



Research Article

POLISHED STEM HEMIARTHROPLASTY FOR FRACTURE NECK OF FEMUR – INTRA OPERATIVE TECHNIQUES- A RETROSPECTIVE ANALYSIS OF OUTCOME IN 100 CASES

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ARTICLE INFO

Article History:

Received 6th January, 2021

Received in revised form 15th

February, 2021

Accepted 12th March, 2021

Published online 28th April, 2021

Key words:

AMP, Bipolar Prosthesis, Autobanking

ABSTRACT

Introduction: This retrospective study was conducted to know the outcome of polished stem hemiarthroplasty, since hydroxyapatite coated stems are costly and hence cannot be used in economically constrained scenario.

Objective: To study the outcome of polished stem hemiarthroplasty which was done in absence of the costly coated stems.

Methodology: The study was conducted from March 2014 to 2017.100 patients with fracture neck of femur were included for this study. Patients underwent hemiarthroplasty with polished stem Austin Moore's Prosthesis (AMP) or standard non-modular bipolar prosthesis or Thompsons Prosthesis. The patients were analyzed at 1 year follow up using Modified Harris Hip Score, Numerical pain rating scale, Face pain scale. Radiographs were also examined for signs of failure.

Results: There were 66 females and 34 males. Age ranged from 55 to 90 years. Mean duration of hospitalization was 6 days. Mean number of days from injury to surgery was 3 days. Mean Operative time was 55 minutes. Overall outcome was tabulated as Excellent (38 patients), Good (39 patients), Fair (16 patients) and Poor (4 patient).

Conclusion: Polished stem Hemiarthroplasty does give satisfactory results using the techniques described and can be safely used in cost constrained situations.

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INTRODUCTION

Fracture of the neck of femur is one of the most common injuries in elderly which an Orthopaedician treats. Incidence of these fractures has increased with improvement in the life expectancy.(1)

Monopolar prosthesis are for home bound and patients with low physical demands whereas bipolar prosthesis is considered in community ambulators.(2)

The results also depend on surgical techniques that are followed. It is noted that errors in technique of stem insertion are common and that may lead to early failure of the prosthesis.(3) Intra operative factors like inadequate calcar seating, insufficient femoral neck, insufficient metaphyseal fill and error in sizing the prosthesis are all associated with early prosthetic failure.(4).

Varied surgical approaches to hip are described in literature, however the Austin Moore Approach (5) was followed in this study as it is the regular approach followed in this institution.

Staheli (6) reported that selected adductor tendon release resulted in decreased dislocation rate of hemiarthroplasties in patients with spasticity.

Reports of hip pain and stem loosening led some investigators to advocate cement fixation over press fit fixation in hemiarthroplasties (7).

Between AMP and Thompsons prosthesis, AMP is popular as it distributes stress over a wide area in the proximal femur, minimizing shear stress(8). Comparable series of bipolar and monopolar prosthesis have either found that bipolar has better outcome(9,10) or no definitive disadvantage with probable benefit in younger and active patients(1).

Fenestrations in prosthesis stem supposedly help in bone ingrowth in them and give stability to prosthesis(11). However nonfenestrated polished stem non modular standard bipolar prosthesis Were Used for financial constraints in 8 and they had a good result at 1 year. There is probably no literature is available on usage of non fenestrated polished stem nonmodular standard bipolar.

While arguments exist for reduction, fixation of femoral neck fractures in younger patients(12,13) elimination of concerns over late collapse, nonunion and desire to immediately full weight bear have made hemiarthroplasty the procedure of choice in elderly(4). Hemi Arthroplasty with polished stem prosthesis is a reasonable option in economically constrained scenario.

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MATERIALS AND METHODS

This is a longitudinal retrospective study conducted with a sample size of 100, for a duration of 3 years.

Inclusion criteria

All patients with displaced fracture neck of femur aged between 55 to 90 years.

Patients unwilling for osteosynthesis after explaining them pros and cons.

Exclusion criteria - Patients with undisplaced fracture neck femur.

Patients ending up with a cemented hemiarthroplasty.

Surgical procedure with Implants used

Moore's Approach (5) was used.

