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CORR INSIGHTS®

CORR Insights®: Does the Extent of Osteonecrosis Affect the Survival of Hip Resurfacing?

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Where Are We Now?

Many patients with osteonecrosis may be candidates for hip resurfacing. Young, active males may be among the best indicated for this procedure. Nevertheless, the use of implants in patients with osteonecrosis is controversial. Progression of the disease and inducing further osteonecrosis of the femoral head by machining or cementing parts of the procedure are concerns that need to be addressed. Therefore, Nakasone et al. asked an important question; does the extent of osteonecrosis affect the survival of hip resurfacing? They also wanted to determine the extent of preoperative osteonecrosis and after machining during surgery.

The investigators reviewed 39 hips in 33 patients who had hip resurfacing with a mean followup of 8 years (range, 2–13 years). A three-dimensional MRI-based template system assessed the extent of the original osteonecrosis of the femoral head and the residual osteonecrosis in the bony bed before implantation (but after machining). They classified patients based on the percentage of volume of residual osteonecrosis into a small group (less than 25%; n = 18 hips) and a large group (25% or greater; n = 21 hips) to determine the affect of residual osteonecrosis on clinical scores and radiographic outcomes. The authors found that the mean percentage of volume of osteonecrosis relative to the entire femoral head was 34% (range, 14%–62%). The volume percentage showed only a 5% difference after the head was machined. They did not find any differences in survival between the small and large lesions, using radiographic loosening of the component as an end point, nor did they find any differences in clinical and WOMAC® scores at last followup between the two groups. The investigators observed femoral component loosening in one hip in the small lesion group and one hip in the large lesion group.

Where Do We Need to Go?

Nakasone et al. did a commendable job assessing the affects of extensive preoperative osteonecrosis or residual osteonecrosis after machining on the results of resurfacing. This is a nice study, but I would consider it preliminary work, in advance of the much larger and deeper efforts on this topic that we need to make. The main limitation, which I hope future studies will overcome, was sample size; the authors studied 39 hips in 33 patients. Certainly, Nakasone et al. had excellent results, with only two failures at a mean followup of 8 years. However, with larger studies and more failures, one could assess the effects of different sizes of the lesion on the results of resurfacing more accurately. In addition, there may be location-dependent and other effects

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of osteonecrosis that might affect survival. Nakasone et al. correctly described that the way the cement is applied to the residual necrotic tissue also might affect the results. For example, if one fixes the cement on soft necrotic tissue that is soft, yellowish, or covered by fibrous debris, one reasonably could suspect that this would increase the risk of femoral component loosening. In one report, Amstutz and LeDuff [1] described a technique of removing necrotic bone down to the underlying normal bone or reparative bone to confirm proper component fixation and durability. I believe we do not yet know the right answer here; it seems that removing all of the necrotic bone down to normal bone may result in the loss of a large part of the femoral head, which could preclude resurfacing. In my experience, I found that one should get rid of any loose, fibrous tissue or debris. However, structurally strong dead bone will lead to adequate support for a resurfacing device, even at long-term (more than 10 years) followup. This issue warrants further study. It appears that the authors' surgical technique of removing necrotic tissue down to normal or densely reactive bone with appropriate anchoring holes and excellent cement technique may have been responsible for their exceptional results. Because of their good results, they had few specimens to analyze; postmortem evaluation would allow for further determination of what happened to the areas involved from the beginning or new areas of dead bone created by the procedure. This will have to wait for future studies. Two studies [3, 6] related resurfacing failures with eventual osteonecrotic bone. Little et al. [3] analyzed 13 revisions from 377 resurfacing procedures and found that histologic evidence of osteonecrosis was common in failed resurfacings. In addition, Ullmark et al. [5] performed a noninvasive method of assessing osteonecrosis by using fluoride positron emission tomography (PET). They found that extensive osteonecrosis developed in three of 14 patients at 1 year followup.

How Do We Get There?

To understand the affect of osteonecrosis on the survival of hip resurfacing, larger studies evaluating more than 33 patients need to be performed. Multicenter studies assessing the effects of technique differences on clinical outcomes will be important. The authors had excellent results with the posterior approach; others have advocated anterolateral approaches to preserve the blood supply (lateral epiphyseal vessels), which might be important in this specific patient population. Khan et al. [2] found a decreased blood supply using the posterolateral approach when compared with a transgluteal approach in resurfacing. Similarly, Steffen et al. [4] studied the oxygen tension in the femoral head and found less declines with an anterolateral versus a posterior approach. There have been no reported differences in outcomes between resurfacing procedures performed with either approach. As stated earlier, larger studies with analysis of failures would allow for an evaluation where the modes of failure would be in the resurfacing group. One could evaluate whether the modes of failure were related to the original amounts of osteonecrosis. I would like to know whether failure occurred because of new osteonecrosis that was created during the procedure; the PET scanning technique described above might help ascertain this. It seems possible that secondary osteonecrosis from the procedure or from remodeling could lead to failure in this patient population. Postmortem retrieval-type studies could answer these questions. I commend the authors for their research, and hope that this early work encourages others to take up these important questions.

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