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SURGICAL CANDIDACY OR WEIGHT STIGMA? THE DILEMMA OF OBESE PATIENTS IN ORTHOPAEDICS – A SYSTEMATIC REVIEW OF THE LITERATURE

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ABSTRACT

Introduction: Obesity (BMI ≥ 30) is a rapidly growing global health issue with significant implications for orthopedic health. It contributes to joint degeneration and complicates surgical treatment through both biomechanical strain and systemic inflammation, particularly affecting the hip, knee, and upper extremities.
Aim: This systematic review aims to evaluate the impact of obesity on orthopedic disorders and surgical outcomes and to assess the validity of excluding patients from surgery based solely on BMI criteria.
State of Knowledge: Obesity significantly increases the risk of postoperative complications, including infections, reoperations, technical difficulties, and inferior functional recovery. Hip and knee arthroplasties in obese patients often yield less optimal results compared to non-obese individuals, though the overall benefit remains considerable. In the upper limbs, obesity is linked to poorer outcomes in rotator cuff repair and higher incidence of compression neuropathies. Despite these challenges, many obese patients report substantial improvements post-surgery. Denying surgery based solely on BMI is not consistently supported by current evidence and may exacerbate health inequalities. Bariatric surgery shows promise in mitigating some orthopedic complications and may improve outcomes.
Conclusions: Obesity adversely affects surgical outcomes in orthopedics, but BMI should not be the sole determinant in surgical eligibility. A more individualized, evidence-based approach—emphasizing preoperative weight management and equitable access—is essential for optimal care and outcomes.

KEYWORDS

Obesity, Surgery, Knee Arthroplasty, Hip, Upper Extremity, Orthopedic

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Introduction.

Obesity is defined as a body mass index (BMI) ≥ 30. Obesity is further classified into different classes based on BMI, such as Class 1 (BMI 30-34.9), Class 2 (BMI 35-39.9), and Class 3 (BMI 40 or greater), with higher classes indicating greater health risks. This is a serious problem, on a growing global scale [17].

In 2024, an estimated 35 million children under the age of 5 years were overweight. Over 390 million children and adolescents aged 5–19 years were overweight in 2022. About 16% of adults aged 18 years and older worldwide were obese in 2022. The worldwide prevalence of obesity more than doubled between 1990 and 2022 [27]. This disease contributes to a major share of health-care expenditures and generate additional economic costs through loss of worker productivity, increased disability, and premature loss of life [17]. Obesity is a known risk factor for the development of cardiovascular disease, hypertension, type 2 diabetes mellitus and mental health issues and various forms of cancer [26]. Obesity accelerates the development of osteoarthritis of the knee and hip by exerting deleterious effects on joints through both biomechanical and also systemic inflammatory changes. This results in inflammation and degeneration, which can cause pain, stiffness, and difficulty moving. Many obese individuals suffer from joint pain. Joint pain severity increases with the increase in BMI [1]. BMI reduction range of 6.2-14.7 kg/m^2 was found to be associated with knee and back pain relief in 5-100% of obese patients and reduced pain severity in 31-94% of patients with other joints [22]. Several studies have demonstrated that obese patients are at an increased risk of postoperative intensive care unit admission, pulmonary complications such as extubation failure, pneumonia, atelectasis, pulmonary embolism, technical difficulties including prolonged operating time and higher likelihood of conversion from minimally invasive to open surgery, and surgical site infections [13]. Obesity is a real concern for orthopedic surgeons, as it affects bones and soft tissues at the biomechanical and biochemical levels [15]. The purpose of this article is to review the literature and summarize the impact of obesity on the on surgical outcomes and orthopedic disorders.

Methods

Relevant literature on impact of obesity in surgical outcomes and orthopedic disorders was identified using a comprehensive search of Pubmed, Web of Science, Google Scholar, and Springer Link. Preference was given to recently published articles to ensure relevance to modern-day practice. We focused on meta-analyses, systematic reviews and randomized controlled trials. A total of over 100 records were retrieved.

Including criteria were studies that:

- evaluated the relationship between obesity and orthopedic disorders and surgical outcomes,
- investigated the mechanism underlying joints problems, patient complaints, the course of surgery and postoperative complications,
- focused on adult populations.

