jefferson University and The Rothman Institute, Philadelphia; University Medical Center, Utrecht, the Netherlands

Patient population: A retrospective cohort of an AOSpine database comprising more than 750 patients with a thoracolumbar injury.

Intervention: More than 750 spinal trauma cases were systematically reviewed by the AOSpine workgroup, hereby revising the Magerl classification, creating a simple and unambiguously morphologic classification. The classification consists out of 3 types of fractures (A=compression fractures, B=tension band fractures, C=translation injuries), containing 5 subtype fractures for type A group, and 3 for type B. After consensus about the grading system, neurological and patient-specific modifiers were incorporated into the classification. Grading of neurological deficits was according to N0-N4, indicating ascending severity in neurological status. M1 was added as a patient specific modifier in deciding type of treatment for patients with unknown integrity of the posterior ligamentous complex. To give attention to additional comorbidity, arguing for or against surgery, M2 was added. As an internal validation 9 fellowship-trained spine surgeons, experienced in spinal trauma, graded the morphological part of the classification on a selection of 40 cases. This was done twice, with a 1 month interval between the two grading sessions.

Outcome: a new classification having acceptable intra- and interobserver reliability defined by Kappa coefficient (κ) according to the Landis and Koch grading system

Results: 40 cases were morphologically graded on type and subtype of fracture pattern and results were expressed using the Kappa coefficient (κ). Neurological deficit or patient specific modifiers were not subject to validation. For subtype fracture gradation the overall κ coefficient was 0.64 for interobserver reliability and 0.77 for intraobserver reliability. For grad-

ing without regard to subtype κ coefficients were 0.72 and 0.85, respectively. These κ coefficients were defined as substantially and excellently reliable or reproducible. A recent article achieved extra morphological validation by presenting 25 cases to 100 spinal surgeons from across the world, resulting in moderate interobserver and substantial intraobserver reliability.¹

Comments: Congratulations to the authors on the publication of this promising classification, which is now part of the AO fracture classification. The well-known but clinically too comprehensive Magerl classification was revised to form the basis of the morphologic component of the new classification and it is hoped this new classification will improve upon the disappointing reliability of the current TLICS of which guidelines for surgical intervention were also subject to discussion.

Although the current classification is lacking an injury score guiding the choice for conservative or operative treatment, other articles supplement this data.^{2,3,4} An internal validation gives extra strength to this new classification, although not all elements were subject to this validation. Thus far no prospective validation on the classification has been performed. Further study is necessary to validate this classification and score system on a broad international basis that will ultimately be used in treatment decisions.

W. Alexander Goudriaan, Adriaan K. Mostert and Guido B. van Solinge

1. Kepler CK, Vaccaro AR, Koerner JD, Dvorak MF, Kandziora F, Rajasekaran S, et al. Reliability analysis of the AOSpine thoracolumbar spine injury classification system by a worldwide group of naïve spinal surgeons. *Eur Spine J.* 2016;25(4):1082-6.
2. Schroeder GD, Vaccaro AR, Kepler CK, Koerner JD, Öner FC, Dvorak MF, et al. Establishing the injury severity of thoracolumbar trauma. *Spine*; 2015; 40(8):E498-503
3. Kepler CK, Vaccaro AR, Schroeder GD, Koerner JD, Vialle LR, Aarabi B, et al. The Thoracolumbar AOSpine Injury Score. *Global Spine J.* 2016;6:329-334.
4. Vaccaro AR, Schroeder GD, Kepler CK, Öner FC, Vialle LR, Kandziora F, et al. The surgical algorithm for the AOSpine thoracolumbar spine injury classification system. *Eur Spine J.* 2016;25:1087-94.

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Proefschriften

Preclinical challenges in the surgical treatment of intervertebral disc degeneration. Suzanne E.L. Detiger, VU University Medical Center, Amsterdam, 23 June 2016

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Intervertebral disc degeneration is considered one of the important determinants, among other etiological factors, associated with low back pain, which is the leading cause of years, lived with disability according to the global burden of disease study of 2010. The main goal of this thesis was to evaluate the feasibility of minimally invasive regenerative treatment modalities for disc degeneration: adipose tissue derived stem cells, growth factors, and/or nucleus pulposus substitutes.

