Cross-cultural adaptation and validation of the Dutch version of the High Activity Arthroplasty Score

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References

[1] OCY = Observed component years
[2] NZOA, The New Zealand joint registry – Eighteen year report January 1999 to December 2016. 2017.
[3] Erivan, R., Eymond, G., Villatte, G., et al., RM Pressfit cup: good preliminary results at 5 to 8 years follow-up for 189 patients. Hip Int, 2016. 26(4): p. 386-391.
[4] Clauss, M., Van Der Straeten, C., Goossens, M., Prospective five-year subsidence analysis of a cementless fully hydroxyapatite-coated femoral hip arthroplasty component. Hip Int, 2014. 24(1): p. 91-7.

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Voorwoord

Afgelopen zomervakantie was er weer sprake van de rituele zorgverzekeraarsdans en het was deze keer de beurt aan Menzis om een 'lumineus' idee te lanceren (of spraken ze voor hun beurt, want ik kan me andere ideeën van Menzis nog herinneren en volgens mij was er een andere verzekeraar aan de beurt, maar vooruit).
Het moet ongetwijfeld te maken gehad hebben met de enorme hitte deze zomer, een andere verklaring voor een dergelijke mate van asociaal gedrag ontbreekt.
Menzis heeft namelijk met zorgaanbieders contracten afgesloten om de behandeling van depressies en angststoornissen alleen dan nog te vergoeden als het resultaat heeft, schaamteloos verwijzend naar hun 'succesvolle invoering van hun programma's bij heupen en knieën', iets waarover de NOV een negatief advies uitvaardigde, maar waar sommige Raden van Bestuur uit angst voor niet meer gecontracteerd worden, toch toehapten. Menzis gedraagt zich hiermee niet als zorgverzekeraar, maar als genezingsmakelaar: zij betalen alleen de behandeling voor hen die genezen, niet voor de mensen die niet genezen. Het beginsel van collectiviteit en solidariteit is daarmee ver te zoeken. Het feit dat een patiënt zorg nodig heeft en dat genezing niet te voorspellen is, wordt volstrekt genegeerd. De genezing wordt aan de zorgaanbieder toegerekend, terwijl de patiënt in kwestie een belangrijkere factor is in het al dan niet behalen van een resultaat. Het behandelresultaat wordt gemeten met behulp van de ook in de orthopedie aanwezige PROM's. Stelt u zich eens voor: no cure, no pay in de orthopedie. Wat is het resultaat dat we nastreven bij het plaatsen van een heup- of knieprothese? Hoe tevreden moet een patiënt zijn wil er door deze verzekeraar worden overgegaan tot betaling? We weten ondertussen wel dat deze PROM's niet geschikt zijn om zorg wel of niet in te kopen, dat ze afhankelijk zijn van vele factoren en dat meetresultaten ongetwijfeld anders worden als daar op een of andere wijze financiële gevolgen aan worden gekoppeld en dat de lokale case-mix een belangrijk onderdeel is in het bepalen van succesvolle resultaten.
Nadenkend over de gevolgen van een dergelijke actie komen bij mij de begrippen inspanningsverplichting en resultaatsverplichting naar boven. Ook zou het 'nuttig' zijn die patiënten te behandelen die slechts kort een probleem hebben en vooral diegenen die op basis van het natuurlijk beloop al beter zouden worden. Leve de scopische Neer, leve de tenniselleboogoperatie! Trouwens: wat ben je voor zorgaanbieder als je op een dergelijk aanbod van een verzekeraar ingaat?
Ik ben dan ook benieuwd of deze gekte zich zal verspreiden als de temperaturen gaan dalen naar normale waarden. Was het weer een proefballonnetje van mensen die de zorg niet interesseert, maar die alleen denken aan zo groot mogelijk maken van de winst van verzekeraars, mensen die denken in prestatie-indicatoren, zonder contact te hebben met individuele patiënten en hun individuele behoeften en situaties?

Dr. Taco Gosens, hoofdredacteur

Inhoud

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Nederlands Tijdschrift voor Orthopaedie

Cross-cultural adaptation and validation of the Dutch version of the High Activity Arthroplasty Score

Bas L. Fransen, Hester J. Kan, Jantine PosthumaDeBoer, Bart J. Burger and Marco J.M. Hoozemans

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Introduction: The High Activity Arthroplasty Score (HAAS) has been designed to differentiate in the functional ability between normal and more active patients after total knee arthroplasty (TKA) and total hip arthroplasty (THA). No such questionnaire is currently available in the Dutch language. The objective of this study was to evaluate the Dutch version of the HAAS in THA and TKA patients.

Patients & Methods: The forward and backward translated Dutch version of the HAAS combined with the national Dutch patient reported outcome measures (PROMS) were sent to two hundred patients of all ages who underwent TKA or THA. The internal consistency, construct validity and ceiling/floor effects of the HAAS were evaluated.

Results: 108 patients (51 THA and 57 TKA) participated in this study. A good internal consistency with a Cronbach's alpha of 0.78, 0.81 and 0.84 was found in all patients, the THA and the TKA group respectively. Significant positive correlations were observed between the HAAS and VAS QoL, EQ-5D, all KOOS sub-scores except the symptoms score, and all HOOS sub-scores except the QoL score. A negative correlation was found with the VAS pain. No ceiling or floor effect was seen in the HAAS.

Discussion: The Dutch version of the HAAS can be used to evaluate the functional ability in more active patients of all ages who underwent THA or TKA with an acceptable internal consistency and construct validity, with no ceiling or floor effects.

Introduction

The evaluation of outcome of total hip arthroplasty (THA) and total knee arthroplasty (TKA) is often performed by (self-administered) questionnaires. The assessment of these Patient Related Outcome Measures (PROMs) has become standard practice for evaluating, pain, function, QoL and patient satisfaction after THA and TKA.[1] Since both THA and TKA have proven to be very effective treatments with generally very good results,[2,3] the most commonly used questionnaires for evaluating THA and TKA provide results in a narrow spectrum of high scores. This results in a ceiling effect, which can interfere with the adequate analysis of research findings.[4]

Current trends show that more and younger patients are undergoing THA and TKA. These younger patients generally attach more value to other aspects of functional outcome, e.g. having an adequate function to be able to return to work or participate in sports activities.[5,6] In addition, older patients who undergo joint replacement remain active on a higher functional level up to a higher age.[7] Ceiling effects of current, decades old, questionnaires provide unsatisfactory means to differentiate between function on a high, or an even higher level of functional outcome. To address this issue, Talbot et al. presented a new questionnaire that is able to assess variation in functional ability in highly functioning TKA or THA patients: the High Activity Arthroplasty Score (HAAS).[8] The questionnaire was designed to provide a tool to differentiate between functional outcome at a level of daily activities (e.g. walking, stair climbing) and a higher level of functional outcome (e.g. sports). The HAAS has been validated in English and French[8,9] and consists of four domains of function: walking, running, stair climbing and activity levels. Since the introduction of the HAAS in 2010, several publications showed that this self-administered questionnaire consistently has good validity and reliability.[8-11]

There is no comparable and validated questionnaire available in Dutch that evaluates the higher-level functional outcome after TKA and THA. Therefore, the goal of the current study was to translate the HAAS into Dutch and to determine its internal consistency, construct validity, and ceiling and floor effects in patients who underwent primary unilateral THA or TKA. We hypothesized that the HAAS would have good internal consistency, a good correlation with other questionnaires focusing on functional outcome, and no ceiling or floor effect.

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Patients & Methods

Translation procedure
The protocol for translating the English version of the HAAS into the Dutch language followed the *Guidelines for the Process of Cross-Cultural Adaptation of Self-Report Measures* by Beaton et al.[12] First, two Dutch orthopaedic residents who were fluent in English and one Dutch professional English translator, who was not working in the medical field, independently translated the HAAS into Dutch. Afterwards a consensus meeting was held in which the three versions were combined into one. Then, two persons whose mother tongue was English, but were also fluent in Dutch, translated this Dutch version back into English. They were not medical professionals and were blinded for the original English version. Using these backward translations, final adjustments to the Dutch version were made in another consensus meeting.

