

## **Natural History of the Dysplastic Hip Following Periacetabular Osteotomy**

**Cody C. Wyles, MD**, Juan Vargas, BA, Mark Heidenreich, MD, Kristin C. Mara, MS, Christopher L. Peters, MD, John C. Clohisy, MD, Robert T. Trousdale, MD, Rafael J. Sierra, MD

**Introduction:** Periacetabular osteotomy (PAO) remains the gold standard treatment for developmental dysplasia of the hip (DDH). The purpose of this multicenter cohort study was to delineate the long-term radiographic natural history of the dysplastic hip following PAO.

**Methods:** We evaluated all patients undergoing PAO from 1996-2012 at three academic institutions. Inclusion criteria were PAO for DDH or DDH and concomitant acetabular retroversion with minimum 5-year radiographic follow-up. Exclusion criteria were PAO for isolated acetabular retroversion, neurogenic dysplasia, Legg-Calve-Perthes, and prior hip surgery. There were 288 patients with 83% women; mean age and BMI were 29 years, 25 kg/m<sup>2</sup>. Mean clinical and radiographic follow-up was 9.2 years (range, 5.0-21.1). Every preoperative and postoperative hip radiograph was assessed to determine the degree of osteoarthritis according to the Tönnis classification. Survivorship was analyzed by multistate modelling, which enables enhanced precision compared to Kaplan-Meier techniques.

**Results:** At final follow-up, 144 patients (50%) had progressed at least 1 Tönnis grade with 42 patients (14.6%) undergoing total hip arthroplasty. The mean number of years spent in each Tönnis grade following PAO was as follows: Tönnis 0=11, Tönnis 1=19, Tönnis 2=8, Tönnis 3=4. The probability of progression to THA increased significantly based on higher initial Tönnis grade ( $p<0.001$ ). The most marked difference occurred between Tönnis 0 or 1 compared to Tönnis 2; for Tönnis 1, the probability of progression to THA at 5 and 10 years was 2% and 11%, respectively, compared to 23% and 53%, respectively, for Tönnis 2.

**Conclusions:** PAO significantly alters the natural history of DDH. Precise radiographic progression based on the Tönnis grade can now be used to ascribe prognosis for the native hip. Importantly, this investigation demonstrates a stark increase in progression to THA within 10 years of PAO for patients with Tönnis 2 compared to Tönnis 0 or 1 osteoarthritis.