Exclusion criteria included pediatric population and diseases unrelated to obesity.

Key terms such as"obesity", "joint pain", "orthopedic surgery""surgical outcome""hip""knee""upper limb" was utilized during the search process to optimize article retrieval.

Literature review

1. Obesity in hip surgery

Obesity is linked to poorer clinical outcomes following hip arthroscopy. A study utilizing the Statewide Planning and Research Cooperative System (SPARCS) database, which included 3, 957 patients from New York, found that individuals with obesity were more than five times as likely to require conversion to total hip arthroplasty (THA) compared to non-obese patients [8]. Performing hip arthroscopy in obese individuals also poses greater technical challenges, particularly regarding patient positioning and portal access, which increases the likelihood of surgical errors [2].

Moreover, obese patients consistently report significantly lower scores on patient-reported outcome measures (PROMs) after undergoing hip arthroscopy than their non-obese counterparts. The rates of conversion to THA and postoperative complications were found to be 2.4 and 3.2 times higher, respectively, among the obese population. Gaining a deeper understanding of how obesity affects surgical outcomes could help refine surgical indications and enable patients to evaluate their individual risks more accurately [10].

As the number of obese individuals affected by osteoarthritis continues to grow, the demand for THA procedures among this population is also increasing rapidly. While total hip arthroplasty generally results in substantial pain relief and improved quality of life regardless of BMI, obese patients often do not attain the same level of physical function during follow-up as patients with normal weight [23]. A significant issue is the exclusion of overweight and obese individuals from surgical consideration. Many candidates for hip arthroplasty are not only obese but also physically inactive and affected by multiple chronic conditions — a problem that is becoming more widespread globally. Existing literature on the effects of obesity on surgical outcomes and clinical guidelines appears to contradict the current commissioning policies for hip and knee arthroplasty in many regions of the UK, especially concerning obese (but not morbidly obese) patients. Individuals who are denied surgery due to their weight or BMI often experience feelings of abandonment, worsening physical and mental symptoms, and uncertainty about where to seek appropriate care [14]. Encouraging weight reduction prior to arthroplasty could not only help lower surgical risks but may also delay or even eliminate the need for joint replacement in some cases [7].

The prevalence of obesity and morbid obesity among patients undergoing primary THA and total knee arthroplasty (TKA) is projected to rise substantially — by 2030, over 55% of primary THA and 69% of primary TKA patients may be obese or morbidly obese. As this trend continues, the incidence of both aseptic and septic revision surgeries is expected to increase accordingly. Aseptic revisions, including those due to loosening, instability, and implant failure, are anticipated to account for a substantial portion of this burden [20]. Obese patients also face elevated risks of postoperative complications and the need for further revisions following aseptic revision TKA and THA. Class II and morbid obesity categories have shown the most pronounced growth among patients undergoing revision procedures. By 2029, it is estimated that nearly 49% of aseptic revision THA and 77% of aseptic revision TKA cases will involve individuals with obesity or morbid obesity. There is a pressing need for resources and strategies aimed at mitigating complications in this increasingly affected patient group [4].

2. Obesity in knee surgery

Arthroscopic anterior cruciate ligament reconstruction (ACLR) is a safe, effective, and common method for ACL injury repair that can restore knee joint function and stability. Infections are the most common complication following ACL reconstruction surgery, although they remain relatively rare overall. Obesity has been shown to negatively impact ACL reconstruction outcomes. Strong evidence investigated the association of obesity (BMI >30 kg/m²) with surgical site infections. The meta-analysis showed that obesity was associated with an 82% increase in the odds of surgical site infections (OR 1.82, 95% CI 1.30 to 2.55, p=0.0005) [30]. Additionally, they may experience reduced postoperative knee function, slower rehabilitation progress, and a higher likelihood of graft failure. These factors highlight the importance of preoperative risk assessment and targeted interventions to optimize outcomes in obese patients undergoing ACL reconstruction.

