Universal health insurance in the Dominican Republic does not cover expensive elective procedures like total joint replacements, and many people in the country cannot afford the cost of these procedures on their own. Over the past seven years, Operation Walk Boston has provided total joint replacements to nearly 300 residents of the Dominican Republic with advanced hip or knee arthritis and limited financial needs. During this time, the Boston chapter of Operation Walk, founded by Brigham and Women’s Hospital (BWH) Chief of Orthopedic Surgery Thomas S. Thornhill, MD, has evolved to include outcomes research which has enhanced all aspects of the program.

Robust Research Program
In 2009, Operation Walk Boston and Hospital General de la Plaza de la Salud (HGPS) in Santo Domingo initiated a first-of-its-kind research program, led by Jeffrey N. Katz, MD, MSc, Director of the BWH Orthopedic and Arthritis Center for Outcomes Research. As part of this initiative, standardized preoperative questionnaires are collected each year from patients scheduled for total joint replacement. All patients undergo unilateral or bilateral hip or knee replacement and remain in the hospital between two and four days. They also attend outpatient physical therapy for two weeks after surgery and are prescribed physical therapy regimens to complete in their homes.

These patients are then invited to return the following year for a postoperative evaluation. To date, more than 95 percent of patients have completed the baseline survey, which includes pain and functional status scales of the Western Ontario and MacMaster Universities Arthritis Index (WOMAC) and the physical function scale of the Short Form Health Survey.

Pre- and post-operative data entered into a relational database at the Orthopedic and Arthritis Center for Outcomes Research has yielded significant findings, including:

- Dominican patients receiving total joint replacement through Operation Walk Boston achieve similar outcomes one year after surgery as patients undergoing joint re-
Innovative Arthroscopic Technique Preserves Chondrolabral Junction during Labral Repair and Acetabuloplasty

Orthopedic surgeons at Brigham and Women’s Hospital (BWH) are utilizing an innovative arthroscopic technique to treat femoral acetabular impingement (FAI) while preserving the chondrolabral junction.

“Patients with untreated FAI and concomitant labral tears are at risk for chondral lesions and arthritis with damage that may lead to total hip replacement in many patients,” said BWH orthopedic surgeon Scott D. Martin, MD.

**Technique Overview**

While labral repair and acetabuloplasty are beneficial, previously described arthroscopic treatment techniques have required surgical detachment of the labrum to access acetabular rim pincer lesions with subsequent repair. These techniques may compromise labral blood flow, which can lead to incomplete labral healing and further damage to the chondrolabral junction. An arthroscopic technique pioneered by Dr. Martin preserves the labral vascularity and chondrolabral junction during labral repair and acetabular osteoplasty (Arthrosc Tech. 2013 Jun 14;2(3):e213-6.). (Figure 1)

During this procedure (Figure 2), the capsulolabral complex is elevated off of the acetabular rim above the chondrolabral junction, all the way down to the edge of the acetabular rim (Figures 3A and 3B). Osteoplasty with burring is performed on the reverse mode to avoid damage to the labrum and surrounding capsule. Using this technique, the capsulolabral blood vessels are preserved (Figures 4A and 4B). The acetabular shelf is then contoured under fluoroscopic guidance, and the labrum is repaired and reconstituted to a newly recessed anatomic footprint.

**Outcomes Assessment**

A retrospective assessment of cases performed at BWH using this technique is currently underway. Every patient is scored before surgery and follow-up information is tracked. In a review of 551 cases, there are 341 cases with two-year follow up. Eighty-three percent of these patients have reported satisfactory results, with less than five percent progressing to a total hip replacement. Over 95 percent of the patients who went on to hip replacement had progressive osteoarthritis with Outerbridge scores of three or four at the time of hip arthroscopy. In the 76 patients who returned for extensive review, 65 percent had good-to-excellent outcomes at follow-up as determined by a modified Harris Hip Score of 80 or higher. Full-thickness cartilage loss was associated with poorer outcomes. Prospective tracking of ongoing cases is being conducted; patients are only considered for repair using this technique if their osteoarthritis is not too far progressed. Dr. Martin also has trained residents and fellows on the technique with much success.

“This technique has been shown to relieve symptoms in the majority of patients,” said Dr. Martin. “It also is instrumental in helping to prevent or delay the need for total hip replacement, particularly in younger patients.”
The capsule and the labrum are elevated off of the acetabulum. A knife rasp is used to begin labral separation 3 to 5 mm above the capsulolabral junction.