Study design and study population
The validation study was performed in a large non-university teaching hospital in The Netherlands. One hundred patients who underwent primary THA and one hundred patients who underwent primary TKA for osteoarthritis between the 1st of July 2015 and the 31st of December 2015 were sent a questionnaire 6 to 12 months after surgery. They were asked to fill in the questionnaire (including an informed consent form) and return it by mail. Patients who reported comorbidities that could influence physical functioning in daily activities (i.e. lower back pain, Parkinson's disease, other joints with OA etc.) were excluded. In the present study we decided to include all ages so that the study population would accurately represent the orthopaedic population that undergoes TKA or THA. This is contrary to the original validation by Talbot et. al. who only included patients under 66 years, but was consistent with Jenny et al who showed that the HAAS can be used in elderly patients as well.[10]

Questionnaires
The Dutch translation of the HAAS (Table 1) was sent as a part of a questionnaire that also included a visual analogue scale (VAS) for pain, the EQ-5D[13] for quality of life (QoL) (which includes VAS for QoL) and either the Hip disability and Osteoarthritis Score (HOOS)[14] or the Knee disability and Osteoarthritis Score (KOOS),[15] depending on whether they underwent THA or TKA. All questionnaires except the HAAS were validated in Dutch and part of our regular PROMs.
The four questions of the HAAS result in a score ranging from 0 to 18, with 18 indicating the highest function. The VAS for pain scores (at the time of response) ranged from zero, indicating no pain, to 100, indicating the worst pain imaginable. The EQ-5D consists of five questions concerning QoL, each with three possible answers, and a VAS for QoL. A combined score of the five questions is calculated ranging from zero (worst) to one (best), with a separate score for the VAS for QoL.[16] The KOOS and HOOS each contain five sub-scores (symptoms, pain, activities of daily living (ADL), sports and recreation, QoL), with scores ranging from zero (worst) to 100 (best).[14,15]

Sample size
For cross-cultural adaptations, a minimum of 30-40 patients is considered to be sufficient to make adequate calculations.[12] Our study met the quality criteria proposed by Terwee and associates[17] for measurement properties of health status question-naires, which require the results from at least 50 patients for the analysis of ceiling or floor effects, reliability and validity.

Statistical analysis
The results were analyzed for all patients together, as well as for THA and TKA patients separately. To assess the reliability of the translated Dutch version of the HAAS, the internal consistency was tested by determining Cronbach's α, indicating the level of interrelatedness of the items in the Dutch HAAS questionnaire.[18] An α of 0.7 – 0.95 was deemed acceptable.[19] Since a gold standard is not available, the construct validity of the HAAS was evaluated by determining its association with the scores on the VAS pain, EQ-5D, VAS QoL of the EQ-5D and KOOS or HOOS using Spearman's rank correlation coefficient (ρ). A correlation of 0.10 was considered a weak association, a correlation of 0.30 was considered a moderate association and a correlation of 0.50 or higher was considered a strong association.[20,21] To evaluate a possible ceiling effect, the criteria by McHorney and Tarlov[22] were used, in which a ceiling or floor effect is determined as 15% or more of the patients achieving the maximum or minimum score in a questionnaire. All statistical analyses were performed using IBM SPSS Statistics version 20 (IBM Corporation, Armonk, NY, USA).

Results

Patient characteristics
In total, 200 patients (100 THA and 100 TKA) received the questionnaire. Of these, 144 (72%) (67 THA and 77 TKA) were willing to participate and completed the questionnaire. After excluding the patients that reported comorbidities that potentially influence their physical functional ability,

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Table 1. The Dutch translation of the HAAS.

Geef voor elk van de vier categorieën aan wat uw hoogste niveau van functioneren is.

1 Lopen (max 5 punten)

5	Over een ongelijkmatige ondergrond > 1 uur
4	Onbeperkt over vlakke ondergrond, moeizaam over ongelijkmatige ondergrond
3	Onbeperkt over vlakke ondergrond, onmogelijk over ongelijkmatige ondergrond
2	Minstens 30 minuten op vlakke ondergrond
1	Korte afstanden (tot 20 meter) zonder hulp
0	Gebruik loophulpmiddelen bij korte afstanden of een nog lager niveau van functioneren

2 Hardlopen (max 4 punten)

4	Meer dan 5 km
3	Rustig joggen tot 5 km
2	Gemakkelijk hardlopen om de straat over te steken
1	Een paar passen hardlopen om een eventuele botsing in het verkeer te voorkomen
0	Kan niet hardlopen

3 Trap oplopen (max 3 punten)

3	Met 2 treden tegelijk trap oplopen
2	Trap oplopen zonder leuning te gebruiken
1	Trap oplopen met leuning of wandelstok
0	Kan geen trap oplopen

4 Activiteitsniveau (max 6 punten)

6	Prestatiegericht sporten, b.v. enkelspel tennis, > 10km hardlopen, > 80 km fietsen
5	Recreatief sporten, b.v. dubbelspel tennis, skiën, < 10 km joggen, intensieve aerobics
4	Inspannende recreatieve activiteiten, b.v. bergwandelen, lichte aerobics, flink tuinieren of ander handmatig zwaar werk
3	Matig inspannende recreatieve activiteiten, b.v. golfen, tuinieren of ander licht werk
2	Licht inspannende recreatieve activiteiten, b.v. een korte wandeling, jeu de boules
1	Alleen noodzakelijke buitenactiviteiten, b.v. een klein stukje wandelen om een boodschap te doen
0	Zonder hulp aan huis gebonden

(max 18 punten)

51 THA (76%) and 57 TKA (74%) patients were included for analysis. The mean age at time of surgery for all patients was 70 (range 42-86) years. Thirty-one patients (32.4%) were aged 65 or younger. All patient characteristics can be found in Table 2. Seven patients (6.5%) did not answer one or more of the questions of the HAAS. Their HAAS scores were excluded from analysis.

Internal consistency and construct validity

Cronbach's α for the Dutch translation of the HAAS demonstrated a good internal consistency of 0.780 for all patients and an internal consistency of 0.810 and 0.838 for the THA and TKA groups, respectively. The Spearman's rank correlation was used to explore construct validity. We observed a significant negative association between the HAAS scores and VAS for pain in all three groups (Table 3). The observed associations were moderate. Significant positive associations were observed between HAAS and VAS QoL, EQ-5D, all KOOS sub-scores except the symptoms score, and all HOOS sub-scores except the QoL score. All associations were weak or moderate, except for the association between the HAAS and the KOOS ADL and Sports & Recreation sub-scores and the association between the HAAS and the HOOS Symptoms and Sports and Recreation sub-scores, which showed a strong association (Table 3).

Ceiling or floor effect

No ceiling or floor effect was found for the HAAS in any of the groups. The distribution of the HAAS scores is displayed in Figure 1. No ceiling or floor effect was observed for the VAS QoL in all groups, nor for the KOOS symptoms, ADL and Sport & Recreation subscores (in the TKA group). Analyses of the TKA, THA and total groups showed a floor effect for the VAS pain. A ceiling effect was found for all other scores.

Table 4 summarizes the ceiling and floor effects for the different outcome measures in THA and TKA.

Discussion

In this work, a translation and validation of the HAAS into Dutch was performed. We found a Cronbach's α of 0.780 for THA and TKA combined indicating a very good internal consistency. Moreover, when analyzing THA and TKA separately, the Cronbach's α scores remained high with 0.810 and 0.838 for the THA and TKA groups respectively. This is in line with earlier studies; in their original paper, Talbot et al. found a Cronbach's α of 0.86 for THA and TKA combined.[8] Another study by Diesinger et al. described an α of 0.58 in the French version of the HAAS for TKA patients.[9]

To evaluate the construct validity of the Dutch HAAS, the associations between the Dutch version of the HAAS and the questionnaires used in the national PROMs (i.e., HOOS, KOOS, EQ-5D, and VAS for pain), were studied. A significant positive correlation was seen between HAAS and VAS QoL, EQ-5D, all KOOS sub-scores except the symptoms score, and all HOOS sub-scores except the QoL score. This showed that patients that have high functional scores in the PROMs also have high HAAS scores. A negative correlation was seen between the HAAS and VAS for pain. Thus, with lower pain scores, higher HAAS scores are observed, indicating that the patient is functioning well. In line with our hypotheses, the HAAS showed better associations with other questionnaires focusing on the functional outcome, such as the sports and recreation sub-score of the KOOS and HOOS, compared to the PROMs that measure the clinical outcome. The Dutch version of the HAAS showed weak, moderate and strong associations with the

