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ORIGINAL RESEARCH

Study Of Functional And Radiological Outcome Of Fracture of Displaced Clavicle Shaft Treated With Intramedullary Nailing At Tertiary Care Centre

[1]Dr. Mrityunjay Pravesh Sharma, [2]Dr. Aayushi Kurmi, [3]Dr. Rajesh K. Ambulgekar, [4]Dr. Ayush Kurmi

[1]Ex-Junior Resident, Dr. SCGMC, Vishnupuri, Nanded, Maharashtra, India
[2]Junior Resident, General Surgery, NIMS University, Jaipur, Rajasthan, India
[3]Professor and HOD, Department of Orthopaedics, Dr. SCGMC, Vishnupuri, Nanded, Maharashtra, India
[4]MBBS(VMMC and SJH, New Delhi), India

Corresponding Author
Dr. Mrityunjay Pravesh Sharma
Ex-Junior Resident, Dr. SCGMC, Vishnupuri, Nanded, Maharashtra, India
Email: drmj8929@gmail.com

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ABSTRACT
Clavicle shaft fractures are common fractures. This study was conducted to learn functional outcome of these fractures managed with open reduction and intramedullary TENS nailing . In this study we have total 15 adult patient included. detail history and clinical finding are confirmed and noted. after surgery patient followed on 1st, 3rd and 6th month for their radiological and functional outcome assessment.

Keywords: Clavicle nailing, Clavicle shaft fracture, Clavicle intramedullary TENS nailing, Clavicle fracture, Open reduction and internal fixation of clavicle, clavicle functional outcome, radiological outcome,

INTRODUCTION

The clavicle or collar bone acts as a strut to place the scapula laterally, so that the upper limb can swing clearly from side of trunk[56,57.58]. It transmits the forces from the upper limb through the coracoclavicular ligament and medial thirds of the bone to axial skeleton[67]. Concave posterior surface of the medial two thirds of the clavicle protects the neuro vascular structures of the root of the neck[68]. It helps in various scapular movements and performs axial rotation around its long axis during elevation of arm above the head[2].

Mechanism[2]:- Fall on the shoulder is the most common cause for the fractures of the middle shaft fractures of the clavicle[3]. It can occur in many ways such as fall from a vehicle or during a sports event . Most of the fractures of clavicle occur at mid third region because it is the narrowest portion and soft tissue coverings are little[4] Clavicle fractures are common in children and young adults commonly occurring in persons younger than 25 years[6]. Clavicle becomes the most common site of injury because of its subcutaneous superficial location, thin midshaft, and the forces transmitted across it[26]. Clavicle fractures comprise about 30 -40% of all shoulder girdle injuries(1). Midshaft clavicular fractures accounts for 80-85% of them(2) Traditional view that all clavicle fractures heal with good functional outcome no longer holds good(3). Midclavicular fractures are generally managed conservatively, e.g. with a figure-of-eight-bandage, clavuclar brace or various splints. Imminent perforation of the skin, impending or existing neurovascular compromise and the floating shoulder and gross displacement of fracture fragments were absolute indications for operative treatment[10].

Patient may tilt their head towards the affected side of injury to relax the trapezius muscle. By gravity and pull of pectoralis minor muscle the affected arm droops downwards and forwards[14]. Marked displacement of fracture fragments may produce tenting of the skin[11]. Examination shows tenderness at the fracture site. Gentle manipulation usually produces crepitus. Movements of the shoulder will be painful in all directions[22].

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In our study, clavicle shaft fracture ,with Allmans classification being used and treated with open reduction and internal fixation with Intramedullay TENS nailing. Various publications[49,50,51,52,53,54] has described the technique of osteosynthesis using Elastic stable intramedullary nails (ESIN) with early functional recovery and rapid return to daily activities and low complication rate have been reported as advantages and also our study gives stable anatomical reduction with good to excellent functional outcome.

AIMS AND OBJECTIVES

To Study the outcome of Radiological Union of fracture of clavicle shaft treated with intramedullary TENS nailing

To study the functional outcome of fracture of clavicle shaft treated with intramedullary TENS nailing

Methodology

After obtaining approval from the institutional ethics committee and with a written informed consent from the patients & relatives, between 01/01/2020 to 30/06/2021 (18 months), 15 cases of fractures involving clavicle diaphysis in adults were treated surgically with open reduction and intramedullary nailing clavicle shaft fracture, were included in the study. The study is a type of prospective observational study done over a period of 18 months with short term follow up done at a tertiary health care centre, with the data being collected from the patients admitted under the orthopaedic wards and trauma intensive care units of the health care centre.

