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EDITORIAL

Outcome scores after hip surgery in young adults: an editorial approach

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Introduction

Over 30% of the submitted articles to our Journal concern the hip in different stages and ages of life from newborns to centenarians. Total hip arthroplasty is the optimal intervention for end-stage hip arthritis in the older populations. However, the management of degenerative hip diseases in young patients remains a challenge. Over the past several years, total hip arthroplasty has been used more and more in young patients; projections show that by the year 2030, more than half of all primary total hip arthroplasties will be placed in patients younger than 65 years of age, with the higher increase in patients between 45 and 54 years of age [1]. Current conditions, such as the femoroacetabular impingement, developmental dysplasia of the hip, and trauma are common sources of pain and functional limitations in active individuals that eventually develop hip osteoarthritis [2, 3]. In this age group, hip arthrodesis and resection arthroplasty were considered alternative salvage procedures in the past; currently, hip preservation surgical techniques such as hip arthroscopy and resurfacing have developed with the appreciation that most hip problems in young adults are associated with altered hip morphology [2, 4]. However, despite the improvement of both open and arthroscopic hip-preservation techniques, these procedures may not provide adequate symptom relief in the case of hip arthritis, and therefore, prosthetic arthroplasty may be required for pain relief and enhanced function [5].

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Young patients undergoing total hip arthroplasty have high expectations concerning their post-operative level of activity [3, 5–7]. However, data on the outcome of primary and revision hip arthroplasty in young patients are limited [8]. Although total hip arthroplasty in older patients has shown excellent outcome and long-term survivorship, this has not been the fact in the young patients due to concerns about the survival of the prostheses, complications and revision operations [5, 8–10]. The inferior outcome in younger patients, as measured with the available scores, and the paucity of long-term reports may create difficulties for surgeons and patients when deciding whether total hip arthroplasty is a feasible option in this age group [9, 10]. Obviously, the loss of stability or mobility at the hip joint in young patients impacts their social and personal development [4]. However, interestingly, with the available functional scores, young patients report good functional outcome measures post-operatively after hip surgery. Additionally, some scores show floor and ceiling effects (where >15% of participants scored the worst and best scores, respectively). The implication is that patients may report high scores and still suffer functional deficits [3, 5, 11, 12]. Therefore, is there any chance that we are using incorrect outcome scores after hip surgery in young adults? Are there additional tools necessary to characterize young adults undergoing total hip arthroplasty? From an evaluation approach to any submitted research, what should be our attitude in analyzing results from various surgical teams? Are the patient-reported outcomes true and reliable?

Hip scores for the young adults

There are currently insufficient studies reporting hip scores in young adults [5, 9, 13, 14]. Some 20 different scores have been introduced in the past to evaluate the results of total hip arthroplasty [13]. A study examined 13 methods of hip scoring in the post-operative assessment of 47 total

hip arthroplasties. Their results were found to be inconsistent, often giving contrary measures of success in the same patient. The authors concluded that the examined hip scoring variables could be reduced to four factors (pain, functional activity, deformity, and range of motion). For outcome assessment, only pain, walking distance, and range of hip flexion needed to be recorded; combination of these three measures into a single hip score was found misleading [13].

When measuring outcomes after hip surgery, it is important to take into consideration the patient's expectations. Traditionally, orthopaedic surgeons measured the success of their treatments using objective measures such as ranges of motion, strength, and imaging. However, these measures have been found to be poor indicators of the functional ability. To assess function, subjective measures of symptoms and emotional and social health are used. In this context, quality-of-life outcome measures have been developed to capture the subjective aspect of health. Moreover, most questionnaires for patients with hip pathology have been created for either patients with a hip fracture or those undergoing total hip arthroplasty. In this respect, some of the existing outcomes often suffer from a ceiling effect, limiting their usefulness in young adults [15, 16]. For active persons such as young adults, pain is the most important reason for surgery. Nevertheless, improved physical function is one of the main goals of the operation. In young adults, sport and recreation function as well as hip-related quality of life were additional important factors [17]. Recently, numerous generic and disease-specific outcome scores have been designed to evaluate the patients' point of view. Currently, patient relevant outcome measures (PROMS) are considered the primary outcome measure in clinical trials [17].

The Harris Hip Score has been used extensively in the hip literature. It has good construct validity [18], but has also been criticized for having a substantial ceiling effect [19]. Other scoring systems such as the Hip Outcome Score (HOS) and the international Hip Outcome Tool (iHOT), the HOOS (Hip disability and Osteoarthritis Outcome Score), the Oxford Hip Score, the Hip Outcome score Activities of Daily Living (HOS-ADL), the HOS-Sport-Specific Subscales (HOS-SSS), and non-arthroplasty related scores such as the Tegner, Non-Arthritic Hip Score (NAHS), the Short Form Health Survey (SF-12 and SF-36), the Copenhagen Hip and Groin Outcome Score (HAGOS), and the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) are considered appropriate tools for evaluating young adults undergoing hip surgery [15, 17, 20–26].

The KOOS (Knee Injury and Osteoarthritis Outcome Score) is a development of WOMAC initially constructed as a measure of patient-relevant outcomes to be used in studies of the treatment of anterior cruciate ligament and meniscus injury [27]. The HOOS (Hip disability and Osteoarthritis Outcome Score) is an adaptation of the KOOS intended to evaluate symptoms and functional limitations related to the hip. It is a self-report questionnaire with forty items and it has five patient-relevant subsets (pain, symptoms including stiffness, function, sports activities, and hip-related quality of life) [17]. The HOOS is a validated and highly reproducible score that is more specific for young adults [8, 28].

