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Evaluation of Radiographic Results after Acetabular Fracture Surgery

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We read with interest the Commentary on our article by Dr. Dana Mears. His critique brings up a number of noteworthy issues.

To date, the question concerning optimal treatment of elderly patients with acetabular fractures has remained unresolved. Whether these challenging cases are best treated nonoperatively, with acute total hip arthroplasty, or with open reduction and internal fixation (ORIF), or both, is a subject of ongoing debate.

Clearly, patient selection for operative treatment is dependent on a range of parameters. At our institution, management of elderly acetabular fracture patients is based on previously published criteria, which include specific fracture characteristics as identified on preoperative radiographs, Judet radiographic views, and computed tomography (CT) imaging (1). According to these guidelines, select elderly patients with more severe osteoporotic fracture patterns receive acute total hip arthroplasty. As noted, this treatment option may pose a viable alternative to reconstruction in the appropriate patient.

It should be recognized, however, that total hip arthroplasty in the presence of a late deformed and/or acute unstable acetabulum is a technically demanding procedure (2). Cup loosening is a frequent complication, the avoidance of which may require additional measures with ORIF, such as bone grafting or cage placement (3, 4). Consequently, acute total hip arthroplasty may appear to be an attractive alternative for reconstruction, but it is associated with its own considerable challenges.

When a surgeon considers operative treatment options in elderly patients, achieving an anatomic

acetabular reduction may not be an absolute requirement for satisfactory clinical outcome (5). Indeed, older individuals often have comminuted osteoporotic fractures and may have extensive areas of dome impaction, precluding accurate articular reconstruction. Restoration of the overall acetabular anatomy and centering of the femoral head under the acetabular dome may be sufficient in many of these low-demand patients.

Postoperative CT imaging in such cases may certainly convey a sobering picture in terms of reduction quality, which brings us to the main message of our paper: While residual intra-articular steps should clearly be avoided, gaps (or areas of impaction) of up to 5 mm appear to be better tolerated than previously thought. Thus, what may look like a poor reduction on postoperative CT may not necessarily translate into an unsatisfactory outcome.

With respect to the practice of routine postoperative CT imaging, we certainly subscribe to the concerns noted in the Commentary, and we alluded to them in our discussion section. But there is also a case to be made in favor of advanced imaging following acetabular fracture fixation. Currently, important treatment decisions are made based on preoperative CT imaging, while subsequent postoperative results in terms of reduction quality are often assessed using an inferior modality. In accordance with the “French pioneers” whom Dr. Mears mentioned, we feel that detailed radiographic assessment of postoperative results is critical in order to further achieve advances within this subspecialty. With its superior imaging quality (as compared to plain pelvic radiography), postoperative CT imaging has improved our understanding of the relative importance of residual gaps as compared to step displacement.

Ultimately, management of elderly acetabular fracture patients should be determined on a case-by-case basis with careful consideration of both patient and radiographic characteristics. The findings in the current study may potentially impact this preoperative decision-making process by altering the concept of what an acceptable or adequate reduction is, and whether it is thought to be achievable.

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Article Author Response

Article Author(s) to Letter Writer(s)

In their recent eLetter, Verbeek et al. provide multiple constructive points for consideration about this highly complex topic.

1. As the authors rightly state, a displaced osteopenic fracture in an elderly individual does not possess a simple surgical solution of ORIF, THA or a combined procedure. The authors correctly allude to problems with arthroplasty as a therapeutic option. For an orthopaedic traumatologist with limited experience in arthroplasty, this concern is accentuated. A total hip specialist with experience in complex revision procedures may be needed to participate in the reconstruction. Nevertheless, until the present time, many traumatologists have been highly reluctant to consider THA as a therapeutic option for any displaced acetabular fracture. In part, their judgment rests upon a limited knowledge about how to undertake such a complex arthroplasty procedure. In view of their specialized training in trauma procedures, this factor is not surprising. In some trauma centers, there are no arthroplasty specialists available to assist in such a procedure. In countries in which trauma hospitals provide the care for most acetabular fracture patients, the limited availability of a total hip specialist may be a major problem.
2. While an elderly individual with a limited activity level may tolerate certain types of residual acetabular deformity, a residual step-off in the weight-bearing dome of >2 mm is unlikely to culminate in a successful outcome. Admittedly, if conservative treatment results in a united acetabulum with symptomatic post-traumatic DJD secondary to a linear step-off, an arthroplasty surgeon can generally perform an uncomplicated THA.
3. The authors rightly emphasize the role of meticulous postoperative imaging to enable a surgical team to appreciate the quality of the reduction and the correlation with a successful or failed clinical outcome. Twenty years ago, my center at the University of Pittsburgh Medical Center obtained routine 2D and 3D CT images, including disarticulated views of the reconstructed acetabular surface, for every postoperative acetabular fracture. We concluded that this educational experience was of considerable value. At that time, most other traumatologists viewed our recommendations for this assessment with disdain. It is

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encouraging to learn that the authors share our enthusiasm for this imaging modality. Nevertheless, the question arises as to the practicality of this strategy for every trauma center that performs ORIF of acetabular fractures. For major trauma centers and teaching institutions, the practice merits consideration. However, in view of the financial limitations that have become a reality of current medical practice in the US, the role for a more extensive application of such costly postoperative imaging may require further evaluation.