The Professional Medical Journal
www.theprofesional.com

ORIGINAL PROF-0-3865

DOI: 10.29309/TPMJ/2019.26.08.3865

FUNCTIONAL OUTCOME OF TENSION BAND WIRING WITH K-WIRES FOR OLECRANON FRACTURES.

Muhammad Kashif[1], Haseeb Hussain[2], Ashfaq Ahmed[3], Rizwan Akram[4], Atiq uz Zaman[5], Shahzad Javed[6], Amer Aziz[7]

1. MBBS, FCPS
Senior Registrar
2. MBBS, FCPS
Senior Registrar
3. MBBS ,MPH ,FCPS (Orthopedics)
Senior Registrar,
4. MBBS, FCPS
Associate Professor
5. MBBS, FCPS
Associate Professor
6. MBBS, FCPS
Professor
7. MBBS, FCPS, FRCS, MSC,
Professor and Head

1,2,3,4,5,6,7
Department of Orthopedics and Spine Centre
Ghurki Trust Teaching Hospital,
Lahore, Pakistan.

Correspondence Address:
Dr. Ashfaq Ahmed
Department of Orthopedics and Spine Centre
Ghurki Trust Teaching Hospital,
Lahore, Pakistan.
ashfaqjadoon40@yahoo.com

Article received on:
12/12/2017
Accepted for publication:
26/02/2019
Received after proof reading:
31/07/2019

ABSTARCT… Among orthopedics trauma, the Olecranon fractures are one of the most commonly seen in the emergency room. The cause of such injuries are either fall or road traffic accident. The coronoid process stabilizes the humerus against the distal ulna. There is loss of extensor mechanism at the elbow joint whenever there is fracture of Olecranon. So, its management is always operative. The main objective of this study was to determine the functional outcome of patients with olecranon fractures treated with tension band wiring and K-wires. **Study Design:** Descriptive case Series. **Setting:** Department of Orthopedics and Spine centre, Ghurki Trust teaching Hospital, Lahore. **Period:** 25th March 2016 to 30th September 2016. **Materials and Methods:** 85 patients were selected using Non Probability/ Consecutive sampling technique. Informed consent was taken and demographic information was noted. Surgery was performed by single team of orthopedics surgeons. Patient was followed after 06 weeks. Post-operatively for the assessment of functional outcome in terms of very good to good, fair and poor according to Murphy's system. All the collected data was entered and analyzed on SPSS version 20. **Results:** In our study the mean age of the patients was 36.62±14.09 years, the male to female ratio of the patients was 0.7:1. The mean value of total Murphy's score of the patients was 5.98±2.03. In this study the good functional outcome was observed in 35(41.18%) patients, fair outcome was observed in 46(54.12%) patients. **Conclusion:** The tension band wiring with K-wires shows good and satisfactory functional outcome for the management of olecranon fractures.

Key words: Functional Outcome, K-Wires, Murphy's score, Olecranon Fractures, Tension Band Wiring

Article Citation: Kashif M, Hussain H, Ahmed A, Akram R, Atiq uz zaman, Javed S, Aziz A. Functional outcome of tension band wiring with k-wires for olecranon fractures. Professional Med J 2019; 26(8):1256-1260.
DOI: 10.29309/TPMJ/2019.26.08.3865

INTRODUCTION

Among the fractures encountered at emergency room Olecranon fractures are one of the most commonly seen.[1] It accounts for 10 % of all upper extremity fractures.[2] The most common cause of olecranon fractures are direct blow during fall or indirectly during road traffic accident after forceful contraction of the triceps against resistance. Less commonly, It may also fractured when the elbow is hyper extended.[3]

Olecranon lies subcutaneously and it is therefore liable to have open fractures.[4] Young patients presented with olecranon fractures after high energy trauma like road traffic accident while elderly patients with low energy trauma like fall. Olecranon mostly fractured alone but it is essential to look for other injuries and fractures especially the ipsilateral extremity. There may be associated fracture dislocation, which may change the plan of management.[3]

The management of olecranon fractures vary from non surgically to surgical. If it is displaced and anatomy is disturbed, it must be surgically managed.[5] While the patients with undisplaced fracture and have intact extensor mechanism can be managed with cast immobilization.[4] The main aim of managing this bone is to restore the normal articular surface, repair of extensor mechanism, stabilization of joint and most important is prevention of joint stiffness and other complications.[3] Different implant have been used

for its fixation like screws, plates and tension band wiring[4,6,7,8,-9], Intramedullary compression device[4] and bone fragment excision with reattachment triceps.[10,3] Among them tension band and plating have excellent results.

