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CORR Insights®: Periprosthetic Occult Fractures of the Acetabulum Occur Frequently During Primary THA

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Where Are We Now?

Unintentional periprosthetic acetabulum fractures during primary total hip replacement were believed to be rare, and as such, they have attracted little interest among researchers. I say “unintentional,” because intended fracture of the medial wall can enhance fixation in acetabular deficiencies without

apparent morbidity [4], so these really should be considered separately. I am also leaving aside the possibly rare fractures during implantation of cemented sockets since cementless shells are the dominant approach in the United States. The paper by Hasegawa and colleagues addresses fractures during cementless acetabular reconstruction, and suggests they are more common than perhaps is widely believed.

Adequate press-fit fixation of the cup depends on sex, acetabular shape, and placement of the hip rotation center [2]. Additionally, fracture risk with cementless acetabular sockets may be a function of cup design. Previous work [3] suggested a higher risk in elliptical monoblock components, while posterior column stability seems

to be the key to healing these fractures and obtaining cup osseointegration [5].

In the current study, Hasegawa and colleagues use routine CT scans to evaluate press-fit impacted acetabular components. The authors found that occult acetabular fractures occur relatively frequently—perhaps an unknown side-effect of the press-fit techniques. Their findings suggest that acetabular fracture during press-fit cup insertion should no longer be considered a rare event.

Where Do We Need To Go?

Many variables relevant to acetabular fixation—from osteoporosis to acetabular shape—could be better characterized, and finding ways to do this before surgery would be particularly important. Additional intraoperative assessment may be required to facilitate intraoperative decisions such as switching to a cemented cup in order to avoid a fracture.

Despite a relatively low average patient age (under 60 years), this series

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documented a higher risk of intraoperative acetabular fracture risk than previously believed (8.4% in this report, 0.4% in another [2]); older patients, one surmises, will be at even greater risk. The influence of age on this risk—and on the potential fallout from this complication—should be better characterized.

Although occult fractures in patients under the age of 60 apparently heal well, the fracture extension is limited in the reported series. It is unclear whether a portion of early cup failures in patients with cementless fixation are caused by intraoperative fractures. More detailed assessment from other imaging views (Judet views, CT scans) may be required in patients with postoperative groin pain.

Rather than mastering a single-cup design, and seeking to apply it to all patients, it may prove important to tailor cup selection and surgical technique to the individual patient. Personalized cup selection could be based on future comparative studies. Underreaming may be called into question, as might be the selective use of screws, which may be important in patients at risk for intraoperative fractures.

How Do We Get There?

We need more comparative analysis of uncemented press-fit cups; basic

experimental studies on the consequences of cup impaction could help us understand how to better avoid occult fractures. Design-specific reaming techniques could be experimentally studied to define the contact areas that receive the blow at impaction, the acetabulum elasticity to receive the impaction, and other implantation parameters whose limits may help to decrease the fracture risk.

Underreaming may not be a good idea for every hip. Comparative studies are necessary to understand when a certain acetabular shape may or may not benefit from underreaming followed by press-fit versus line-to-line with screw fixation.

Extending the use of press-fit cups to elderly patients, particularly women, may also increase the risk of early cup failure. The influence of age and underlying osteoporosis should be clarified. Comparative cohort studies could help to evaluate the influence of these variables in the adequate press-fit among different cups, comparing elliptical versus hemispherical and peripheral self-locking cups. Although it may not be possible to evaluate every variable, personalized indications could be clarified with adequate studies. Registry studies could help us determine failure risks of uncemented cups in elderly patients compared to cemented cups, if current implantation trends persist. From the surgeon and

the institutional point of view, cup cementing techniques should not be abandoned, considering the predictable outcome of cemented cups in the elderly.

Although the routine use of CT to identify occult acetabular fractures is not practical, surgeons should consider this test in patients with postoperative groin pain, as it may represent occult fracture. Similarly to what has been seen in evaluating acetabular defects [1], CT could be helpful to clarify contact between the cup and the acetabular bone (with or without fractures) in patients with groin pain that might be at risk for early cup failure.

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