



Special article

Total knee prosthesis. Development of an objective selection tool for patients[☆]



Elaboración de un índice objetivo de selección de pacientes subsidiarios de prótesis articular de rodilla

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Introduction

The national health systems of developed countries are engaged in a huge economic challenge. Initially, these dealt with problems that threatened life, such as infections and tumours. Once these were somehow under control, and because of the success in treating them, the life expectancy of the population has thankfully been extended. At the same time, the population expects, not only to live longer, but also to improve the quality of life.

The increase in years lived has resulted in the emergence of degenerative diseases at epidemic proportions. Thus, in the scope of orthopaedics, osteoarthritis creates havoc on the quality of life because it limits the daily activities of patients. Unlike with other degenerative diseases, such as neurological disorders, an effective solution has been found in reducing the discomfort that occurs with this disease. Prosthetic replacement of the affected joint often improves the stiffness and pain associated with it.

But the increasingly high demand for them, either because more and more joints are susceptible to replacement or because, as stated above, expecting to lead a “comfortable life” is now the norm, causing a growth rate that, although it is not geometric, it is definitely arithmetic. The total number of prostheses implanted in Spain and

in the world is unknown because there are no national records in all countries. The earliest hip and knee records were established in Sweden in 1975,¹ and this has more than 200,000 hip replacements. In Spain, the record has only been implemented in Catalonia since 2005, and has since then collected nearly 25,000 hip and knee arthroplasties.¹ In Spain, according to data from companies that produce these arthroplasties, such as Waldemar Link,² it is estimated that 45,000 total knee replacement (TKR) are implanted per year, compared to 100,000 in Germany. This is a very significant problem from a healthcare management perspective, because the resources used in one area are not used in another. At a time of budgetary constraints, expenditure items that seem to increase very fast must be kept under control for the entire system to remain stable and maintained over time.

On the other hand, there are no indisputable criteria regarding the surgical indication for TKR. Except in cases where a large joint destruction is observed, well documented by radiologic evidence and accompanied by permanent strong pain, the vast majority of cases involve intermittent pain with varying clinical–radiological dissociation. Therefore, the time of implantation is not fully established. It is accepted that the best time to implant is the time when all medical resources have been exhausted orally, intra-articularly and through rehabilitation. In line with this, it has been observed that the indication and implantation variability rate of the same is very high. In 2005, the *medical practice variability Atlas* analyzed knee replacements in Spain, noting that it was a process of high variability, with a standardized rate by age and sex which ranged between 2.5 and 13.49 interventions per 10,000 inhabitants-year.³

Therefore, building an index that would reduce, or at least try to reduce this variability was considered useful. This would also help

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to establish the prosthetic indication with objectivity and fairness so that the whole population could have access to it on equal terms, and likewise, governed by general principles of beneficence and non-maleficence.

An index with these characteristics should aim to meet several objectives: first, to be as simple as possible so that it can be used regularly in routine clinical practice. Without this scientific “principle of simplicity”, it is not operative and runs the risk of being relegated sooner rather than later. Second, as previously mentioned, it must be objective, so that when applied, all people have equal opportunity to access these resources, without any more requirements other than his/her medical needs, avoiding any spurious event. And thirdly, it must measure exactly that which wants to be measured. Intra- and interobserver variability should be as small as possible. This is achieved, in part, whenever the second objective is achieved. As a summary, the clarity, conciseness and accuracy criteria governing any scientific work must be met.

The aim of this work is to build a brief referral index (definitive referral index [DRI]) for patients susceptible of TKR from primary care services to Orthopaedic Surgery, so as to select those patients who need it most following fairness and objectivity criteria.

