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"Newer Bearing Surface Total hip arthroplasty in Developmental Dysplasia of hip"

Dr Sanjeev Jain[1,] MS, MCH. Dr Aditya C Pathak[2], MS, DNB.
Dr K Kalaivanan[3], MS

([1-]Senior Consultant and Surgeon, Department of Orthopaedics, Dr LH Hiranandani Hospital, Powai, Mumbai-400061,India
[2-]Assistant Professor, Dr RN Cooper Hospital, Vile parle, Mumba400056, India.
[3-] Fellow in Arthroplasty, Department of Orthopaedics, Dr LH Hiranandani Hospital, Powai, Mumbai-400061,India)

Abstract-
Introduction *–Total hip arthroplasty for Developmental Dysplasia of Hip with secondary arthritis in younger patient is a challenge in itself due to its distorted anatomy. To restore the normal anatomy of hip, achieving length, stability, function and longer survivorship surgical technique and implant plays a major role. One should be careful to complications like sciatic nerve palsy, non-anatomic positioning of implants, shortening etc.*
Case Presentation *– This is a case report and five year follows up of a young female of 34 years age with Neglected Developmental dysplasia of hip confirmed clinically and radiologically. Patient had painful limp, shortening and decrease range of motion resulting into restriction in performance of her daily routine activities. She was treated with Ceramic on Ceramic Modular uncemented total hip replacement and was followed up for 5 years .*
Conclusion *– Restoration of anatomical hip centre with complete containment of acetabular socket, judicious use of cement-less implant and ceramic bearing surface could provide excellent result in a case of secondary arthritis due to congenital dislocation of the hip (Crowe type IV) in a young and active patient.*
Keywords- *Delta, Ceramic on ceramic bearing, Developmental dysplasia of hip, Congenital dislocation of hip.*

I. Introduction

For biomechanical reasons, the acetabular component is best placed in the anatomical position [1]. However, when a high dislocation (Crowe type IV) [2] is present, soft-tissue contractures and concerns about sciatic nerve stretching make it difficult to reduce the prosthetic femoral head into the acetabular component in the anatomical position. Acute lengthening of more than 4 cm has been associated with an increased risk of nerve injury [3].A standard technique for dealing with this problem is femoral shortening with a subtrochanteric osteotomy [4, 5]. A hip system that incorporates a modular head and neck has several theoretical advantages in that leg length, femoral anteversion and femoral offset can all be adjusted if required[1,2]. It's a challenge to find the original acetabular socket, reconstruct it, bring down the head to appropriate level, correct its distorted version and negotiate its narrow femoral canal [3].

II. Case Report

34 year's old female came with marked limp since childhood and left hip pain since many years unable to perform her daily routine activities. She had marked painful restriction of hip movements with 4.5 cm of shortening. A radiograph confirmed type IV Crowe developmental dysplasia of left hip with dysplastic femoral head, neck, canal and acetabulum. The preoperative Harris hip score was 55.

She was subjected to a total hip replacement with cement-less delta ceramic on ceramic bearing surfaces with modular stem and neck system.

The hip was exposed using the posterior approach. The dysplastic femoral head which was dislocated was exposed. The sciatic nerve was visualised and safeguarded throughout the procedure. The false acetabulum had formed superior to the dysplastic true acetabulum. It was difficult to identify the original centre of acetabulum as it was filled with fibrous tissue and was not well developed. .The preparation of the acetabulum was done by removal of all fibrous tissue. There was a defect postero-superiorly for which we used the graft from the femoral head and shaped it and fixed it with screws in the postero-superior quadrant. The Acetabulum was cautiously reamed medially and enlarging the cup size keeping the anteversion of acetabulum in mind. After this the cementless acetabular cup was impacted in the anatomical true acetabulum. Because of the soft tissue contractures it was not possible to bring the femoral head to its anatomical location; we had to do as

femoral shortening of 4 cms by subtrochanteric osteotomy.The femoral canal was prepared for a modular cement-less stem. The femoral canal was narrow and accommodated a narrow stem (size 6). After trial the appropriate offset and version was chosen and the final prosthesis was implanted with ceramic head size 36 mm and ceramic liner . The wound was sutures in layers over drain.(Fig 2)

