Total Hip Arthroplasty with femoral shortening and rotational osteotomy by Direct Anterior Approach in CROWE IV hip patients

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Introduction

Total hip arthroplasty (THA) for Crowe IV hip dysplasia poses challenges due to proximal migration of the center of rotation, muscle retraction and bone compromise at the true acetabulum; surgery in affected patients predisposes to an increased rate of neurological complications and revision. Direct anterior approach (DAA) demonstrated its effectiveness in the management of patients with Crowe IV hips; however, it is considered a less suitable approach in those patients requiring a subtrochanteric femoral shortening osteotomy. This additional procedure is usually performed when expected leg lengthening exceeds 4cm, or to correct femoral pathological increased anteversion, to support acetabular component placement at the true acetabulum and an adequate combined anteversion of implant components.

This retrospective study examines the safety and the clinical and radiological outcomes of THA with femoral shortening and derotation osteotomy performed by DAA. The main hypothesis was that DAA contributed to the restoration of hip biomechanics, promoted bone and soft tissue management, and allowed functional improvement with limb length correction at the costs of an acceptable rate of complications. The aim of this video is to describe the surgical technique for the performance of THA with femoral shortening and derotation osteotomy by DAA in a 56-year-old female with severe CROWE IV iliac hip dislocation due to hip dysplasia, showing the clinical and radiological outcomes on a case series of 12 consecutive hips operated by this technique.

Materials and methods

A total of 10 patients (12 hips) with hip dysplasia and iliac dislocation, classified as Crowe IV, underwent THA with femoral shortening osteotomy and rotation by DAA between May 2020 and May 2023 at the Authors' Institution. The mean follow-up was 60 months (range 12-36 months). After surgery, patients were kept in a hip SPICA cast for 45 days; then standing and assisted ambulation with partial and progressive weight bearing were allowed. Demographic and clinical parameters were retrospectively collected from the hospital records, including age and in-hospital length of stay. The Harris hip score (HHS) for each patient was determined preoperatively and postoperatively at the final follow-up. Radiological evaluation of cup inclination, healing of the osteotomy and radiographic leg length discrepancy (LLD) was conducted on pre and postoperative radiographs. Intra- and post-operative complications were recorded.

Results:

The average patient age at the time of surgery was 55.5 years (range 28 to 64 years). Length of hospital stay averaged 16 days (range 12-21). Preoperative Harris hip score averaged 32.6 (24-53) points, and significantly improved to 83.1 (range 72-90) at last follow-up ($p<0.001$). Cup placement was at the true acetabulum in all patients, with an average inclination of 37° (range 29°-55°). Average shortening osteotomy was 25mm and, considering patients with unilateral iliac dislocation (n=8), average radiographic LLD improved from -38mm to -5mm postoperatively. An overall complication rate of 33.4% (4/12) was observed, including one intraoperative periprosthetic (femur) fracture treated by wiring, one transient femoral nerve paralysis, and 2 delayed healing at the osteotomy site with callus formation at 6 months. No patients required revision surgery at the last available follow up.

Conclusion

The results of the current study support the performance of DAA for THA with shortening and derotation osteotomy in Crowe IV patients. The procedure combines the advantage of the use of DAA in the management of soft tissue and bone pathological anatomy, while correcting the rotational deformity of the proximal femur through the performance of derotation osteotomy under direct visualization in supine position. When performed by surgeons experienced with this approach, DAA is a valuable resource for deformity correction and THA performance in Crowe IV patients, allowing good component positioning at the cost of an acceptable rate of complications.