In summary, the specific aims of this thesis were:

1. To characterise the viscoelastic behaviour of the nucleus pulposus and biomechanical behaviour of healthy and degenerated spinal motion segments;
2. To evaluate and validate an objective, quantitative, non-invasive diagnostic method to assess early intervertebral disc degeneration;
3. To regenerate the nucleus pulposus at a mildly degenerated stage, by means of growth factors and/or stem cells;
4. To replace the nucleus pulposus at a more severely degenerated stage, with a mechanically characterised NP substitute.

With regard to the viscoelastic properties, we found significantly lower (10-12%) NP viscoelastic moduli after mild degeneration within goats, though the inter-animal differences were relatively large (complex modulus -12-41 kPa). The large variability between animals in viscoelasticity, but not in segmental biomechanical characteristics, implies that the influence of viscoelasticity within the NP on the mechanical behaviour of the whole spinal motion segment is marginal.

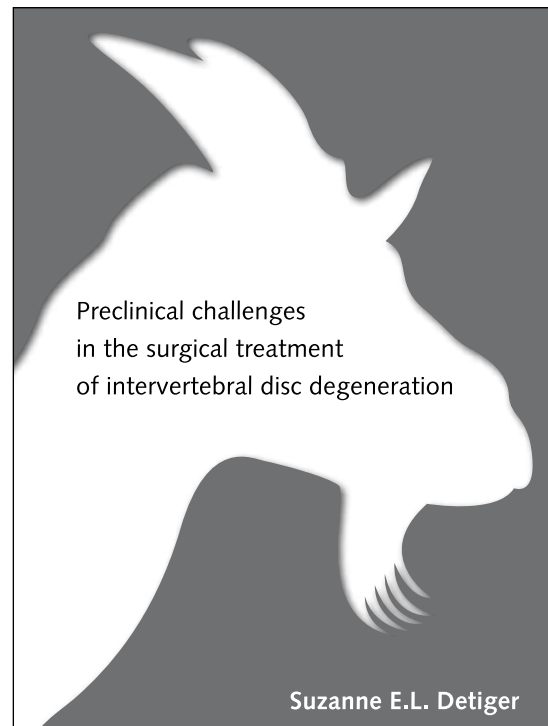
Secondly, we validated MRI T2* relaxation time mapping as an objective diagnostic tool to quantitatively assess intervertebral disc degeneration on a continuous scale. We found a significant correlation between T2* relaxation time and established parameters of IVD degeneration at tissue level, namely proteoglycan content as well as histological and macroscopic grading, implying that MRI T2* mapping is a promising method to reliably evaluate disc degeneration.

Next, we attempted to regenerate the nucleus pulposus at a mildly degenerated stage by means of growth factors and/or adipose stem cells in a validated goat model for disc degeneration. A slow re-

lease system containing BMP-2 and BMP-2/7 bound to proteins for coupling and subsequent release could be safely applied in caprine intervertebral discs. However, no effect on disc regeneration was observed, as demonstrated by the absence of statistically significant - let alone clinically relevant - differences between any of the intervention groups.

The injection of stromal vascular fraction - a heterogeneous cell mixture containing among others multipotent adipose-derived stromal cells - harvested using a refined enzymatic and washing protocol was not successful either: we observed a severe inflammatory response, including massive lymphocyte infiltration, neovascularisation and endplate destruction, for which the responsible agent has not been identified yet.

Finally, a novel nucleus pulposus substitute, consisting of a hydrophilic swelling core (Hydromed) encapsulated by an electrospun envelope of 6-8 mm diameter was tested in several consecutive mechanical setups of increasing complexity. From our observations, we conclude that implants may mimic native disc behaviour in simple mechani-



cal tests, yet fail in other, more realistic setups. Therefore, we recommend that biomaterials for NP replacement be tested in several mechanical testing modalities of increasing complexity and in their relevant anatomical surroundings, for a more

reliable prediction of clinical potential.

