Obesity is an epidemic across both the developed and developing nations that is possibly the most important current public health factor affecting the morbidity and mortality of the global population. Obese patients have the potential to pose several challenges for arthroplasty surgeons from the standpoint of the influence obesity has on osteoarthritic symptoms, their peri-operative medical management, the increased intra-operative technical demands on the surgeon, the intra- and post-operative complications, the long term outcomes of total hip and knee arthroplasty. Also, there is no consensus on the role the arthroplasty surgeon should have in facilitating weight loss for these patients, nor whether obesity should affect the access to arthroplasty procedures.

Obesity has become one of the world’s leading public health concerns. Unfortunately, the prevalence and incidence is increasing globally. Obesity is most commonly defined on the basis of a person’s Body Mass Index (BMI). This is calculated by dividing a person’s weight in kilograms by their height in metres squared (kg/m²). According to World Health Organization (WHO) definitions, individuals who have a BMI of 25 to 29.9 are overweight. Obese individuals are those with a BMI greater than, or equal to 30. This category is then subdivided into three classes: Class I is a BMI of between 30 and 34.9; Class II is a BMI of between 35 and 39.9; and Class III is a BMI greater than, or equal to, 40. In addition to the traditional WHO class definitions, the medical and surgical literature has also further classified the severely obese into two groups. Patients with a BMI of 40 to 49.9 are commonly classified as morbidly obese, while those with a BMI greater than, or equal to, 50 are termed super obese.

In considering the North American population, over the past two decades, there has been approximately a 10% increase in the prevalence of obesity. In 2009, nearly 25% of men and women in Canada were obese, in comparison to approximately 33% of American men and 36% of American women. The greatest percentage increase were for women in the 20 to 39 years old demographic. The increasing rate of obesity, particularly in younger individuals, is of concern from the standpoint of individual and population health. The rising rates of obesity carries with it strains on the healthcare system with regards to the disease burden and its effects on patient morbidity and mortality. Obesity is an independent risk factor for several diseases. Obesity is currently the fifth leading cause of death and accounts for nearly half and one-quarter of the disease burden of diabetes and ischemic heart disease respectively. It is a factor in the development of numerous cancers including endometrial, breast and colon. It is also a significant risk factor for diabetes and musculoskeletal disorders, namely osteoarthritis. Of particular concern is the greater prevalence of childhood obesity; which translates into a higher chance of adult obesity, premature death and disability related to the medical risks. The direct annual health care costs in the United States resulting from obesity is approximately $200 billion.

Beyond North America, financially, obesity accounts for 2% to 7% of worldwide healthcare costs. Although there is a wide range in the percentage of overweight adults across the developed world, most countries have a prevalence of obese adults of between one-fifth and one-quarter of their populations. In the developing world, there is an estimated 35 million children under the age of 5 who are overweight or obese. This is in addition to a worldwide doubling since 1980 of overweight or obese adults to 1.5 billion people.

It has been well established that there are clear trends across the globe of increasing rates of obesity. When examining total hip and knee arthroplasties projections predict continued exponential annual increases over the next few decades. It has been estimated that the annual
number of total hip arthroplasties in the US will increase to 572 000 and total knee arthroplasty to 3 480 000 by 2030. The rate of revision total hip and knee arthroplasties are also projected to increase by 137% and 601% respectively over the same period.6

Obesity, in all likelihood, is a contributing factor to the increasing numbers of arthroplasties performed. Obesity affects the odds ratio of developing symptomatic hip, and especially, knee osteoarthritis. As the class of obesity increases, so does the relative risk of requiring a joint replacement. This peaks at a relative risk of approximately 32 times for a total knee arthroplasty relative to normal weight individuals and 8.5 times for total hip arthroplasty in Class III obese patients (Fig. 1).7 The pathophysiology of obesity and osteoarthritis has not been conclusively elucidated, however, it likely involves a mechanical mediation, biochemical mediation, or combination of the two.8 The demographics of obese patients differ from their normal weight counterparts. Morbidly obese patients are on average 10 and 13 years younger than normal weight patients undergoing primary total knee and hip arthroplasties respectively.9 The data regarding the rates of revision are less clear. Arthroplasty outcomes in younger patients are generally inferior to those of older patients. It could be inferred based on this that there will be an increased number of revisions in morbidly obese patients, however these patients also have a life expectancy that is approximately a decade shorter than normal weight individuals.

