CASE STUDY

Total Hip Arthroplasty in Failed Hip Fractures: A Case Series

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Introduction

Osteoporosis is epidemic in Asian countries. It is a major cause of fractures that orthopaedic surgeons deal in Pakistan, though proper epidemiological data is not available. Habiba U et al found that 75.3% of post menopausal women of Pakistan were predisposed to Osteoporosis [1]; whereas Baig L has described an average T - score of -1.833 ± 0.65 on bone mineral density calculation of post menopausal females of Pakistan [2]. Osteoporotic hip fractures constitute a major cause of elderly mortality worldwide and recent figures supporting the idea that these patients have survival rates comparable to breast and thyroid cancer patients [3]. Pakistan is a developing country with large burden of hip fractures. Patients living in remote areas are the ones which suffer more because of inadequate awareness, fear of surgical treatment and lack of availability of standard treatment. These patients are dealt by surgeons of various expertise and levels of experience. Lack of facilities in hospitals is well known and usage of sub-standard implant is a major cause of failure. Therefore these patients either because of their bone fragility or mal-treatment suffer frequently from failure of hip fracture surgeries. Being in a tertiary care centre we come across these types of cases very frequently. Six to eight such cases present to outpatient department of Liaquat National Hospital every month being referred from every part of the country. These patients may have been operated once, twice or even multiple times. Special attention is required to acquire an informative history from these cases and perform a comprehensive examination. Moreover previous records and radiographs provide invaluable information regarding cause of failure and deciding course of further treatment. We herein discuss few of the cases of failure of hip fractures which were treated by hip arthroplasty.

Case Series

Case 1 (Figure 1)

59 year old female presented with left hip pain. She had an intertrochanteric fracture of left femur fixed with a Dynamic hip screw (DHS) 8 months back. Recent radiographs revealed lag screw cut out superiorly in the acetabulum. After planning and consent she received a primary cemented total hip arthroplasty after removal of DHS. At five year follow up she was still an independent walker

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without support and pain free.

Figure 1: (a) Initial post op radiographs; (b) Lag screw cut out; (c) After arthroplasty

Case 2 (Figure II)

63 year old female suffered an intertrochanteric fracture which was fixed with a DHS 16 months earlier to presentation. After 6 months of fixation she still had pain and radiologic exam revealed screw cut out. Cemented total hip arthroplasty was planned but during surgery after acetabular cup placement, there was a loss of lateral proximal femoral shaft while placement of femoral component. So surgery was converted to staged procedure. Later on with availability of revision arthroplasty equipment, she received an uncemented wagner femoral component with fibular strut graft and cancellous bone graft from posterior superior iliac spine with large head metal on metal bearing surface. At 10 months of follow up, she had no active complaints and used a cane for walking.

Figure II: (a) after fixation; (b) after 6 months of fixation; (c) after removal and debridement of first arthroplasty; (d) trial of long stem modular femoral component; (e) implant being placed; (f) implant in situ; (g) after cerclage; (h) immediate post operative radiographs; (i) at 10 months follow up.

Case 3 (Figure III)

42 year old male after a cannulated hip screw procedure for neck of femur fracture, presented with pain and inability to bear weight on affected limb 10 months after the surgery. X-rays showed improper placement of screws that further penetrated the head and tips of screws migrat-

ing superiorly to the acetabulum. He underwent an uncemented total hip replacement (uncemented stem and cup with large head metal on metal bearing surface which was in common practice at that time) and is now free of symptoms at 5th year of follow up.

Figure III: (a) (b) post cannulated hip screw images; (c) immediate post arthroplasty; (d) at 5 year follow up.

Case 4 (Figure IV)

50 year old diabetic male suffered neck of femur fracture for which he was managed conservatively in his village by a local uncertified medical practitioner for first 4 months. Later he came to an institution where he underwent cannulated hip screws which was also not able to solve the prob-

Figure IV: (a) Pre operative image; (b) after first surgery; (c) post removal of screws; (d) Austin moore and non locking plate for iatrogenic fracture; (e) antibiotic cement spacer to treat infection; (f) placement of non cemented cup and (g) femoral component; (h) immediate post operative image and (i) results after 3 years.

lem. He was bed bound for further 3 months. He changed his consulting doctor and was managed by another institution where the screws were removed at one stage and later Austin Moore hemiarthroplasty was performed along with a non locking dynamic compression plate to the lateral aspect of femur for iatrogenic fracture. With all these procedures even his primary complaint did not resolved. When he presented to our institution he had fever, an elevated CRP and white cell count and warm hip region. After thorough planning a first stage surgery was performed comprising removal of implant, surgical debridement and placement of antibiotic cement spacer. Tissue cultures revealed resistant strains of *Staphylococcus Aureus*. After appropriated treatment with antibiotics management of diabetes he was again prepared for surgery and underwent uncemented total hip arthroplasty (uncemented femoral stem and cup with large head metal on metal bearing surface). At 3 years follow up he is still clear of infection and able to walk independently.