The full thesis is available at:

link: <http://orthopeden.org/base/downloads/proefschrift-suzanne-detiger.pdf>

Clinical and radiographic outcome of cemented revision total hip arthroplasty. Martijn A.J. Te Stroet, Radboudumc, Nijmegen, 16 December 2016

This thesis shows that satisfying mid- to long-term results can be achieved in both femoral and acetabular revision surgery using several different cemented treatment modalities. The survival outcomes of all studies were acceptable with in general survival of above 90% for the endpoint re-revision for any reason when the 10 years survival point was reached. Also the clinical scores in all studies improved during follow-up and the radiographic appearance of the reconstructions was good. In general, when grafts were used incorporation was observed on both acetabular and femoral side.

In the Cox regression analysis of the femoral bone impaction grafting revisions we found that obese patients had a significant higher risk for a re-revision for any reason compared with non obese patients. This can probably be explained by the fact that a higher BMI results in chronically higher biomechanical loads on the reconstruction. Earlier studies also showed that obese patients who had undergone a revision total hip arthroplasty had a significant higher risk for a postoperative infection, which was the pri-

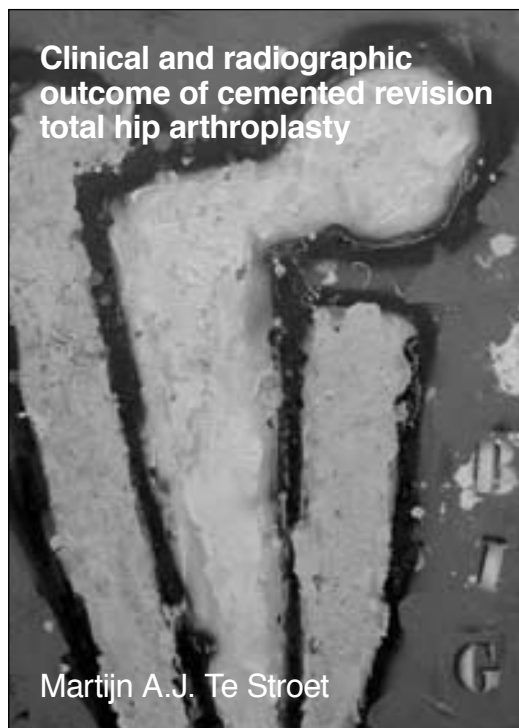
mary reason for re-revision in our study population. The studies in this thesis show that there are several treatment variations possible when a cemented revision technique is used, on both femoral and acetabular side. When there is an intact cement mantle and a revision needs to be performed for, for example, stability problems (like a change of femoral offset or anteversion), a cement-in-cement revision is a reasonable choice. When there are signs of radiographic and intraoperative loosening of the existing cement mantle, or when an uncemented component is removed and there is almost no bone stock loss, a 'cement only' revision without additional bone grafting results in acceptable results. And when in a revision bone stock deficiencies need to be encountered bone impaction grafting almost always is a suitable technique with excellent long term results on both femoral and acetabular side. We have shown that, by replenishing the bone stock, even re-revisions are possible with acceptable long term results using bone impaction grafting and a cemented component. In our opinion this is the great advantage of the biological way of thinking by using bone impaction grafting in revision surgery, compared to other - non-biological - revision methods.

We think that especially in young patients it is of great value to replenish the bone stock, because these patients will probably outlive even their revision total hip arthroplasty and therefore will need to undergo more future revisions. In patients at a higher age or with a weak general health condition also cemented revisions without bone grafting can provide acceptable results.

In conclusion, this thesis shows that satisfying mid- to long-term results can be achieved in revision surgery using cemented components, with and without the use of bone impaction grafting. We think that, even in these times of growing use of uncemented components in primary and revision total hip arthroplasty, cementing is an essential technique in the armamentarium of a present-day hip replacement surgeon.