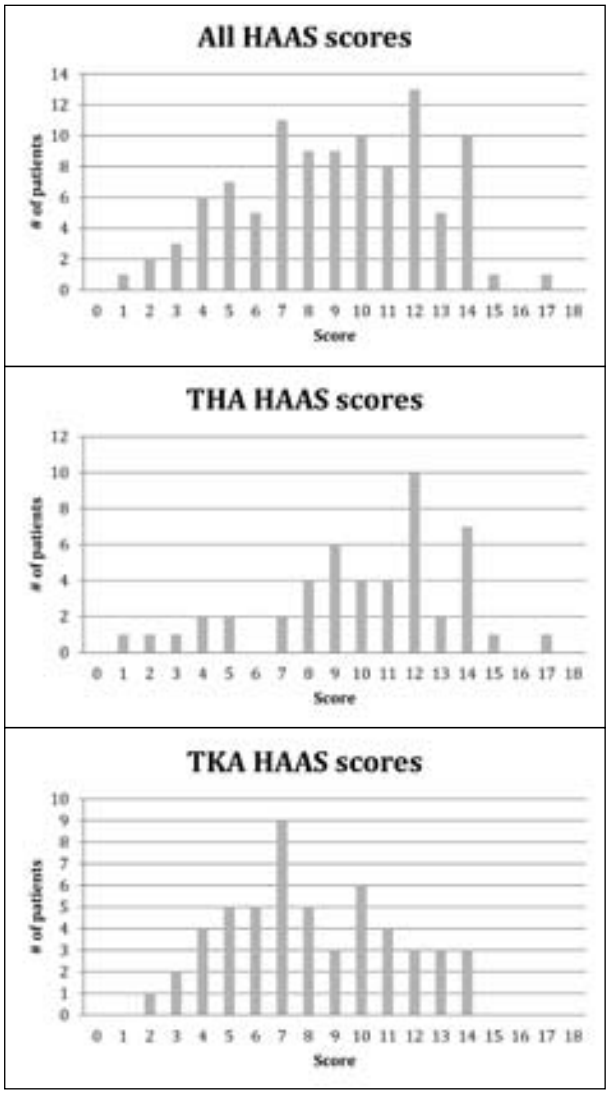

Figure 1. HAAS scores distribution. This figure shows the distribution of HAAS scores among all patients (A) and the study population of TKA (B) and THA (C) patients.

Table 2. Patient characteristics for all patients, the total hip arthroplasty (THA) and total knee arthroplasty (TKA) group.

	All n=108	THA n=51	TKA n=57
Age at time of surgery (years)	70 (42 - 86)	69 (42 - 86)	72 (51 - 85)
Gender:			
Female	60 (55.6%)	33 (64.7%)	27 (47.4%)
Male	48 (44.4%)	18 (35.3%)	30 (52.6%)
BMI	27.3 (19.5 – 46.6)	26.5 (19.5 – 34.9)	28.2 (21.1 - 46.6)
Side:			
Left	48 (44.4%)	20 (39.2%)	28 (49.1%)
Right	60 (55.6%)	31 (60.8%)	29 (50.9%)

Data in Mean (range) or Number (%). BMI = Body Mass Index

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Table 3. Internal consistency & correlations. This table shows the Spearman's rank correlation coefficient (ρ). A R of 0.10 was considered a weak association, 0.30 was considered moderate and a R of 0.50 or higher was considered a strong association.[20,21]

	All n=108	THA n=51	TKA n=57
Internal consistency HAAS (Cronbach's alpha)	0.780	0.810	0.838
Construct validity (Spearman's rho)			
HAAS & VAS pain	-.378 (p<.001)	-.303 (p=.041)	-.357 (p=.009)
HAAS & VAS QoL	.286 (p=.004)	.417 (p=.004)	.290 (p=.035)
HAAS & EQ-5D	.466 (p<.001)	.470 (p=.001)	.447 (p=.001)
HAAS & KOOS			
Symptoms score			.182 (p=.201)
Pain score			.379 (p=.006)
ADL score			.559 (p<.001)
Sport & Recreation score			.674 (p<.001)
QoL score			.392 (p=.004)
HAAS & HOOS			
Symptoms score		.534 (p<.001)	
Pain score		.313 (p=.032)	
ADL score		.461 (p=.001)	
Sport & Recreation score		.602 (p<.001)	
QoL score		.242 (p=.097)	

HAAS=High Activity Arthroplasty Score; THA=total hip arthroplasty; TKA=total knee arthroplasty; VAS=visual analogue scale; QoL=quality of life; KOOS=Knee disability and Osteoarthritis Score; ADL=activities of daily living; HOOS=Hip disability and Osteoarthritis Score

PROMs commonly used in The Netherlands. In both the English and French validation of the HAAS,[8,9] the American Knee Society Score (AKSS) and Oxford Knee Score (OKS) were used. We used the KOOS and the HOOS for exploring the construct validity of the Dutch HAAS since these are included in our national PROMs. However, since the KOOS and HOOS also contain both clinical and functional questions it is to be expected that associations between the Dutch HAAS, AKSS and OKS would be similar to those found between the Dutch HAAS, HOOS and KOOS in the current study.

No ceiling or floor effect was observed in the Dutch HAAS, which is consistent with reports of the HAAS in other languages, which did not show these effects either. Jenny et al.[10] confirmed the absence of ceiling and floor effects in the English version of the HAAS in TKA patients of all ages, one year after surgery in 2014, as opposed to both the AKSS and the OKS. Thus, the results of the HAAS in studies so far indicate that it is better in analyzing differences in both low and higher levels of the functional outcome for younger and older total joint arthroplasty patients, compared to the HOOS/KOOS, AKSS and OKS.

Originally, the HAAS has been developed and validated in patients under 66 years old, since they are more likely to have a higher functional level. This was also confirmed by a pilot study the authors had performed.[8] However, trends show that older patients undergoing lower limb total joint arthroplasty are increasingly active, remain more active up to a higher age[7] and some even participate in high impact sports (i.e. alpine skiing, tennis).[23] A later article by Jenny et. al. demonstrated that the HAAS could be used in TKA patients of all ages with good results. Therefore, patients with higher ages were also included in this study. We find that this increased the external validity of this study of the cross-cultural adaptation and validation of the HAAS because we show that the HAAS is applicable to the general orthopaedic population, and not only to a selected group of patients younger than 66 years. By excluding patients that reported comorbidities that potentially influenced their functional levels, the homogeneity of the groups concerning functional activity was increased. However, since comorbidity has been shown to influence outcome scores,[24] the influence of comorbidity on the Dutch HAAS scores should be the subject of further study.

Table 4. Ceiling & floor effectsThis table shows the ceiling and floor effects. A ceiling or floor effect is determined as 15% or more of patients achieving the maximal or minimal score on a questionnaire.

	All n=108	THA n=51	TKA n=57
No Floor or Ceiling effect	HAAS VAS QoL	HAAS VAS QoL	HAAS VAS QoL KOOS Symptoms score KOOS ADL score KOOS Sport score
Ceiling effect	EQ5D (49.0%)	EQ5D (56.9%) HOOS Symptoms score (25.5%) HOOS Pain score (37.3%) HOOS ADL score (27,5%) HOOS Sport score (19.6%) HOOS QoL score (29.4%)	EQ5D (36.8%) KOOS Pain score (22.8%) KOOS QoL score (17.5%)
Floor effect	VAS pain (49.1%)	VAS pain (58,8%)	VAS pain (38,6%)

Percentage of patients scoring the highest or lowest score for ceiling and floor effects, respectively. HAAS=High Activity Arthroplasty Score; THA=total hip arthroplasty; TKA=total knee arthroplasty; VAS=visual analogue scale; QoL=quality of life; KOOS=Knee disability and Osteoarthritis Score; ADL=activities of daily living; HOOS=Hip disability and Osteoarthritis Score

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Using questionnaires to measure PROMs has become common practice to evaluate and compare outcome of joint arthroplasty. However, several regularly used questionnaires, such as the HOOS/KOOS and EQ-5D, have been developed several decades ago and have shown limitations such as ceiling and floor effects.[1] This notion, combined with the knowledge that arthroplasty patient populations and characteristics have changed over the last decades,[7] may give rise to the need for new and improved easy-to-use self-administered questionnaires. The HAAS seems to be a promising alternative. However, before the HAAS could be included in day-to-day practice, further research is necessary. For example, treatment effect measurements could be tested to show whether it may be possible to use the HAAS scores to detect changes in patients before and after an intervention.

A limitation of this study is the lack of a reliability study with a proper test-retest design, as patients were only asked to fill in the questionnaire once. To our knowledge this has not been done in any of the HAAS validations. Finally, it must be noted that in 6.5% of patients one or more questions of the HAAS were left blank. No clear pattern or cause for these omissions could be deducted from the data collected in this study, and the response patterns could therefore be a subject of further study. Follow-up ranged between 6 and 12 months after surgery, which could also have introduced bias. Patients that are 1 year after surgery might have a better function compared to 6 months after surgery. This was not reflected in our data as a difference in outcome scores. Another factor of influence could be the gender distribution. In general, more women than men undergo arthroplasty surgery, but in the TKA group of the present study 52.6% were men. Since men are known to have a better function before and after TKA[25,26], this could have influenced our results by showing higher overall scores for the entire TKA group than might be expected in a normal orthopaedic population with average gender distribution.

Conclusion

The cross-cultural adaptation of the HAAS into Dutch as presented in this study can be used to evaluate function in patients who underwent THA or TKA with an acceptable internal consistency, good construct validity, and no ceiling or floor effects.