Illustrations by Nicole Wolf, MS ©2012

Left hip. Arthroscopic view of 12 o’clock through the AL portal. Acetabular recession of a pincer lesion (original location at dashed line) with a 4.0 round abraider through the Dienst portal. Chondrolabral junction (arrows) is preserved.

AP of the left hip. Fluoroscopic guidance of acetabular recession.
Researchers Use Advanced Techniques in Molecular Biology to Understand Limb Regeneration

Striving to identify the mechanisms of appendage regeneration, a research team led by Jessica L. Whited, PhD, at the Brigham and Women’s Hospital (BWH) Regenerative Medicine Center is using innovative molecular biology techniques to study limb regeneration in a colony of axolotl salamanders. By manipulating gene expression at specific points in time during limb regeneration, they are working to determine events that initiate the regenerative process.

“Humans and other mammals have extremely limited regenerative capacity in many key areas, including limbs,” said Dr. Whited. “Axolotl salamanders exhibit remarkable regenerative abilities and are genetically similar to humans with limbs that are anatomically similar to human limbs as well. By understanding how limb regeneration occurs in these animals, we hope to provide critical information for designing therapies to stimulate regeneration in humans.”

Analyzing Gene Expression
Dr. Whited and her team employ advanced sequencing technology to compare the gene expression in regenerated limbs, uninjured limbs, and the blastema – a collection of relatively dedifferentiated cells and stem cells that forms at the site of injury. Analysis is performed at both the tissue and single-cell level. Dr. Whited has developed a unique method for obtaining temporal control over exogenous gene expression (Proc Natl Acad Sci U S A. 2012 Aug 21;109(34):13662-7.). This inducible system allows for systematic analysis of phenotypes at defined developmental or regenerative time points. Methods to highly express genes of interest include viral gene transfer via pseudotyped retroviruses in axolotl cells (Development. Mar 1, 2013; 140(5): 1137-1146.) for both lineage and functional analyses in regenerating limbs.

Broad Implications of Research Findings
Salamanders not only regenerate limbs, but also can regenerate heart, brain, spine, and other tissue. Findings from the team’s research related to the healing process in salamanders may help the advancement of a wide range of regenerative research efforts.

“We know, for example, that healing in salamanders does not involve the formation of scar tissue, so scar-free healing is a key part of the regenerative process,” said Dr. Whited. “Understanding healing in these animals can ultimately have benefits for many other areas of research.”

Access to Our Orthopedic Surgery Services
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placement in developed countries (Figure 1), despite having considerably worse functional status before surgery (Rheumatology (Oxford). 2013 Oct;52(10):1802-8);

• An analysis of Operation Walk Boston at HGPS using Blue Cross Blue Shield Center of Excellence criteria, which combines structural elements, processes of care, and outcomes, demonstrated a score of 71 points out of a possible 100 – with 60 qualifying as a Center of Excellence (BMC Musculoskelet Disord. 2013 Sep 23;14:275);

• Despite substantial gains in functional capacity, Operation Walk Boston patients have moderate levels of physical activity participation following joint replacement surgery, resuming obligatory activities but not recreational ones.

“Our program has demonstrated that clinical research as part of global medical relief organization missions can afford insights into the quality and outcomes of sophisticated procedures in resource-poor countries,” said Dr. Katz.

Baseline and 12-month Western Ontario and MacMaster Universities Arthritis Index (WOMAC) function scores in combined knee and hip replacement patients of Operation Walk Boston, stratified by baseline WOMAC function scores.

**Team Approach**

Operation Walk Boston’s annual missions are supported by a large group of volunteers from BWH and other Boston-area hospitals, including surgeons, anesthesiologists, medical physicians, nurses, physician assistants, physical therapists, and additional operating room personnel. The Boston team is led by Dr. Thornhill and Operation Walk Boston Chief Operating Officer Roya Ghazinouri, DPT, MS, of BWH. Traveling to Santo Domingo, the Boston team works alongside HGPS’ surgeons, medical students, nurses, anesthesiologists, and other medical staff, exchanging information and demonstrating clinical skills in many areas, including surgery, nursing, rehabilitation, and research. “Our missions have gone far beyond performing joint replacements,” said Dr. Thornhill. “We have formed a strong partnership with our colleagues in the Dominican Republic to help address their growing burden of joint disease through collaboration in medical education, surgical and rehabilitative training, and research, leading to improvements in care delivery and patient outcomes.”

