Revision Total Hip Arthroplasty
Reconstruction at a High Hip Center in Acetabular Revision Surgery Using a Cementless Acetabular Component

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Most total hip replacements result in proximal displacement of the hip center. In the average standard primary total hip replacement, the hip center moves up about a centimeter.

In many revision operations, the bone stock has been eroded or removed by lysis and the available bone stock for acetabular reconstruction in substantially higher than in the normal case. A variety of possibilities exist for dealing with such circumstances. One can use a bulk allograft, such as a femoral head. One can use a "double bubble" acetabular component in some of these circumstances. Other surgeons use elliptical acetabular components. Still others use impaction grafting techniques, and yet another alternative is the use of acetabular cages. Our approach to these problems, in most instances, is simply to use a high hip center.

The reason for this is the fact that cementless hemispherical acetabular components fixed with screws have yielded the best 10-year results in revision surgery of any technique. Therefore, we use a cementless hemispherical socket fixed with screws in almost all acetabular revisions.

One of the requirements for success with this type of surgery is intimate apposition of the porous surface with viable host bone. If the viable host bone is high, the acetabular component must be placed high.

To define the behavior of such reconstructions, we have selected out the most severe cases, meaning not just 1 cm or 2 cm above the interteardrop line, but rather that subset of revision acetabular reconstructions in which the resulting hip center was at least 3.5 cm above the interteardrop line.

If the bone stock will permit conversion of the existing host bone into a hemisphere or to something that approximates a hemisphere, it is then possible to use this technique. The porous surface then is placed against the intact viable host bone, and any deficiencies are filled with particulate graft. The acetabular component is fixed with screws and the reconstruction is complete.

RATIONALE

The first rationale is that cementless hemispherical acetabular components fixed with screws provide the best 10-year results in acetabular reconstruction of any technique available. Most of us were taught to avoid high hip centers because they were biomechanically at a disadvantage. The second feature in this rationale is the observation that the old adage against doing a high hip center is, in fact, false.

In fact, high hip centers are not at a biomechanical disadvantage if they are high but not lateral. The other key observation is that most high hip centers are not lateral, just high. Consequently, one can do a high hip center without a biomechanical disadvantage.

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Additionally, creating a hemisphere for a cementless socket and fixing it with screws is by far the simplest of the operative techniques available for managing these problems. Moreover, while bulk autografts and allografts serve well over the early period, they have increasing failure rates with the passage of time. By 16 years, two thirds of the acetabular components supported by bulk grafts have become loose.

**Materials and Methods**

Forty-six hips in 44 consecutive patients underwent an acetabular revision in which the bone stock loss was so severe that the acetabular reconstruction resulted in a hip center that was at least 35 mm above the interteardrop line. Four of these 46 hips were second acetabular revisions and 3 had previously had resection arthroplasty. Thirty-four of these 46 had a high hip center prior to revision.

Of special interest is the fact that although these were high placements of the acetabular component, the average outside diameter of the acetabular component was 56 mm. In these operations, a trochanteric osteotomy was used to provide wide exposure in 44 of the 46 hips.

The vast majority of these cases had major compromise in the available bone stock and were classified as grade III. Only two hips fell into the grade IV category, which includes pelvic dissociation. Forty-two of the 46 acetabular reconstructions required some form of bone grafting.

**Results**

Six patients died prior to a minimum of 8 years of follow-up; there was one failure among these 6 patients. The failure occurred in a 78-year-old woman who weighed 220 pounds; after 6 years, the component broke into the pelvis. That case was the only reoperation for a loose component among this group of 46 difficult acetabular revisions (2%).

Two other patients were dropped from the series when they developed deep infection following subsequent femoral revisions. One patient who had initially had tuberculosis and subsequently had pyogenic sepsis after a total hip replacement done elsewhere developed sepsis again following the revision.

Thirty-six hips in 34 patients had an average follow-up of 10 years. In that group, none were revised and one was loose (3%). No other reoperations were done.

The hip center was made higher by the index revision in 24 cases and was made lower in 19. In terms of leg length, the preoperative average leg-length discrepancy was 1.6 cm short on the involved side, and the average postoperative leg-length discrepancy was 0.9 cm short on the involved side. Ninety-eight percent had a positive Trendelenberg test preoperatively, while postoperatively, 47% had a positive Trendelenberg test.

**Conclusion**

Among this group of 46 consecutive difficult acetabular reconstructions, all done using a hemispherical acetabular component fixed with screws and all having a resulting hip center that was at least 35 mm above the interteardrop line, one was revised and one was loose. Among the 36 hips in 34 patients with a minimum of 8 years of follow-up and an average of 10 years of follow-up, none were revised and one was loose. In that group, there were no other operations. This approach provides excellent results for this difficult form of acetabular reconstruction.