Inclusion criteria

- Displaced clavicular fractures
- The range of age were 18-60 years old
- Medically fit for surgery with no associated chest ,abdomen or any severe injury

Exclusion criteria

- Combined with injuries of blood vessels or nerves
- Associated with serious co-morbidities
- Open fractures
- Fractures due to malignancy
- Medical contraindication to surgery
- Patients less than 18 years of age
- Stable fractures.

Statistical analysis

Following the above procedure, the findings will be recorded in the proforma. These findings will be entered in Microsoft Excel. The results will be compiled by using suitable tables and graphs wherever necessary. The variations will be analysed as a percentage of the total and reported. Data analysis will be done with the help of appropriate software version.

Quantitative data will be presented with the help of mean, standard deviation, median. Qualitative data will be represented with frequency and percentage tables.

MATERIALS AND METHODS

Study design: Prospective observational study

Study area: Tertiary care centre.

Study population: All patients Of Displaced clavicle shaft Fracture In adults undergoing surgery at tertiary care centre.

Sample size: All patients Of Displaced clavicle shaft Fracture In adults undergoing surgery at tertiary care centre during January 2020 to June 2021 at tertiary care centre.

Study duration: 18 months

Surgical Procedure:

Operative Technique:

Patient positioning and operating room preparation:

The patient was placed supine in beach chair position on a radiolucent Operating room table with the C arm coming in from the opposite side. The surgeon and assistant stand on the side of the affected limb.

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Surgical exposure

- A small incision of 2-3 cm is taken on the anterosuperior aspect of clavicle over fracture site

- Soft tissue dissection is done using blunt instruments.
- Small scissors or a surgical clip and small retractors were used to dissect to the bone under direct vision.
- Fracture site is visualized, fractures edges are freshened and through wash given.
- Lateral fragment of clavicle is elevated by holding with blunt instruments like Babcocks forceps. Canal of clavicle is drilled with 2.7mm drill bitt.
- Drilling is proceeded till posterior aspect of lateral end of clavicle is pierced and then stab incision is taken over posterior aspect of shoulder where drill bit is protruding

- Drill bit is passed through skin. Then Appropriate sized TENS nail with straight tip is inserted through the reamed canal of lateral shaft of clavicle and is brought out till the fracture site under vision.

- The position of TENS nail is confirmed under C-arm image intensifier. Fracture ends of clavicle is reduced by bone holding forceps under vision and TENS nail is proceeded to cross the fracture site

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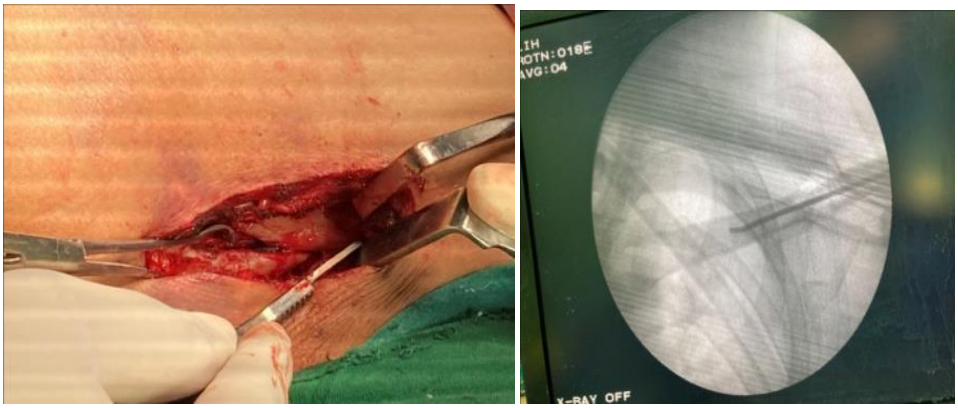

- Again the position of TENS nail and fracture reduction is confirmed under C-arm image intensifier.
- After acceptable reduction is confirmed, lateral end of TENS nail is cut using Jumbo Cutter and tip of the nail is buried. Through wash is given again and closure is done in layers
- Compression dressing is applied and patient is given sling in post operative period.