The full thesis is available at:

<https://goo.gl/YTOFxx>



Functional outcome assessment following total hip and knee arthroplasty. Implementing wearable motion sensors.

Stijn Bolink, Universiteit Maastricht, 19 januari 2017

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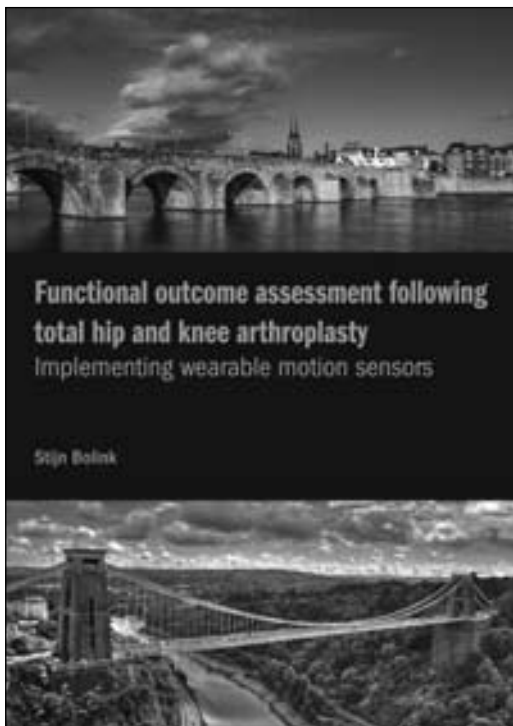
This thesis describes a novel method for objective assessment of the functional impairments in patients with end-stage hip or knee osteoarthritis (OA), and their functional abilities after total joint arthroplasty (TJA). Patient-reported outcome measures (PROMs) have become increasingly popular to assess outcomes following TJA. However, their outcomes are dominated by pain and suffer from a ceiling effect. Objective physical performance-based measures (e.g. gait analysis) capture a different construct of physical function that is supplementary to PROMs. A commercially available inertial measurement unit (IMU) was used to derive objective physical performance-based measures. The IMU allows acquisition of 3D body translations, rotations and orientation angles (six degrees of freedom). It was attached onto the dorsal side of the pelvis to derive motion parameters during gait, sit-to-stand (STS) transfers and block step-up (BS) transfers. Good agreements were found between IMU measurements and optoelectronic motion capture (MOCAP) system measurements. In a cohort of patients with end-stage knee OA undergoing total knee arthroplasty (TKA), IMU derived motion parameters exposed task specific alterations of movement. After TKA, significant improvements were found for measurements of time (effect size: 0.73 - 1.20) and IMU-derived motion

parameters (effect size: 0.56 - 1.07). Postoperative improvement was larger in challenging tasks (e.g. BS transfers). Moderate correlations (Spearman's rho range 0.45-0.74) were found between PROMs and physical performance-based measures preoperatively and one year postoperatively. These findings highlight the inherent link yet relative independence of the two measurement tools. In patients with end-stage hip OA, specific gait alterations were found in frontal plane pelvic motion. After total hip arthroplasty (THA), 50% of patients reached near maximum (≥ 90 points) WOMAC function scores 3 months postoperatively, and 28% reported the maximum WOMAC function score of 100 points one year postoperatively. WOMAC function scores and parameters of gait were moderately correlated (Spearman's rho = 0.33 - 0.51) preoperatively and one year postoperatively. No significant correlations were found 3 months postoperatively. This highlights the disparity of self-reported and objective measures of physical function, especially in the early postoperative period when pain is substantially reduced. Preoperative functional status did not demonstrate a great influence on final outcomes after THA. Patients with a lower preoperative level of physical function improved significantly more after THA on both subjective WOMAC function scores and objective gait parameters. By 3 months after THA, their gait was comparable to patients with better preoperative function. Limited evidence was found for the relationships between the restoration of native hip offset and leg length after THA, and functional outcomes assessed by PROMs or physical performance-based tests. A decrease of more than 15% in femoral offset and variations in LLD below 10mm after THA did not cause clinically relevant functional impairments. There seems to be a reasonable safe zone regarding the reconstruction of offset and leg length to create a well-functioning THA.

