MENU

Achieving Consensus on Acetabular Bone Loss

New recommendations for ABL in revision hip arthroplasty incorporate international expertise with the latest evidence.

REVISION RATES after total hip arthroplasty are decreasing, yet 10 to 15 percent of patients require revision within 20 years to address implant failure due to loosening, instability, or prosthetic joint infection. These issues may lead to acetabular bone loss (ABL) and pelvic discontinuity in severe cases.

Optimal approaches for diagnosing and treating ABL have been unclear and not systematically incorporated into existing treatment paradigms despite multiple reconstruction options, surgical techniques and imaging advancements. To address this inconsistency, HSS orthopedic surgeon Thomas Sculco, MD, Surgeon-in-Chief Emeritus, convened and led an international symposium sponsored by the HSS Stavros Niarchos Foundation Complex Joint Reconstruction Center (CJRC) on June 21, 2019, to develop a consensus on best practices for diagnosing and treating ABL.

An international panel of 36 revision hip surgeons and biomechanical engineers attended the live event and published their comprehensive consensus statement in the *HSS Journal* online on September 28, 2021. "At HSS, we provide high-quality joint replacement care. We are also dedicated to addressing complex issues and sharing knowledge through education," says Dr. Sculco. "It was our pleasure to host the ABL International Consensus Symposium and facilitate agreement on recommendations for optimal workup, management strategies, and future research directions in addressing ABL."

ief Emeritus,
esulted in the

Matthias Bostrom, MD, Chief of the Adult Reconstruction and Joint Replacement Service at HSS

Alejandro Gonzal
Service at HSS

The experts were challenged to reach consensus recommendations in four topic areas: preoperative planning and postoperative assessment; implant selection and management of osteolysis and massive bone loss; treatment challenges of pelvic discontinuity, periprosthetic joint infection, instability and poor bone biology; and the principles of reconstruction and classification of ABL.

Some of the most notable recommendations in the consensus statement are as follows:

KEY RECOMMENDATIONS FOR MANAGING COMPLEX ABL CASES

The consensus panel agreed that massive ABL cases can be reconstructed effectively by experienced surgeons working in partnership with biomechanical engineers and infectious disease specialists. The most challenging cases include pelvic discontinuity, severe ischial or iliopubic osteolysis, an inability to achieve a stable three-point fixation for the implant components, component migration greater than 2 cm above the base of the original reconstruction, joint infections, and poor host bone quality.

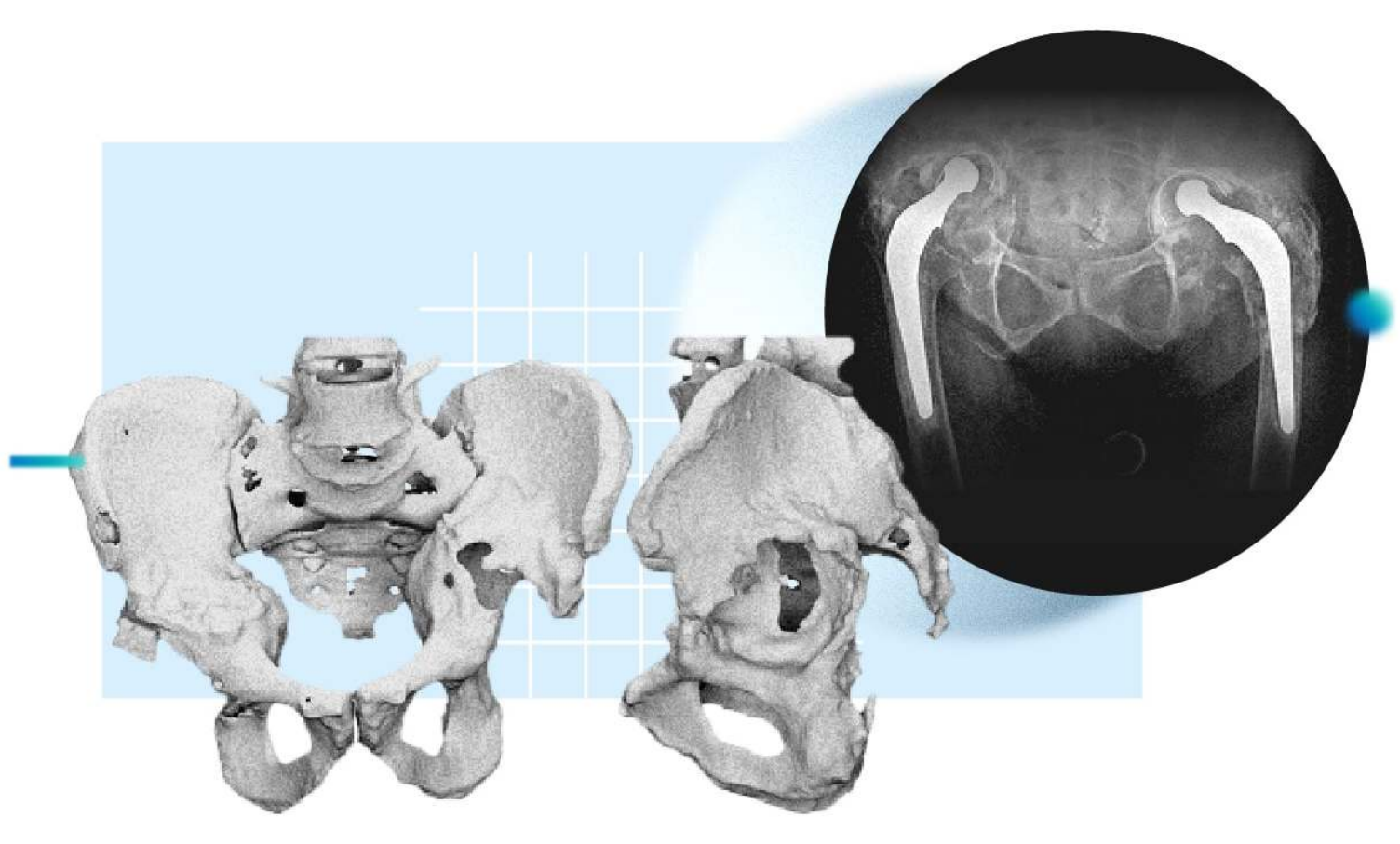
3d-printed plastic models facilitate preoperative planning with multiple augments for complex acetabular reconstructions.