Thromboprophylaxis was also given. The patient was started with hip range of motion exercises on 2nd post operative day and non weight bearing walking with frame on the 3rd day. The patient was kept non weight bearing for 4 months. At 5th months the patient started full weight bearing and daily routine activities and was followed up 6 monthly thereafter. At 5 years her Harris hip score was 90 and radiographs shows excellent incorporation of the bone graft (Fig 3).

III. Discussion

Patients with untreated high developmental hip dislocations frequently develop symptoms of secondary arthritis in the third and fourth decades of life [1–3]. The native acetabulum is hypoplastic, and its bone density is often low because of lack of stress remodelling. The femur is small and often shows excessive neck-shaft angles and increased anteversion, which shifts the greater trochanter to a more posterior position along with a narrow medullary canal [10]. Soft tissues surrounding the hip joint are frequently contracted because of the chronicity of dislocation [4]. The longevity of hip arthroplasty in these patients has been improved with restoration of the anatomic hip center, which decreases the hip joint reaction force and creates an improved lever arm for the abductor musculature [5–7].

Restoration of the anatomic hip centre frequently requires limb lengthening in excess of 4 cm and increases the risk of neurologic traction injury [1,8,9]. The subtrochanteric shortening osteotomy appears to be a safe and reliable procedure to restore the anatomic hip center and trochanteric rotation without neurologic injury as done in our case.

A modular Total hip replacement neck system with delta ceramic on ceramic bearing improves the long term outcome. The bearing has been used considering the age and activity level of patient and long term survival reports presents with advent of new generation of ceramic on ceramic. Survivorship of new generation alumina ceramic bearings at end of 10 years was more than metal on polyethylene bearing surfaces. These materials are biocompatible, wet-table, high-strength, provide superior lubrication and wear resistance and can yield good surface finishes [11]. Thus, the ceramic femoral head and acetabular cup may be a good choice for the younger patient in whom it seems necessary to use a larger head for stability reasons. This bearing surface has shown both good short term and long term survivorship rates with less complication rates [12,13]. Both for acetabulum and femur cementless fixation was used as it aids in getting better union at the osteotomy site and bone graft site on superior aspect of acetabulum, improves survivorship and aids in revision if required in future as the patient in young[14]. Recent studies have well shown good 6 years survival rates without any complications for Delta ceramic on ceramic bearing [15].

IV. Conclusion

Restoration of anatomical hip centre with complete containment of acetabular socket, judicious use of cement-less implant and ceramic bearing surface could provide excellent result in a case of secondary arthritis due to congenital dislocation of the hip (Crowe type IV) in a young and active patient.

Clinical message-

Adequate knowledge of distorted anatomy and restoration of normal anatomy of hip is must for treating Secondary arthritis in neglected developmental dysplasia of hip by Total hip arthroplasty. Cementless modular Total hip arthroplasty gives good results and survivorship. Moreover Even new generation Delta Ceramic on ceramic bearings which are rarely used in arthritis secondary to neglected developmental dysplasia of hip gives good clinical results and survivorship.

Conflict of Interest

None of the authors who have contributed in this case report have any conflict of interest regarding publication of this case report.

Consent-

We as authors of this case report declare that we have taken an written informed valid consent from the patient for this procedure and publication .

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Figure Legends –

Figure 1 – Antero-posterior Radiograph showing left hip Crowe type IV congenital dislocation of hip.
Figure 2 – Immediate Post operative radiograph.
Figure 3 - A 5 years Follow-up radiograph
Figures

Fig 1

Fig 2

Fig 3

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