

K-wire fixation and clavicular hook plate fixation in the treatment of unstable fractures of the distal clavicle

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ABSTRACT:

Background: Unstable fracture of the distal clavicle is usually accepted as an indication for surgical treatment. The present study was conducted to compare K-wire fixation and clavicular hook plate fixation in the treatment of unstable fractures of the distal clavicle.

Materials & Methods: 68 fractures of the distal clavicle patients of either gender were classified into batches of 2 containing 34 patients each. Group I patients were treated with K-wire fixation and group II with clavicular hook plate fixation. Shoulder function was evaluated with the Constant-Murley scoring system.

Results: In group I and group II, mode of trauma was RTA in 15 and 18, fall in 12 and 10, sports injury in 7 and 6, side affected was dominant in 25 and 22 and non-dominant in 9 and 12. Associated injuries were present in 14 and 16 and absent in 20 and 18. The mean L'Insalata score in group I patients was 90 and in group II was 91, constant score was 85 in group I and 89 in group II. Complications found were infection in 4 in group I and 2 in group II, loss of reduction 2 in group I and 1 in group II and non-union 1 in group I. The difference was significant ($P < 0.05$).

Conclusion: Management of distal clavicular fractures with clavicular hook plate found to be better as compared to K-wire fixation.

Key words: Clavicular hook plate, Distal clavicular fractures, K-wire fixation

I. INTRODUCTION

Clavicle fractures constitute 5 to 10 percent of all fractures. Most occur in men younger than 25 years; however, they are also more common in men older than 55 and in women older than 75.¹ The anatomic site of the fracture is typically described using the Allman classification, which divides the clavicle into thirds. Group I (midshaft) fractures occur on the middle third of the clavicle, group II fractures on the lateral (distal) third, and group III fractures on the medial (proximal) third.² Midshaft fractures account for approximately 75 to 80 percent of all clavicle fractures and typically occur in younger persons. Distal third fractures represent about 15 to 25 percent of clavicle fractures. Medial third fractures are least common, accounting for less than 5 percent of clavicle fractures.³

It has been reported that fractures of the clavicle account for approximately 2.6% of all fractures. Incidence in males is usually highest in second and third decade which decreases thereafter as per age. In females, it is usually bimodal, with peak incidence in young and elderly.⁴ Unstable fracture of the distal clavicle (Neer 2) is usually accepted as an indication for surgical treatment. Several methods have been proposed and the

commonest probably being trans- or extra-articular K-wire fixation but this carries a considerable risk of complications, especially migration of the pin and loss of reduction.⁵ Plate fixation is insecure, because the distal fragment is usually small and the metaphyseal bone soft. Therefore, a hooked plate with an extension under the acromion has been developed to give more stable fixation.⁶The present study was conducted to compare K-wire fixation and clavicular hook plate fixation in the treatment of unstable fractures of the distal clavicle.

II. Materials & Methods

This study comprised of 68 fractures of the distal clavicle patients of either gender. They were made aware of the purpose of present study and were convinced for the participation with their written consent.

Randomization of patients using simple random sampling was followed. Patients were classified into batches of 2 containing 34 patients each. Group I patients were treated with K-wire fixation and group II with clavicular hook plate fixation. Shoulder symptoms were assessed using self- administered questionnaires, devised by L’Insalata et al. Shoulder function was evaluated with the Constant-Murley scoring system. Complication of each modality was also assessed and recorded. Mann Whitney U test was applied for correct inference where p value <0.05 was considered significant.

III. Results

Table I Patient distribution

Groups	Group I	Group II
Method	K-wire fixation	Clavicular hook plate fixation
M:F	20:14	16:18

Table I shows that group I had 20 males and 14 females and group II had 16 males and 18 females.

Table II Assessment of parameters

Parameters	Variables	Group I	Group II	P value
Mode of trauma	RTA	15	18	0.05
	Fall	12	10	
	Sports injury	7	6	
Side affected	Dominant	25	22	0.04
	Non- dominant	9	12	
Associated injuries	Present	14	16	0.81
	Absent	20	18	

Table II, graph I shows that in group I and group II, mode of trauma was RTA in 15 and 18, fall in 12 and 10, sports injury in 7 and 6, side affected was dominant in 25 and 22 and non- dominant in 9 and 12. Associated injuries were present in 14 and 16 and absent in 20 and 18. The difference was significant (P< 0.05).

