

## Position Statement

# The Impact of Obesity on Bone and Joint Health

*This Position Statement was developed as an educational tool based on the opinion of the authors. It is not a product of a systematic review. Readers are encouraged to consider the information presented and reach their own conclusions.*

According to the Centers for Disease Control and Prevention (CDC), “overweight” and “obesity” are labels for weight ranges that exceed what is generally considered healthy for a given height.

**How to Calculate Waist-to-Height Ratio (WHtR)**

$$WHtR = \frac{\text{Waist (in.)}}{\text{Height (in.)}}$$

| Weight Status | Men            | Women          |
|---------------|----------------|----------------|
| Underweight   | Less than 43%  | Less than 42%  |
| Normal        | 43-52%         | 43-48%         |
| Overweight    | 53-62%         | 49-57%         |
| Obese         | 63% or greater | 58% or greater |

**How to Calculate Body Mass Index (BMI)**

$$BMI = \frac{\text{Weight (lb.)}}{\text{Height}^2 (\text{in.})} \times 703$$

| BMI Ranges   | Weight Status  |
|--------------|----------------|
| 18.4 or less | Underweight    |
| 18.5 to 24.9 | Normal         |
| 25.0 to 29.9 | Overweight     |
| 30.0 to 39.9 | Obese          |
| 40.0 to 49.9 | Morbidly obese |
| 50.0 or more | Super obese    |

***The American Academy of Orthopaedic Surgeons (AAOS) believes that orthopaedic surgeons and patients should maintain an open dialogue about the detrimental effects of obesity on musculoskeletal health, and the increased risks of obesity on orthopaedic pre- and postsurgical complications and inferior outcomes.***

Obesity—an increasingly common condition among patients with orthopaedic conditions—affects individual patient care, the healthcare system and nearly every organ in the body. It is one of the most common diseases that adversely affect bone and joint health.

More than two-thirds of adults in the United States are overweight<sup>1</sup>, and one in three adults<sup>2</sup> have obesity. The percentage of adults with obesity has more than doubled over the past 30 years—from 15 percent in 1980 to 35 percent in 2010.<sup>3</sup> Approximately 17 percent<sup>4</sup> of children have obesity, triple the rate from just one generation ago. At the current rate of increase, by 2030, an estimated 44 percent<sup>5</sup> of American adults will be diagnosed with the disease.

The overall direct and indirect costs of obesity-related healthcare in the United States exceed \$215 billion per year<sup>6</sup>. However, obesity is not only a domestic health challenge. It also is a global health challenge. In 2008, the World Health Organization estimated that, worldwide, approximately 500 million<sup>7</sup> adults age 20 and older are obese while 1.5 billion are overweight. A November 2014 study from the McKinsey Global Institute reported that the global cost of obesity-related healthcare is \$2 trillion per year.

## The Impact of Weight on Bone, Joint, and Overall Health Care

Obesity frequently contributes to soft tissue damage and osteoarthritis—a progressive wear-and-tear disease of the joints. The impact of obesity is especially felt in osteoarthritis of the hip and knee joints.

Every pound of body weight places four to six pounds of pressure on each knee joint. Individuals with obesity are 20 times more likely to need a knee replacement than those who are not overweight. From 2002 to 2009, the number of total knee arthroplasty (TKA) procedures performed on patients with obesity doubled.

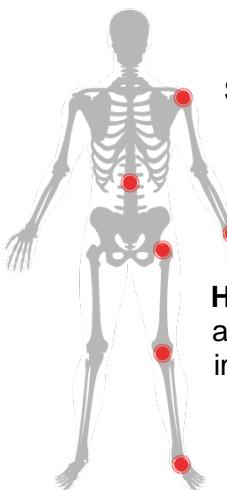
The detrimental effects of obesity on surgical outcome results and complication rates are well-documented in medical literature. These effects include higher rates of infection and prosthesis failure/loosening of the implant when compared to patients of normal weight.