Implants used included AMP[2 or 3 holes in stem, rectangular/round holes in stem ,2 different collar diameter prosthesis were used], Thompsons Prosthesis, Standard non modular Bipolar Prostheses (Fenestrated stem and Non fenestrated stem were used).No implant had any coating over stem(Polished stem prosthesis)

Surgical Techniques

Patients were operated using Moore's approach, in lateral position under anaesthesia. A 15 cm long curvilinear incision taken distally from posterior superior iliac spine to the greater trochanter. However incision was not extended beyond base of greater trochanter if the patient was lean and the fracture was less than 3 weeks old. This is because the quadratus femoris, gluteus maximus muscle insertions need not be released to internally rotate femur for prosthesis implantation. Moreover the piriformis tendon need not be released in such patients. Short external rotators were released and capsulotomy was done, following which femoral head was extracted. It is difficult to extract the femoral head from the acetabulum if the fracture neck is subcapital and non communitied. Here the neck is resected first keeping a thumbs breadth above lesser trochanter (approximately 2cm) with a saw or a nibbler to make room to extract the head .If a saw is used it is advanced forward with caution and slowly while sawing the anterior neck to prevent it from damaging the acetabulum. If nibbler is used the nibbling should essentially include only biting till bone breakage and not rotating or maneuvering it since it may break away a significant portion of calcar even up to the lesser trochanter. We left behind neck length to a little more than a thumbs breadth (approximately 2.5cm) if the patient had a neck shaft angle of more than 135 degree on the normal hip while we resected it to about 15mm in people with neck shaft angle of less than 135 degree. If excess of neck is left behind the reduction is difficult and pressure on acetabular cartilage increases. Eftakar(14) states that "pressure brought by the femoral prosthesis upon acetabular cartilage makes subsequent migration of the prosthesis inevitable".

The head is extracted using a corkscrew extractor. After gaining adequate purchase in the central portion of the femoral head, it is rotated circumferentially with the extractor till the Ligamentum Teres gives way or head is popped out using traction on the extractor and then the Ligamentum Teres is cut using scissor. The head can also be extracted by pushing it out using a curved gouge between the head and acetabulum.

However this is to be done gently since excess pressure on the acetabular rim with gouge can fracture rim especially in osteoporotic. Ligamentum Teres gets cut after the head pops out and if not it is cut off later.

The ledge of bone of the remnant neck over the medial aspect of greater trochanter is nibbled off completely in patients with good bone stock while 2-3mm of it is left behind in severe osteoporosis since the greater trochanter tends to fracture at this point during prosthesis insertion.

Extracted head size was measured and then a trial prosthesis head was inserted into the acetabulum and its free rotation inside was assessed and on a bloop suck out sound on its extraction confirmed correct size. In absence of free movement a smaller prosthesis was tried while in absence of a bloop sound a bigger prosthesis was tried. However we gave more importance to free movement than to sound and finalized head size. A larger head causes equatorial contact resulting in a tight joint with decreased motion and pain. A smaller head causes polar contact and increased stress over reduced area leading to acetabular erosion, superomedial prosthetic migration and pain.

The femur medullary canal finder is introduced and then the prosthesis is inserted after packing its fenestrations with cancellous bone obtained from femoral head and without any reaming in severe osteoporotics. After seating the prosthesis the surgeon tries to pluck the prosthesis out with his hands using moderate force to see if it comes out. If it comes out, the canal is packed with the bone from femur head and then reinserted. We did not separate cartilage from head and hence nibbled bone included both. The fenestrations in AMP were also packed with bone and then the prosthesis reinserted. If the AMP failed to be extracted with the hand it was left behind and if it still came out, it was cemented keeping the bone graft in its fenestrations and in femoral canal too. In patients with better bone stock we attempted to put the AMP after reaming only the greater trochanter till 3-4cm of proximal femur .If the AMP does not go in with every shot of gentle hammering, the AMP is removed ,canal reamed for the length of Austin Moore stem and reinserted. If still unsuccessful in seating, the femoral canal was reamed with a non-flexible solid spiral reamer .The breadth of the femur neck was measured medio-laterally and an AMP was chosen correspondingly. We have AMP in 3 different medio-lateral neck breadths --small, standard and extra-large (fig1). In spite of choosing one of the neck breadths, we still had cases of hairline fracture and opening of neck when the native neck tries to accommodate a marginally bigger size of the proximal AMP. In such cases we delayed weight bearing for about 2-4 weeks. Sometimes the terminal 2-3 mm of AMP does not sit on the neck and in such cases we realized that the problem was in the neck cut and the AMP was already well seated on the anterior neck cortex. Before realizing this we have had cases where we tried to hammer it a little more to seat it and had fractured the anterior neck. We now ignore if 2-3mm of AMP does not sit on the posterior neck and we try to drill and weaken and then nibble the anterior cortex if the AMP is prouder than 3mm on the posterior neck cortex. Access to nibble the anterior cortex is difficult especially after AMP is inserted and if quadratus and maximus insertions have not been released.