The treatment algorithm for multiple ligament knee injury (MLKI) is complex and requires numerous decision-making steps and are often complicated by additional pathology, such as concomitant neurovascular injury, meniscus or cartilage damage, bony fracture, and/or arthrofibrosis [6]. Given the high prevalence of obesity around the world, orthopaedic surgeons have frequently investigated the effect of obesity on outcomes after surgery.

In one study, outcomes of ultralow velocity (ULV) knee dislocations, the authors showed that ULV-MLKI occurred in patients with greater BMI (49.1 vs. 34.1 kg/m^2), and were associated with higher rates of neurovascular injury, wound infection, deep vein thrombosis (DVT), vascular claudication, and reoperation. It was postulated that an elevated BMI might significantly increase forces sustained by the knee, thus causing the increased morbidity associated with these seemingly innocuous mechanisms of injury. Altogether, it is worth investigating if obesity may be a poor prognostic factor for peri- and postoperative outcomes after MLK surgery [25].

Obese patients undergoing surgery for an MLKI had longer operative times, greater rates of wound infection requiring irrigation and debridement, and lower rates of arthrofibrosis. Surgeons may consider these results when counseling patients on their postoperative course and risk for complications [11].

The numbers of people who will need a total knee replacement in their lifetime are likely to rise as the population ages. Some groups of people may benefit less than others from surgery. Previous studies have suggested that those who are older, or a very high body mass index (BMI) may have worse outcomes. UK guidance states that GPs can refer people with osteoarthritis and a high BMI for joint replacement surgery. Despite this, some areas have a local rule that prevents GPs from making these referrals. In one study only few people in any BMI group needed repeat surgery within 10 years the risk was raised in the obesity class I and II groups compared with normal weight, but it remained well within accepted levels. Deaths within 90 days of surgery were rare and they were highest in the underweight group and lowest in the overweight group [19].

Obese individuals are frequently disqualified from undergoing total knee arthroplasty (TKA) solely due to their high body mass index (BMI), a practice that may lead to serious psychological and physical consequences. Many patients report feelings of rejection, frustration, and social exclusion because of being denied surgery, which can exacerbate both their physical limitations and mental health challenges. Importantly, current evidence does not consistently support the exclusion of patients from TKA based only on BMI, as obese individuals can still experience significant improvements in pain and function following the procedure. Thus, such restrictive policies may be unjustified and counterproductive.

Obesity, a major public health issue in Canada, is associated with numerous health complications, including degenerative joint disease. Patients with a BMI greater than 50 are at increased risk of complications such as joint failure and report lower postoperative satisfaction compared to normal-weight individuals. However, data on how best to manage these patients remain limited and conflicting. Some studies suggest that bariatric surgery prior to TKA may reduce complication rates, operative time, and improve outcomes, while others point to higher risks of infection and revision surgery. Recent findings indicate that patients who undergo laparoscopic sleeve gastrectomy (LSG) prior to TKA not only achieve greater weight loss but also show no increase in postoperative knee complications compared to those who have knee arthroplasty first [16]. Moreover, bariatric surgery before TKA has been associated with a lower incidence of venous thromboembolism (VTE), stroke, and periprosthetic fractures. These findings support considering bariatric surgery as a preparatory step for TKA, particularly in patients at elevated risk of such complications. In some cases, significant knee pain relief following LSG may even eliminate the need for joint replacement altogether. This strategy could reduce surgical risks and help alleviate the burden of long wait times for TKA, especially among patients with a high BMI [16, 18].

Osteoarthritis is a major health concern affecting many individuals over 65 years of age. Obesity is a well-established risk factor for its development. Conservative treatments such as weight loss and physical activity are

strongly supported by evidence. However, obese patients with osteoarthritis are more likely to eventually require surgical treatment. Weight loss, especially when combined with exercise and professional support, can significantly reduce symptoms, and potentially delay or eliminate the need for joint replacement. Despite this, as has been highlighted earlier, BMI is often used in the UK as a criterion to restrict access to surgery, even though evidence suggests many obese patients benefit from arthroplasty and that denying surgery based solely on BMI may not be justified. While morbidly obese patients (BMI ≥ 40) face higher surgical risks, most struggle to lose weight independently when denied surgery, and support systems are often insufficient [14, 3].

