Predicting Factors Affecting Quality of Life After Total Knee or Hip Arthroplasty for Osteoarthritis Patients : A Literature Review

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Abstract

Osteoarthritis is the most prevalent articular disease, the most common non-inflammatory arthropathy, and the main cause of chronic impairment. The most popular reconstructive treatment to improve the management of diseases that failed to respond well to standard medical therapy is total hip or total knee arthropathy. After a total knee or hip replacement, a patient's abilities to carry out daily tasks was referred to as their quality of life. The intended outcome of this literature review was to describe the patients' quality of life following surgery from earlier, comparable studies. This evaluation of the research suggests that certain factors, including comorbidities, preoperative quality of life, age, gender, excess weight, ethnicity, and psychiatric status, can predict health-related quality of life.

Keywords : Osteoarthritis; Quality of Life; Total Knee Arthroplasty; Total Hip Arthroplasty

1. Introduction

Osteoarthritis is considered as non-inflammatory arthropathy due to absence of neutrophils in synovial fluid. It is a degenerative joint disease known as “wear and tear” arthritis. With osteoarthritis, the cartilage within a join begins to break down and the underlying bone begins to change. [1] Osteoarthritis is the most prominent articular disease and the primary source of persistent disability, being one of the most common conditions leading to disability, particularly in the elderly population. [2] Usually, it impacts the knees, hips, hands, spine, and feet. [3] Joint pain, edema, and stiffness are a few examples of inflammatory component clinical manifestations. Chondrocytes are triggered in osteoarthritis through exposure to aberrant environmental insults including high magnitude mechanical stress, inflammatory cytokines, or changed levels or organizations of matrix protein, including breakdown products. [4]

The US National Health Interview Survey analyzed from 2003 to 2005 revealed that the prevalence of osteoarthritis ranged between 12,3-21,6%. [3] Knee osteoarthritis has the highest occurrence rate and shows up at the earliest age, especially in younger age groups of obese women. [5] Females over 55, particularly whom have menopause, tend to suffer severe osteoarthritis. [6] Compared to the general population, those with osteoarthritis have a greater risk of dying (OR 1.54). A few significant risk factors include the presence of a walking disability and comorbid diseases like diabetes, cancer, cardiovascular disease, and diabetes. [5]

Skeletal manifestations include a wide variety of medical and demographic data, as well as age, sex, body mass index, difficulty walking down stairs, palpable effusion, fixed-flexion deformity, and restricted flexion range of motion. Crepitus was a skeletal manifestation that correctly predicted knee OA with a sensitivity of 94% and specificity of 93%. [7] Conventional radiography, which is not sensitive enough and has a number of

limitations, is used to evaluate the relationship between joint lesions and discomfort. [8] The different relationship between joint space narrowing and knee pain may be partly explained by a biomechanical component that might turn an osteoarthritis with no symptoms on radiographic examination into a symptomatic condition. [9]

2. Prevalence and incidence of osteoarthritis

Due to population aging and the increase of obesity or overweight in the general population, there are more persons who are impacted by symptomatic knee osteoarthritis. [10] The prevalence of symptomatic knee osteoarthritis was substantially greater in rural than in urban or suburban areas. [11] Diagnosis of knee osteoarthritis and severity of disease was made based on Kellgren-Lawrence radiographic grade ≥ 2, severe radiographic knee as 3 and 4, and symptomatic knee osteoarthritis as knee symptoms in a knee with radiographic osteoarthritis. [4] The Kellgren-Lawrence grading system evaluates cysts, sclerosis, joint space loss, and osteophytes. [12] Hip osteoarthritis is less common than knee. The growing age of the population in developed and developing countries as well as increased risk factors for osteoarthritis, particularly obesity and a sedentary lifestyle suggest upcoming increased number of hip or knee osteoarthritis over the coming decades. The prevalence of radiographic hand osteoarthritis varies from 27-80%. Symptomatic hand osteoarthritis is far less common. [13]

3. Etiology and risk factors

Numerous factors can cause osteoarthritis. Adolescent athletes have a higher risk to develop early osteoarthritis if they participate in sports, sustain a joint injury, are obese, or have a genetic predisposition to it. [5] Joint osteoarthritis is associated with a variety of factors, including older ages, female gender, overweight and obesity, knee injury, repetitive joint use, bone density, weak muscles, and joint laxity. A significant component of osteoarthritis is the utilization of mechanical forces to the joints. Compared to other risk variables, body mass index is the most adjustable. [15]

The greatest risk factor for osteoarthritis may be aging, which is probably triggered by a number of variables including oxidative damage, cartilage thinning, muscle atrophy, and a deterioration in proprioception. [16] Osteoarthritis development was associated to repetitive joint usage. Hip osteoarthritis was linked to prolonged lifting and standing, but knee osteoarthritis was more frequently seen in those whose occupations required squatting and kneeling. [17] Individuals whose occupations required more manual dexterity were more likely to have hand osteoarthritis. [3] For elderly people, prolonged squatting is a significant risk factor for tibiofemoral knee osteoarthritis. [18] More than two hours per day of squatting or kneeling at work drastically elevated the probability of moderate to severe radiographic knee osteoarthritis by a two-fold increase. Because surgical repair of the ACL improves joint stability without preventing knee osteoarthritis, 13% of cases of anterior cruciate ligament rupture result in early onset osteoarthritis of the knee after 10 to 15 years. [19] Knee osteoarthritis is 2.5 times more likely to develop in the future after meniscal surgery. In comparison to people with normal menisci, patients who undergo partial meniscectomy and reconstruction surgery are significantly more likely to develop radiographic signs of osteoarthritis. [20]