Case 5 (Figure V)

60 year old female came with osteonecrosis of right hip which she suffered after 18 months of fixation of her right acetabulum reconstruction. She was treated with uncemented total hip arthroplasty. She was able to mobilize full weight bearing after surgery and was doing well at 4 years of follow up.

Figure V: (a) after fixation of fracture; (b) damage to head evident (c) broken screw appreciable; (d) after arthroplasty

Case 6 (Figure VI)

48 year old male came to our outpatient clinic with fever and pain in left hip. He had a Jewett nail plate for proximal femur fracture at the age of 40 years. Recent radiographs showed gross infective changes involving the proximal 1/3rd of femur. Initially the implant was taken out and handmade antibiotic cement spacer by mixing cement with 2 gram of vancomycin was placed. Cultures revealed *staphylococcus aureus*. After 6 weeks of intrave-

nous vancomycin therapy, removal of spacer was done and total hip arthroplasty was carried out with large head metal on metal bearing surface along with uncemented wagner stem supported with a fibular strut graft and cancellous bone graft from posterior superior iliac spine.

Figure VI: (a) infection evident in images; (b) after implant removal and debridement; (c) removal of necrotic bone and (d,e) placement of long stem implant; (f) after cerclage; (g) post operative x-ray and (h) follow up image after 2 years.

Case 7 (Figure VII)

Figure VII: (a) significant migration of implant; (b) removal of Austin moore; (c) placement of Burch Schneider cage; (d) after cementing and placement of cup; (e) placement of femoral stem; (f) final image before closure; (g) immediate post operative x-ray; (h) after 1 year follow up.

58 year old male received an Austin moore hemiarthroplasty after a neck of femur fracture 15 years back elsewhere. He developed pain on weight bearing 2 year before presenting to us. Radiographs showed migration of prosthesis superiorly towards the pelvic cavity. He was offered surgery and a cemented total hip with normal femoral stem and cemented acetabular component with Burch Schneider cage and bone graft was used. Follow up of 6 years is uneventful.

Case 8 (Figure VIII)

75 year old male suffered a failure of DHS for intertrochanteric fracture evident at 5 months follow up radiograph. In another institution he underwent removal of DHS and a redo fixation with locking proximal femur plate was done. 6 months later the pain increased and x-rays showing broken metal plate and osteonecrosis of femur head. With this situation he consulted our clinic. After initial workup the implant was removed and a cemented cup and a long stem uncemented modular femoral stem was used. His 4 year follow up is free of complaints and he now walks without any support.

Figure VIII: (a) injury x-ray; (b) after DHS; (c) after redo fixation; (d) implant failure; (e) broken implant being removed; (f) femoral canal prepared, long stem implant inserted after trial; (g) implant in situ; (h) post operative radiograph.

Case 9 (Figure IX)

65 year old lady presented with infected non-union of left sub trochanteric femur fracture and broken screws of a dynamic condylar screws done to fix the same. There was gross involvement of proximal femur by the infective process. After a first stage surgery of removal of implant, debridement of dead and infected tissue and placement of handmade spacer comprising vancomycin mixed with bone cement was done. Tissue cultures revealed methicillin resistant staphylococcus aureus (MRSA) sensitive to Polymyxin B. She had intravenous therapy of Polymyxin B for continuous 7 weeks after which her erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP) returned to normal. The only option left was a long uncemented modular stem and cemented acetabular cup and she underwent the same. She lost to follow up after 3 years of unremarkable recovery.

Figure IX: (a) implant with broken screw and gross bony changes; (b) femoral shaft and removal of implant and clearance; (c, d, e, f) long stem modular femoral implant inserted; (g, h) immediate post operative and 3 year follow up radiographs.

Case 10 (Figure X)

68 year old male presented with left hip pain to our clinic. He had undergone Austin moore hemiarthroplasty of the left side 1 year back while cannulated hip screw on right side 4 years back for neck of femur fractures. Upon obtaining the full length femur radiographs of left side it was noted that the tip of Austin moore prosthesis has broken inside the shaft and there was an element of protrusion as well. After proper counselling of patient regarding the condition, he underwent surgery in which extended tro-

chanteric osteotomy of the shaft was done to retrieve the broken implant and a long stem modular uncemented wagner SHR was done and osteotomy held in place with cerclage wires. At 1 year follow up this gentleman is doing well and has no complaints.