Materials and methods

A survey among the members of the Spanish scientific society of Orthopaedic Surgery and Traumatology (SECOT) was performed. They were asked about the opinion they had in regard to objective criteria involved in the indication of TKR. Also, they were asked to rate how much they had to weigh each parameter involved such as age, radiographic grade and body mass index (BMI) in the final indication. They were asked to give their opinion on whether they thought other treatments had to be exhausted before indicating TKR, such as physiotherapy and intraarticular infiltration treatment with hyaluronic acid. And finally, whether they thought any other objective and non-objective criteria could be implemented in the preparation of the definitive index. Therefore, in summary, the items on which the survey was structured were: age, radiology, BMI, previous physiotherapy and previous infiltrations.

The data obtained were treated statistically. Cronbach's alpha coefficient was calculated, and once the index was built, it was applied to 41 patients, repeating measurements with the same investigator and with a different one in order to determine the internal and external validity of the test through the intraclass correlation coefficient (ICC).

Results

49 responses were obtained. The questions and the means of each response are indicated in Table 1.

The questionnaire included open questions to indicate objective and non-objective criteria that could contribute to the final preparation of the index. Given its lengthiness and lack of statistical impact, they are not discussed in this text.

Cronbach's alpha coefficient was 0.774 at 95% confidence and ICC, with the same confidence interval to measure the internal validity of the tool, was 99.8%, and 99.5% for external validity.

Discussion

The fewest possible criteria had to be used in the design of the index, and these would need to measure what really needed to be measured, i.e., the need for a TKR in a concise and precise manner, having failed other oral, articular and physiotherapy treatments. Besides these criteria, the lack of subjectivity criteria is of paramount significance.

Table 1

Questions and responses mean in the survey conducted among members of the Spanish Society of Orthopaedic Surgery and Traumatology.

	Yes	No
Considers age and radiological deterioration objective and decisive parameter to implant TKR	79.6%	20.4%
What weight would it have from 0 to 10 on aggregate in the indication?	Age 4.95	Radiology 5.62
In relation to age, rate from 0 to 10 the most appropriate intervals to perform an arthroplasty	<55 55–65 65–75 >75	1.64 2.64 4.67 3.73
Should there be an age limit? ^a	Yes 59.2%	No 40.8%
Is obesity an objective parameter indicating a TKR?	79.6%	20.4%
In relation to weight, rate from 0 to 10 the different sections that are most suitable for TKR	BMI <25 25–30 30–35 >35	4.51 3.03 1.82 1.76
Should physiotherapy be performed before TKR? ^b	Yes 73.5	No 26.5
Should infiltration treatment be tried?	Yes 77.6	No 22.4

BMI: body mass index; TKR: total knee replacement.

^a The highest response rate among those who answered yes was 22.4% (84 years).

^b The highest response rate among those who answered yes was 42.9% (6 months).

Thus, age meets the latter, because a TKR performed in a young person is associated with future follow-up processes, which ideally should be avoided, as it is not a final prosthetic implantation. Moreover, implantation in the very elderly, with their potentially fewer remaining years of life, can make a scarce resource less profitable, even more in certain age groups.

Kellgren and Lawrence radiological criteria⁴ (Table 2), within the limitations of its variability, inter- and even intraobserver is a parameter that cannot be left out of an index like this. This variability, although low, is remarkable because other parameters are totally objective, without any variability. The reason for introducing it has to do with being a criterion which is always taken into account. TKR implantation is inconceivable without performing an X-ray.

BMI is a useful indicator of intra- and postoperative complications of TKR, among others. Although conflicting studies including this idea⁵ have been recently published, its justification by the authors is based on the great technical perfection achieved with

Table 2

Kellgren and Lawrence radiographic criteria.

Grade	Gonartrosis	Radiographic findings
0	No	Absence of osteophytes, narrowing or cysts
1	Inconclusive	Osteophytes only
2	Minimum	Small osteophytes, moderate narrowing of the joint interline, there may be cysts and sclerosis
3	Moderate	Clear moderately sized osteophytes and narrowing of the joint interline
4	Serious	Large osteophytes and severe narrowing of the joint interline

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