Akman et al. evaluated the results of olecranon fractures treated with tension-band wiring technique. After a follow up, they found complete union of all fractures. The results were very good in 75% of patients while remaining having fair to poor results.[11] Tension band wiring have its own advantages and disadvantages. This procedure has got its importance because of its easy availability, cost effective and having excellent results.[6,7] While the drawbacks of this procedure is some degree of loss of reduction, skin irritation and migration of k-wires.[12]

Most of the studies had discussed this tension band in term of pain relief and functional status of elbow joint at 6th weeks of follow up. But the literature is deficient in determining functional outcome using Murphy's criteria in Pakistan. So, the main aim of this study was to determine the evidence based outcome of tension Band Wiring with K-wires in terms of pain relief and functional status of elbow joint. The results of this study can be used in local references by researches working in this field and useful in management of patients undergoing olecranon surgeries.

MATERIALS AND METHODS

This descriptive case series was conducted using Non Probability/ Consecutive sampling technique at Department of Orthopedics, Ghurki Trust Teaching Hospital, Lahore from (25-03-2016) to (30-09-2016). The Sample size of 85 cases was calculated with 95% confidence level, 7% margin of error and taking expected percentage of "poor functional outcome" i.e 12.2%[3] of patients with olecranon fractures treated with tension band wiring with K-wires. Inclusion and exclusion criteria was accessed on standard AP and Lateral radiograph of elbow joint and associated injuries on radiograph and clinical examination.

Inclusion Criteria

1. Mode of injury was trauma.
2. Patients of either gender.
3. Age ranging from 13 to 60 years.
4. Patients with transverse olecranon fractures.

Exclusion Criteria

1. Patients having comminuted fractures of olecranon assessed on X-Ray.
2. Patients with avulsion fractures of olecranon assessed on X-Ray.
3. Patients with fracture dislocation assessed on X-Ray.

85 Patients, who fulfill selection criteria, was enrolled in the study after written Informed consent and approval from hospital Ethical Committee All patients were assessed by consultant orthopedic surgeon in the emergency department of orthopedics. The patients informed about the procedure and its possible outcome. The researcher himself collect all the data in order to reduce the bias. The patients who fulfilled the inclusion criteria were admitted in the ward, history were taken and surgical intervention done by same group of surgeons. Patients were followed at regular intervals i-e 2 weeks, 4 weeks and 06 weeks. Functional outcome was measured by using Murphy's system as Gold standard.

Total score 10.

- Very Good & Good (7 and Above).
- Fair (3-6).
- Poor (<3).

Data was initially entered on a preformed performa and later on analyzed on SPSS version 20. Quantitative data like age and Murphy's score was presented in mean ± SD. Qualitative data like gender and functional outcome (very good, good, fair, poor) was presented in form of frequency and percentages. Data was stratified for age, gender and BMI to address the effect modifier. Post stratification chi square test was applied to check the significance with p-value ≤0.05 as significant.

RESULTS

In this present study total 85 cases participated. The mean age of the patients was 36.62±14.09 years with minimum and maximum ages of 13 & 59 years respectively. 37(43.53%) patients were

males and 48(56.47%) patients were females. The male to female ratio of the patients was 0.7:1. The mean value of BMI of the patients was 28.10±5.04 kg//m^2 with minimum and maximum BMI values of 18.99 & 40 kg//m^2 respectively.

In this study the mean value of total murphy's score of the patients was 5.98±2.03 with minimum and maximum total score values of 2 & 10 respectively. The good functional outcome was observed in 35(41.18%) patients, fair outcome was observed in 46(54.12%) patients and poor outcome was observed in 4(4.71%) patients. (Table-I)

The study results showed that the ≤ 30 years patients were 33 in which good outcome was noted in 13 cases, fair outcome was in 19 and poor outcome was noted in 1 case, similarly >30 years patients were 52 in which good outcome was noted in 22 cases, fair outcome was in 27 and poor outcome was noted in 3 case. Statistically insignificant difference was found between the outcome with age. i. e p-value=0.989.

The study results showed that the 37 cases were males in which good outcome was noted in 16 cases, fair outcome was in 20 and poor outcome was noted in 1 case, similarly 48 patients were females in which good outcome was noted in 19 cases, fair outcome was in 26 and poor outcome was noted in 3 case. Statistically insignificant difference was found between the outcome with sex. i. e p-value=0.566.

The study results showed that the 35 cases were with normal BMI in which good outcome was noted in15 cases, fair outcome was in 19 and poor outcome was noted in 1 case, similarly 50 patients were overweight and obese in which good outcome was noted in 20 cases, fair outcome was in 27 and poor outcome was noted in 3 case. Statistically insignificant difference was found between the outcome with BMI. i. e p-value=0.635.

