



Role of screw intramedullary elastic nail fixation in mid shaft clavicle fracture

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Abstract

Background: Displaced midshaft clavicle fracture treated by surgical stabilisation. To prevent changes of nail migration we have used a screw intramedullary device in which screw head of nail get hold in medial side. The aim of the study is to analyse the role of SIMN in midshaft clavicle fracture and to observe the complications associated with this procedure

Material and Methods: The study include 20 patients (16M & 4F median age of 26.3 years, ranging from 16yrs to 60 years) who underwent and faced a displaced clavicular fracture. The follow up was of 6 months. The CMS & ASES scoring were used to determine the functional outcome of the patients

Results: 10% union was achieved. The union time was 1.3 weeks. The average CMS and ASES scoring at 6 month was 93.60 & 94.65 respectively. 1 patient had medial nail protrusion and required nail removal after union.

Conclusion: SIMN is safe and simple minimal invasive technique with minimal complications and have good patient satisfaction. And provide excellent cosmetics and functional outcome.

Keywords: screw intramedullary elastic nailing, CMS, ASES, midshaft clavicle fracture

Introduction

Clavicle fractures are common and comprise 2.6 to 4% of all adult Fractures and account for 35% of injuries to the shoulder girdle ^[1]. The most Common site of fracture in the clavicle occurs at the middle third which accounts for almost 80% of all clavicle fractures. Annual incidence Varies between 29 and 64 per 100000 population. Traditional view that all clavicle fractures heal with good functional outcome no longer holds good.

Clavicle fractures are commonly seen in young adult. In young adults they usually occur as a result of high velocity trauma and often have associated injuries. Various treatment modalities exist for dealing with clavicle shaft fractures. Treatment options include both operative and non-operative options. However, the optimal treatment for displaced Clavicle shaft fractures remains a controversial and widely debated.

Older studies suggested that a fracture of the shaft of the clavicle, even when significantly displaced, was an essentially benign injury with An inherently good prognosis when treated non operatively ^[4]. Conservative treatment of displaced and shortened fractures has been followed by non-union and malunion rates as high as 15%, with associated morbidity ^[5, 6]. The different treatment options for displaced and shortened clavicle shaft fractures can be categorized as extramedullary and intramedullary. Although both modalities are effective, each is associated with different complications and limitations. Patients treated with the extramedullary technique (plating) can have a prominent painful subcutaneous plate and screws ^[7, 8]. Whereas, intramedullary devices can migrate and there can be soft- tissue irritation at their insertion site ^[9, 10, 11]. device failure has been reported with both techniques ^[12]. Potential advantages of intramedullary nailing are smaller surgical scars and thus potentially better cosmetic results as well as the possibility of preserving the vascularity to the bone.

Material and Methods

This study was conducted on 20 cases with Displaced Midshaft Clavicle Fracture between 15 to 60 years of age, treated at our Centre. All the patients with neglected injury, pathological fracture or other associated injuries, psychiatric disorders, neurological disorders were excluded.

Inclusion criteria

- Age between 15 year to 60 year
- Middle third clavicle fracture
- No Contact between fracture fragments
- Duration of fracture within 10 days

Exclusion criteria

- Ipsilateral limb fractures.

- Delayed presentation > 10 days
- Grossly comminuted fractures.
- Pre-existing shoulder pathology.

Implant Specifications

Screw intramedullary nail is available in different diameters (2mm to 3.5mm) and lengths (120mm to 150mm). The nails are manufactured by K-AIMS ORTHO implants, Mumbai, Maharashtra, India. The unique feature of the nail is because of its beveled tip and threaded head, it allows the self-cutting thread to be advanced and screwed in with screwdriver. The advantage of this nailing to decrease the incidence of complications associated with other nailing.