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Intramedullary versus extramedullary alignment of the tibial component in primary total knee arthroplasty

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Background: For the long-term success rate of primary total knee replacements (TKR), accurate alignment of the implants is important. Nowadays there is no consensus on the most optimal surgical guide system for tibial component alignment. Regarding the desire of standardization in high-volume surgical procedures like TKRs, knowledge about the most optimal technique is warranted.

Objective: We present a patient with a BMI of 36 who underwent primary TKR with the perioperative use of an extramedullary (EM) guide system for coronal tibial alignment, and discuss the pros and cons of EM and intramedullar (IM) alignment systems for tibial component placement.

Discussion and Conclusion: In literature, post-operative varus alignment of the mechanical axis of more than 3° have a significant higher failure rate, while neutral and valgus alignment increase implant survival duration. There is no clear and convincing evidence that the use of either EM or IM guide systems for primary TKRs is superior in terms of accuracy, complication rate and clinical outcomes. The use of the IM guide system, however, might result in a shorter surgical time. Anatomical limitations, surgeon's expertise and comfort level with a particular technique are, for the time being, the determining factor in the type of alignment system that is used.

Introduction

With the aging population and increased longevity in our society, the number of total knee replacements (TKR) has increased in the last decades.[1] In the Netherlands, more than 26,000 primary TKRs are performed each year.[2] Accurate alignment of the implant components is important for the long-term success of TKR.[3,4] However, there is a lack of consensus on the most optimal surgical technique for coronal tibial component alignment. Both intramedullary (IM) and extramedullary (EM) techniques are used in daily practice. Regarding the high number of TKRs and the desire for standardization within hospitals and preferably also on a national level in order to improve the health care system[5], knowledge about the most optimal technique is warranted. We present the case of a primary TKR and discuss the pros and cons of IM and EM alignment systems for the correct tibial component placement in the coronal plane in primary TKR.

Patient

A 73-year-old woman with a BMI of 36 presented with progressive pain in her right knee at the health care centre. On physical examination, obvious adipose tissue was seen around both legs and the medial joint space was painful on palpation. The range of motion of her knee was 100 degrees flexion and a 5 degree extension deficit. X-Rays showed severe tricompartimental osteoarthritis. Since conservative treatment with analgesics, physiotherapy and dietetics had insufficient effect and her symptoms and were limiting her mobility and quality of life, a TKR was planned.

Intervention

A TKR was performed. The EM alignment technique was used for tibial component placement in the coronal plane, following the standard protocol in our hospital. In EM alignment, a rod with aiming device is placed exterior on the tibia. Based on the rod's position parallel to the anterior crista of the tibia or mid-malleolar line, the position of the tibial component can be determined.[6] In this case the mid-malleolar line was used, because of the great soft-tissue volume around the tibia.

Comparison

In this case, the EM alignment technique for the tibial component was performed. In the alternative IM alignment technique, a rod is placed in the medullary cavity. The aiming device is placed on the bar to facilitate proximal tibial resection.[6]
In the guidelines of the Dutch orthopaedic association (NOV) and the Dutch TKR guideline, no recommendation is described regarding the optimal tibial

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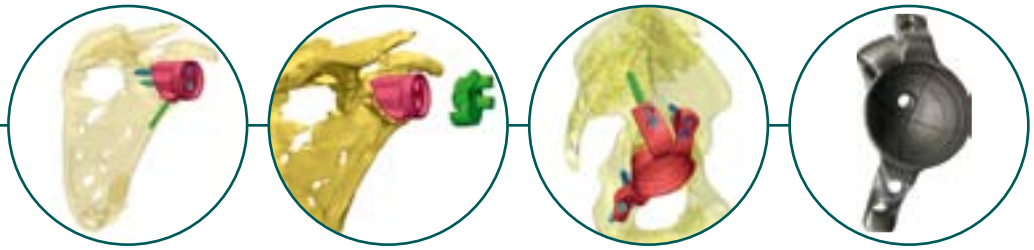

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Table 1. Summary of EM and IM outcomes.

	EM	IM	P value	Level of evidence	Reference, First author
Proper Alignment (90° ±<3°)	65% 53%	85% 59%	0.019 NS	1b 1b	Reed[18] Da Rocha[10]
Difference in mean tibial component angle	-0.1 1.5	0 0	0.6 NS	1a 1b	Zeng[19] Da Rocha[10]
Difference in mean mechanical axis deviation	0.32 2.4	0 1.6	NS 0.02	1a 2b	Zeng[19] Cashman[23]
Risk ratio on 90° ± >3°	1.1	0	NS	1a	Zeng[19]
Difference in mean tibial slope	0.22	0	NS	1a	Zeng[19]
WOMAC score	22.5	11.8	NS	2b	Cashman[23]
SF-36 score	22.5	12.7	NS	2b	Cashman[23]
Oxford knee score	37.6	36.8	NA	1b	Blakeney[11]
Complications	9% 4.2%	3% 3.0%	NS NS	1b 1a	Blakeney[25] Zeng[19]
Difference in tourniquet time (minutes)	6.24	0	0.01	1a	Zeng[19]

EM: extramedullary, IM: intramedullary, NS: not statistically significant, NA: not available.
When IM = 0, IM was used as a reference group. EM<0 is in favour of EM. EM>0 is in favour of IM.

component alignment technique.[7,8] Surgeon's expert opinion and comfort level with a particular technique seem to be the decisive factors in current orthopaedic practice (Level 5 of evidence).

Outcome

Postoperatively the patient was almost fully relieved of her knee pain at a follow-up after three months. Control X-rays showed a good position of the tibial component with a neutral alignment. The patients quality of life was improved after the surgery.

Relevant literature

It is well known that the long-term success and survival rate of primary TKRs depend on a number of patient, prosthetic, and surgical factors.[9,10] Correct alignment is one of these surgical factors, and is correlated with an increased implant survival, a higher quality of life, higher Oxford Knee Scores, better knee function, and unaltered knee pressure and load distribution after primary TKR.[4,9,11-13] A meta-analysis of Liu et al. (2016) found that TKRs with a post-operative varus alignment of the mechanical axis of more than 3° have a significant higher failure rate, with a relative risk of 1.65 (95% coincidence interval: 1.07 – 2.55, P=0.02).[4] The higher failure rate in TKR with malalignment could be caused by abnormal wear, premature loosening and patellofemoral problems.[4,14] Numerous studies have demonstrated that particularly varus malalignment is associated with increased strain on the medial tibial component and underlying bone tissue, leading to osteolysis and implant failure.[15,16] On the contrary, the meta-analysis by Liu showed also that neutral and valgus alignment increase implant survival.[4]
In 1996, 76% of the British orthopaedic surgeons stated to prefer the EM system for tibial varus-valgus alignment.[17] However, the first RCT comparing EM and IM from Reed et al. (2002) found a correct

tibial alignment (deviation from mechanical axis: 90° ± <3°) in 65% of the cases in the extramedullary group, compared to 85% in the intramedullary group (P=0.019).[18] This resulted in an increase in IM preference. More studies on this particular subject were performed, and a recent meta-analysis of RCTs from Zeng et al. (2015) showed no statistical significant difference in the mean mechanical axis (P=0.31), the risk with a mechanical axis deviation greater than 3° (P=0.63), the mean frontal tibial component angle (P=0.60), the risk with a deviation greater than 3° from neutral in the frontal tibial component angle (P=0.89), or the mean tibial slope (P=0.42) between the two alignment techniques (Table 1).[19] However, it must be stated that most included RCTs had a small sample size, which could have underpowered the results. Non-statistically significant differences with regard to frontal tibial component angle and risk on a deviation greater than 2° were also found by a more recent double-blind RCT with 41 primary TKRs.[10] In this study, tibial component angles of 88-92° were considered normal. In 59.1% of the cases, the mechanical alignment was considered to be adequate in the IM group, versus 52.6% in de IM group.[10]

Overall, the published literature is divided as to which tibial alignment system is superior in accuracy. According to the literature review of Zeng et al., approximately 52.6% of the relevant studies described that EM and IM guide systems are equally accurate, 36.8% of the studies suggested that an IM guide system is more accurate, and 10.5% suggested that more accuracy could be achieved with the use of an EM guide system.[19]

When determining the choice of alignment system in daily practice, the patient's anatomy should also be taken into consideration. Obesity or increased soft-tissue volume around the tibia as in our case makes the use of an EM alignment guide more difficult.[10] On the other hand, the use of an IM alignment guide is not always possible, for instance in cases of bone deformity, sequela of trauma, or when osteosynthetic material obliterates the medullary canal.[10]

While it has been demonstrated that IM would result in more intra-operative venous embolisms due to instrumentation of the medullary cavity, this could not be confirmed by all studies.[20-22] Furthermore, the meta-analysis from Zeng et al. found no significant difference in the complication rate between the two alignment systems, so the theoretically higher risk for venous embolisms should be questioned.[19] Regarding surgical characteristics, for instance surgical time, the use of the IM guide system resulted in a shorter tourniquet time of 6.24 minutes (P=0.01).[19] To our knowledge, there are no studies available comparing the long-term survival rate between IM and EM tibial alignment guides.