Figure X: (a) Broken Austin moore with protrusion evident; (b) implant visible after extended trochanteric osteotomy; (c) tip of implant in situ; (d) final implant position before osteotomy closure; (e) post operative x-rays.

Discussion

Hip arthroplasty after failure of hip fracture surgery is often termed as Salvage hip arthroplasty (SHA) [4]. Borderrick et al described incidence of failure of fixation as being 5% in peritrochanteric fractures, 15% in undisplaced neck of femur fractures and 41% in the displaced ones [5]. Various factors for failure of hip fracture surgeries have been defined in the literature including osteoporosis, unsatisfactory fracture reductions, choice of implant used, early post operative weight bearing and occurrence of infections. In our region we face added difficulties. At various non teaching small health care centres, there is lack of care and facilities, and usage of sub standard implants. Moreover surgeons of various levels of expertise deal with such fractures and patients are not adequately dealt by them with respect to follow up and fracture care. Most of these patients have undergone more than one surgical procedure before presentation. Pachore and Weiss both encountered patients who had undergone multiple surgical procedures with a range of 1-4 which is similar to our observation [6, 7].

A careful history from the patient and past record review may reveal an obvious cause of fixation failure. Wound healing problems during previous surgeries point out to possibility of occult infection and extra care should be taken in such cases with respect to growing cultures from tissues taken from various sites and planning definitive surgery in two stages [8, 9]. However Klatte preferred single stage procedure and observed good outcomes [10].

Weiss reported a high reoperation rate after SHA because of infection [7].

Thorough and attentive pre operative planning is also an unavoidable part of the surgical procedure when considering SHA. One must be wary to analyse the radiographs properly as it will reveal many aspects of operative planning such as quality of bone stock, previous hardware configuration, fracture status and possible hindrances in retrieval of the old and placement of the new implant. All arrangements shall be made for removal of implant including universal nail extractor and broken screw extraction set. Small cannulated reamers should also be made available as sometimes one may encounter fibrosis in the femoral canal and reaming over a guide wire may be necessary. In cases of trochanteric non-union, Pachore et al [6] has reported satisfactory results with tension band wiring whereas Petrie et al [11] has recommended a trochanteric slide technique in order to preserve abductor function and facilitate implant placement for mal-united greater trochanter. He also prefer clearance of sclerosis around screw holes with a high speed burr, so broaches may not get deviated while canal is prepared for stem insertion.

Every case of SHA is unique in its own kind and a full range of implant should be available to operating surgeon. In cases where there is no acetabular damage or cartilage wear, a bipolar hemiarthroplasty is ideal [12]. However in many cases there may be damage to acetabulum due to lag screw migration of previous implant, previous repeated surgical trauma and presence of weakness secondary to osteoporosis. In these situations a total hip arthroplasty is a feasible option either cemented or uncemented one with options of bone grafting and screw fixation as per the case requirement. Similarly collared femoral stems are preferred by many to attain adequate fixation, whereas other are advocates of well uncemented long stem modular implants that will have a stable hold in distal shaft that is mostly unaffected by the previous surgeries [11]. Haidukewych has recommended a distal insertion of long modular implant of about double the diaphyseal diameter of shaft (approximately 6 cm) in order to prevent stress riser [12]. Cerclage wires can also be used to ensure stability.

Patients undergoing SHA are affected by age, decreased mobility, osteoporosis and previous trauma by repeated surgeries. Therefore these patients tend to develop more complications. Intraoperative fractures and iatrogenic injuries to the bone and soft tissues while extracting the previous implant is a possibility. Zhang et al encountered an overall complication rate of 47% while treating intertrochanteric fractures with hip arthroplasty [13]. Co-morbidities pose an anaesthetic risk to such patients, while post operatively venous thromboembolism, infection, dislocation,

subsidence and heterotopic ossification are highly likely. Petrie encountered 5 deep wound infections out of 30 operated patients for which a further surgical debridement was carried out [11].

Finally SHA though has a good overall satisfaction rate as per patients but functional outcome varies due to various contributing factors. These include age and health status of the patient, presence of other systemic illnesses, number of previous surgical procedures undergone and if suffered from infection or not. Harris hip scores vary between Fair to Good values in multiple studies [6, 13].

Conclusion

Failed internal fixation after hip fracture is a difficult problem to deal with especially as the life expectancy of patients and associated osteoporosis is increasing in the current age. It is possible to improve their quality of life with SHA by experienced arthroplasty surgeon. Our observation also concludes that meticulous debridement and staged procedures for infected fixations of hip fractures can yield good functional outcome after hip arthroplasty with minimal chances for revision.

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