**Ongoing and Reciprocal Benefits**

Educational presentations by Operation Walk Boston volunteers also are provided to local medical students in the Dominican Republic on the management of arthritis and other musculoskeletal disorders. Examples include rheumatoid arthritis and the benefits of disease-modifying antirheumatic drugs (DMARDs), which are just beginning to appear in developing nations. The volume of total joint replacements at HGPS throughout the year also has increased five-fold since the start of Operation Walk Boston.

Conversely, Operation Walk Boston members have learned from their work in the Dominican Republic. They have observed, for example, that Dominicans have decreased need for pain medications and are more resilient in general than joint replacement patients in the United States. The Operation Walk Boston team also benefits from operating in a diverse team environment that is much different from an academic medical center.

“Operation Walk Boston really offers bidirectional benefits,” said Dr. Thornhill. “We have learned and gained from our experience as much as HGPS members have from their work with us.”

**Access and Information**

For a consultation, more information on our orthopedic surgery services, or to refer a patient, please call our helpful and experiences Referral Coordinators at (617) 732-9894 or email bwhreferrals@partners.org.
To find effective, evidence-based strategies to address the personal and public health burden of falls in older adults, the National Institutes of Health (NIH) and the Patient-Centered Outcomes Research Institute (PCORI) have joined to support a clinical trial to test individually tailored interventions to prevent fall-related injuries. The award, made by the National Institute on Aging (NIA) of the NIH and funded by PCORI as part of the Falls Injuries Prevention Partnership of the two organizations, is expected to total some $30 million over the five-year project. First-year funding of $7.6 million was awarded last June.

The trial is led by Shalender Bhasin, MD, a researcher in the Division of Endocrinology, Diabetes and Hypertension at Brigham and Women’s Hospital; Thomas Gill, MD, of Yale School of Medicine; and David Reuben, MD, of the David Geffen School of Medicine at the University of California. The team includes more than 100 researchers, stakeholders, patients and their representatives at 10 clinical health system sites across the country.

Unique Research Approach
The study’s approach differs from others in that it will integrate proven falls reduction strategies into a cohesive intervention that can be adopted by many health care systems.

Previous studies have analyzed risk factors for falls and falls injuries, along with interventions to prevent them. But the best evidence about how to reduce falls has not been broadly applied. Attempts to change physician behavior about falls through conventional medical education channels and other methods have not been very effective. Patients and other stakeholders generally have not been partners in the research process and, as a result, not fully engaged.

NIA Director Richard J. Hodes, MD, said, “This study will focus on people at increased risk for injuries from falls, the specific care plans that should be implemented, including interventions tailored to individual patients, and how physicians and others in health care and in the community can be involved.”

Each person in the trial will be assessed for his or her risk of falling, and receive either the current standard of care – primarily information about preventing falls – or the experimental study intervention in which individualized care plans will be developed and administered. The plans will be presented to the participant’s primary care physician for review, modification, and approval and will include proven fall risk reduction interventions that can be implemented by the research team, physicians and other health care providers, caregivers and community-based organizations. The intervention centers on the concept of a falls care manager working with each participant’s primary care provider to develop and monitor the plans.

The research team plans to enroll 6,000 adults in the U.S. age 75 and older, living in the community, with one or more modifiable risk factors for falls. The first year of the study is a pilot phase, during which many aspects of the intervention will be tested with small numbers of people across 10 clinical sites. If the go-ahead is given by NIA and PCORI to proceed with the study after that, enrollment for the full trial will start in year two and take place over 18 months. The participants will be followed for up to three years.

The primary trial outcome is reduction in serious fall injuries, including non-spinal fractures, joint dislocation, head injuries, lacerations, internal injuries, and hypothermia. Secondary outcomes include reduction in all falls that cause injuries; all falls regardless of injury; indicators of well-being, physical function and disability, and anxiety and depression.

“We have an interdisciplinary dream team of investigators, clinicians, and stakeholders from the participating trial sites,” said principal investigator Dr. Bhasin. “With this team, we can put all the different pieces of the falls prevention puzzle together. The trial will focus on clinical practice redesign, while also using interventions tailored to individuals. The goal is to recognize and overcome challenges in implementing fall-injury prevention strategies in diverse health systems.”

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