

# Obesity in Elective Foot and Ankle Surgery



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## KEYWORDS

- Obesity • Elective surgery • Foot and ankle surgery • Total ankle replacements
- Body mass index • Forefoot surgery • Ankle arthroscopy

## KEY POINTS

- The prevalence of obesity is increasing at a staggering rate. Obesity is related to many comorbidities, including heart disease, diabetes, metabolic syndrome, and musculoskeletal disorders. Caring for obese patients is proving to be a significant financial burden to our health care dollars.
- Obese patients have been found to have higher rates of foot and ankle pain, likely because of a complex interplay between alterations in gait, increased biomechanical loads, and metabolic effects of excess adipose tissue.
- There is conflicting evidence as to whether obese patients are at increased risk of complications following total ankle replacements, ankle arthroscopy, flatfoot reconstruction, and forefoot surgery.
- It is important to counsel obese patients about weight loss and other modifiable comorbid conditions before elective surgical intervention.

## INTRODUCTION

The waistlines of Americans are expanding at an alarming rate. By now it is a well-known fact that we are in the midst of an obesity epidemic. Epidemic is a powerful word, but it perfectly encapsulates the extensiveness of the problem. Obesity has wide-ranging effects with serious health and economic consequences. As society has become more technologically advanced, we have begun to live more sedentary lifestyles. We are at a point now where much of our needs are met with the touch of a button. Shopping, learning, working, entertainment, and communication can be addressed in the seated position with our mobile or laptop devices. Multiple studies highlight that children and adolescents are becoming increasingly less active, with most not participating in the recommended 1 hour of daily physical activity.<sup>1</sup> It only makes sense that we would see these rising rates of obesity. In 1960, 16% of women and 12% of

men were considered obese.<sup>2</sup> By 2008, the vast majority, more than 68% of US adults were overweight and 35% of women and 32% of men were considered obese.<sup>3</sup> That was 10 years ago, so rest assured the rates are even higher at this point because the trend is only increasing. In fact, if the present trend continues at this rate, by 2030, 86% of adults will be overweight and more than 50% will be obese.<sup>4</sup> These staggering numbers are a growing drain to our health care dollars as well. Obesity carries with it a significant burden of disease. Diabetes, high blood pressure, coronary artery disease, stroke, high cholesterol, asthma, arthritis, and overall poor health status are associated with being overweight.<sup>5,6</sup> Quality-adjusted life-years (QALYs) is used as a generic measurement tool for morbidity and mortality associated with a disease process. It is used to assess different diseases and compare them so that the degree to which they affect overall health can be quantified. From 1993 to 2008, the average QALYs

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loss increased 127% for obesity, making it an even greater contributor to morbidity than smoking.<sup>7,8</sup> We are now spending in excess of 100 billion dollars each year on health care resources that are attributed to obesity.<sup>6</sup> That number is expected to double every decade, and by 2030, 1 in every 6 health care dollar has been projected toward an obesity-related health complication.<sup>4</sup>

Presently, the vast majority of obesity-related orthopedic literature has been derived from hip and knee arthroplasty studies. Within total joint arthroplasty, it has been well established that obesity increases perioperative complications and leads to higher rates of revisions and reoperations.<sup>9–17</sup> It has only been over the last few years that publications have highlighted the effects of obesity on foot and ankle surgery. The purpose of this article is to provide a comprehensive review of the literature as it pertains to obesity within foot and ankle surgery, with hopes of improving surgeon decision making, mitigating risk, and providing better outcomes for patients. A better understanding of the effects of obesity also allows for improved prognostic performance, which plays a substantial role in patient education, especially when counseling about potential surgical risks and benefits. Increased patient awareness should only aid the patient and surgeon if complications do arise. If realistic expectations have been set beforehand, then each side should be better equipped to deal with difficulties that will invariably arise. Areas of concern for obese patients undergoing foot and ankle surgery may also be identified and it may be determined if there are specific pathologic conditions where the current literature is deficient, with the goal of establishing areas of future research.

## DEFINING OBESITY

Obesity has been defined by the World Health Organization as a body mass index (BMI) greater than 30. BMI is a calculation based on a person's weight and height. This scale is used as a screening tool given its ease of collection and cost-effectiveness. It is also the metric used by most research studies when discussing obesity, making it very easy for comparative data analysis. The use of BMI has been criticized though because it may falsely identify muscular individuals as obese, given that it cannot distinguish the weight of muscle versus that of fat. It also does not take into account the distribution of adipose tissue. Waist circumference and measurement of the percentage of body fat have

also been used to define obesity but to a lesser extent.

## BIOMECHANICAL AND METABOLIC EFFECT OF OBESITY

Both biomechanical and metabolic mechanisms have been hypothesized to contribute to the high rates of orthopedic pathologic condition in obese patients. The foot and ankle provide the base of support during standing and walking, so intuitively, it makes sense from a biomechanical standpoint that obesity would have a significant effect. Traditional views were that excess weight places additional stress across bones and soft tissues and will eventually lead to "wear and tear," putting these patients at increased risk for arthritis, tendonitis, and bursitis. These injuries are often colloquially termed "overuse injuries," and it seems logical to assume that obese patients would suffer more frequently from these conditions. Frey and Zamora<sup>18</sup> surveyed 1411 subjects and found that patients with a BMI greater than 25 were more likely to have tendinitis within the foot and ankle compared with the control group (BMI <25). Riddle and colleagues<sup>19</sup> found that patients with BMI greater than 30 were at increased risk of developing plantar fasciitis. To make matters worse, Weil<sup>20</sup> found that patients with a higher BMI had less success with typical conservative treatments for Achilles tendinopathy, plantar fasciitis, and adult-onset posterior tibial tendon dysfunction. These treatment failures may be the result of decreased healing potential, as related to metabolic factors discussed later, or difficulty with common conservative treatment methods, such as body habitus, limiting the effectiveness of brace-wear or therapeutic exercises.

Obese patients also have more foot and ankle pain in general compared with normal weight subjects.<sup>21–23</sup> Mickle and Steele<sup>21</sup> looked at more than 300 subjects divided into 3 groups based on weight: normal, overweight, and obese. Foot pain was present in 40% of the obese compared with 23% of the overweight and 11% of the normal weight. They hypothesized these findings were secondary to changes in the normal biomechanics of the foot and ankle during standing and walking. At baseline, obese subjects have significant reductions in gait speed, resulting in increased total contact time with the ground during stance phase and increased peak pressure across the midfoot. Excessive biomechanical loading with a foot that is in contact with the ground longer leads

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