Murphy's Scale	Frequency (n)	Percentages (%)
Very good to Good	35	41.18%
Fair	46	54.12%
Poor	4	4.70%

Table-I. Murphy's scoring after surgical intervention;

DISCUSSION

Olecranon fractures are intra articular and mostly displaced with loss of extensor mechanism at the elbow joint, therefore surgical intervention is always needed.[13] The tension band wiring with k-wires fixation are excellent choice of surgical intervention for olecranon fractures upto three fragments. This surgical intervention always taking the lead from other implants because of easily availability and good outcome as per described in literature.[6]

Olecranon fractures account for 10% of all fractures of the upper extremities. Olecranon fractures may occurred after detachment of triceps muscle due to pull on it after overstretching of arm or a direct blow on the elbow joint.[14] Flinterman et al found the co relation of olecranon union with age of the patient but in our study no such co-relation was found. But similar to our results, good union was found with tension band wiring.[15]

According to our study results the mean value of total murphy's score of the patients was 5.98±2.03. The good functional outcome by using K-wire was observed in 35(41.18%) patients, fair outcome was observed in 46(54.12%) patients and poor outcome was observed in 4(4.71%) patients. By stratifying age, sex and BMI statistically insignificant difference was noted with outcome.

Helm et al[16] reported that 82% of patients in his study population needed hardware removal following tension band wiring. While we mostly removed the implant after 3 months. Hume and Wiss[17] performed a randomized prospective trial with 41 patients with displaced Olacranon fractures treated with either tension band wiring or plating. The complications with tension band wiring was more as compared to plating group.

A study by Alamzeb et al[18] resulted that the Olacranon fractures heal well in most instances achieving recovery of normal function in more than 95% of patients. One study by K.W. Chan et al in their study found that the tension band wiring is gold standard treatment for managing patients with olecranon fractures because of its good post operative elbow function and minimal

loss of physical capacity. Tension band wiring fixation for isolated olecranon fractures leads to good elbow function and minimal loss of physical capacity. The new implants are designed for managing these fractures just because of wound irritation and metalwork removal later on with tension band wiring.[19]

Wu et al. developed a technique using long K-wires placed intramedullary to avoid these complications. Despite good results, this technique has not been widely applied in clinical practice.[19]

Erturer et al retrospectively reviewed the outcome of 18 patients who underwent locking plate fixation for communited olecranon fractures. All the patients having good union without any significant elbow stiffness.[20]

Buijze et al compared the stiffness and strength of contoured locking compression plate fixation (combined with an intramedullary screw) to one-third tubular plate fixation (combined with bicortical screws) in a cadaveric comminuted olecranon fracture model with a standardized osteotomy. There were statistically no significant difference found between two implants.[21] In another study by Buijze and Kloen, found that intramedullary screw obstruct the placement of bicortical screws. So, it is recommened to put a intramedullary screw and unicortical screws using locking compression plate. 2 According to Iannuzzi and Dahners, in comminuted fractures of the olecranon (Mayo type IIB), it may be difficult or even impossible to preserve the olecranon's normal articulation with the trochlea of the humerus. The authors therefore described a modified technique for reconstruction. In this technique, the comminuted fragments are excised and the proximal olecranon fragment is advanced past the resulting defect and fixed to the distal ulna.[23]

There are few limitations in our study. The technique of tbw with K. Wiring were not compared with other modalities of treatment like plating. The follow up was limited to 6 weeks and types of different olecranon fractures were not described. So, further studies were needed for better outcome in our population.

CONCLUSION

According to our study the tension band wiring with K-wires shows good and satisfactory functional outcome in the management of olecranon fractures. It is simple technique and should always be considered for olecranon fractures.

REFERENCES

1. Raju S, Gaddagi RA. **Cancellous screw with tension band wiring for fractures of the olecranon.** Journal of clinical and diagnostic research: JCDR 2013; 7(2):339.

2. Matar HE, Ali AA, Buckley S, Garlick NI, Atkinson HD. **Surgical interventions for treating fractures of the olecranon in adults.** Cochrane Database of Systematic Reviews. 2014(11).

3. Wiegand L, Bernstein J, Ahn J. **Fractures in brief: Olecranon fractures.** Clinical Orthopaedics and Related Research® 2012:1-5.

4. Hong CC, Han F, Decruz J, Pannirselvam V, Murphy D. **Intramedullary compression device for proximal ulna fracture.** Singapore medical journal 2015; 56(2):e17.

