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GHAI JOINT SPARING DUAL INTRAMEDULLARY K-WIRES TECHNIQUE FOR MANAGEMENT OF METACARPEL AND PHALANGEAL FRACTURES

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ABSTRACT Hand fractures are amongst the most common fractures in the skeletal system. Too often these fractures are considered as minor and trivial injuries and are allocated for treatment to the junior most resident resulting in major disabilities. Proper preoperative planning, surgical intervention whenever needed, selection of appropriate anaesthesia and application of the principle of biological fixation, rigid enough to allow early mobilization are all very important for a good functional outcome. The hand fractures are equally or more worthy of expertise as major extremity trauma are, and the final outcome depends upon the fracture personality, appropriate and timely intervention followed by proper rehabilitation. The present study is a prospective study undertaken to evaluate the functional outcome of joint sparing surgical stabilization by double intramedullary K wires in metacarpals and phalanges. **Material And Methods:** The present study was done in department of orthopaedics Govt. Medical College, Amritsar. The study consisted of a total of 25 cases. An adult case of either sex of age 20 and above was included in the study. **Results:** Final evaluation of patients was done at six months by calculating Total Active range of Motion (TAM) as suggested by the American Society For Surgery of Hand (ASSH). In the present study 23 cases (92%) were having result good to excellent. 2 cases (8%) were having fair results and none of the cases had poor results. Discharge was the most common associated complication in this study. It was present in 20% of cases followed by stiffness present in 16% of cases. There was no case of non union and implant failure in present study. **Conclusion:** This technique represents a safe and effective treatment option for metacarpal and phalangeal fractures of hand and provides maximum functional recovery with minimal complication rate because in contrast to other methods it does not disturb the tendons gliding on their diaphyseal beds intimately enveloping the tubular skeleton of the phalanges and are the ultimate determinants of functional outcome after skeletal trauma.

KEYWORDS : Metacarpal fractures, dual intra-medullary K-wires, Ghai joint spring technique, phalangeal fractures.

INTRODUCTION

The hand is a human being's most exquisite organ of direct interaction with the surrounding universe. It allows the ability to grasp, and differentiated from other animals by an opposing thumb. The main functions include both fine and gross motor skills as well as being a key tool for sensing and understanding the immediate surroundings.

Hand fractures are the most common fractures presenting at emergency and within orthopaedic clinics. Fractures of metacarpals and phalanges constitute between 14-28% of all visits to the emergency department[1]. Fractures of the metacarpal are the most common of hand fractures accounting for up to 40% and are usually the injury described as 'a broken hand' by the general public[2]. Insufficient/over-treatment leads to stiffness and deformities in the hand which further leads to poor outcome of the hand[3].

Non-thumb metacarpals account for 88% of all metacarpal fractures with 5th finger most commonly involved[4]. Too often these metacarpal fractures are neglected or treated as minor injuries and results in major disability and deformity with permanent disability and handicap[5,6]. Healing of the fractures of the hand is not only a prime consideration but the functional outcome is of paramount importance[7].

MATERIALS AND METHODS

The present study involves management of metacarpal and phalangeal fractures of hand by Ghai's joint sparing dual intramedullary K wires technique. This study was undertaken to evaluate the functional outcome of surgical stabilization by Ghai's joint sparing dual intramedullary K wires technique in metacarpals and phalangeal fractues.

The study consisted of a total of 25 cases. An adult case of either sex of age 20 and above was included in the study. An informed written consent of the patient was obtained before inclusion in the study As the hand injury may be associated with multiple injuries, so the cases were assessed clinically, resuscitated (if required) and treated accordingly.

Injured hand was x rayed (AP and OBLIQUE views) to know the type and location of fracture. The fractures were than classified according to the OTA classification.

Technique

A curved track was made on either side of bone with 2.5mm curved K-wire. The location of the track was decided depending on the site of fracture. In metacarpal fractures, two 1.5mm k wires with their tips curved as per the curve of 2.5mm curved K-wire were inserted through these tracks on both sides of the bone and were advanced into the medullary cavity till the end of the medullary canal (sub-chondral bone) across the fracture site under x ray control. The fracture was not opened and was stabilized with the K-wires that were introduced under x ray control. For phalanges, 1.2mm k wires were used. While advancing the wires were rotated so that their tips engage different quadrants from within, thus providing rotational stability. K-wires were cut as close to the skin surface and buried under the skin to avoid pulling out and pin tract infection. Postoperatively light bandage was given. No external immobilization was used. Active and passive movements were started immediately and patients were examined after every week for six weeks.

RESULTS

Evaluation of the result was done according to the Strickland's System as excellent, good, and fair or poor based on TAM score. In the present study 23 cases (92%) were having result good to excellent. 2 cases (8%) were having fair results and none of the cases had poor results.

