

Outcome measures following hip arthroplasty

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Abstract

The use of outcome measures following surgery has become increasingly common in an attempt to determine the success or otherwise of a particular procedure. Multiple tools are available for use, each with their own benefits and limitations. There has been specific focus in recent years on the use of Patient Reported Outcome Measures (PROMs). With specific regard to hip arthroplasty, outcome measures have been developed and adopted to provide more accurate information regarding the success or failings of a procedure, implant, hospital, or even individual surgeon. These are generally conveyed as quality of life scores or PROMs, which contrast with outcomes such as crude revision or mortality rates. These blunter outcomes remain important but are less nuanced. Understanding the range of outcome measures that are available to surgeons undertaking hip arthroplasty is essential. Use of the appropriate tools is imperative in modern practice to allow assessment of performance at all levels, from individual to national. Outcome measures and tools facilitate identification of best practice, as well as identifying trends which may give rise to cause for concern. Quality of life scores, morbidity and mortality measurements and registry data all have roles to play in assessing outcomes following hip arthroplasty and should be employed routinely.

Keywords Hip arthroplasty; morbidity; outcome measures; registry

Introduction

Assessment of outcome following hip arthroplasty surgery has always been of interest. It has gained importance more recently for numerous reasons, partly driven by health economics:

- the need to quantify morbidity and mortality
- a desire to compare the success of particular implants, or implant combinations
- the ability to compare individual surgeons and centres
- the comparison of techniques, such as type of surgical approach.

Despite the increased interest in evaluating outcome following surgery, challenges remain in ensuring that such assessments of outcome are accurate, reliable and relevant. There are many different tools available to measure outcome, each with their own advantages and drawbacks. This paper gives an overview of

the instruments available to evaluate outcomes following hip arthroplasty, commenting on their relative merits.

The broad groups into which outcome measures can be categorised are as follows: quality of life measures, implant survivorship, mortality rates, and morbidity. All of these measures, when used correctly, can guide the clinician in pursuit of successful practice. The information gleaned from such tools can suggest which implants are best (and worst) performing and advise on patient selection. To use any of these instruments in a reliable way, they must have reproducibility and validity. The clinician must be clear regarding the question they wish to be answered when choosing which tool to use.

Validity, reliability and sensitivity to change

For an outcome measure to be useful and statistically robust it must meet certain characteristics, including those of being valid, reliable and sensitive to change. Validity has many forms but generally refers to how well a question being asked actually covers the subject it is meant to assess. Reliability is a measure of how consistent or reproducible a particular outcome measure is when used in different settings, for example at different times or with different age groups. The ability of a test to be sensitive to change refers to whether a clinical change deemed to be important is reflected by a change in the outcome of that test. This explains why performing outcome scoring both pre- and post-operatively is imperative.⁸

Quality of life instruments

There are a plethora of such tools available to the clinician to evaluate either clinician recorded, or Patient Reported Outcome Measures (PROMs). PROMs have increased in popularity recently as a tool to evaluate the success of orthopaedic surgery in general; they provide a broader and more patient-centred assessment of outcome, than crude survivorship figures alone. They also enable differences between prostheses or surgical techniques with similar revision rates, but different functional outcomes, to be identified. For example a hip implant system which does not allow adequate restoration of femoral offset may have a very satisfactory revision rate, but provide a relatively poor functional outcome. PROMs also provide direct evidence of the benefit of hip arthroplasty in an environment where clinicians must prove interventions are of significant value. This is of particular importance in parts of the UK where clinical commissioning groups (CCGs) want evidence to show a specific intervention is worthy of funding.

A comprehensive summary of these tools has been provided by Haddad et al. who have reviewed such outcome measures in great detail and described them in the following groups: global quality of life measures, disease-specific outcome measures and joint-specific outcomes measures.¹

Global quality of life measures

Multiple varying tools exist to assess the impact of hip arthroplasty on quality of life generally. These instruments are used across the spectrum of medicine and are not confined to orthopaedic practice. Ideally, they should assess each of the domains of quality of life as laid out by the World Health Organization (Table 1).¹⁴ Importance is attached to the validity of each of these

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tests and their ability to assess a change after an intervention such as hip arthroplasty. The most commonly employed instruments include EQ5D, Short Form 12 and Short Form 36 tests.