Besides these conventional instruments, computer-assisted techniques are available for correct implant alignment.[9,25-28] There is evidence that computer navigation results in greater accuracy and reproducibility of prosthetic alignment compared to conventional techniques, but also in significant reduction in perioperative blood loss, fewer systemic embolic events, better function and quality of life.[9,26-28] However, computer-assisted surgery is associated with prolonged surgical time, complexity and higher costs, and there is no evidence that computer-assisted surgery will lead to a long-term decrease in TKR revision rates.[25,29,30]

Recently, patient specific matched guides (PSG) have been introduced as the most recent advanced technique for correct implant alignment with theoretically advantages as less blood loss, reduced surgical time, preoperative calculation of the size of the prosthesis, and less variability among surgeons.[31-33] However, in literature there is no hard evidence that this technique will improve the accuracy of TKRs.[31,32] Regarding the coronal tibial alignment in particular, as it is the subject of this paper, there has been no benefit obtained by using PSG.[31,34,35] The RCT of Victor et al. (2014), for example, showed even more outliers (deviation >3°) in the PSG group compared to the EM conventional guide technique.[32] Before computer-assisted alignment techniques or PSG should be considered for primary TKRs, the benefits must exceed the costs, and long-term studies should be performed to determine its possible impact on TKR revision rates.

Conclusion and recommendation

Since there is no clear and convincing evidence that for the tibial coronal alignment of primary TKR's the use of either EM or IM guide systems is superior in terms of accuracy, complication rate ,clinical outcomes and no optimal guide system can be pointed out. Anatomical limitations and surgeon's expertise and comfort level with a particular technique remains the determining factor. Before new computer assisted alignment techniques or PSG should be considered, evidence has to be found that this technique is superior to the conventional guide systems in short-term and long-term patient outcomes and prosthetic survival rate to determine a best practice.

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The trigger wrist

Nico M. G. Maas, Gerald. A. Kraan and Taco Gosens

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A trigger wrist is rarely known and seen, and has been described irregularly since Eifel started off in 1961.[1,2,3] The most frequently used definition is a painful click or catching sensation around the wrist joint during finger or wrist movements.[4,5] Triggering of the fingers at the wrist occurring during finger motion should be described as such or called pseudo-trigger wrist. The underlying mechanism is an inadequacy of the carpal tunnel size to accommodate its contents.[6] In the broad differential diagnosis are the better known trigger finger, with its lifetime incidence of 2% (up to 10% in diabetics), and the carpal tunnel syndrome (CTS), which is, as the trigger wrist, sporadically seen in children.[7-9] Here we describe a young boy with an idiopathic pseudo-trigger wrist, and the relevant literature is reviewed.

Patient

A healthy three-year old boy presented with a 2-month old history of triggering of the wrist. It affects his ability to play and draw. Besides his brother, who has a trigger thumb, no congenital- or rheumatic diseases or any other health problems are present in the boy or his relatives.
Inspection of the right wrist showed a visibly thickened volar aspect of the wrist. At that volar side a soft, solid moving mass was palpable. During active, not passive, finger motion of dig. II, III, IV a painful click/snap was present at the wrist around flexor zone 4. Neither a sign of instability of the wrist, nor signs of hypaesthesia or paraesthesia of the median nerve were found. Albeit children are often too young to communicate their problems.[8]

Intervention

In most cases triggering is caused by a local space occupying lesion within the carpal tunnel, such as: intrasynovial lipoma, fibroma, ganglion, scapholunate subluxation and lunate deformity, (acute) partial flexor/extensor tendon laceration, anomalous skeletal muscles (e.g. EIP syndrome) and neoplasmata.[3,10-12] Recent research suggest that trigger wrist management should be tailored to the cause of triggering.[9,13] Nowadays the diagnostic possibilities are endless and thus a dilemma presents itself, how to diagnose a trigger wrist?

In our case an ultrasound scan of the wrist was performed and showed normal flexor tendons with a thickened surrounding synovium. No abnormalities of the tendons itself, nor at the site of the carpal tunnel, nor at the site of the flexor tendons at the pulley systems of the fingers were shown that might have explained a local aetiology of the triggering.
Ultrasound imaging was chosen to differentiate between a cystic and a solid mass, it is a non-invasive quick dynamic tool, and moreover no sedation was needed for this paediatric patient.[14,15]
However, considering triggering is an active and dynamic symptom, an accurate diagnosis of pathology can be challenging because the ultrasound image can be blurred.[4]

Since the differential diagnosis is broad, an underlying systemic cause should be taken into account. In our case, with support we excluded generalised (i.e. lysosomal storade diseases, synovitis) and genetic causes because they can also cause CTS symptoms in children.[8,10,17,18]

Comparison

Alternatives, such as an X-ray (e.g. carpal tunnel view) can be used to detect pathology and reveal finger or wrist deformities, such as bone deformities, carpal malalignment and perilunate disorders. Nerve conduction studies are indicated in neurologically symptomatic patients to show e.g. median nerve motor latency or conduction-time delay, and tenography can also be used.[9,16,17]

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Magnetic resonance imaging (MRI) is useful to detect a tendon lesion and rule out other pathology. However, for children sedation is necessary and it cannot demonstrate the exact mechanism in real time, but combined with an ultrasound scan accurate diagnosis can be made. [4,10,18 19]

Outcome

In the case described above the young boy started avoiding use of his wrist in daily life, hence under general anaesthesia surgical exploration was performed by using a standard carpal tunnel approach. The carpal flexor retinaculum was decompressed and peroperative findings showed only a thickened synovium. No lesions, extra muscle or tendon fibres were found, so synovectomy and minimal tenolysis followed. Two yellow-grey fragments of a maximum of 8mm of synovial tissue of the mass were sent for histopathological examination and showed: carpal tunnel tendon and fatty tissue with minimal reactive changes with no evidence of inflammation, generalized disease or malignancy.
At the follow-up after 3 and 6 months, his triggering had disappeared and he was free of symptoms.

Literature

In the literature we found no guideline regarding the diagnostic process and treatment of a trigger wrist. Most of the available evidence is limited to case reports. Trigger wrists are reported under different names, e.g. a 'snapping' or 'clicking' wrist, and many wrists with definite triggering were reported as a carpal tunnel syndrome, instead of a trigger wrist.[20] With regard to age, there have been several reports of a trigger wrist in middle-aged and elderly patients.[16,20,21] However, a trigger wrist in children and teenagers is extremely rare. The literature uses two classifications, one on the basis of aetiology and one on the basis of an anatomical mechanism.

Aetiology:
According to Al-Qattan et al. (aetiology classification, see table 1) these associations for a trigger wrist have been reported: a history of juvenile arthritis is suggestive of the presence of a synovial mass (Type A).[9,22] Anomalous muscles (Type B and C) are usually associated with a bulge in the distal forearm which is more apparent on passive hyper-extension of the wrist. Acute trigger wrist and acute CTS have been described after accidental forced supination of the wrist, in which palmar masses arise from flexor sheaths (Type C/D).[15] A history of a laceration is suggestive of type D (i.e. partial flexor tendon injury). A history of carpal tunnel release is suggestive of Type E.
The most common aetiology is the folding of injured (partial) flexor tendon fibres back on themselves, contributing to bunching and nodule formation rather than torn tendon fibres forming a bulky bulbous scar at the area of laceration.[4,9]

Anatomical Mechanism:
The trigger phenomena is location dependent, creating a click or catch on the volar or dorsal side of the wrist. Theoretically, triggering around the wrist joint can be produced by finger motion, wrist motion, or rotation of the forearm.[21] However, clinicians should differentiate between 'triggering of the fingers at the wrist occurring on finger motion' and the true trigger wrist: 'triggering at the wrist upon wrist movement'; the wrist joint being the site of triggering in both cases.[23]

The concept of the true trigger wrist was firstly described by Lemon and Engber in 1985 referring to 'triggering induced by wrist motion'.[4,21,23] This type of 'true' trigger wrist was also reported by Koob and Steffens, and Smith et al.[24,25] Cases of triggering of the fingers at the wrist caused by finger flexion and extension is more common than that caused by wrist movements. Therefore, triggering phenomenon occurring at the wrist induced

Table 1. Classification based on aetiology.[8]