While plain radiographs play a role and Judet views provide additional information, symposium participants agreed 3D CT imaging is the gold standard for assessing complex patterns of bone loss. "At HSS, we rely heavily on 3D imaging on CT because it provides a good idea of surrounding bone loss volume and the quality of remaining bone for guiding the choice of implants and augments to fill defects," says biomechanical engineer Timothy Wright, PhD, a symposium participant and co-author of the consensus statement. "When designing implants, we look for the best way to transfer load between the implant and healthy bone."

> **Revision patients should be followed more frequently than primary hip patients to confirm fixation and identify problems early**

Settling a controversial debate about follow-up frequency after total hip replacement, especially in patients with asymptomatic osteolysis, the group recommended earlier and more frequent follow-ups for patients with conventional polyethylene bearing surfaces than those with highly cross-linked polyethylene constructs. In general, revision patients should be followed more frequently than primary hip patients to confirm fixation and identify problems early. Radiostereometric analysis, a newer, validated technology available at selected centers, provides valuable insights into the extent of migration that can occur without eventual reconstruction failure.

HSS orthopedic surgeon Peter Sculco, MD, symposium participant and lead author of the consensus statement, points to a recent complex reconstruction in which he used 3D CT imaging to visualize the extent of bone loss and then used a life-size 3D printed plastic model for presurgical planning and decision-making on the best reconstruction approach. The revision surgery used bilateral custom augments, restored the hip center of rotation, and achieved long-term stability.



CT reconstructions (left) are useful in more advanced cases of bone loss that cannot be easily identified with standard imaging such as pelvic X-ray (right).

INCORPORATING ADVANCES IN IMPLANT TECHNOLOGIES

Today, about 95 percent of acetabular revisions are treated with a hemispherical cup with screw fixation. However, a wide variety of implants and augments are now available for reconstruction. The consensus statement discusses the pros and cons of the most popular options, including cup-on-cup with screw fixation through both cups, half and full cup-cages, bulk and impaction grafting, and dual mobility versus constrained cup liners.

95%

of acetabular revisions are treated with a hemispherical cup with screw fixation

The consensus symposium participants recommended cup-cages and patient-specific flanged implants as the preferred reconstruction approach for massive ABL with or without pelvic discontinuity.

The introduction of prefabricated, high-friction, highly porous revision shells with multiple holes for screw fixation has been a significant advance over the last decade. The symposium panel recommended first exploring whether bone loss defects can be addressed effectively with prefabricated constructs since they are less expensive than custom implants and available in shorter time frames. They recommended custom implants as ideal solutions for complex cases, such as patients with small pelvises or when fitting an elliptical-shaped defect with a hemispherical cup in patients with a small anterior-posterior acetabular diameter.

FUTURE DIRECTIONS IN ABL RESEARCH AND CARE

The consensus participants strongly recommended developing a revised classification system for ABL, given that existing systems rely primarily on plain radiographs and not the more advanced 3D CT scans. Ideally, the new classification system would include two guidelines — one for preoperative assessment and a second for intraoperative decision-making and final reconstruction.

> **Dr. Peter Sculco is currently developing a more accurate grading system for classifying ABL cases using hundreds of images from the HSS prospective registry**

Developing and validating patient-reported outcome questionnaires for ABL revision surgeries is another area for future research. Contemporary outcome questionnaires were designed for primary joint replacement or osteoarthritis pain and dysfunction and thus do not adequately capture factors affecting clinical outcomes in ABL revision, such as abductor dysfunction.

"We hope our consensus statement will serve as a blueprint for the development of new clinical practice guidelines for ABL in revision hip arthroplasty," Dr. Thomas Sculco says. "The guidelines would include diagnosis and treatment algorithms based on the clinical expertise of international surgeons and biomechanical engineers and our comprehensive review of the latest evidence in the literature."

Additional HSS authors of the consensus statement were Michael-Alexander Malahias, MD; Mathias Bostrom, MD; Seth Jerabek, MD and Alejandro Gonzalez DellaValle, MD.

The Diagnosis and Treatment of Acetabular Bone Loss

LEARN MORE