When considering the increasing rates of total joint arthroplasties and the increasing prevalence of obesity in the population, it can be extrapolated that arthroplasty surgeons will be faced with caring for an increasing number of obese patients. For the surgeon, obesity has implications for the medical management of the operative patient, technical intra-operative considerations, the outcomes following, and complications associated with total hip and knee arthroplasty. Most of the intra-operative complications are the result of a challenging exposure that is often the case in an obese patient. Obtaining an adequate exposure generally results in an increased operative time in morbidly obese patients. Several studies have identified a link between obesity and an increased blood loss and risk of transfusions.10-12 There are suggestions that the incidence of component malpositioning and nerve injury is more common in obese patients than their normal weight counterparts, as is the incidence of injuries such as medial collateral ligament (MCL) avulsions. These have been reported to occur in as many 8% of morbidly obese patients undergoing total knee arthroplasty.13

In the post-operative period there is an increased risk of complications. Most commonly, there is an increased risk of wound complications in morbidly obese patients.14,15 There is also an increased risk of infection as well as an increased odds ratio of 1.5 for every 5 point increase in BMI for a thromboembolic event.16 There is no consensus in the literature regarding the influence of obesity on other post-operative medical complications. That said, patients should be thoroughly reviewed and optimised in the pre-operative period to prepare for peri-operative medical challenges and to ensure factors such as careful diabetic management is carried out to minimise the role it may have in increasing post-operative complications.17

There is often the notion that osteoarthritis is a contributing factor in causing weight gain. The pain associated with osteoarthritic hips and knees limits a person’s activity causing weight gain from a decreased caloric expenditure. Although there is evidence to suggest that some patients lose weight, much of the research examining weight loss following total hip and knee arthroplasty indicates otherwise. Several studies have shown that there is a high correlation between pre- and post-operative weight.18,20 Overweight patients undergoing total joint arthroplasty, on average, gain approximately three kilograms after at least one year following surgery.18 When examining total knee arthroplasty patients divided into normal weight, overweight and obese, those patients who were heavier were more likely to be female, be younger at the time of surgery, and have a higher incidence of diabetes and cardiovascular disease. The majority of patients in the series maintained their weight within 5% of the pre-operative weight, 14% of people lost weight and 21% gained weight. Weight loss is more reliably seen in patients of advanced age.21

Arthroplasty surgeons will play a role in counseling patients regarding the management of their weight. Surgeons should be clear that arthroplasty should not be considered an adjunct to facilitate weight loss, with the possible exception of selected sub-groups. Pre-operative weight loss should be encouraged to arguably improve longevity and results of total joint arthroplasty, but more reliably and importantly, to improve general health and wellbeing. In the morbidly obese patients, depending on available resources, there may be a role in considering interventions such as bariatric surgery.
prior to proceeding with total joint arthroplasty to possibly delay or avoid the arthroplasty. If weight loss doesn’t adequately relieve the patient’s arthritic symptoms and they still require an arthroplasty, there is the benefit of an easier technical procedure and reduction in the chances of post-operative complications.

When considering the outcomes of total hip and knee arthroplasty in obese patients the literature it is clear that they derive significant benefit from the surgery. Obese patients tend to have lower pre-operative functional scores than normal weight patients. The same is also true regarding their post-operative scores across different validated tests. When considering the magnitude of improvement however, obese patients improve as much, or in some cases, more than matched normal-weight individuals.14,22,23 Regarding survivorship there is evidence to support that there are no differences in the survival of total hip arthroplasties in morbidly obese patients at ten years. When considering all cause revisions, septic causes as well, there are trends of a higher revision rate in total hip arthroplasty. Similarly, ten year outcome data for total knee arthroplasty show survivorship of greater than 90%. When compared considering all cause revisions, septic causes as well, there are trends of a higher revision rate in total hip arthroplasty. Similarly, ten year outcome data for total knee arthroplasty show survivorship of greater than 90%. When compared to patients, the literature it is clear that they derive significant benefit from the surgery. Obese patients tend to have lower pre-operative functional scores than normal weight patients. The same is also true regarding their post-operative scores across different validated tests. When considering the magnitude of improvement however, obese patients improve as much, or in some cases, more than matched normal-weight individuals.14,22,23 Regarding survivorship there is evidence to support that there are no differences in the survival of total hip arthroplasties in morbidly obese patients at ten years. When considering all cause revisions, septic causes as well, there are trends of a higher revision rate in total hip arthroplasty. Similarly, ten year outcome data for total knee arthroplasty show survivorship of greater than 90%. When compared to patients, the literature it is clear that they derive significant benefit from the surgery. Obese patients tend to have lower pre-operative functional scores than normal weight patients. The same is also true regarding their post-operative scores across different validated tests. When considering the magnitude of improvement however, obese patients improve as much, or in some cases, more than matched normal-weight individuals.14,22,23 Regarding survivorship there is evidence to support that there are no differences in the survival of total hip arthroplasties in morbidly obese patients at ten years. When considering all cause revisions, septic causes as well, there are trends of a higher revision rate in total hip arthroplasty. Similarly, ten year outcome data for total knee arthroplasty show survivorship of greater than 90%. When compared to

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