Clin Orthop Relat Res (2016) 474:796–798 / DOI 10.1007/s11999-015-4618-x

Clinical Orthopaedics and Related Research®
A Publication of The Association of Bone and Joint Surgeons®

Published online: 11 November 2015

CORR Insights

CORR Insights®: Obesity is Not Associated with Increased Short-term Complications After Primary Total Shoulder Arthroplasty

R. Michael Gross MD

Where Are We Now?

This paper by Jiang and colleagues [3] is a timely study, considering the recent and substantial growth of shoulder arthroplasty that has occurred since November of 2003, when the FDA approved the reverse total shoulder. The authors correctly point out that this demanding procedure generally is suited for older individuals who may be more likely to be obese. Studies have disagreed about whether obesity is a risk factor for complications after shoulder replacement [6, 7, 9], which raises the question: "Is there a lack of consensus because BMI is simply not a useful index?"

In the mid-1800s, Adolphe Quetelet, considered one of the most influential social statisticians of the 19th century, introduced the concept of an obesity index, called the Quetelet index [1]. The formula was pretty straightforward: Weight in kilograms/height in inches [6]. In 1972, Ancel Keys and colleagues [6] introduced the BMI index, calculated by weight in kilograms/height in meters [6]. In 1985, the NIH established the BMI as its standard index and set the upper limit for normal at 27.8 for men and 27.3 for women. That number was scaled back to 25 in 1998 to be consistent with international norms.

Although a quick and easy equation, the BMI formula clearly has some drawbacks. The most-frequent criticisms—it treats men and women as if they have the same body physique, height gets undue consideration, roughly adding 10% to the BMI for tall individuals and subtracting 10% for short individuals, and heavily muscled individuals can easily be erroneously categorized as obese—are valid. On the positive side of the ledger, BMI has the advantage of simplicity and a high degree of sensitivity, especially as the BMI number increases (it will accurately identify all of the target obese individuals in the population with few false negatives).

A number of other measurements or indices have been introduced in order to more accurately—that is, more specifically—identify the patient with obesity: BMI Prime (ratio of BMI to the upper limits of a normal BMI), waist circumference, index of central obesity (ratio of waist circumference to height),

This CORR Insights® *is a commentary on the article* "Obesity is Not Associated with Increased Short-term Complications After Primary Total Shoulder Arthroplasty" *by Jiang and colleagues available at:* DOI: 10.1007/s11999-015-4584-3.

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This *CORR* Insights® comment refers to the article available at DOI: 10.1007/s11999-015-4584-3.

R. M. Gross MD (✉)
Primary Shoulder Specialist, GIKK Ortho Specialists, 17030 Lakeside Hills Plaza Suite 200, Omaha, NE 68130, USA
e-mail: drgross@gikk.com

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DEXA radiograph scan, waist to hip ratio, skinfold measurements, and more have all been attempts to improve on the specificity of the BMI. In other words, identify a population with no false positives in which anybody included has obesity. The difficulty is that these refinements are cumbersome and time-consuming, and beyond that there is no evidence documenting the need for this level of accuracy.

On the other hand, if a more accurate index is important, it naturally leads to the question: "Does that mean that all of the information that we have based on BMI is flawed?" I believe we have to accept the fact that this question has yet to be answered.

Where Do We Need to Go?

The risks involved with shoulder replacement in the patient with moderate-to-severe obesity have been well explored by studies such as Jiang and colleagues, as well as others [6]. These studies lean in favor of considering shoulder replacement as a reasonably safe procedure up to a BMI of 40. Beyond a BMI of 40, it is harder to say—the current study did not explore this scenario. The study by Linberg and colleagues [6], points out that there are real risks associated with this procedure even in the hands of experts when a patient's BMI reaches 40 or more. Neither the available evidence nor a sophisticated index will answer this dilemma. It seems to me like the answer to this question lies in the surgeon's honest appraisal of his or her skill level and the patient's emotional as well as physical health. Can you perform the procedure safely; will the patient actively participate in his or her recovery?

How Do We Get There?

This is a serious question which will likely get more relevant as time goes on. The population is aging. Obesity is becoming more common. Expectations are rising, and with them, the frequency with which arthroplasties are being performed. But even though all of that is true, we should remember that a total shoulder is not necessarily the only choice for all painful arthritic shoulders. If the glenoid and rotator cuff are relatively strong, and the wear pattern reasonably balanced, a hemiarthroplasty—particularly a subscapularis sparing approach as popularized by Savoie and colleagues [8]—is a much simpler procedure that offers an excellent solution. Unfortunately, that still leaves some individuals who will require a total shoulder replacement.

In my view, this situation will not have a "scientific or objective" answer, but rather a subjective one, as did the 1964 Supreme Court case of *Jacobellis v Ohio* [2] in which Justice Potter Stewart famously settled an obscenity case with his subjective opinion of: "I know it when I see it" [5]. Applying Judge Potter's observation suggests that individuals with BMIs over 40 are not all the same. Some individuals represent reasonable surgical risks, and clearly we all have seen others whose risk is unacceptable. It is our job as physicians first and then surgeons to help as many people as we possibly can, always keeping in mind, primum non nocere. We must be honest in the assessment of our surgical skills as well as the risk factors of our patient, and not be seduced by the desperateness of the situation. It is important that we remember that: "there is nothing so bad that a little surgery can't make it worse" and must always be vigilant to recognize the unacceptable risk "when we see it."

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