- Most of the patients i.e. 13 out of 25 (52%) were of the younger age group of 31-50 years[8,9].
- Males were more commonly involved as compared to females in this study with a ratio of 3:1[8].
- Right hand (60%) was more involved as compared to left hand (40%)[10].
- Majority of the patients had injury due to road side accidents (60% cases) followed by assault (28%) and sports injury (12%)[11].
- In this series, phalangeal fractures (68%) outnumbered metacarpal fractures (32%).
- 12 patients (48%) sustained associated injuries out of which 2 (8%) had tendon injury along with the fracture.

- Most of the fractures united with average period of 7.68 wks.
- Discharge was the most common associated complication in this study. It was present in 20% of cases followed by stiffness present in 16% of cases. There was no case of non union and implant failure in present study.
- None of the fractures lost reduction originally obtained in the operation theatre.
- Cutting the nails flush with the bone avoided soft tissue tethering.

Showing Fracure Type According To Ota Classification

OTA Class		No. of cases	Percentage
78-A		11	44.0
	A-1.1	02	08.0
	A-2.2	01	04.0
	A-2.3	02	08.0
	A-3.1	05	20.0
	A-3.2	01	04.0
78-B		06	24.0
	B-2.1	01	04.0
	B-2.2	03	12.0
	B-2.3	02	08.0
78		17	68.0
77-A		06	24.0
	A-1.1	01	04.0
	A-3.1	03	12.0
	A-3.2	02	08.0
77-B		02	08.0
	B-2.2	02	08.0
77		08	32.0
Total	25	100.0	

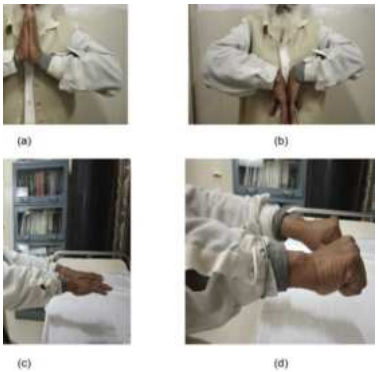
Showing Complications

Type of complication	No. of cases	Percentage
Swelling	2	8
Discharge	5	20
Stiffness at joints	4	16
Delayed union	2	8
TOTAL	13	52

Fig. 1. PRE operative x-ray

Fig. 2. POST operative x-ray

Fig. 3. X-Ray showing union at 8 weeks



(a) (b) (c) (d)

Range of motion (a)dorsiflexion at carpometa carpal joint (b) palmar flexion at carpometa carpal joint (c) extension at mcp joint, pip joint and dip joint (d) flexion at mcp, pip and dip joint

DISCUSSION

Hand being the third eye of the body, when injured it needs a multidisciplinary approach from the beginning. Though the surgeon's work appears to be of paramount importance in the early phase, the contribution from anaesthetist, physiotherapist, occupational therapist, orthotist and above all a highly motivated patient cannot be overemphasized. The management of skeletal injuries of the hand is a fine balancing act between mobility and stability on one hand and stiffness and adhesions on the other, and the surgeon as the leader of the team should modulate within his limits to tilt the balance in favor of mobility. Though open reduction/close reduction and internal fixation with single K-wire12 is one of the treatment modalities in unstable fractures yet they provide less rigid fixation and with no rotational stability, leading to more stiffness and the pin tract infections as K-wire was kept outside of the skin.

The evaluation of results was done on the basis of TAM score at 6 months post-op. The result was labelled as excellent, good, and fair or poor based on TAM score. In the present study 23 cases (92%) were having result good to excellent. 2 cases (8%) were having fair results and none of the cases had poor results. However the results of this study are in contrast to some previous studies which have showed excellent results in all the patients.

	Excellent (%)	Good (%)	Fair (%)	Poor (%)
Present study	52(13 cases)	40(10 cases)	8(2 cases)	0
Belsky et al	61	29	-	10

CONCLUSION:

- This method being closed pinning offers biological advantages such as preservation of soft tissue and fracture hematoma and no periosteal stripping.
- This method uses dual pinning which increases the rotational stability of the fixed fragments.
- This method being joint sparing in nature also helps in early mobilization and exercises and so good functional outcome have been obtained.
- This method can be performed as a day care procedure thus reducing the hospital stay and cost.
- No surgical incisions given with surgical blade, so no stitches and no stitch scar marks on the hand after the procedure.
- No drill utilization for preparing the entry.
- After surgery, the functional status of hand can be improved with physiotherapy.
- This technique represents a safe and effective treatment option for metacarpal and phalangeal fractures of hand.
- This technique provides maximum functional recovery with minimal complication rate.
- This technique is not recommended for intra-articular fractures and those with extensive comminution.

Our study has demerits in that few patient numbers are involved; however we have highlighted the merits of a very simple technique that saves operative time, adequately stabilizes the metacarpal and phalangeal fracture, promotes early mobilization, fewer complication rates and obtains a satisfactory outcome in the majority of patients. Larger, prospective studies may be required to validate the technique.

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