Conclusion

An inertial measurement unit (IMU) is a clinically feasible tool for accurate motion analysis of physical performance-based tests. Concurrent use with PROMs is recommended for more comprehensive functional outcome assessment following total hip and knee arthroplasty.

The full thesis is available at:
<http://publications.epublisher-world.com/YourThesis/17084>



Hip Osteoarthritis symptomatic presentation and non-operative treatment.

Desirée M.J. Dorleijn, Erasmus MC Rotterdam, 25 January 2017

The aim of the research described in this thesis was to assess the effectiveness of intramuscular corticosteroid injection in patients with painful hip osteoarthritis (OA), and to gain insight in the course of pain and comorbidities influencing hip complaints in patients with hip OA.

In a double-blinded, RCT we enrolled patients with painful hip OA scoring ≥ 3 on an 11-point numerical rating scale (NRS:0-10;0=no hip pain) despite the use of oral analgesics. Patients were screened for eligibility by general practitioners and orthopaedic surgeons. Patients were randomized to receive either 40mg of triamcinolone acetate or placebo (saline) with an intramuscular injection into the ipsilateral gluteus muscle. The primary outcome was severity of hip pain at 2 weeks, measured with an 11-point NRS in rest and on walking, and with WOM-AC pain subscale (0-100; 0 = no symptoms). Clinical relevance was defined as a difference of ≥ 1 on a scale of 0-10. Statistical analysis was based on the intention-to-treat principle. Linear mixed models with repeated measures were used for continuous outcomes. 107 patients were randomized of which 106 patients could be analyzed; 52 patients in the corticosteroid group and 54 patients in the placebo group. At 2 weeks follow-up, the corticosteroid injection was statistically significant and clinically

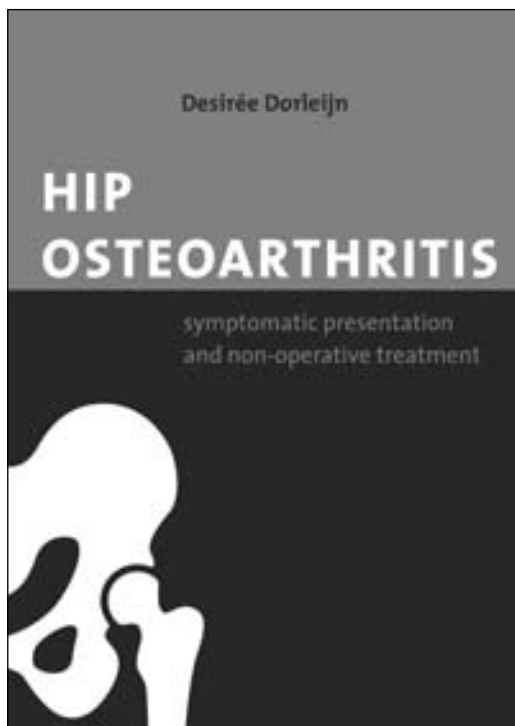
relevant associated with hip pain reduction at rest (difference -1.3, 95%CI -2.3 to -0.3) compared to the placebo injection. At 4, 6 and 12 weeks the corticosteroid injection was also associated with statistically significant and clinically relevant hip pain reduction at rest as well as during walking. We conclude that an intramuscular corticosteroid injection compared to placebo showed clinical effectiveness in patients with painful hip OA for 12 weeks of follow-up.

In a systematic review we assessed the diagnostic value of intra-articular anesthetic hip injection in patients with hip pain atypical for OA. Of the 1387 potentially eligible articles, nine case series (351 patients) with high risk of bias (in particular verification bias) were included. Meta-analysis and quality assessment shows that for clinical practice, no recommendation can be made regarding the use of hip injections for diagnosing hip OA.

