

Opinions among Danish knee surgeons about indications to perform total knee replacement showed considerable variation

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ABSTRACT

INTRODUCTION: During the past decade, the incidence of primary total knee replacement (TKA) surgery in Denmark has approximately doubled. This increase could be due to weakened indications to perform TKA surgery. We aimed to investigate variation in opinions about indications to perform TKA among Danish knee surgeons.

MATERIAL AND METHODS: In October 2011, a survey among Danish knee surgeons was performed at the Annual Meeting of the Danish Orthopaedic Society. A questionnaire targeting knee surgeons' opinion on indications for primary TKA was distributed. Questions concerned opinions on aspects of pain, body mass index (BMI), exercise, function, age, clinical and radiographic findings, and specific patient cases.

RESULTS: A total of 41 questionnaires were returned. Twenty-three knee surgeons performed > 100 TKAs annually. Opinions about the duration of knee pain and pain treatment, preoperative weight loss and exercise, excessive BMI as a contraindication, low age as a contraindication, and some of the specific patient cases demonstrated considerable variation. A statistically significantly higher proportion of high-volume versus low-volume knee surgeons did not find that BMI could be a contraindication to proceed with TKA surgery ($p = 0.02$).

CONCLUSION: Opinions among knee surgeons about indications to perform TKA showed considerable variation. The majority of the variation observed is tolerable and may be explained by lack of evidence or diverging literature reports. However, variation in opinions regarding preoperative weight loss and exercise may warrant the introduction of further guidelines for involved care takers.

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During the past decade, the incidence of primary total knee replacement (TKA) surgery in Denmark has doubled [1]. A similar pattern has been observed in the rest of Europe and North America, and further increases are expected [2]. The operative capacity to undertake these operations has increased, strongly facilitated by dedicated fast track arthroplasty surgery units [3]. Primary TKA surgery has proven successful in terms of

relieving pain, increasing patient mobility and health-related quality of life [4], and a potential positive effect of more patients being operated is that appropriate and successful treatment is offered to more patients. Conversely, it could be argued that the increase in the incidence of primary TKA surgery might be a result of weakened indications to perform surgery among knee surgeons – that is, more patients with less pain, less functional compromise and overall lower grades of osteoarthritis (OA) being operated.

Traditionally, it is acknowledged that significant pain, functional impairment and radiographic OA are indications to proceed with TKA surgery. However, the opinions about the indications for TKA surgery have been shown to vary between surgeons, and individual opinions have been shown to be inconsistent [5-9]. Inconsistencies in opinions may result in differences in the use of TKA surgery between surgeons and departments, and inappropriate use of TKA surgery may therefore occur. To further complicate the issue, the optimal timing of surgery with respect to the level of patient affection is the subject of ongoing debate [10, 11].

The aim of the present study was to investigate the opinions among knee surgeons about indications to perform TKA surgery. Knowledge in this field would help evaluate the magnitude of variation in opinions, whether opinions in general adhere to “good standards of treatment”, and to establish if further guidelines regarding surgical indications are warranted.

MATERIAL AND METHODS

At a meeting in the Society of Danish Hip and Knee Arthroplasty Surgeons, held during the Annual Meeting of the Danish Orthopaedic Society in October 2011, we performed a survey among the attending knee surgeons. We estimate that this occasion is the most likely to gather the highest number of active knee surgeons in one place. At the beginning of the meeting the survey was introduced to the audience and all knee surgeons were invited to participate by filling in the distributed questionnaire during the session and returning it by end of the session.

The questionnaire, “Operative indications for knee

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arthroplasty among Danish knee surgeons" targeted knee surgeons' opinions about indications for primary TKA. The questions were categorized into the following main categories: 1) Facts about geographical ties and years of specialist practice, 2) facts about other types and number of knee arthroplasties performed, 3) surgeons' opinions about different aspects of knee pain and its treatment, 4) surgeons' opinions about weight/body mass index (BMI) and the attempt to lose weight preoperatively, 5) surgeons' opinions about preoperative exercise, loss of function and patient age, 6) surgeons' opinions about findings on clinical and radiographic examination, and 7) surgeons' opinions about whether to proceed with TKA surgery in eight specific patient cases (Table 1).

Answers to the questionnaire are reported as the distribution of the actual number of responses to the questions. Further, it is assessed if opinions on duration of pain, duration of pain treatment, BMI as contraindication, necessity of preoperative weight loss, age as contraindication, necessity of preoperative exercise, and minimal degree of radiographic OA differs between knee surgeons performing more (high volume) and less (low volume) than 100 TKAs annually. Statistical comparisons were performed by Fisher's exact test or Pearson's χ^2 -test.

Trial registration: not relevant.