The risk of radiographic knee osteoarthritis increases in patients with metabolic syndrome, particularly obesity, but has less of an impact on progression. According to Silverwood et al. (2015), obesity defined as body mass index (BMI) > 30 kg/ m2 is significantly associated with knee osteoarthritis, whereas the relationship between overweight and knee osteoarthritis is lower but still significant. [21] The relationship between BMI and osteoarthritis of the knee is essentially linear, and the amount of time that increased joint loading or weight gain is also important. [22] The notion that obesity is also associated to hand

osteoarthritis shows that its effects might indeed be biomechanical but also have metabolic and inflammatory consequences throughout the body. [23] One study noted that the median level of high sensitive CRP in progressive knee osteoarthritis was higher than non-progressive disease, and that it was linked to functional disability, joint tenderness, pain, fatigue, overall severity, and depression in osteoarthritis. This suggests that inflammation may play a role in the development and progression of osteoarthritis. [24]

4. Total Knee or Hip Arthroplasty

Total knee arthroplasty (TKA) and total hip arthroplasty (THA) are the most common joint replacement procedures. [25] The management of disorders that did not respond well to conventional medical therapy has improved with the surgical replacement of the knee or hip joint with an artificial prosthesis. THA entails the surgical removal of the acetabular cartilage and subchondral bone as well as the head and proximal neck of the femur. These total hip arthroplasty components must be firmly bonded to the bone, either with polymethylmethacrylate cement or in more contemporary uncemented designs, in order to produce satisfactory results. The primary indication for this procedure is severe pain and the limitation in activities of daily living that the disease causes. The pain must be resistant to conservative treatments including NSAIDs, weight loss, activity restriction, and cane use. [26] For the treatment of chronic knee pain and impairment, TKA is regarded as an effective technique. Chronic knee pain, most commonly caused of osteoarthritis, has only affected a little by non surgical therapeutic intervention. Based on the outcomes of surgeon-based outcome instruments and survivorship analysis, TKA is commonly regarded as an efficient and effective end-stage surgical surgery for reducing chronic knee pain and functional handicap. [27]

5. Factors Predicting Quality of Life After TKA/THA

The degree to which patients can perform activities of daily living is strongly related to how satisfied they are with the results of their surgery. Activities that are correlated with a patient's preoperative expectations include walking and standing, moving sideways, crouching, and climbing up and down stairs. [28] A prospective study by Bruyère et al. (2012) evaluated 49 consecutive patients' health quality of life (HRQOL) over the course of seven years. The Western Ontario and McMaster Universities Osteoarthritis Index was used to measure specific HRQOL, while the short-form (SF-36) was used to assess general HRQOL (WOMAC). Out of 39 participants, 56.4% had hip replacement surgery and the remaining 43.6% had knee replacement surgery. The short-term improvements in HRQOL after surgery are at least maintained for a 7-year follow-up period. [29] At 36 months following TKA, HRQOL considerably improved in individuals with severe osteoarthritis, especially in the pain component. Postoperative WOMAC ratings were adversely affected by lower preoperative WOMAC scores, chronic pain unrelated to knee osteoarthritis, and severe obesity. This disease-specific questionnaire may aid in identifying individuals who are more likely to experience undesirable outcomes following surgery. [30] After adjustment for age and sex ($p<0.005$), QOL scores for the cohort of 10 years were substantially lower compared to those for the reference population. Living alone, substantial amount of comorbidities, a high mean age at surgery, low QOL scores prior to surgery, low QOL scores at follow-up, and unfavorable environmental conditions were all related with low QOL. [31] Numerous comorbid problems were discovered in a 2003 study by Nilsdotter et al. that were unrelated to functional status following arthroplasty. [32]. Another study determined that a low WOMAC function score was associated to poor mental health, obesity, and the presence of at least one geriatric condition (visual impairment, falls, incontinence, or impaired balance). [33] A study conducted by Norman Taylor et al., (1996) showed a return to normality in 39% patients after THA and in 32% patients after TKA. [34]

Comorbidities and poor preoperative quality of life significantly affect quality of life scores. [34] A few patient-related characteristics, including age, gender, excessive weight and obesity, indication, ethnicity, patients' psychological status, and comorbidities, can have an impact on quality of life. Obese patients typically experience significant functional improvement following TKA compared to patients with normal BMI. [29] Other study mentioned some factors that associated negatively is obesity, advanced age, comorbidities, persistence of pain after the procedure and a lengthy wait for surgery. [36] This study is consistent with a study by Papakostidou et al. (2012), who found that TKA patients' quality of life significantly improved despite having less-than-optimal physical function in the first six weeks following surgery, with clear gender disparities in QOL throughout the same time period. [37] To prevent impingement with soft tissue caused by implant overhang, which causes pain and unhappiness, a rigorous surgical approach and correctly sized implant are needed. The improved cognitive outcomes of THA can be partially attributed to the hip joint's depth, presence of a large muscle envelope, and simple kinematics. Regular follow-up consultations with the surgeon are required along with medical care to lessen pain and therapy to regain flexion. [24]

6. Conclusion

Patients with osteoarthritis who did not respond well to conventional medical treatment have been considered candidates for total knee or total hip arthroplasty. After surgery, a patient's satisfaction is contingent on their ability to perform activities of daily life, such as climbing and descending stairs, getting in and out of a car, walking and standing, stooping, and crouching. Health-related quality of life (HRQOL) has been shown in numerous studies to significantly improve following TKA/THA; however, there are some factors that can affect HRQOL, including comorbidities, preoperative QOL, age, gender, excess weight and obesity, indication, ethnicity, and psychological health of the patient. As a result, it is impossible to predict whether a single stage of surgery will have a meaningful result. The entire process requires close follow-up. It is necessary to perform close follow up throughout the years until the maximum functional outcome achieves.

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