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Case Report

Interposition arthroplasty: an epochal event in a case of bilateral post burn contracture of elbow

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ABSTRACT

A 21 year old female, suffered accidental burns in April 2008 resulting in severe soft tissue contractures and bony ankylosis of both elbows. She was disabled with both nonfunctional upper extremities and reported to our center with deformity and dysfunction of both elbows for past 02 years. On evaluation her elbows were fixed in 40° flexion on right side and 30° flexion on left side. She was completely dependent on her mother for her daily activities like feeding and hygiene care, though she had acceptable wrist and hand function. She was managed with interposition arthroplasty with ipsilateral autogenous tensor fascia lata graft on both elbows. At 5 year follow-up, she has pain free elbows with functional range of motion and no neurovascular deficits. She is able to use both upper extremities for all activities of daily living. Most importantly she is independent and has taken up a job for her livelihood.

Keywords: Arthroplasty, Elbow, Fascia lata, Interposition

INTRODUCTION

Prosthetic arthroplasty has been an effective and reliable procedure in arthritic elbows with less functional demands.[1,2] However, it requires certain prerequisites like intact capsuleligamentous structures, muscular integrity, good skin and soft tissues around elbow and most importantly, no evidence of sepsis to achieve a successful outcome. The aim of any reconstructive surgery in elbow is functional restoration of motion which is painless and stable. Arthrodesis is a good option in young patients, but it is functionally very disabling.[3] In a young active patient with high demands, prosthetic replacement may not be a preferred option, instead interposition arthroplasty of a biological tissue is an attractive alternative. Here, we present an interesting case of post burn contracture of both elbows in a young female, who was severely disabled with deformity and dysfunction and was managed with bilateral interposition arthroplasty.

CASE REPORT

A 21 year old female, had an accidental burns of around 60% in April 2008 while cooking in a kitchen. She was managed with multiple surgical procedures for burns following the incident and the recovery was satisfactory except for the contractures in both elbows with split skin graft all around the elbow. Individual had sought repeated orthopaedic consultations for the disability at various hospitals in and around the locality, but was not satisfied with the options advised and was economically incompetent to afford a prosthetic replacement though was not an ideal option in this scenario. She was dependent on her mother completely for her activities of daily living like eating and hygiene care. Her mother is a manual labourer with poor economic status and was working on daily wages to support the family. So, she didn't have anybody to take care during working hours of her mother. She was totally disturbed both mentally and

physically when she reported to our center after 02 years following the injury with complaints of deformity and inability to move both the elbows. She had complete bony ankylosis of both elbows with right elbow fixed in 40° flexion and left elbow fixed in 30° flexion with nonfunctional upper extremities (Figure 1). In addition, she had contractures of the muscles of forearm which resulted in minimal wrist and finger deformities on both sides. However, she had acceptable range of motion at shoulder, wrist and hand on both sides with no distal neurovascular deficits.

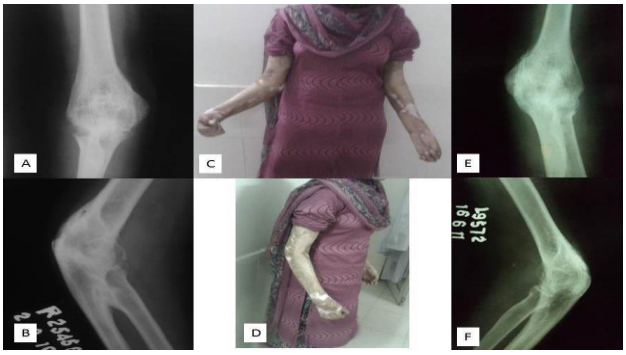

Figure 1: (A) Pre-operative radiograph of right elbow, anteroposterior view; (B) Pre-operative radiograph of right elbow, lateral view; (C) Pre-operative clinical picture, anteroposterior view; (D) Pre-operative clinical picture, lateral view; (E) Pre-operative radiograph of left elbow, anteroposterior view; (F) pre-operative radiograph of left elbow, lateral view.

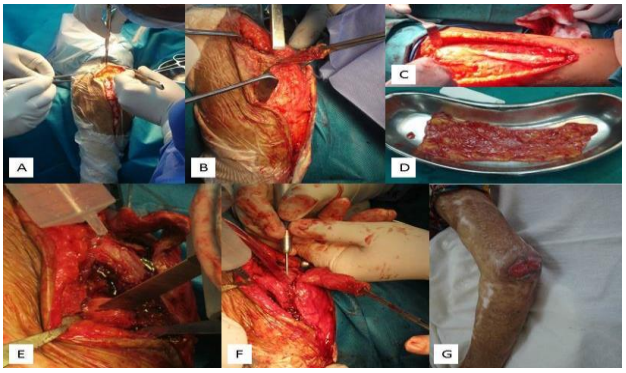

Figure 2: (A) Intra-operative photograph showing the posterior approach; (B) Intra-operative photograph showing elevation of triceps flap; (C) Intra-operative photograph showing harvest of fascia lata from ipsilateral thigh; (D) Intra-operative photograph showing harvested fascia lata from ipsilateral thigh; (E) Intra-operative photograph showing radial head excision; (F) Intra-operative photograph showing suturing of interposed fascia lata; (G) Post-operative clinical picture showing wound dehiscence on left side.

