

Original Research Article

Salvage total hip arthroplasty (THA) for failed internal fixations of proximal hip fractures

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ABSTRACT

Background: Failed proximal femoral fractures like operated transcervical neck fractures, intertrochanteric fractures and subtrochanteric fractures poses a great challenge to surgeon with limited options. Revision of failed internal fixation with hip arthroplasty, also known as Salvage THA (Total Hip Arthroplasty) is a promising surgical option in elderly patients providing early mobility and preventing age related complications.

Methods: 45 patients with failed proximal hip fractures were treated over a period of 2 year with THA with modular cemented prosthesis by southern approach.

Results: Fourty five patients were followed up for atleast 16 months with no radiological evidence of loosening and heterotrophic ossification and analyzed for pain, difficulty in walking, muscle power, range of motion of joint and functional status. The overall results were expressed in terms of Salvati-Wilson hip grading system.

Conclusions: Revision of failed internal fixation with hip arthroplasty, also known as Salvage THA (Total Hip Arthroplasty) is a promising surgical option in elderly patients providing early mobility and preventing age related complications.

Keywords: Cemented, Failed ORIF, Failed proximal hip fractures, Revision hip surgery, Replacement, Salvage THA

INTRODUCTION

Fractures of proximal femur are becoming more prevalent in elderly population and most of these patients sustain fractures of femoral neck and intertrochanteric region.¹

The failure of internal fixation methods may be due to various reasons like non-union, loss of fixation, femoral head osteonecrosis, post-traumatic arthritis, malunion, infection or symptomatic hardware.²⁻¹⁰ Simultaneous evolution of advanced methods of internal fixation of femoral neck and intertrochanteric fractures have reduced failure rates (2-3%) but in elderly and osteoporotic patients it still carries high risk of failure.^{11,12} Conversion arthroplasty in such failed fixations also known as

salvage THA appears to be the promising treatment as it allows immediate ambulation and prevention of age related complications.¹³

METHODS

We included all failures of internal fixation of intertrochanteric fractures, transcervical femoral neck fractures and failed Hemiarthroplasty with Austin Moore Prosthesis in this study. The study group included 45 patients treated over a period of 2 year with mean age at the time of revision being 60 years.

Each case was analyzed for type of complications necessitating THR, time interval to conversion, type of component used, leg length restoration, technical problem

encountered during surgery, postoperative complications and clinical outcome using Salvati-Wilson Hip Score.¹⁴ Preoperative assessment was done in view of possibility of previous infection, reason of failure of primary procedure, implant *in situ*, removal of broken/failed implant, bone preparation, placement of total hip prosthesis.

Table 1: Pre-operative data.

Type of failed fixation	Number of patients
Failed intertrochanteric fractures	21
Failed Transcervical femoral neck fractures	8
Failed Hemiarthroplasty with Austin Moore Prosthesis	15
Failed Osteotomy	1

All patients included in study were evaluated using Salvati-Wilson hip rating system (Hospital for special surgery hip rating system) which included 40 points based on pain, walking, muscle power, motion and function with score between 0 to 10. Advantage of Salvati-Wilson Hip Scoring system over other system is that, it also evaluates the muscle power along with the function of hip joint.¹⁴

Salvati-wilson hip scoring system.¹⁴

This scoring system was used at Hospital for Special Surgery, New York, and have been used in assessment of outcome following treatment of hip fractures with arthroplasty after failed internal fixations.

Pain

- 0 = Constant and unbearable. Frequent strong analgesia
- 2 = Constant but bearable. Occasional strong analgesia
- 4 = Nil or little at rest. With activities
- 6 = Little pain at rest. Pain on activity
- 8 = Occasional slight pain
- 10 = No pain

Walking

- 0 = Bedridden
- 2 = Wheelchair
- 4 = Walking frame
- 6 = One stick, limited distances up to 400 yards
- 8 = One stick, long distances
- 10 = Unaided and unrestricted

Muscle power and motion

- 0 = Ankylosis with deformity
- 2 = Ankylosis with good functional position

- 4 = Poor muscle power. Flexion <60° abduction <10°
- 6 = Fair muscle power. Flexion 60 – 90° abduction 10 – 20°
- 8 = Good muscle power. Flexion >90° abduction >20°
- 10 = Normal muscle power. Full range of movement

Function

- 0 = Bedridden
- 2 = Housebound
- 4 = Limited housework
- 6 = Most housework, can shop freely
- 8 = Very little restriction
- 10 = Normal activities

Grading of results

Score

- More than 31 = excellent,
- 16– 23 = fair,
- 24 – 31 = good
- less than 16 = poor.