Post operatively

- All patients were given prophylactic antibiotics pre-operatively and post operatively for 7days.
- Suture removal was done on post-operative day 12 to14.
- patients were advised not to lift any heavy object for 6 weeks. At that time, passive exercises were started with sling
- Radiological and functional examination was done on 1st, 3rd& 5th month review for first 6 months and third monthly thereafter.

RESULTS

- The mean age of the patient in this study was 35.93years.
- Males dominated in our study group forming 86.66 % of the whole whereas females formed 13.34%.
- Road Traffic accident was most common cause of trauma and right-side trauma more than leftside.
- Middle third fracture was common than other type of fractures.
- Most of the patients came after 2 to 3 days after trauma.
- Mean duration of surgery was 75 minutes.
- Anatomical reduction (73.33%) was more than acceptable (26.67%) reduction.
- Better functional and cosmetic outcome with minimal complications is achieved with internal fixation with nail system.

The main advantages of intramedullary nailing include maintenance of reduction, provision of an inexpensive, minimally invasive, relatively easy application, protection of bone alignment by three-point contact, acceleration of bridging callus formation through micro movements at the fracture site, and thus contribution to rapid bony healing.

Intramedullary fixation materials include Kirschner-wires, Rush nail,and elastic titanium nails, the clinical setting, titanium is being used more often than stainless steel because of the elastic properties which allow for improved insertion and rotation but it may be expensive and not easily available in many hospitals in rural set up.

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CASE ILLUSTRATION

CASE - I

Pre-op X-ray **3 months Post-op X-ray**

AP view **AP view**

Follow up at 9 months

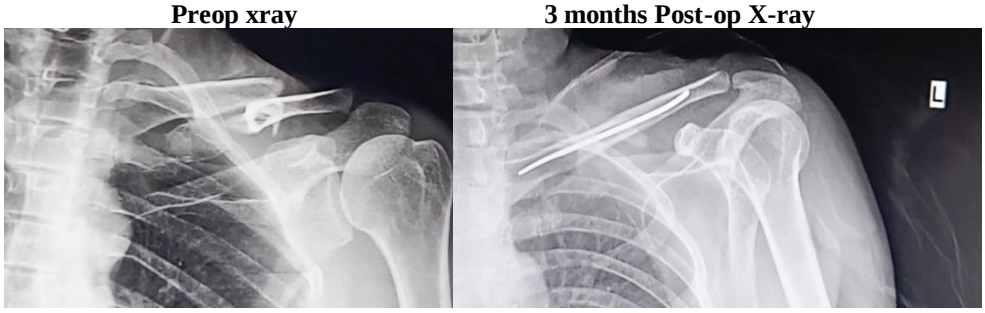
AP view

Full Range of Motion

AP view

CASE II

Preop xray **3 months Post-op X-ray**



AP view **Ap view**

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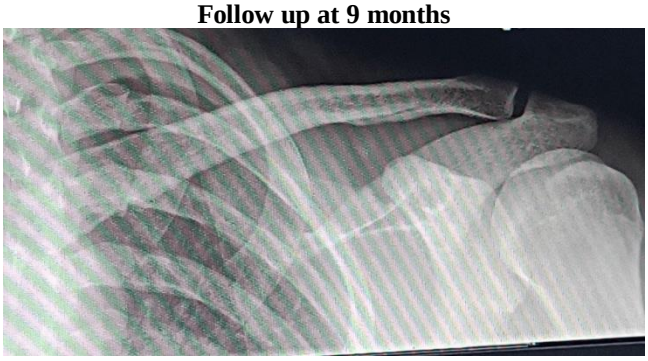
Follow up at 9 months



AP view

Full Range of Motion

CONCLUSION

The present study concludes that accurate anatomical reduction, rigid fixation with restoration of articular congruity and early surgical fixation of clavicle shaft fracture results in good functional and radiological outcome. The clavicular intramedullary fixation with TENS nail is one of the method of choice which can be considered for fixation of displaced midshaft clavicle fracture which gives stable anatomical reduction with good to excellent functional outcome. From this study, we recommend the use of minimally invasive TENS (titanium elastic nail) for fixation of displaced midshaft clavicle fractures in view of faster fracture union, earlier rehabilitation, lesser morbidity, easier implant removal and fewer complications.

We recommend that further studies should be done on a larger scale in a population based setting for longer duration of follow up.

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