In the 'young old' population (15)we sacrificed the neck femur leaving behind 2-4mm of it from the lesser trochanter and then

inserted the fenestrated or non-fenestrated, standard non-modular polished bipolar prosthesis. In the elderly population with a remnant neck size of less than 1cm we decided to further excise it and insert a non fenestrated polished stem Thompson prosthesis if the femoral canal was wide enough to accept the thick stem of the Thompson. We cemented the prosthesis if it could be plucked out with the hand despite the femur canal being packed with head graft.

We used the fenestrated standard bipolar polished stem after packing the fenestrations with graft or a non-fenestrated polished stem standard bipolar for elderly with narrow canal with small neck remnants of <1cm of either anterior or posterior cortex or both due to fracture or comminution. We cemented the bipolar if it could be plucked out despite filling femoral canal with graft. This rarely happened since the canal was narrow and in few cases that it happened we concluded that the graft got pushed distally by the prosthesis rather than getting around it.

The femoral head was divided into half along with its cartilage and 'auto banked' (16)(fig2) in the iliac fossa between iliacus and Ilium in 'young old' patients (15) in whom it was not used as graft in femur canal.

Post Operative care

It included regular dressings, drain removal after 24hrs, long knee brace immobilization for 72 hours continuously and thereafter at night only for 2 weeks(as a preventive care against dislocation),weight bearing was allowed as per pain tolerance after 48 hours of surgery.

Assessment Tools

Modified Harris Hip score, Numerical pain rating scale(NPRS) and Face pain scale(FPS) were used to assess patients at 3,6 and 12 month post Operative intervals. The observations were tabulated.

Modified Harris Hip score was graded as,Excellent(90-100), Good (80-89), Fair(70-79), Poor(60-69) for the purpose of this study.

At 3,6 and 12 months review patients rating 0 to 5 in the pain score chart were grouped as improved while those marking 06 or above were considered as failures.

RESULTS

The Sample consisted of 100 patients, with 66 females and 34 males. Age ranged from 55 to 90 years.Mean duration of hospitalization was 6 days with range of 5 to 13 days. Mean number of days from injury to surgery was 3 days with range from 2 to 8 days .Operative time ranged from 45 minutes to 100 minutes. Overall outcome was tabulated as Excellent (38 patients), Good (39 patients), Fair (16 patients) and Poor (4 patient).(table1)(table2)

DISCUSSION

Our study comprised of 100 patients with neck fracture who underwent Hemi arthroplasty with polished stem prosthesis using the tips and tricks mentioned above. Each patient was operated using Moore's approach. Surgical outcomes were assessed clinically using Modified Harris Hip score and NPRS, radiologically for loosening (17)at 1 year review. During the study 97 patients were followed up and 3 patients in whom Thompson's was used, were lost for follow up.

During the surgical procedure, in patients where the SNUG FIT (stability of the prosthesis after insertion) was not attained in spite of following our techniques, were converted to cemented Thompsons/Non fenestrated standard Bipolar prosthesis and were not included in our study.

The main advantage of uncemented hemi-arthroplasty over cemented is avoiding complications of cementing. Complications of cementing ranges from local reactions of soft tissue damage/local burning to serious systemic complications of hypotension, pulmonary embolism and even cardiac arrest on table (cement disease).(18)

From the study we conclude that for patients above 75 years and in patients with motor vehicular accidents it is better to cement or to use a metaphyseal fill Thompson's.

The use of polished stem implants in this study is to emphasize the importance of these prosthesis in cost constrained situations where the usual coated stems (HA coated) are not regularly available in our set up.

CONCLUSION

The use of polished stem prosthesis without cementing for Hemi arthroplasties in displaced fracture neck of femur showed subjective satisfactory results at 1 year follow up.

Auto banking of excised femoral head between Iliacus muscle and Ilium for a probable future use would be a good practice in young old patients.

Both Unipolar and Bipolar prosthesis without cementing gave good results when used in conjunction with the surgical tips and tricks.

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How to cite this article:

Milind Deshpande *et al* (2021) 'Polished Stem Hemiarthroplasty For Fracture Neck of Femur – Intra Operative Techniques- A Retrospective Analysis of Outcome In 100 Cases', *International Journal of Current Advanced Research*, 10(04), pp. 24174-24177. DOI: <http://dx.doi.org/10.24327/ijcar.2021.24177.4791>