In a cohort study of 222 patients with hip OA we assessed the association between two cartilage biomarkers and clinical symptoms using pain trajectories defined by Latent Class Growth Analysis, reported at multiple time moments. The urinary biochemical markers uCTX-II and uCIIM are not associated cross-sectional with hip pain at each 6-month interval during the 2-year follow-up.

Also in this cohort we assessed the association between weather variables and clinical symptoms in hip OA. Our results support the general opinion of patients with OA that barometric pressure and relative humidity influence symptoms in hip OA. However, the contribution of these weather variables to the severity of OA symptoms was not clinically relevant. Finally, we assessed the prevalence of Greater Trochanter Pain Syndrome (GTPS) in this cohort. One in seven patients with hip OA had concurrent GTPS. Patients with hip OA and GTPS showed clinically significant higher hip pain scores than those with hip OA without GTPS.

The full thesis is available at:
<https://epubs.ogc.nl?epub=d.dorleijn>



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De bijzondere kant van het werk van Lucas Kleijn

'Het is inspirerend om uit je comfortzone te stappen'

In elke editie van NTvO vertelt een NOV-lid over de bijzondere kant van zijn of haar werk. Dit keer is dat Lucas Kleijn; hij verbleef een jaar in Auckland (Nieuw Zeeland) voor een fellowship schouder in het North Shore Hospital.

Kleijn kon meteen na zijn opleiding toetreden tot de maatschap orthopedie van het Elkerliek Ziekenhuis. Hij doet daar algemene orthopedie en trauma, met de schouder als aandachtsgebied. 'Eigenlijk was het een samenloop van omstandigheden dat we voor een jaar naar Nieuw-Zeeland vertrokken', vertelt hij. 'Mijn vrouw wilde graag een sabbatical en ik wilde na tien jaar nog wat meer de diepte in op professioneel gebied. Dat past ook wel bij de trend die we zien in de orthopedie in Nederland. De combinatie van een fellowship in Nieuw-Zeeland voor mij en een sabbatical voor mijn vrouw was meteen ook een mooi buitenlands avontuur voor het hele gezin. We zijn het samen met onze drie tieners aangegaan.'

Minder tijdsdruk

Het North Shore Hospital is een public hospital. Kleijn was er voor ongeveer 50 procent gekoppeld aan Peter Poon, schouder- en elleboogspecialist. De zorg in Nieuw-Zeeland is qua niveau goed te vergelijken met Nederland. De financiering is er anders, maar wel goed geregeld.

Kleijn vertelt over de verschillen: 'Efficiency is er nog wat minder doorgevoerd en eerlijk gezegd is dat wel eens prettig. Het is goed hoor om efficiënt te werken, maar het kan ook wat ver gaan. In Nieuw-Zeeland heb je meer tijd tot je beschikking. Er is bijvoorbeeld veel meer ruimte voor onderwijs; de trainee doet de ingreep en de senior superviseert. Op het spreekuur zie je ook echt minder mensen dan in Nederland. De tijdsdruk is gewoon lager.'

Inspiratie en groei

Kleijn vertelt dat posterieure instabiliteit van de schouder in Nieuw-Zeeland veel voorkomt. Hij vervolgt: 'Een wezenlijk verschil met de patiëntenpopulatie in Nederland. Het is gerelateerd aan rugby; de spelers vallen op hun elleboog.' Kleijn deed in Auckland veel cuff-repairs, peestransposities en



scopische stabilisaties. Ook plaatste hij veel schouderprothesen; zowel primair- als revisie. In het jaar buitenland deed hij veel meer schouderingrepen dan in het Elkerliek en hij vertelt dat hij echt een groei heeft doorgemaakt, ook op het gebied van fractuurbehandeling. Hij vult aan: 'Aan de andere kant kon ik de Nieuw-Zeelandse collega's laten zien hoe de voorste benadering van de heup wordt uitgevoerd. Daarmee hadden zij nog niet zoveel ervaring.'