RESULTS

A total of 41 questionnaires were returned. Not all questionnaires were fully completed. The question on minimal level of patient knee pain required to proceed with TKA surgery was answered by 33 knee surgeons, and the remaining questions by 39 to 41 of the knee surgeons. The geographical regional ties of the knee surgeons were as follows: Capital Region: n = 18; Region Zealand: n = 5; Region of Southern Denmark: n = 4; Cen-

tral Jutland Region: n = 8; North Jutland Region: n = 5; Greenland: n = 1. Years in specialist practice were distributed among categories as follows: 0-5 years: n = 5; 6-10 years: n = 12; 11+ years: n = 24. The number of performed TKAs (primary and revision) annually for each surgeon was distributed as follows: 1-24: n = 1; 25-49: n = 5; 50-99: n = 12; >100: n = 23. One-stage bilateral TKA and unicompartmental knee arthroplasty were performed by 20 and 21 knee surgeons, respectively.

Pain

A total of 39 of 41 knee surgeons found that pain treatment had to be attempted prior to making the decision to proceed with surgery: less than three months was found to suffice by 20 surgeons, whereas 18 found 3-6 months of pain treatment to be appropriate. The total duration of knee pain required for the surgeon to proceed with surgery was 3-6 months for 19 surgeons, 6-9 months for nine surgeons and 9-12 months for seven surgeons. The minimum level of knee pain required for surgeons to proceed with surgery (on a zero to ten visual analogue scale (VAS)) was a median three at rest and a median five when active. A total of 32 surgeons reported that they would proceed with TKA surgery in a patient with pain during activity only, but no pain at rest.

Weight/body mass index

In all 19 of 41 surgeons required that weight loss had been attempted in overweight patients prior to TKA surgery. A total of 13 surgeons did not find excessive BMI to be a contraindication to surgery. A BMI > 40 kg/m² was reported to be a contraindication by 18 surgeons, whereas a BMI > 45 kg/m² and > 50 kg/m² was found to be a contraindication for surgery by two and six surgeons, respectively.

Exercise, function and age

An attempt by patients to exercise with a view to relieving knee symptoms and improve function was required by 14 surgeons prior to TKA surgery. A significant reduction in patient walking distance was required by 28 surgeons to proceed with surgery. Eight surgeons required that patients had experienced inability to do sports (n = 3) or had a slight reduction of walking distance (n = 5) to proceed with surgery. Four surgeons required no functional limitations to proceed with surgery (if the patient had knee pain). Low patient age at surgery was not considered a contraindication by 23 surgeons. Age at surgery < 30 years, < 40 years and < 50 years was considered a contraindication by seven, three and six surgeons, respectively.

Findings on clinical and radiographic examination

Surgeons were asked to indicate the minimum level

TABLE 1

Patient cases and the distribution of answers. Surgeons were asked if they would proceed with total knee replacement surgery in the given case.

Patient case – description of findings	Yes, n	No, n
Pain, crepitus, normal radiograph	2	32
Pain, no crepitus, normal radiograph	0	41
No pain, crepitus, severe radiographic OA	5	36
Pain, no crepitus, OA on arthroscopy, normal radiograph	22	19
Pain, no crepitus, contained "to the bone" cartilage defect on arthroscopy, normal radiograph	22	19
Severe radiographic OA, varus malalignment, no pain	10	31
Pain, OA on MRI, no crepitus, normal radiograph (no answer: n = 1)	10	30
Pain, 10° flexion contracture, normal radiograph (no answer: n = 2)	4	35

MRI = magnetic resonance imaging; OA = osteoarthritis.

of radiographic joint degeneration on the Kellgren-Lawrence (K-L) scale (1-4) that needed to be present for them to perform TKA surgery. A total of 25, 11 and four (in total 40 of 41) knee surgeons indicated that at least grade two, three or four, respectively, was needed. Grades 2-4 are indicative of at least possible narrowing of the joint space.

Further, knee surgeons were asked to prioritize the four most important factors in their decision to proceed with TKA surgery. The eight factors taken into consideration were: pain on function, pain at night, knee crepitus, reduced range of motion, severe radiographic OA, reduced level of mobility, flexion contracture, and malalignment. Starting with the factor that was most frequently prioritized as either the most important factor or the second most important factor, the overall four most important factors in decision-making were: 1) pain on function, 2) pain at night, 3) severe radiographic OA and 4) reduced level of mobility.

Patient cases

In eight patient cases, the knee surgeons were asked to answer if they would proceed with TKA surgery in each specific case. The patient cases and the distribution of answers are shown in Table 1.

Comparison of opinions between high- and low-volume total knee replacement surgeons

Only the opinion on BMI as a contraindication to proceed with TKA surgery differed statistically significantly between high- and low-volume knee surgeons. 48% of high-volume knee surgeons versus 12% of low-volume knee surgeons did not consider excessive BMI a contraindication ($p = 0.02$).