In addition to contributing to arthritis and other musculoskeletal health issues, obesity also is linked to diabetes, heart disease, sleep apnea, liver disease, pancreatitis, certain tumors and cancers, and psychiatric disorders. Obesity, in the absence of these conditions, does not appear to significantly increase the risk of orthopaedic pre- and postoperative complications. However, in combination with any of these conditions, obesity can adversely affect orthopaedic surgical outcomes.

Pre- and postoperative complications may include wound healing, infections, blood clots, blood loss, and dislocation of the replacement joint, especially in the hip.

### FIGURE 1

Operative time and length of hospital stay for surgeries tend to increase among patients as BMI increased. Compared to patients of normal weight, patients with obesity may also experience the following:



**Shoulder:** Lower functional outcomes following rotator cuff injuries and repair.

**Spine:** Higher rates of hardware failure, complications, and infections.

**Hand:** A direct decrease in hand grip strength.

**Hip and Knee:** Significantly higher rates of complication and hardware failure after total joint arthroplasty (TJA). However, postoperative function greatly improves after surgery in individuals with obesity.

**Foot and Ankle:** Excess weight can cause chronic overuse disorders of the foot and ankle like “flat foot,” which can lead to plantar fasciitis, Achilles tendonitis, and foot and ankle pain.

## Sports

Individuals with obesity participating in fitness activities are at greater risk than patients of normal weight for musculoskeletal injuries like fractures in the lower extremities, meniscal tears, rotator cuff tendonitis, heel bone fractures, and ankle injuries. Low-energy falls can lead to spontaneous knee dislocations, which could lead to other complications. Ankle fractures are more frequent and more severe in obese patients than in normal-weight individuals.

## Trauma

Adequate imaging of patients in the trauma setting with above-normal BMI is difficult. Patients with obesity who sustain injury in motor vehicle collisions or other blunt trauma are more likely to have an increased risk for medical complications, longer hospital stays, increased mortality rates and a higher likelihood of multi-organ failure. In addition, these patients have a higher risk of hardware failure, experience slower wound healing after surgical repair of a fracture, and deep venous thrombosis.

Compared to normal-weight pediatric trauma patients, pediatric trauma patients with obesity are more likely to sustain fractures in areas of the bone near a joint (distal). This includes the wrist (distal radius), shinbone (distal tibia), and thighbone (distal femur).

Children with obesity have significantly increased odds of sustaining lower extremity injuries and pain compared to normal weight children.

Although complication rates increase as the BMI increases, orthopaedic surgical interventions can offer patients with obesity significant bone and joint pain relief and function improvement.

***The AAOS recommends patients with morbid obesity (BMI of 40 or higher) take the following steps prior to undergoing elective orthopaedic surgery:***

- ***Discuss with their physician(s) and consider carefully the impact of their weight on possible complications and results after surgery.***
- ***Speak with their physician(s) about resources available to help them lose weight before surgery. A delay in surgery is not a judgmental statement, but rather a risk reduction tool to avoid potentially serious and life-changing complications.***
- ***If it is in the patient's best interest, consider delaying certain surgeries, such as joint replacement, where losing weight could improve the outcome of treatment, to provide time to take interventions for obesity.***
- ***Participate in a weight-loss program before undergoing TJA or replacement.***
- ***Develop a plan to manage comorbidities.***
- ***Assess nutritional status and address any deficiencies. Patients with obesity have a high incidence of altered nutritional status, and poor nutrition may contribute to comorbidities such as diabetes, in which blood sugar should be brought to reasonable levels to reduce risk.***
- ***Talk about rehabilitation protocols with their physicians and determine their ability and commitment level to follow them.***
- ***Consider signing a commitment letter to lose weight, to exercise and eat better to demonstrate responsibility for personal health. Even after surgery, patients must make an ongoing commitment to keep weight down for their overall health and for issues such as the longevity of TKAs.***

**References:**

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