Type	Aetiology
A	Tumour or inflammatory mass, which may originate from the median nerve, flexor tendon or other contents of the carpal tunnel
B	Anomalous muscle crossing the carpal tunnel
C	Tumour within an anomalous muscle crossing the carpal tunnel
D	Partial flexor or extensor tendon injury at the wrist level
E	Mechanical causes, e.g. snapping dislocation of a flexor tendon over the hook of the hamate (may occur after carpal tunnel release) and tendon adhesions between the flexor pollicis longus and other flexor tendons within the carpal tunnel (may occur following surgery within or near the carpal tunnel)

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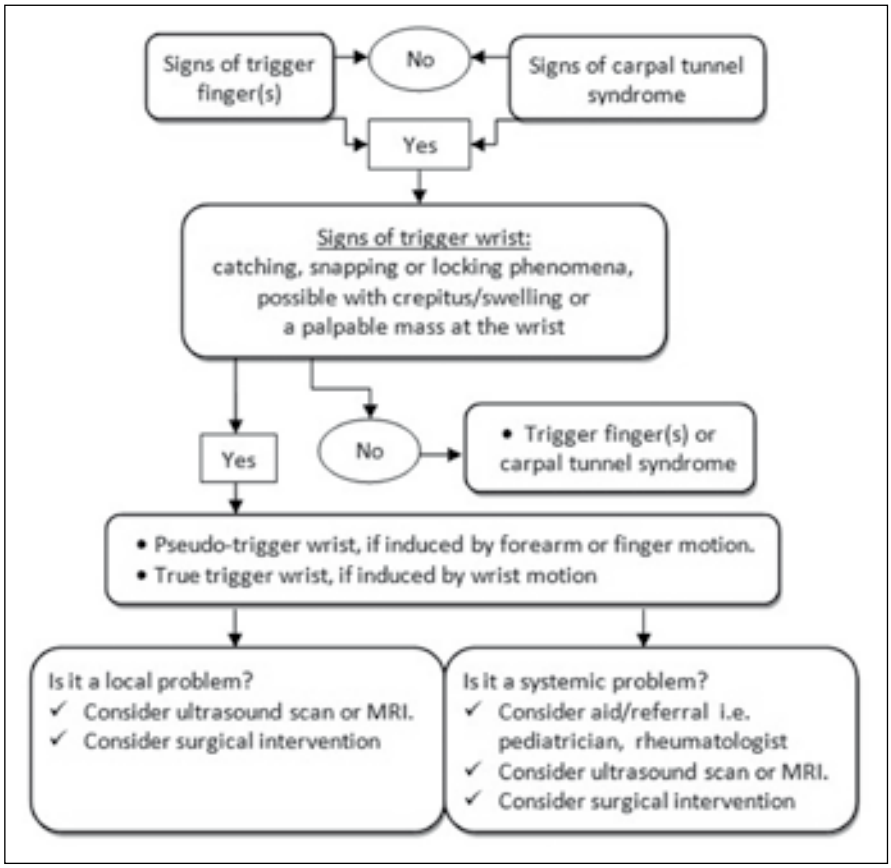

Figure 1. Supportive clinical flow chart.

by finger motion should be described as triggering of the fingers at the wrist, or pseudo-trigger wrist.[16,20] Our case showed trigger fingers of dig. II,III,IV with a painful click/snap at the wrist, thus also a pseudo-trigger wrist.

To clarify and to prevent aggravated conditions and inappropriate treatment, a supportive clinical flow chart was made, see figure 1. Conservative treatment appears to be ineffective in curing a true trigger wrist.[4] However, surgical exploration (release or resection) and intervention offers a good therapeutic outcome.[20,21] Local anaesthesia is recommended to find the source of triggering accurately and assess the effectiveness of procedure intraoperatively.[10] Notwithstanding, in our case and in any similar case with small children, sedation is advised.

Recommendations

We present a case of a trigger wrist in an infant with a snapping or locking phenomena at the level of the wrist, but induced by finger motion, thus a pseudo trigger wrist. Clinical symptoms of a trigger wrist are characterized by a catching, snapping, or locking phenomena, possibly with crepitus with a swelling or palpable moving mass at the wrist. The differential diagnosis is broad, and careful searching for congenital and systematic diseases should be part of the diagnostic process. Regarding the state of the art diagnostics of the trigger wrist, no guideline or extensive expert opinion has been found. The authors prefer the ultrasound because it is a non-invasive, dynamic, quick and a relatively cheap diagnostic tool. In addition, there is no need for sedation in the paediatric patient. It provides information on any locally involved structures and can confirm the clinical diagnosis. Treatment should be tailored to the cause of triggering.

Disclosure statement
The authors have nothing to disclose.

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PICO: Does cement augmentation improve stability in intramedullary nailing for metastasis of the long bones

Ewout S. Veltman and Martijn van Dijk

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Bone is the third most common site of metastatic cancer after lung and liver.[1] Almost two-thirds of patients dying from cancer have developed bone metastases.[2] Bone metastases contribute to the deterioration of quality of life of cancer patients due to pain and impaired mobility, especially when causing a pathologic fracture.[3] The choice of fixation modality depends on the type of primary malignancy, location and cortical involvement of the lesion, and life expectancy of the patient.[4] Available treatment modalities include embolization of the tumor, curettage and plate osteosynthesis with or without cement augmentation, intramedullary nailing (IMN) with or without cement augmentation and prosthetic replacement using tumor prostheses.[5,6]

Fixation of long bone metastasis by intramedullary nailing provides direct stability and pain relief.[4,7] The selected fixation modality should be sustainable for the remaining lifetime of the patient, whilst the recovery and rehabilitation time should not exceed the life expectancy.[4] Due to improvements in cancer treatment the lives of patients with bone metastasis are prolonged.[8,9] Therefore the demands on fixation devices to ensure long-term stability are increasing. Intramedullary nails are available for stabilization of the complete length of the humerus or femur. An intramedullary nail allows for immediate mobilization and unrestricted stability. With time, intramedullary nails are at risk of failure, because they are load-sharing devices instead of load-bearing devices.[4] Whether or not cement augmentation should be performed to improve stability of the construction remains subject to discussion.

The question arises that there is scientific evidence to advocate the use of cement augmentation in intramedullary osteosynthesis for (impending) pathologic fractures of the long bones. We hypothesize cement augmentation providing additional stabilization of the metastatic lesion and patients experience quicker pain relief in the early postoperative period. The literature was reviewed for evidence supporting or disproving the use of cement augmentation in intramedullary osteosynthesis of long bone metastasis.

Patients

Patients with (impending) pathologic fracture of the humerus or femur due to metastatic disease, eligible for treatment with an intramedullary nail.

Intervention

Intramedullary osteosynthesis with cement augmentation.

Comparison

Intramedullary osteosynthesis without cement augmentation.

Outcome

Outcomes describing surgery (duration of surgery, blood loss, intraoperative complications), function (pain, ability to walk, patient reported outcome measures), patient satisfaction and postoperative complications were extracted.

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Relevant literature

Pubmed and Embase databases were searched for studies describing intramedullary nailing of long bone metastasis of the humerus or femur, with or without cement augmentation. Exclusion criteria were minor age and patients treated with treatment strategies other than intramedullary nailing.
The most recent review describing treatment of pathologic fractures of the long bones was published in 2016.[4] Twelve other relevant studies have been published including one large multicentre cohort study of 245 cases and two retrospective comparative studies.[5,10-20] All studies were a level of evidence IV. Findings of the included studies can be found in Table 1 and 2. To date a prospective randomized study comparing intramedullary nailing of the humerus or femur with or without cement augmentation is lacking. Current evidence mostly consists of low-volume retrospective studies.
Six large studies were conducted evaluating outcome after fixation for metastases of the humerus or femur with either IMN or prosthetic

Table 1.