Individual was taken up for surgery through posterior approach in September 2010 on right side (Figure 2). Ulnar nerve was identified, mobilized and transposed anteriorly. As the articular cartilage was completely damaged and beyond salvage, a small amount of articular bone was removed. Care was taken not to remove excess subchondral bone. The articular surfaces were then prepared and made congruent with rongeur and burr. Adhesions were released and myositis mass along with radial head was excised. Autogenous ipsilateral tensor fascia lata graft was harvested from the thigh and was double breasted on itself. Later on the graft was sewn to the articular margins on the humerus and ulna. Stability and movements were assessed intraoperatively and found satisfactory. Wound was closed in layers with absorbable sutures. Following the surgery, the elbow was immobilized in above elbow brace for 02 weeks to enhance soft tissue healing. Subsequently gentle range of motion and stretching exercises started with a range of motion elbow brace. At around 06 weeks after the surgery, muscle strengthening exercises were advised.

Figure 3: (A) Post - operative radiograph of right elbow, anteroposterior view; (B) Post-operative clinical picture of right elbow; (C) Post-operative radiograph of right elbow, lateral view; (D) Post-operative radiograph of left elbow, anteroposterior view; (E) Post- perative clinical picture of left elbow; (F) Post - operative radiograph of left elbow, lateral view.

Post-operative period was uneventful. The same procedure was repeated on left side in July 2011. Postoperatively, wound dehiscence was noticed on left side which was subsequently managed with transposition flap cover in September 2011 by the plastic and reconstructive surgery team of this center (Figure 2G). Six months postoperatively on either side, individual started using her elbows effectively for all activities of daily living like eating and hygiene care. One year postoperatively, individual was asymptomatic and has pain free elbows on both sides (Figure 3). She had well healed operated scars on both the elbows with the range of motion of 30°-120° flexion in right and 0°- 140° flexion in the left (Figure 4). There were no distal neurovascular deficits. Most importantly, she was independent and was planning to take up a job for livelihood. Presently, at 5 year follow-up she is still asymptomatic and has taken up a job.

Figure 4: (A) Post - operative range of motion of right elbow- extension; (B) Post - operative range of motion of right elbow- flexion; (C) Post - operative range of motion of left elbow- extension; (D) Post - operative range of motion of left elbow- flexion.

DISCUSSION

In a painful arthritic elbow, interposition arthroplasty has been proposed as treatment option in the past. However, an ankylosed or stiff elbow formed the main indication for this procedure.[4] Other indication mentioned in certain studies was pain relief in an elbow with functional movement.[5,6] Interposition arthroplasty has been done in the past using various biological tissues like muscle flaps, pig bladder, fascia, fat transplants, fibrous tissue and skin. It has been used for treatment of arthritis involving various other joints including temporomandibular, shoulder, wrist, knee, and hip joints. The procedure is reported to be most successful in temporomandibular joint followed by elbow joint.

Ollier in 1882 was the first surgeon to carry out resection arthroplasty of the elbow for stiff elbows mostly of tubercular etiology.[7] It involved complete excision of distal humerus, olecranon and radial head. The main complication of this was gross instability. This led to the advent of functional arthroplasty by Hass, in which a wedge was created in distal end of humerus to provide a fulcrum for forearm articulation with limited olecranon resection.[8] Some authors rounded off the trochlea of the humerus with skin interposition. Muscle and other biological tissues were used as an interposition material subsequently. This type of arthroplasty was used mainly for post-infectious stiff elbows in earlier days; however the indications were later extended to involve rheumatoid arthritis, hemophilic arthropathy, post traumatic stiffness/ arthritis. With these extended indications, various modifications in the surgical techniques were proposed. Distraction interposition arthroplasty was one of such techniques which improved joint mobilization while allowing soft tissue healing. Cheng and Morrey have shown that nine patients had a satisfactory result after distraction interposition arthroplasty in their study of 13 patients.[9]

In our case, it was following severe burns with poor skin, soft tissue contractures and bony ankylosis. Patient was severely disabled with dysfunction and deformity. The most disheartening thing was the eating and hygiene care of the patient for which she was entirely dependent on her mother. Morrey has described an arc of 30° to 130° of elbow flexion with 100° forearm rotation (50° pronation and 50° supination) as a requirement to carry out basic tasks of daily life such as grooming, feeding and hygiene care.[10] Keeping this in mind, some form of reconstructive surgery was the necessity as she had acceptable shoulder, wrist and hand function. Prosthetic replacement was not chosen in view of her young age, poor soft tissue cover and increased risk of sepsis. Arthrodesis was not considered in view of bilateral involvement and functional impairment associated with the procedure. Hence, interposition arthroplasty was decided as the procedure of choice in this particular case. Radial head was sacrificed as in other studies, although biomechanical studies show its presence as a secondary stabilizer of elbow in valgus loading.[5,6,11-13] The outcome was excellent on long term follow-up which has changed the life of the patient from a helpless dependent state to a confident independent individual. Hence, interposition arthroplasty was truly an epochal event in the life of this patient.

CONCLUSION

Multiple procedures are available for reconstruction of ankylosed elbow joint but the choice of the correct procedure suitable to the contracture, the patient and the surgical team must be well considered to achieve optimal results. Interposition arthroplasty offers a painless, stable, mobile joint (pseudoarthrosis with synovial joint) with good prognosis and long life with a chance for revision in future in a young patient with arthritic/ankylosed elbow. As alternatives to prosthetic replacement in younger patients continue to evolve, interposition arthroplasty assumes a bigger significance in such situations.

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