EQ5D: this is a standardized tool developed by the EuroQol group which has gained widespread use in the healthcare setting. There are three variants, each with a descriptive component and a visual analogue scale which gives a numerical representation of the patient's own judgement of their quality of life. The descriptive component comprises five parameters: self-care, usual activities, mobility, pain, and anxiety/depression. The scores of the five parameters can be either be presented as a health profile or converted into a summary number in order to compare with others.²

Short Form 36 (SF-36): this is a widely used survey which assesses overall health. It has been extensively tested to determine its validity, reliability and sensitivity to change. It is a very good indicator of overall mental and physical wellbeing, with a score given for each domain from a composite of responses to the 36 questions asked. These questions cover eight distinct areas:

- bodily pain
- physical functioning
- role limitations due to physical health
- general health
- mental health
- vitality
- social functioning
- role limitations due to emotional health.

Four domains are related to physical health and the other four mental health. The test specifically covers the preceding four week period. Scores are stratified from 0 to 100 (worst to best).

Although this method has shown to be valid, reliable and sensitive to change (both generally and specifically for hip arthroplasty), its effect may be limited at the extremes of the scale, where it is less sensitive at detecting changes in the poorest and best outcomes.³ Other advantages of this test are its ease of use, relatively quick time to undertake (5–10 minutes) and the fact that it can either be self-administered, completed online, or via telephone.

Short Form 12 (SF-12): this is an abridged version of the SF-36 with only 12 questions asked, This is an abridged version of the SF-36 with only 12 questions asked. It has also been validated and deemed reliable but clearly is not as comprehensive as its longer variant. Specifically, it is less sensitive to change and less

precise in assessing scores for each of the eight domains assessed. There needs to be an adequate sample size for the scores provided in each domain to be reliable. It is however, quicker and easier to perform, and as such is cost saving and more efficient.⁴

Disease-specific scores

Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC): the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) is a health status questionnaire used to assess pain, stiffness and function in those with either hip or knee osteoarthritis. It can be used to examine the change in patients after many treatments for hip osteoarthritis including exercise, medications, physiotherapy, acupuncture or operative intervention including arthroplasty. It has been used in multiple trials to determine outcome, including observational and epidemiological studies.

The administration of this tool is subdivided into three areas – pain, stiffness, and physical function – with a varying number of questions for each area (five, two and seventeen respectively). There are two versions, one with a Likert scale scoring chart, and another with a visual analogue scoring chart. In the Likert scale, the responses include none, mild, moderate, severe and extreme. Each of these responses are scored 0–4 on an ordinal scale. In the 100 mm visual analogue version the measurement is taken in millimetres from the left side of the scale to the patient's mark. The responses in both versions are then summed for each area of the questionnaire, although the ranges differ between the two scoring versions. Higher scores indicate worse pain, stiffness and function.

This tool has been validated for use following hip surgery and is widely used. It does have some weaknesses however, including the retest reliability of the stiffness sub-scale, and a potential inability to detect change in the physical function category when there is a weak correlation between pain and physical function.⁵

Joint-specific scores

Harris hip score was originally a clinician based tool used to assess outcome after surgery on the hip. It can also be used to evaluate response to non-operative treatment of hip conditions, but has been most widely used to assess outcome following hip arthroplasty. It was first introduced in 1969 and has subsequently been modified.

The score is made up of four sections: pain, function, the absence of deformity and range of motion. Scores from each section are summed to give a total ranging from 0 to 100, where higher scores indicate better outcome. The modified version is now patient reported rather than clinician recorded and assesses seven domains (limping, walking distance, putting on socks and shoes, climbing stairs, sitting, support for walking and pain). This version also gives an overall score of 0–100, but a lower score indicates a superior outcome.

The HHS is valid, reliable and is widely used but has been reported to be susceptible to a ceiling effect whereby it is unable to fully assess those scoring at the highest functional end of the scale. The clinician recorded version may also be prone to observer bias.⁶

The six domains of the World Health Organization Quality of Life position paper

- Physical domain
- Psychological domain
- Level of independence
- Social relationships
- Environment
- Spirituality/religion/personal beliefs.

Table 1

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