Humerus	Uncemented			Cemented		
Study	Laitinen 2011	Bauze 2003	Alvi 2013	Laitinen 2011	Choi 2016	Kim 2011
N	19	31	14	21	32	15
Age	63,6	67	x	67,1	59,8	56,6
N fracture	19	25	x	21	32	8
Death <14d	1	0	x	0	0	0
VAS (0-10)	1,4*	x	x	0,4*	2,1	3,6
Mechanical complications (breakout, nail breakage, screw breakage)	0	6	0	0	0	1
Infection	3	0	x	0	1	0

scored on scale 0-4

replacement.[21-26] These studies did not separate results for IMN from other treatment modalities and/or IMN with and without cement augmentation and could therefore not be included in this study. They did however show that intramedullary nails provide adequate stability during patients' lives. Willeumier and colleagues performed a retrospective multicentre cohort study including 228 patients treated with intramedullary nailing with or without cement augmentation for a femoral metastasis.[5] They reported mechanical implant failure in 4% of patients after 6 months. Whether or not these patients were treated with cement augmentation or not is not mentioned. The majority of mechanical failures occurred in patients with an actual pathologic fracture. Use of cement augmentation was independently associated with a lower risk of revision ($p = 0.025$).[5]

Laitinen and colleagues performed a retrospective comparative study comparing two cohorts of patients treated in different time periods with intramedullary nailing either with or without cement augmentation.[17] The reason for the change in treatment strategy was not provided in the original study. Duration of surgery, perioperative blood loss and intraoperative complications are comparable between intramedullary nailing with and without cement.[17] They found improved pain relief, less use of analgesics and better functional restoration immediately after surgery in patients with cement augmentation of the intramedullary nail in 21 patients with metastasis of the humerus.[17]

Kim and colleagues retrospectively analyzed IMN of the humerus and femur with and without percutaneous cement augmentation.[16] All patients had an (impending) pathological fracture and a Mirels score >9. Patients in the control group had refused cement augmentation. Results were not shown separately for the femur and humerus and could therefore not be included in the table. Their results showed significantly less pain (visual analogue pain score (VAS) 3,3 for IMN with cement augmentation versus VAS 6,6 for IMN without cement augmentation) six weeks postoperatively. Without reaching statistical significance the percentage of mechanical failure were lower for patients undergoing IMN with cement augmentation.[16] Kim and colleagues found no mechanical failures with mean follow-up of 10 months.

We found four retrospective cohort studies studying intramedullary nailing of humeral metastases, two studies with cement augmentation and two series without cement augmentation (Table 1).[10,12,13,15] There were six mechanical complications in 45 patients in the uncemented group and 1 mechanical complication in 47 patients in the cement augmentation group. Outcomes concerning consolidation of fractures and pain scores were not reported in the uncemented group and therefore cannot be compared.

We found six retrospective cohort studies studying intramedullary nailing of a femoral metastasis, one study with cement augmentation and five series without cement augmentation (Table 2).[10,11,14,18-20] Mechanical complications were present in 12 out of 169 patients in the uncemented group and in 1 out of 21 patients in the cemented group.

Recommendations

Metastases of the long bones are a serious threat for quality of life of cancer patients. Intramedullary nailing provides immediate stability for the long

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Table 2.

Femur	Uncemented						Cemented	
Study	Arvinius 2014	Samsani 2004	Sharma 2007	Tanaka 2016	Alvi 2013	Willeumier 2017	Willeumier 2017	Gao 2016
N	65	18	25	80	46	178	50	21
Age	65,9	56	66	60	x	65	65	72,6
N fracture	44	4	12	14	x	94	23	x
Death <14d	6	0	1	3	x	x	x	0
Walking	54	18	24	x	x	x	x	x
VAS	x	x	x	x	x	x	x	2,7
Mechanical complications (breakout, nail break, screw break)	x	3	1	3	5	x	x	1
Infection	x	1	2	0	1	x	x	1

bones and allows patients to remain mobile. With the increasing survival time of cancer patients due to improved cancer treatment, the absolute number of patients needing (preventive) stabilisation of the long bones due to a bone metastasis may increase. Cement augmentation of the lytic lesion may improve stability after intramedullary nailing of (impending) pathologic fractures. It has not yet been studied whether cement augmentation of an intramedullary nail provides improved long-term stability of the construction in patients with metastases of the long bones. Local debridement and cement augmentation of the lytic lesions seems to improve stability and decrease postoperative pain.[16,17] However, in the comparative retrospective case-control study by Laitinen only patients with metastasis of the humerus were included.[17] In the patients included in other case series, the same trend seems present for treatment of femoral metastases.[5,16]

Both Willeumier et al. and Miller et al. have studied the failure of intramedullary nails for metastases of the long bones and found that failures were caused by surgeon error, tumour progression, non-union, and hardware failure.[5,27] Failure may be minimized by adequate implant selection and surgical technique, and by avoiding underestimation of patient survival. Willeumier and colleagues reported that augmentation of the intramedullary nails seems to limit the number of revisions.

It is unclear whether patients with metastasis of weight bearing long bones such as the femur or tibia will have the same positive result after augmentation of the intramedullary nail. Theoretically cement augmentation only improves stability and therefore, at least, should have no negative effect on the early and long-term outcomes after intramedullary nailing of long bone metastases of the lower extremity. Nail breakage occurs mostly in patients surviving longer than one year.[21] Physicians should carefully estimate survival expectancy and discuss whether the patient will outlive the stability of the intramedullary nail and therefore maybe eligible for a different type of surgical treatment.

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None of the authors have anything to disclose.

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Eponymous terms in orthopedic surgery

Trendelenburg sign

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The original

In his classical paper from 1895 Trendelenburg describes how a swaying gait in case of congenital hip dislocation is explained by supposed gliding of the femoral head across the ilium. Dupuytren called this the 'glissement vertical', or vertical sliding. This resulted in operations to fixate the head to the pelvis instead of relocating the head of the femur. Trendelenburg however observed that the pelvis in these cases does not slide over the femoral head but has a paradoxal swing, being that the pelvis sinks not over the standing leg but over to the opposite side. He compares it to the gait of a patient with muscular atrophy. After studying healthy patients gait with the help of photography (in which he thanks the aid of his assistant, dr. Perthes) he explains a horizontal pelvis during one leg stance due to the action of the abductors, specifically the gluteus medius. When compared to a patient with hip dislocation he concludes that the dropping pelvis on the opposite side of the standing side is attributed to poor function of the abductors. He concludes that the standing test and also raising the affected upwards leg while laying on the other side are good measure of abductor function.[1]

Figure 1. Friedrich Trendelenburg around 1910.

The man

Friedrich Trendelenburg (May 24, 1844 – December 15, 1924) was born in Berlin. His father was a well-known philosopher. Although at the time Berlin was a world centre of medical science he chose to study medicine in Glasgow and Edinburgh. Afterwards he completed his studies in Berlin under Von Langenbeck (1810-1887). His dissertation was on surgery in ancient India, for which he received his doctorate in 1866. He got positions as professor in Rostock (1875), Bonn (1882) and Leipzig (1895). He remained in Leipzig until his retirement in 1911. He was the first to suture a patella (1878) and introduced operation for varicose veins. In 1907 he made an unsuccessful attempt at removing a pulmonary embolism. He would live to see his pupil Kirschner (1879-1942) perform the first successful embolectomy in 1924. Trendelenburg is the founder of the German Surgical society in 1872 and was interested in surgical history. He died in Nikolassee due to carcinoma of the mandible.[2-4]

The clinical implication

Since the introduction of multiple tests and identification of signs indicating developmental dysplasia of the hip and subsequent treatment, the rate of adolescents with a dislocated hip has dropped significantly. Although the results of screening remain under debate, the good results of treatment are apparent.[5,6] Therefore the Trendelenburg sign is these days not often the result of an untreated dislocated hip. But still the sign has its value in ascertaining the function of the hip abductors. The diagnosis of a gluteus medius rupture or trochanter major avulsion can clinically be made by the Trendelenburg sign.[7] Also abductor weakness due to the Hardinge approach or a suboptimal offset or cup height after total

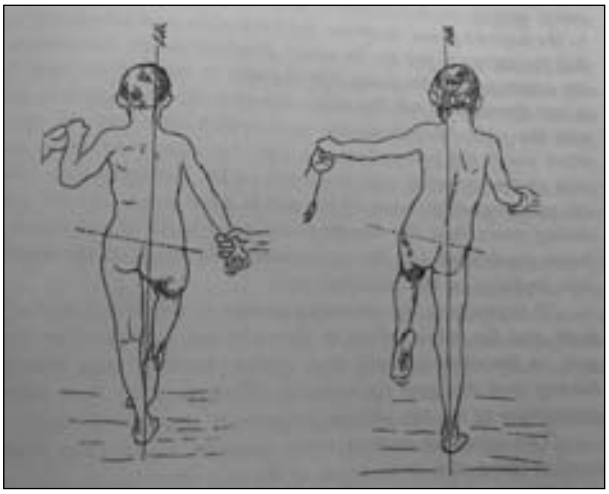

Figure 2. Trendelenburg's drawing of his observation.

hip replacement can be evaluated clinically by this sign.[8,9]

Finally, to get a good appreciation of abductor strength in patients with hip pain, the Trendelenburg sign in my opinion is a simple to perform test to evaluate this. It might be useful to address abductor weakness by training before performing total hip arthroplasty, independently of the approach used for placement.

Matthijs P. Somford

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Vol 25

sep '18

De bijzondere kant van het werk van Peter Joosten

"Meewerken aan zo'n evenement is echt inspirerend!"

In elke editie van NTvO vertelt een NOV-lid over de bijzondere kant van zijn of haar werk. Dit keer is dat Peter Joosten. Hij is orthopedisch chirurg bij Amphia en was deze zomer intensief betrokken bij de medische begeleiding van de Champions Trophy (hockey) in Breda.

