

Evaluation of bernese periacetabular osteotomy

Prospective studies examining projected load-bearing area, bone density, cartilage thickness and migration

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ABSTRACT

This PhD dissertation is based on studies carried out during my employment as Research Assistant at the Department of Orthopaedics, Aarhus University Hospital in the period 2004-2007.

The typical dysplastic hip joint is characterised by maldirection of the acetabulum and femoral neck, insufficient coverage of the femoral head focally and globally and erosions of the limbus acetabuli. An unknown number of persons with hip dysplasia will suffer from pain in hip or groin, decreased hip function and development of osteoarthritis at a young age. The Bernese periacetabular osteotomy is performed to prevent osteoarthritis in patients with hip dysplasia and has been carried out at Aarhus University Hospital, Denmark since 1996 with more than 500 osteotomies performed. Throughout the years, research and quality improvement of the treatment has taken place, and this PhD thesis is part of that process.

The aims of this PhD thesis were to evaluate outcome aspects after periacetabular osteotomy in terms of I) estimating the projected loadbearing surface before and after periacetabular osteotomy based on CT, II) estimating bone density changes in the acetabulum after periacetabular osteotomy on CT images, III) developing a stereological technique to precisely and efficiently estimate the thickness of the articular cartilage in the hip joint based on MRI and IV) examining the stability of the re-orientated acetabulum after periacetabular osteotomy by use of radiostereometric analysis.

In conclusion, the studies in the present PhD thesis indicate that the projected loadbearing area of the hip joint increases considerably in patients undergoing periacetabular osteotomy and a method to estimate this area was described. Bone density increases in the medial quadrants two years postoperatively and a method is developed to precisely estimate bone density on CT images. Also a method to precisely estimate cartilage thickness was presented and we suggest that the method can be advantageous for assessing the progression of osteoarthritis in dysplastic hips after periacetabular

osteotomy. Due to the very limited migration of the acetabular fragment fixated with two screws, we find our fixation sufficient and the postoperative partial weight-bearing regimen safe.