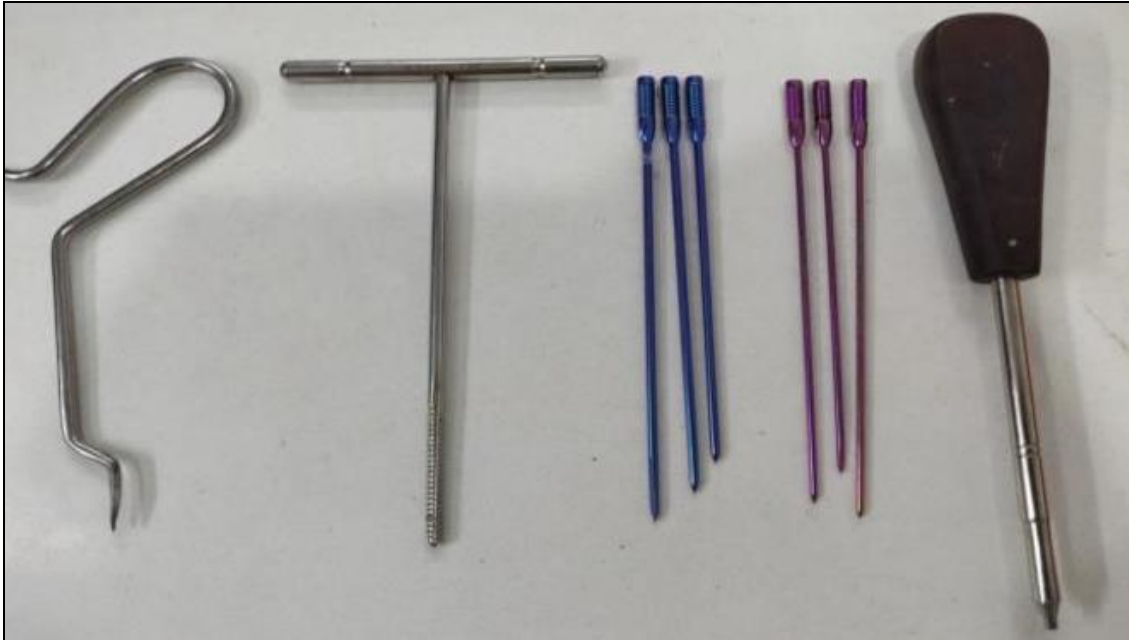


Fig 1: Awl, Tap, Nail, Screwdriver

Operative Procedure

Surgery was carried out under interscalene block or general Anesthesia. Affected shoulder was elevated by a bolster so that clavicle becomes more prominent. The procedure was performed under fluoroscopic guidance.

- A 1 cm skin incision was made over the medial end of clavicle.
- The insertion point was made approximately 1 cm lateral to the Sternoclavicular joint.
- The entry portal was made with a curved awl.
- The reaming of canal widening was done with sequential reamer and then an elastic nail was inserted in the medullary canal of Clavicle till the fracture site.
- Fracture reduced with close or mini open reduction.
- After reduction nail negotiated in lateral fragment.
- Finally, screwing the nail into metaphyseal region with the help of 3.5 mm size of screw driver.
- Wash and closed the incised wound.



Fig 2: Pre-op



Fig 3: Immediate post-op



Fig 4: 15 days post-op



Fig 5: 1 month post-op



Fig 6: 3 month post-op



Fig 7: 6 month post-op



Fig 8-9: Assessing functional outcome

Post-operative care

- Arm pouch support was given to the patient
- Rest and ice fomentation

- Pendulum exercise is started from the first day
- Skin sutures was removed from the fifteenth day

Results

In our study of 20 patients (16 Males & 4 Females) with Midshaft Clavicle fracture, the mean age found was 26.6 ± 7.4 years with right side preponderance. The average duration of stay being less than 3 days. 12 patient required mini-open reduction. The mean union time was 1.3 weeks. The mean CMS at 1 month was 64.25, at 3 month was 77.85 and at 6 months it was 93.60. The mean ASES score at 1 month postoperatively was 66.05, at 3 month was 79.95 and at 6 months it was 94.65. One case was met with a complication of nail protrusion at 3 month follow-up.

Discussions

The treatment of mid shaft clavicle fracture has been debatable since long. The most common mode of treatment is conservative. However the common complications associated with conservative treatment are shortening of clavicle, non-cosmetic bump at the base of the neck, and functional impairment of the shoulder^[13]. In displaced midshaft clavicle fractures commonly used operative treatment options include plating and intramedullary nailing. A variety of plates are available including Anatomical plate but surgical site infection, hypertrophic scar, prominent hardware, second surgery for plate removal, and cutaneous hypoesthesia and painful neuroma are the usual outcomes associated with plate^[13]. As compare to plating, intramedullary nailing act as an internal splint, can be done with smaller incision, associated with soft tissue dissection, is a safe method, and cosmetically much superior. But nail breakage and medial migration are common complication associated with nailing.¹³ Current study and available literature suggests that male predominance is due to their more exposure to outdoor injuries and more common in young population owing to more physical and outdoor works. When larger diameter nails were used, it was observed that flexibility was reduced and manipulation by close insertion was difficult. After 1-2 gentle attempts of close reduction we use the mini open approach as rigorous reduction maneuver might leads to neurovascular injury In Mueller *et al* reported major complications were superficial skin infection in one case, medial migration in seven cases, lateral migration in one case, breakage of nail in two cases and eight cases had keloid^[14]. Frigge *et al*. have shown in their studies seven medial perforations seven lateral perforations, one nail breakage, one nail dislocation, and seven hardware irritations^[15] In the similar study by Gadegone, Lokhande, 3 cases had medial nail protrusion and delayed union was observed in 5 cases^[13]. In our study all patient united within 10-12 weeks. Nail was removed in only one case due to medial nail protrusion. Lateral cortex perforation, non-union, post op nail breakage, CPRS, neurovascular problems were not observed in our study. SIMN prevent medial migration and shortening because nail is screwed into the metaphysis.

In our study the functional results were evaluated by constant Murley score (CMS) and American shoulder elbow surgeon score (ASES). Mean CMS score increased from 64.25 ± 2.88 at 1 month to 93.6 ± 2.06 at 6 months which showed a significant increase in total CMS score ($P=0.0001$). Mean ASES score increased from 66.05 ± 2.26 at 1 month to 94.95 ± 2.87 at 6 months which showed a significant increase in total ASES score ($P= 0.0001$). In our study sample size was short and not compared with any other treatment modalities therefore these are the shortcomings of our study.

Conclusions

Screw intramedullary elastic nail is excellent modality of treatment for displaced midshaft clavicle fracture. The procedure provides stable fixation as compared to routine intramedullary nailing. Rate of complications is much less as compared to other available modalities. Return to normal function is facilitated by early rehabilitation measures.

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