Op het moment dat duidelijk was dat de Champions Trophy in Breda zou zijn, nam Joosten contact op met de hockeybond. "Ik heb ondersteuning vanuit Amphia aangeboden. Het leek mij sowieso mooi om te doen, maar bovendien goed om als ziekenhuis eens op een andere manier in the picture te staan." Joosten werd de superviserende toernooiarts. Hij stuurde een team van 2 AIOS orthopedie en 2 AIOS chirurgie aan en was backup voor de EHBO-ers die dagelijks aanwezig waren. Verder zorgde hij voor de verbinding tussen het medisch team van het toernooi en de medische begeleiding van de deelnemende hockeyteams.

Aanpak

Voor het toernooi hadden Joosten en zijn collega's een planning gemaakt en de benodigde maatregelen getroffen. Bij elke hockeywedstrijd was een arts aanwezig met EHBO-ers. De artsen hadden vanuit hun dagelijks werk veel ervaring met eerste hulp, trauma en sportletsel. "We hadden goede afspraken gemaakt binnen het Medisch Specialistisch Bedrijf van Amphia. Alle dienstdoende artsen waren op de hoogte van het wedstrijdschema en als het nodig was konden we snel schakelen, bijvoorbeeld om een MRI te laten maken." Op het sportcomplex was verder een centrale behandelpost; deze werd bijvoorbeeld gebruikt als er gehecht moest worden. Doordat de artsen geoefend hadden met collega specialisten van KNO en kaakchirurgie, wisten zij hoe ze kaak, gebit en aangezichtsletsel het beste konden opvangen.

Hitteplan en letsels

Joosten was tijdens alle wedstrijden aanwezig. "Het grote verschil met mijn dagelijkse werk was dat ik hier minder praktisch bezig was. Vanuit mijn kennis als orthopeed had ik nu een aansturende en coördinerende rol."

Met de letsels viel het uiteindelijk gelukkig mee. De grootste uitdaging was eigenlijk de extreme hitte. Joosten: "Vooral het publiek had daar last van en er waren veel insectenbeten. We moesten een hitteplan opstellen, waardoor we ineens samenwerkten met de GHOR. Onze betrokkenheid kreeg door het warme weer dus een hele andere wending; we hadden te maken met crowdmanagement. Verder waren er enkele bedrijfsongevallen van de cateraars die aanwezig waren; brandwonden en een polsbreuk bijvoorbeeld."

Inspiratie

Joosten concludeert dat meewerken aan zo'n evenement echt inspirerend is en dat je veel contacten opdoet. "Het is gaaf om vanuit je achtergrond en kennis iets bij te dragen. We kregen ook enthousiaste reacties vanuit Amphia. Het ondersteunen van een toernooi past eigenlijk prachtig binnen de missie van een ziekenhuis van deze tijd: we zijn er in eerste instantie om problemen te voorkomen en als er echt iets is, staan we natuurlijk klaar om te helpen."

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

Sporthopedie 2018

Op 30 juni vond de tweede editie van het jaarlijkse Sporthopedie-toernooi plaats op een zonovergoten Sportpark Maarschalkerweerd. Ruim 250 tot het bot gemotiveerde sporters vanuit de acht opleidingsregio's verzamelden zich op het terrein van Kampong. Zij hadden maar 1 doel: ROGO Midden-West onttronen als winnaar van het jaarlijkse orthopedische sportevenement.

Na een welkomstwoord van prof. dr. René Castelein, opende dr. Hans-André Schuppers het toernooi met de woorden "orthopedie houdt Nederland in beweging, maar Sporthopedie houdt de orthopeden in beweging". Vervolgens werd gestart met het openingsnummer, de Gouden Arm, die kundig door het AMC werd binnengehaald.

Gedurende de dag probeerden de teams van subspecialisten uit de verschillende ROGO's (voetballers, hockeyers, tennissers, hardlopers, joueurs de boules) elkaar af te troeven in hun strijd het toernooi te winnen en de felbegeerde bokaal mee naar de eigen academie te slepen. Het sportieve gedeelte van de dag werd afgesloten met touwtrekken, waarbij ROGO-Rotterdam over het meeste gewicht bleek te beschikken.

Na een korte douche, goede borrel en een heerlijke BBQ was het tijd voor de prijsuitreiking. Nadat enkele individuen in het zonnetje waren gezet voor hun bijzondere prestaties die dag - zwaarste blessure, mooiste sportbroek, meest markante snor - was het tijd om de winnaar bekend te maken. Onder grote belangstelling maakte dr. Gie Auw Yang een einde aan de spanning en wees ROGO-AMC aan als winnaar van Sporthopedie editie 2018.

Als organisatie kijken we terug op een geweldige dag en we hopen dat alle deelnemers er net zo van hebben genoten als wijzelf. We danken de ondersteunende ziekenhuizen voor de (financiële) support die nodig was om van het toernooi een succes te maken en we moedigen ROGO-AMC aan om het succes van deze editie te overtreffen!

Namens de organisatie van Sporthopedie 2018,
Anika Tsuchida en Wout Veltman

Prioriteringsbijeenkomst onderzoeksagenda orthopedie

Op dinsdag 3 juli vond de prioriteringsbijeenkomst plaats voor de herziening van de onderzoeksagenda orthopedie. NOV-leden en stakeholders - waaronder Patiëntenfederatie Nederland - hadden kennishiaten aangeleverd voorafgaand aan de bijeenkomst; zowel voor zorgevaluatie als innovatie. De aangeleverde kennishiaten zijn door de werkgroep gecontroleerd volgens vastgestelde criteria. Uiteindelijk bleven er 135 kennishiaten over en deze werden in 3 rondes geprioriteerd door de 53 deelnemers. Na een korte presentatie van de - per deelgebied - geprioriteerde kennishiaten, mochten alle deelnemers 5 kennishiaten prioriteren.

Hoe nu verder?
Uiteraard is het nog niet klaar! De Werkgroep Herziening Onderzoeksagenda Orthopedie gaat samen met de Werkgroep Orthopedie & Wetenschap literatuursearches uitvoeren om te beoordelen of de hoogst geprioriteerde kennishiaten daadwerkelijk geschikt zijn voor de nieuwe onderzoeksagenda. Om te inventariseren welke onderzoekslijnen er al lopen in de Nederlandse orthopedische klinieken, ontvingen de voorzitters van de vakgroepen in september een vragenlijst. Daarin vroegen we ook om per kliniek contactpersonen CORE aan te leveren. Hiermee hopen we het CORE-onderzoeksnetwerk

te verstevigen en de uitwerking van onderzoeksvragen te bevorderen.

Als de uiteindelijke agenda is samengesteld, legt het NOV-bestuur deze voor aan de leden. Het streven is om de agenda te presenteren tijdens het NOV-Jaarcongres. Om deze gemakkelijk toegankelijk te maken, kiezen we voor een online format.

Heeft u vragen of suggesties voor het verbeteren van het onderzoeksnetwerk CORE, meld dit dan gerust aan de researchcoördinator via CORE@orthopeden.org

Najaarscongres 9 en 10 oktober Rotterdam

Op dinsdag 9 en woensdag 10 oktober vindt het NOV-Najaarscongres plaats in WTC Rotterdam. Op dinsdagochtend verzorgen de werkgroepen Kinderorthopaedie en Hand & Pols parallelsessies en er is een uitgebreid wetenschappelijk programma. 's Middags is er een sessie van de Commissie Kwaliteit en CORE en een interactieve sessie over kwaliteitsregistratie. Aan het einde van de dag is de Algemene Ledenvergadering van de NOV en 's avonds is er een walking dinner. Op woensdag verzorgt het Concilium een sessie over de EPA's en er is een onderdeel over wetenschappelijk onderzoek van Anna Fonds I NOREF. De middag wordt ingevuld door de Werkgroep Heup, in samenwerking met de European Hip Society.
Details over het programma, de kosten en de inschrijving: www.orthopeden.org/congressen. Tot ziens in Rotterdam!

Voor uw agenda

9-10 oktober	NOV-Najaarscongres
9 oktober	Algemene Ledenvergadering NOV
18 oktober	Symposium *De pijnlijke knieprothese* (Werkgroep Knie)
24 oktober	Bijeenkomst seniorleden NOV
9 november	Jaarcongres Dutch Spine Society *The paediatric spine*
16 november	CCOC *Trauma, alleen volwassenen zonder wervelkolom*
28 november	Starterscursus voet en enkel
29 november	Advanced course foot & ankle
24-25 januari 2019	NOV-Jaarcongres *Innovations*
24 januari 2019	NOV-dag secretaresses en poli-assistenten

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

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