Nieuw-Zeeland is volgens Kleijn een fijne plek om te werken als orthopedisch chirurg. De sfeer in het ziekenhuis is prettig en open. Je doet er volgens hem - ook voor Nederland - relevante ervaring op, maar je moet je realiseren dat je er niet zomaar kunt waarnemen. Je moet allerlei examens doen om je specialistenregistratie te behalen. Voor een fellowship is dat niet nodig, maar daarvoor moet je wel een Engels examen afleggen. 'Het is heel fijn om tijd te besteden aan je eigen groei. Al werkend doe je dat natuurlijk sowieso, maar nu was het hele fellowship gericht op mijn groei. En daarnaast doe je dan nog eens de ervaring op van een ander land, nieuwe mensen en de Engelse taal. Juist die combinatie heeft goed uitgepakt voor het hele gezin, want alleen voor het fellowship had ik natuurlijk ook in Nederland kunnen blijven. Wij hebben ervaren dat het heel inspirerend is om uit je comfortzone te stappen.'

Tijdens zijn afwezigheid is Kleijn in het Elkerliek ver-

vangen door een Jonge Klare en die kan nog twee jaar blijven. De maatschap kon dus met het fellowship van Kleijn ook ruimte bieden aan een Jonge Klare.

Kent u een NOV-lid dat past in deze rubriek? Laat het ons weten via communicatie@orthopeden.org.

Consortium Orthopaedic REsearch (CORE)

Op het gebied van zorgevaluatie-onderzoek orthopedie wordt in Nederland steeds intensiever samengewerkt. We geven u graag een update.

Enige maanden geleden zijn de volgende projecten gestart met de inclusie:

- *LEAK studie*; onderzoek naar de beste behandeling van wondlekkage bij heup- of knieprothese.
- *DART-studie*; onderzoek naar de kosteneffectiviteit van operatief behandelen versus gips bij distale radiusfracturen bij ouderen. Beide studies kunnen nog deelnemers gebruiken!

In december starten de volgende studies:

- *APOLLO*; evaluatie chirurgische benadering van een kophalsprothese bij een heupfractuur.
- *PaTIO*; evaluatie van de kosteneffectiviteit van geoptimaliseerde, individuele treat-to-target postoperatieve fysiotherapie, vergeleken met gebruikelijke postoperatieve fysiotherapeutische zorg bij TKP en THP patiënten.

De ARGON-audit door de NOV is afgerond. Het doel hiervan was om lessen te leren voor andere landelijke onderzoeksprojecten; o.a. over belemmerende en bevorderende factoren voor multicentre onderzoek.

In de CORE-sessie van het NOV-Najaarscongres op vrijdag 13 oktober komen bovenstaande onderwerpen stuk voor stuk aan de orde, alsmede een pitch van de ingediende projecten. We besteden bovendien aandacht aan de herziening van de Agenda Zorgevaluatie Orthopedie. Rudolf Poolman houdt een presentatie hierover als voorzitter van de Werkgroep Herziening Agenda Zorgevaluatie. Hij licht toe hoe de herziening in zijn werk gaat en hoe u mee kunt denken over de prioritering van uit te werken onderwerpen. De sessie wordt afgesloten met tips en tricks voor het aanvragen van subsidies, verzorgd door de Werkgroep Orthopedie en Wetenschap. Meer informatie over CORE en de verschillende studies vindt u op www.orthopeden.org (wetenschap).