3. Obesity in upper extremity surgery

Rotator cuff tears are a common shoulder condition that can lead to pain and reduced function, with prevalence increasing with age—affecting over 25% of adults. Surgical repair, particularly via arthroscopy, is often performed to alleviate symptoms and restore shoulder mobility, and generally yields satisfactory outcomes. However, retear rates after surgery range from 9% to 36%, and failed repairs are linked to poor functional recovery and limited mobility. Several risk factors contribute to retear and worse post-operative outcomes, including advanced age, osteoporosis, fatty muscle infiltration, diabetes, and notably, obesity. Obesity plays a particularly significant role, as it negatively impacts tissue healing and is associated with poorer functional results, making it a key concern in rotator cuff repair prognosis. The meta-analysis showed that obesity significantly increased the risk of postoperative retear, probability of reoperation, and incidence of complications and led to worse postoperative pain and functional scores. However, obesity did not affect the duration of surgery and did not appear to affect postoperative ER of the shoulder significantly [28].

Obesity and upper extremity compression neuropathies (UECN), particularly carpal tunnel syndrome, are increasingly common and negatively impact both physical and mental health. While obesity is considered a risk factor for UECN—possibly due to metabolic or mechanical factors—its precise role remains unclear, and other types of compression neuropathies have not been well studied in this context. Bariatric surgery is known to produce sustained weight loss and health benefits, but its impact on UECN has not been thoroughly explored [21, 12].

In one study, it was found that patients with obesity had significantly higher rates and odds of developing upper extremity compression neuropathies (UECN), particularly carpal tunnel syndrome, compared to non-obese individuals. Patients with obesity who underwent bariatric surgery had lower rates and odds of developing UECN than those who did not receive surgical intervention, suggesting a potential protective effect. The findings support the theory that mechanical factors, such as increased intracarpal pressure from adipose tissue, may play a greater role than systemic metabolic factors in the development of UECN, especially in younger patients. Although the reduction in risk after bariatric surgery was modest, this study highlights an additional benefit of surgical weight loss and contributes to understanding the link between obesity and nerve compression syndromes [9].

Obesity significantly increases the risk of upper extremity fractures, particularly humerus fractures, due to both mechanical and physiological factors. Obese individuals are more prone to falls and less able to protect themselves during a fall, often landing in ways that increase fracture risk. Additionally, obesity is associated with lower levels of vitamin D and higher levels of adiponectin, both of which negatively affect bone health. Interestingly, significant weight loss may also raise fracture risk by reducing bone density previously maintained by carrying excess weight. These findings highlight the complex relationship between obesity, bone strength, and injury risk in the upper limb [24].

While early research primarily associated obesity with degenerative joint disease in weight-bearing joints like the hips and knees—due to increased mechanical load—more recent studies have demonstrated a clear link between obesity and degeneration in non–weight-bearing joints, such as the hand and wrist. This shift in understanding suggests that the adverse effects of obesity on joint health are not limited to biomechanical stress alone. Instead, systemic metabolic factors—such as chronic inflammation, insulin resistance, and adipokine dysregulation—are increasingly recognized as key contributors to cartilage breakdown and joint degeneration. For example, adipose tissue secretes cytokines like adiponectin and leptin, which can promote low-grade systemic inflammation and negatively impact joint tissues even in joints not subjected to high physical load. These findings highlight the role of obesity as a systemic disease that affects musculoskeletal health more broadly than previously believed [24, 29, 5].

Conclusions

Obesity significantly worsens outcomes in orthopedic surgery, increasing the risk of complications such as infections, reoperations, and poorer functional recovery—particularly in hip, knee, and shoulder procedures. It contributes to joint degeneration through both mechanical overload and systemic inflammation, not only in weight-bearing joints but also in the upper extremities. Despite the higher risks, many obese patients benefit from orthopedic surgeries, and denying them access based solely on BMI is not consistently supported by evidence. Bariatric surgery may reduce some of the orthopedic complications associated with obesity and improve overall surgical outcomes. Effective preoperative weight management and individualized care are key to optimizing results. Health policies should move away from BMI-based exclusions and support comprehensive, evidence-based approaches to treating obese patients with joint disorders.

Disclosure

Author's contribution:

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