Patient-reported outcome measures (PROMs) such as the Hip Outcome Score (HOS) and the international Hip Outcome Tool (iHOT) were originally used to assess treatment effectiveness within clinical trials. However, the use of PROMs has evolved into tools that allow healthcare providers to evaluate the effects of their interventions by gaining their patients' perspective in a reliable, valid and acceptable way [29, 30]. The HOS (Hip Outcome Score) was designed to assess the treatment outcomes of arthroscopic hip surgery [23]. The International Hip Outcome Tool (iHOT-33) is a 33-item patient-reported measure of health-related quality of life. It was designed to measure the impact of hip disease in young, active patients and to measure the effect of treatment of this disease. It is more likely to be used in the research setting to compare treatment strategies in young adults with a wide range of symptoms and problems covered by the 33 items of the score [16]. A short version of the iHOT, the iHOT-12, has been developed. It has very similar characteristics to the original 33-item score losing very little information. It is valid, reliable, and responsive to change. The authors suggest that it should be used for initial assessment and post-operative follow-up in routine clinical practice [23]. By comparing the measurement properties of the HOS and the iHOT-12 in patients with hip pain, it was found that these two scores were closely related. In particular, HOS was identified as the most proven instrument for use in young adults, with the greatest amount of clinimetric evidence [15]. Age, weight, and BMI were statistically similar; however, there was a statistically significant difference between genders for the HOS but not for iHOT12 [23, 29]. Another study looked at psychometric evidence of outcomes used in hip arthroscopy [31]. The authors of that study identified the modified-HSS, the NAHS, and the HOS as the 3 optimal outcome measures but concluded that the combined NAHS and HOS should be used as outcome measures for young adults undergoing hip arthroscopy [31].

The HAGOS (Copenhagen Hip and Groin Outcome Score) consists of six separate subscales assessing pain, symptoms, physical function in daily living, physical function in sport and recreation, participation in physical activities, and hip and/or groin-related quality of life [24]. The HAGOS, HOS, iHOT-12, and IHOT-33 have been recommended for assessment of young to middle-aged adults with pain related to the hip joint, undergoing non-surgical treatment or hip arthroscopy [29].

Floor or ceiling effects

Floor or ceiling effects are considered to be present if more than 15% of respondents achieved the lowest or highest possible score, respectively. Floor and ceiling effects are present if the questionnaire fails to demonstrate a worse score in patients who clinically deteriorated and an improved score in patients who are clinically improved. If floor or ceiling effects are present, it is likely that extreme items are missing in the lower or upper end of the scale, indicating limited content validity. As a consequence, patients with the lowest or highest possible score cannot be distinguished from each other, thus reliability is reduced. Furthermore, the responsiveness is limited because changes cannot be measured in these patients. Absence of floor or ceiling effects is considered if no floor or ceiling effects are present in a sample size of at least 50 patients [32].

Outcome measurements tools can demonstrate ceiling effects when a sizeable proportion of respondents achieve the best possible score and there is no room on the scale to detect further improvement. This may be a function of tool design with regard to the construction of items and item responses but may also relate to the disease or intervention being examined [28]. Ceiling effects have been reported for variable scores such as the mHHS, HAGOS, HOOS-12, the KOOS-12, and the Oxford Hip and Knee Scores. Ceiling effects for the HOOS-12 and KOOS-12 function is particularly relevant for younger, more active patients undergoing joint arthroplasty [28, 33, 34].

Epilogue

Definition of the best clinical score for young patients suffering from hip pain and undergoing any surgical procedure is a topical issue in orthopedic debates.

Evaluation tools were originally designed to assess the outcome of total hip replacement in individuals older than 65 years.

Hip surgery in young adults today spread from arthroscopy to hip resurfacing, across joint preservation procedures like core decompression and osteotomies. A so wide spectrum of procedures together with the consistent reduction in mean age at the time of total hip replacement requires specific tools to properly evaluate responsiveness to clinical changes, limiting as much as possible floor or ceiling effects and keeping skewness and kurtosis below 1.0 (Interpretability).

However, a high ceiling effect can be expected considering the effectiveness of total hip replacement, and the goal to keep top scores below 15% of examinations may appear too restrictive.

Internal consistency, reliability, and convergency with well-validated tools should be taken into account in designing or evaluating any new clinical tool.

A practical attribute is the acceptability of the test: as more comprehensive is the questionnaire as long and time consuming it appears, both to patients and investigators, with different response between clinical trials and clinical daily practice. This is the main reason for creating short forms of the original scores (SF-12, HOOS-12, iHOT 12) able to reduce the items approximately to one third of the original number and possibly not jeopardizing the ability to capture variation or responsiveness to clinical changes.

Scientific Societies play a crucial role in promoting the use of validated clinical evaluation tools, with the goal of identifying the best scores possible and aligning the outcome measurements among the different reports. International Societies encourage the validation of these scores in different countries, adapting them to different languages and cultures.

In this respect, SICOT plays a fundamental role, as its statutory mission is to bring together the orthopaedic specialists and trainees, sharing knowledge between countries with different cultures and levels of preparation. SICOT is favoring the education at all levels and growth of those with difficult access to learning and education

Subspecialty committees, whose members are by definition experts of the subject, play a role of great importance by always keeping constant the level of education and updating all the members with the necessary information and tools.

Our Journal serves as an education and communication tool for the SICOT and for the scientists associated to our specialty and is the main communicator of scientific peer-reviewed information between congresses with a continuous activity; online updates are published every week. Therefore, our interest in publishing valuable scores and evaluation tools for function and well-being after surgery in young and old subjects is crucial.

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