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Uncemented hemiarthroplasty in a case of post-polio residual paralysis patient with transcervical femur fracture with dysplastic femur: A surgical technical challenge

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Abstract

Introduction: Technical difficulties in managing a case of transcervical femur fracture in post-polio residual paralysis patient with dysplastic femur.

Case Report: We present a case of a 66 year male with Post-Polio residual Paralysis walking with Hand to knee gait who sustained a transcervical Femur fracture. The difficulties faced in this case were narrow medullary canal, coxa valgus, dysplastic greater trochanter, hypoplastic lesser trochanter, Shallow acetabulum, inability to compare the length after insertion of trial implant with the opposite limb due to underdeveloped and shortened affected limb.

Conclusion: We try to emphasise on the preoperative preparations that need to be done in terms of CT scan with pre operative estimation of canal diameter, keeping a back-up of an array of implants including CDH hip stems, technique of measuring the vertical and horizontal offset before neck osteotomy and extraction of the head and recreating the offset after implantation, increased anteversion of the hip to prevent dislocation due to shallow acetabulum, and proper closure of the capsule.

Keywords: Post-polio residual paralysis, hemiarthroplasty, dysplastic hip

Introduction

Post-polio residual paralysis with transcervical femur fracture is always a challenge to manage in view of their altered muscle power and biomechanics and thereby altered geometry of the bone which is usually hypoplastic.

Our aim is to anticipate the difficulties which one might face intraoperatively while handling such a case and preparations one needs to make to have a good surgical outcome.

Case report

A 66 year old male with post-polio residual paralysis involving the right lower limb presented with history of fall sustaining injury to right hip following which the patient was unable to bear weight or walk. Radiograph of the right hip revealed trans-cervical fracture of femur with a hypoplastic right femur. Before the fall, the patient was ambulatory with hand to knee gait. On examination the right lower limb had gross wasting of the muscles due to polio with limb in attitude of external rotation. There was no neurovascular deficit.



Fig 1: Preoperative radiograph showing transcervical femur fracture with dysplastic femur

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Fig 2: Preoperative CT scan to measure the narrowest diameter of the femoral canal which was found to be 0.79 mm

Pre-operative evaluation

Pre-operative plain radiographs (fig 1) and CT scan (fig 2) was done. CT scan was used to determine the narrowest diameter of the canal of the femur and was found out to be around 8 mm in diameter. Implant for the dysplastic femur

namely CDH corail stems were kept in the array of the implants in the operation theatre. Also the challenge was to recreate the horizontal and vertical offset for the fractured femur as the limb length could not be compared to the opposite normal limb as is usually done.



Fig 3: intra-operative photograph showing the reduced femoral neck and measurement of the femoral offset



Fig 4: post operative radiograph showing well seated uncemented femoral stem



Fig 5: Six months follow up clinical photograph of patient lying down with externally rotated hip



Fig 6: Six months follow up clinical photograph showing patient standing with walker

Surgical technique

Patient was put on left lateral decubitus. Using the posterior approach incision was taken. Tensor fascia latae was split. Gluteus maximus was split. Hypoplastic short external rotators were tagged and cut. Capsule was incised in a T shaped manner.

Head was extracted out before doing neck osteotomy. The head and the neck were held in place with k wire temporarily after dislocating the hip and the vertical and horizontal offset was measured and noted (fig 3). The Aim was to recreate the same vertical and horizontal offset after implantation to maintain the pre fall tissue tension and limb length. Neck osteotomy was done and femur was broached

with increasing sizes of broaches till the trials were fitting firmly without any rotational mobility. Due to dysplastic femur size 8 Corail stem gave a perfect fit and CDH stems were not needed and the diameter matched with the measurement we got on pre-operative CT scan. Uncemented proximally HA coated stem was implanted with slightly increased anteversion after matching with the already noted vertical and horizontal offset and head of size 28 mm inner diameter and 46 mm outer diameter was inserted. Hip was reduced and was found to be stable through a wide range of movements namely flexion, extension, abduction, hyperflexion and internal rotation of up to 60 degrees. Capsule and short external rotators were sutured back.

Post operative radiograph was satisfactory with well centred implant (fig 4). Patient was made to walk post surgery and at 6 months of follow patient is doing well and continuing with his pre fall hand to knee gait without any instability (fig 5, 6).

Discussion

The femoral geometry in patients with PPRP with femoral fractures was studied in the paper Assessment of bone geometry and its considerations in implant selection for polio affected femoral fractures: An outcome analysis Dr. V Thirunarayanan *et al.* [1] and concluded that no implant is unique for surgical management of femur fractures in post-polio residual paralysis patients. Proper pre-operative evaluation and planning should be individualised for each case according to the measured femoral geometry. The best implant should be chosen and a wide array of implants should be made available during surgery to achieve good results.

Choice of implants in management of fractures in patients with post polio residual paralysis by T.Satishkumar *et al.* [2] infer that nails with smaller diameter or custom made locking compression plates give better results than conventional plates and nails.

Bilateral Uncemented Hemiarthroplasty in a patient with Bilateral Lower limb PPRP with Right Knee Arthrodesis: Surgical Difficulties and Techniques by Garg *et al.* [3] describe a technique of bilateral hemireplacement in patient with bilateral PPRP with Arthodised knee patient describes a technique using transcondylar Steinmen pin as a reference for guiding the anteversion of the femoral stem [4]. Outcome of femoral fractures in poliomyelitis patients by Gellman *et al.* conclude that polio patients femoral fractures have guarded prognosis to regain their pre-injury ambulatory status.

There is one study by Nam *et al.* [5] where they have detailed the incidence of falls in polio survivors where the incidence of a fall in one year was 68.5% and of these, 23.3% reported fractures. As per Bickerstaffe *et al.* [6], the incidence of falls in polio survivors is 73.8% in one year and 7.1% of these, sustain a fracture. Due to paralysis, asymmetric involvement and hypoplasia of the limb leads to osteoporosis and can predispose to fracture neck of femur even with trivial trauma [7].

Hemiarthroplasty in patients with post polio residual paralysis is a challenge as the femur is dysplastic and narrow and we need to anticipate the difficulties one can face intraoperatively namely

1. Keep a back up implants namely CDH implants to deal with the dysplastic femur.
2. To recreate the pre fall limb length and tissue tension

- by measuring the vertical and horizontal offset after temporarily fixing the head to the neck.
3. Recreating the same measured vertical and horizontal offset during implantation.
 4. Increased anteversion of the femoral stem to increase the stability of hip as polio patients are more prone to repeated falls.

Conclusion

Intraoperative measurement of the vertical and horizontal offset of the femur before doing a neck osteotomy and recreating the same offset during implantation gives good functional outcome. Also emphasis need to be laid on keeping the appropriate implants handy in view of the morphological variations in the femoral anatomy in polio patients and increased anteversion of the femoral stem to enhance the stability of the hip.

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