DISCUSSION

It might be speculated that weakened indications among knee surgeons to perform TKA played a role in the increase in incidence of TKA surgery observed during the past decade. A survey to investigate the opinions about indications for TKA surgery was therefore warranted. Previous reports, both historical and contemporary, from North America have demonstrated considerable variation in surgeons' opinions about indications for TKA surgery [5, 6, 9].

In accordance with national guidelines on treatment of knee OA, nearly all knee surgeons found that pain treatment had to be attempted prior to TKA surgery [12]. There are no clear-cut recommendations on the minimum duration of pain treatment that has to be attempted before proceeding with surgery, and the variation in surgeons' opinions that we observed was therefore to be expected. The total duration of knee pain required for the surgeon to proceed with surgery



Total knee replacement has proven successful in terms of relieving pain, increasing mobility and health-related quality of life. Picture shows patient with bilateral total knee replacement walking independently 23 hours after surgery. Photo by Susanne Østergaard, Hvidovre Hospital. Used with permission from the patient.

showed great variation, however, with the majority of surgeons reporting 3-6 months as the minimum duration. This could reflect that the majority of surgeons find this time interval optimal to evaluate the effect of pain relief and the fluctuation of symptoms that is part of the natural course of OA. Waiting too long before proceeding with surgery may lead to increased levels of pain, decreased mobility and deterioration of health-related quality of life, which has been shown to result in poorer outcome TKA outcome [10, 11]. Based on these conflicting interests regarding optimal timing of TKA surgery, variation is expected.

Both weight loss in obese patients and exercise have been shown effective in relieving symptoms and improving function in patients with knee OA [13]. Less than half of the knee surgeons required that these non-surgical treatments be attempted prior to TKA surgery. Morbid obesity (BMI > 40 kg/m²) is associated with an increased risk of infection and other complications following TKA surgery [14, 15], and this is probably the reason why almost half of the surgeons found that a BMI > 40 kg/m² was a contraindication for surgery. Likewise, a recent report found that 40% of surgeons were less likely to perform TKA surgery in obese patients [9]. On

the other hand, morbidly obese patients undergoing TKA have shown larger absolute improvements in function than non-morbidly obese patients [16]. One-third of surgeons did not find excessive BMI to be a contraindication for TKA; and in a sub analysis, the proportion of high-volume surgeons with this stand point was statistically significantly higher than among low-volume surgeons. Risks and benefits should be discussed with each individual morbidly obese patient before TKA surgery.

Nearly all surgeons required that patients showed some degree of functional compromise, besides pain, to proceed with TKA surgery. This is a common approach, but the optimal level of functional compromise before TKA surgery is unknown. However, studies have indicated that the more severe the functional compromise, the poorer the outcome following TKA [10, 11].

Low age, in the interval < 30 to < 50 years, was considered a contraindication to proceed with TKA by 16 surgeons. Traditionally, postponing surgery for as long as possible has been a strategy to avoid revision(s) in the patient's remaining life span. However, with improved long-term survivorship of both primary TKA and revision surgery, this strategy should be balanced against the good outcomes achieved when intervening earlier in the course of OA.

Nearly all (40 of 41) knee surgeons required minimal K-L grades of OA of 2-4 to proceed with TKA surgery. This is in line with the traditional approach that patients should have possible or definite joint space narrowing preoperatively. Variation in the interval of grades 2 to 4 is expected as it seems there is no correlation between preoperative grades of OA and preoperative pain. Further, the pain relief and function achieved postoperatively has been reported not to differ between varying degrees of preoperative OA [17].

The overall four most important factors in the decision-making to proceed with TKA was pain (at night and on function), reduced level of mobility and radiographic severity of OA; and in a recent Canadian survey these were the same factors that caused approximately 70% or more of surgeons to "be more likely" to perform TKA surgery [9]. Thus, the findings in our survey adhere to traditional and contemporary thinking in decision-making to proceed with TKA.

The distribution of answers showed some variation in four patient cases. These cases were characterized by normal radiography and OA on arthroscopy (two cases), severe OA and no pain, or pain and OA on magnetic resonance imaging, but not in radiographs. These cases were constructed to include controversy in decision-making. In the case of no pain, it is surprising that one quarter of the surgeons would proceed with surgery. It is commonly perceived that knee pain *must* be present to proceed with TKA surgery. In the remaining three

controversial cases, variation can be explained and tolerated as literature findings do not support the superiority of either decision.

A study limitation should be acknowledged: The number of eligible respondents to the questionnaire is unknown. A low response rate could potentially limit the survey results in being representative of all Danish knee surgeons. However, given the considerable variation in indications to perform TKA among knee surgeons, it does not seem that the questionnaire answers were biased.

Opinions among knee surgeons about indications to perform TKA showed considerable variation. The majority of variation observed can be explained by lack of evidence or diverging literature reports. However, variation in opinions regarding preoperative weight loss and exercise may warrant the introduction of further guidelines for involved care takers.

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