Figure 1: Pre-operative x-ray of conversion THA of a failed transcervical fixation.



Figure 2: Post-operative x-ray of conversion THA of a failed transcervical fixation.

All operative procedures were done in lateral position with modified postero-lateral approach (Southern (Moore) approach) exposing the hip posteriorly. All

surgeries were done using modular cemented prosthesis (Figure 1-6). Intraoperative fluid was aspirated and sent for smear and culture sensitivity.

Few specific precaution were taken and assessment during surgeries was done regarding number and type of screws and their orientation, peri-implant osteolysis, medial displacement of neck/shaft, shortening of proximal femur, varus angulation, calcar resorption, periprosthetic stress fracture, cortical hypertrophy, severe osteoporosis, abnormal bone formation (intramedullary bone along screws), osteosclerosis, deformity and malalignment, synovial line membrane and requirement of impaction bone grafting for acetabular defects.



Figure 3: Pre-operative x-ray of conversion THA of a failed DHS fixation.



Figure 4: Post-operative x-ray of conversion THA of a failed DHS fixation.



Figure 5: Pre-operative x-ray of conversion THA of a failed austin moore prosthesis.



Figure 6: Post-operative x-ray of conversion THA of a failed austin moore prosthesis.

RESULTS

The study cohort of 45 patients were divided into 3 groups

- Group I- Failed intertrochanteric fixation
- Group II- Failed transcervical neck fracture fixation.
- Group III- Failed Hemiarthroplasty with Austin Moore prosthesis

All the patients were followed up for atleast 16 months with no radiological evidence of loosening and heterotrophic ossification.

At final follow up patient were analyzed for pain, difficulty in walking, muscle power, range of motion of joint and functional status. The overall results were expressed in terms of Salvati-Wilson hip grading system.

Table 2: Percentage improvement.

	Pre-Surgery Score	Post-Surgery Score	Percentage improvement
Group I	12(30%)	30(75%)	45%
Group II	9(28%)	37(93%)	65%
Group III	15(38%)	32(80%)	42%

*(Score of 40 is 100% of Salvati-Wilson Score and above 31 is excellent).

DISCUSSION

Vidal et al and Lord et al were the first to propose primary arthroplasty to treat trochanteric hip fractures at the end of the 1970's.^{15,16} We studied its use in failed internal fixations of intertrochanteric, subtrochanteric and transcervical femoral neck fractures. Even though the clinical results are satisfactory, hip arthroplasty following failed internal fixations remains a technical challenge to the operating surgeon.¹⁷ Structural defects and modifications of bony landmarks due to deformation and displacement of fragment combined with poor bone quality, loss of bone stock and presence of holes after removal of internal fixation hardware all encourages intraoperative mechanical complications (fracture and cortex perforations).¹⁷ Several different implants have

been used in many other studies. Zhang et al and Hernigou et al, Mehlhoff et al, Haentjens et al, Tabsh et al, Haidukewych and Berry, Hammad et al favoured use of standard cemented stem.¹⁸⁻²⁴ A long cemented or cementless long stem is helpful to bypass cortical defects and/or screw holes left at the site of failed fixation.²⁵

Every case of salvage THA is unique and surgical plan should be tailored as per preoperative assessment. In most cases there will be damage to acetabulum due to lag screw migration of previous implant, previous repeated surgical trauma and presence of weakness secondary to osteoporosis.²⁶ In these situations salvage THA is a feasible option with cemented and cementless long stem with option of bone grafting and screw fixation as per the case to case requirement. Intraoperative complications to bone and soft tissue while extracting the previous implant need to be dealt with caution. Zhang et al encountered an overall complication rate of 47% while treating intertrochanteric fractures with hip arthroplasty.²⁷

Despite advances in internal fixation methods have now lowered the percentage of failures of internal fixation, still fixation of unstable, comminuted and subtrochanteric fractures in elderly and osteoporotic patients carries high chances of failure.²⁸ In such cases salvage THA appears to be the best treatment options as it allows immediate ambulation with minimal complications.

CONCLUSION

Till date, though customized stem designs provide more options during revision of failed internal fixations but still cemented stems are widely used with promising results.

In conclusion, Salvage THA with cemented long stem is a promising solution for failed internal fixations of proximal hip fractures with slightest elevated risk of complications which suggest meticulous preoperative assessment and planning in expert hands will achieve a good functional outcome with minimal complications. Though higher level of expertise is required but definitely Salvage THA is a hope for early ambulation and prevention of DVT in cases of failed internal fixation of proximal hip fractures.

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