5. Baecher N, Edwards S. **Olecranon fractures.** The Journal of hand surgery 2013; 38(3):593-604.

6. Schneider MM, Nowak TE, Bastian L, Katthagen JC, Isenberg J, Rommens PM, et al. **Tension band wiring in olecranon fractures: the myth of technical simplicity and osteosynthetical perfection.** International orthopaedics 2014; 38(4):847-55.

7. Wilkerson JA, Rosenwasser MP. **Surgical techniques of olecranon fractures.** The Journal of hand surgery 2014;39(8):1606-14.

8. Niglis L, Bonnomet F, Schenck B, Brinkert D, Di Marco A, Adam P, et al. **Critical analysis of olecranon fracture management by pre-contoured locking plates.** Orthopaedics & Traumatology: Surgery & Research 2015; 101(2):201-7.

9. Chen Y, Chen G, Zhou F, Li S, Song Y, Gao W, et al. **[Case-control study on therapeutic effects of different fixation methods for the treatment of olecranon fracture].** Zhongguo gu shang= China journal of orthopaedics and traumatology 2014; 27(11):891-5.

10. Canale ST, Beaty JH. **Campbell's operative orthopaedics e-book.** Elsevier Health Sciences; 2012 Oct 29.

11. Akman S, Ertürer R, Tezer M, Tekeşin M, Kuzgun U. **[Long-term results of olecranon fractures treated with tension-band wiring technique].** Acta orthopaedica et traumatologica turcica 2001; 36(5):401-7.

12. Kim W, Choi S, Yoon JO, Park HY, Kim SH, Kim JS. **Double tension band wiring for treatment of olecranon fractures.** The Journal of hand surgery 2014; 39(12):2438-43.

13. Rommens P, Schneider R, Reuter M. **Functional results after operative treatment of olecranon fractures.** Acta Chirurgica Belgica 2004; 104(2):191-7.

14, Newman S, Mauffrey C, Krikler S. **Olecranon fractures.** Injury 2009; 40(6):575-81.

15 Flinterman HJ, Doornberg JN, Guitton TG, Ring D, Goslings JC, Kloen P. **Long-term outcome of displaced, transverse, noncomminuted olecranon fractures.** Clinical Orthopaedics and Related Research® 2014; 472(6):1955-61.

16 Hume MC, Wiss DA. **A Clinical and Radiographic Comparison of Tension Band Wiring and Plate Fixation.** Clinical orthopaedics and related research 1992; 285:229-35.

17. Durrani A, Inam M, Siraj M, ur Rahman S, Wazir IK. **Olacranon fracture treated with tension bend wire by passing two parallel Kirschner wires distally into the anterior cortex of ulna.** Pak J Surg 2013; 29(2):115-8.

18 Chan K, Donnelly K. **Does K-wire position in tension band wiring of olecranon fractures affect its complications and removal of metal rate?** journal of orthopaedics 2015; 12(2):111-7.

19. Wu C-C, Tai C-L, Shih C-H. **Biomechanical comparison for different configurations of tension band wiring techniques in treating an olecranon fracture.** Journal of Trauma and Acute Care Surgery 2000; 48(6):1063-7.

20.Erturer RE, Sever C, Sonmez MM, Ozcelik IB, Akman S, Ozturk I. **Results of open reduction and plate osteosynthesis in comminuted fracture of the olecranon.** Journal of Shoulder and Elbow Surgery 2011; 20(3):449-54.

21.Buijze GA, Blankevoort L, Tuijthof GJ, Sierevelt IN, Kloen P. **Biomechanical evaluation of fixation of comminuted olecranon fractures: One-third tubular versus locking compression plating.** Archives of orthopaedic and trauma surgery 2010; 130(4):459-64.

22, Buijze G, Kloen P. **Clinical evaluation of locking compression plate fixation for comminuted olecranon fractures.** J Bone Joint Surg Am 2009; 91(10):2416-20.

23. Iannuzzi N, Dahners L. **Excision and advancement in the treatment of comminuted olecranon fractures.** Journal of orthopaedic trauma 2009; 23(3):226-8.

AUTHORSHIP AND CONTRIBUTION DECLARATION

Sr. #	Author-s Full Name	Contribution to the paper	Author=s Signature
1	Muhammad Kashif	Article writing.	
2	Haseeb Hussain	Article writing.	
3	Ashfaq Ahmed	Data collection.	
4	Rizwan Akram	Data collection.	
5	Atiq uz Zaman	Data analysis.	
6	Shahzad Javed	Final review.	
7	Amer Aziz	Critical analysis.	