NOV-Najaarscongres

Op donderdag 12 en vrijdag 13 oktober organiseert de NOV het jaarlijkse Najaarscongres in de Koningshof in Veldhoven. De CWI heeft een gevarieerd programma voor u samengesteld en het beloven twee mooie dagen te worden! De eerste congresdag begint met parallelsessies van de Werkgroep Schouder en Elleboog en de Werkgroep Biotechnologie. Vervolgens is er een uitgebreid en afwisselend wetenschappelijk programma met de uitreiking van de Mathijsenprijs. We sluiten deze dag af met de ALV, een borrel en een sfeervol avondprogramma. Op vrijdag starten we met een gezamenlijke sessie

van CORE en de Werkgroep Orthopedie & Wetenschap. Parallel daaraan is er een programma van de recent opgerichte Werkgroep Bot en Weke-delen Tumoren. Vervolgens staat een sessie van Anna Fonds|NOREF op het programma met de uitreiking van de Anna Prijs. We sluiten het congres af met een aantal voordrachten van de Werkgroep Knie. Het complete programma-overzicht en informatie over de inschrijving en de sprekers vindt u op orthopeden.org/congressen. U kunt zich tot en met 5 oktober online inschrijven. Daarna betaalt u op de congresdagen € 50 extra aan de inschrijfbalie.

Matchmaker en vacatures

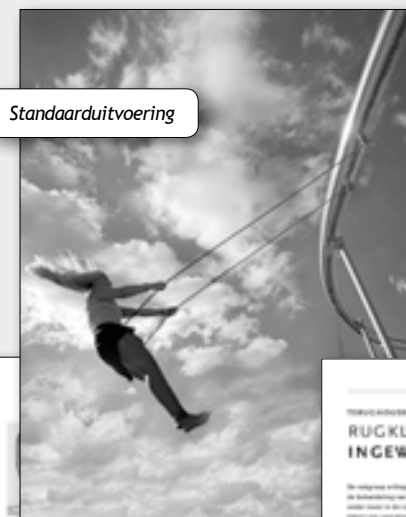
Zoekt uw vakgroep (tijdelijk) een nieuwe collega? In de *Matchmaker Orthopedie* ziet u wie er beschikbaar zijn. U kunt hen rechtstreeks benaderen. Informatie hierover vindt u via de knop *Beschikbare orthopeden* op de pagina met het vacature-overzicht. Heeft uw vakgroep een vacature, dan kunt u deze op de NOV-website plaatsen. Gebruik hiervoor de knop

Vacatures plaatsen op de pagina met het vacature-overzicht.

Inmiddels hebben ruim 25 (bijna klare) orthopeden zich ingeschreven voor de *vacature-alert*. Zij ontvangen nieuwe vacatures per e-mail zodra deze op de NOV-website zijn geplaatst. Informatie hierover vindt u via de knop *Vacature-alert* op de pagina met het vacature-overzicht.

Zorg voor beweging Jaarmagazine 2018

De deadline voor het bestellen van Zorg voor beweging Jaarmagazine nadert. Ook in 2018 kunt u kiezen voor:



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ketten, kosten en bestelprocedure vindt u op orthopeden.org/vereniging/communicatie/bestellen-jaarmagazine.

U kunt het Jaarmagazine bestellen **t/m 9 oktober**. Heeft u vragen of speciale wensen? Neem dan contact op via zorgvoorbeweging@orthopeden.org.

Voor uw agenda

9 oktober	Deadline bestellen Jaarmagazine Zorg voor beweging 2018
12 en 13 oktober	NOV-Najaarscongres, Veldhoven
17 november	CCOC pols/hand zonder fractures en epidemiologie/evidence based medicine, Utrecht
13 december	MMV-congres, Nieuwegein
12 januari 2018	CCOC Heup + basic science inclusief heup-arthroscopie, Utrecht
24 januari	Seniorenindiner
25 en 26 januari	NOV-Jaarcongres, 's-Hertogenbosch
25 januari	NOV-dag secretaresses en poli-assistenten, 's-Hertogenbosch
1 februari	Congres Collegium Chirurgicum, Ede
9 maart	CCOC Knie en basic science 2, Utrecht
25 mei	NOV-Voorjaarscongres, Utrecht

Meer informatie op de website van de NOV (orthopeden.org/kalender).



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1. Latest ODEP ratings can be found at www.odep.org.uk
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