Graph I: Assessment of parameters

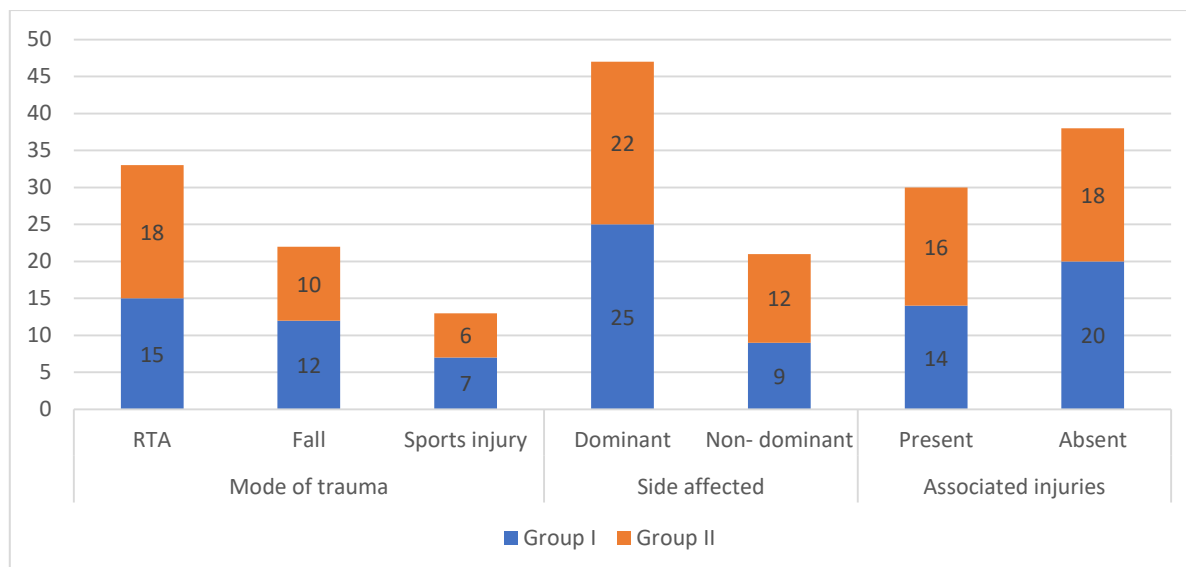


Table III Comparison of score and complications

Parameters	Group I	Group II	P value
L' Insalata score	90	91	0.91
Constant score	85	89	0.94
Infection	4	2	0.02
Loss of reduction	2	1	0.05
Non- union	1	0	0.04

Table III shows that mean L' Insalata score in group I patients was 90 and in group II was 91, constant score was 85 in group I and 89 in group II. Complications found were infection in 4 in group I and 2 in group II, loss of reduction 2 in group I and 1 in group II and non- union 1 in group I. The difference was significant ($P < 0.05$).

IV. Discussion

Distal clavicle fractures are traumatic injuries usually caused by direct trauma to the shoulder from a fall in adults.⁷ Fractures of the distal clavicle account for approximately 10% to 30% of all clavicle fractures.⁸ Management of distal clavicle fractures is often challenging because of the difficulty in distinguishing subtle variations in the fracture pattern that may indicate fracture instability.⁹ Stable fracture patterns generally heal uneventfully with nonsurgical management, but unstable fracture patterns are often associated with longer time to union and notable non-union rates.¹⁰ Because of concern that nonsurgical management may result in non-union, primary surgical management has been recommended for certain distal clavicle fracture patterns. However, these non-unions are often asymptomatic, and their clinical relevance has been questioned. The use of nonsurgical management is bolstered by the various complications that have historically been reported following surgical fixation.¹¹ The present study was conducted to compare K-wire fixation and clavicular hook plate fixation in the treatment of unstable fractures of the distal clavicle.

In present study, group I had 20 males and 14 females and group II had 16 males and 18 females. Flinkkiläet al¹² in their study, Kirschner wire (K-wire) fixation was used in 22 cases and a clavicular hook plate in 17. Shoulder symptoms and function were assessed using self-administered questionnaires devised by L'Insalata et al. and Constant scoring. Mean follow-up was 6.2 years in the K-wire fixation group and 2.0 years in the clavicular hook plate one. The mean L' Insalata scores were 91 in both groups (92% and 93% of the contralateral side) and the mean Constant scores 84 (95%) and 90 (96%) for K-wire fixation and the clavicular hook plate, respectively. Complications commonly occurred with K-wires, which migrated in 12 cases, resulting in loss of reduction in 7 and infection in 3, and 2 cases of non-union. In the clavicular hook plate group, there was 1 complication, a fracture of the clavicle, and 2 cases of non-union.

We found that mode of trauma was RTA in 15 and 18, fall in 12 and 10, sports injury in 7 and 6, side affected was dominant in 25 and 22 and non- dominant in 9 and 12. Associated injuries were present in 14 and 16 and absent in 20 and 18 in group I and group II respectively. Kiefer et al¹³ compared the mechanical strengths of various types of fixation of the AC joint and found that transarticular K-wires with a tension band were much more stable than a clavicular hook plate (Balsler plate), which had no rotational stiffness. During mobilization of the shoulder, rotation of the clavicle causes migration of wires. When a clavicular hook plate is used, the AC joint can rotate normally and undisturbed bone to-bone healing occurs at the fracture site. Coracoclavicular screw fixation is also a mechanically good method.

We found that mean L' Insalata score in group I patients was 90 and in group II was 91, constant score was 85 in group I and 89 in group II. Complications found were infection in 4 in group I and 2 in group II, loss of reduction 2 in group I and 1 in group II and non- union 1 in group I. Eberle et al¹⁴ compared coracoclavicular screw fixation with clavicular hook plate fixation and found similar functional results in both groups. However, earlier mobilization was possible when clavicular hook plates were used.

V. Conclusion

Authors observed that management of distal clavicular fractures with clavicular hook plate found to be better as compared to K-wire fixation.

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