

# Olecranon Fracture; Treated with Tension Bend Wire by Passing two Parallel Kirschner Wires Distally into the Anterior Cortex of Ulna

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## ABSTRACT

**Objective:** To evaluate the results of two parallel K-wires of 2 millimeter size distally placed in the anterior cortex of ulna, together with the number of tightening loops on the cerclage wire.

**Materials and methods:** This descriptive study was performed in Department of Orthopedics and Spine Surgery, Hayatabad Medical Complex Peshawar from March 2008 to February 2012 on 38 consecutive patients of either sex with age above 20 years, having olecranon fracture. Fracture osteosynthesis was achieved with the insertion of two parallel 2 millimeter (mm) Kirschner wires from the tip of the Olecranon to the ulnar anterior cortex and an 18 gauge wire in a figure of eight fashion.

**Results:** There were total 38 patients in the study. Male patients were 22(57.9%) while female patients were 16(42.1%). Minimum age was 20, maximum 80 and average age was 48.95 years. Complications include delayed union in 1(2.6%), infection in 2(5.3%), pain at proximal end of K wires 3(7.9%), prominent wire in 3(7.9%), broken skin in 4(10.5%), Proximal migration of K wires in 2(5.3%), superficial erythema in 1(2.6%) and Ulnar Nerve Palsy in 3(7.9%) patients.

**Conclusion:** Olecranon fractures heal well in most instances achieving recovery of normal function in more than 95% of patients. Functional outcome is dependent on fracture severity, length of immobilization, and patient factors.

**Keywords:** Tension Band Wire, Olecranon, Fracture, ulnar nerve palsy.

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## INTRODUCTION

Olecranon fracture is an intraarticular lesion with loss of the extension mechanism of the elbow joint, therefore its treatment is always operative<sup>2</sup>. In 1963 Weber and Vasey introduced tension band wiring for its treatment. The tension band principle has been used since long but several modifications, especially to avoid migration of the Kirschner wires, have been introduced in it<sup>3</sup>.

In an attempt to reduce the re-operation rate, careful attention should be given to the surgical procedure<sup>2</sup>. In addition, modifications to the original operative technique have been advocated. These include placing the longitudinal K-wires in the anterior cortex of the ulna rather than the intramedullary bone<sup>6</sup>, use of long K-wires spanning from the Olecranon to the ulnar styloid process<sup>7</sup>, placing the tension band anterior to the K-wires<sup>8,9</sup>, utilizing vitallium cable<sup>8</sup> and using two tightening loops on the cerclage wire rather than one<sup>10</sup>.

Although the olecranon fracture is regarded as

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one of the simplest articular lesions and its operative treatment as straightforward, reports exist on a number of postoperative problems<sup>11</sup>. Infection, delayed union and ulnar nerve palsy have been described in up to 10% of the cases. Specific complaints are related to the subcutaneous position of the Kirschner wires<sup>12</sup>. Their migration may be responsible for secondary displacement, wound healing problems, local pain and a number of re-interventions.

In this study we have critically examined two parallel K-wires of 2 mm size distally placed in the anterior cortex of ulna, together with the number of tightening loops on the cerclage wire.

## METHOD AND MATERIAL

This descriptive study was performed in Department of Orthopedics and Spine Surgery, Hayatabad Medical Complex Peshawar from March 2008 to February 2012 on 38 consecutive patients of either sex with age above 20 years, having Olecranon fracture. All patients were selected from emergency department and admitted to ward. When the patients were stabilized then the purpose of the study was explained to them, their cooperation sought, their reservations and concerns were addressed and

informed written consent was taken. Schatzker<sup>10</sup> classification was used in this study which takes into account the fracture configuration as well as the stability of the elbow joint.

The surgical procedures were carried out with the patient in a lateral decubitus position under general anesthesia. A tourniquet was inflated after giving intravenous Cefuroxime 1.5 grams and the fracture site was approached via a posterior midline skin incision. Fracture osteosynthesis was achieved with the insertion of two parallel 2 mm Kirschner wires from the tip of the Olecranon to the ulnar anterior cortex and an 18 gauge wire in a figure of eight fashion. The proximal end of K-wires was bent and the cerclage wire was placed through a hole that was drilled transversely in the distal fragment. Subsequently, the cerclage wire was tightened to create interfragmentary compression.

The postoperative protocol included antibiotics administration (Cefuroxime) for 24 hours and progressive mobilization of the elbow joint. In all cases a posterior splint with the elbow in a semi flexed position was applied for a period of 2 weeks to prevent fracture displacement. After two weeks period the posterior splint and stitches were removed and active exercises were advised. Anteroposterior and lateral elbow radiographs were taken at first post operative day, at 6 week and three months intervals and callus formation was noted. The duration of follow up was three months. In each visit infection, sign of union, ulnar nerve palsy, position of the Kirschner wires, wound healing and local pain was noted. Hardware removal was done in symptomatic patients. The data was analyzed with the help of SPSS version 10.

**RESULTS**

There were total 38 patients in the study. Male patients were 22(57.9%) while female patients were 16(42.1%) (Fig. 1). Minimum age was 20, maximum 80 and average age was 48.95 years. There were 10(26.3%) patients with type A, 8(21.1%) type B, 10(26.3%) type C, 1(2.6%) type D, 7(18.4%) type E and 2(5.3%) with Schatzker type F fracture (Figure 2). In half of the cases we applied single knot while in half of case double knots were applied. Complications include delayed union in 1(2.6%), infection in 2(5.3%), pain at proximal end of K wires 3(7.9%), prominent wire in 3(7.9%), broken skin in 4(10.5%), Proximal migration of K wires in 2(5.3%), superficial erythema in 1(2.6%) and Ulnar Nerve Palsy in 3(7.9%) patients (Table 1). In 9(31%) patients hardware was symptomatic and was removed at 6 months period, while rest of the hardware is removed in one year average.

Table 1: complications

|                                 | Frequency | %    |
|---------------------------------|-----------|------|
| Delayed Union                   | 1         | 2.6  |
| Infection                       | 2         | 5.3  |
| Pain at Proximal end of K wires | 3         | 7.9  |
| Prominent TBW                   | 3         | 7.9  |
| Proximal migration of K wires   | 2         | 5.3  |
| Skin Broken down                | 4         | 10.5 |
| Superficial Erythema            | 1         | 2.6  |
| Ulnar Nerve Palsy               | 3         | 7.9  |

Fig. 1: Gender of patients

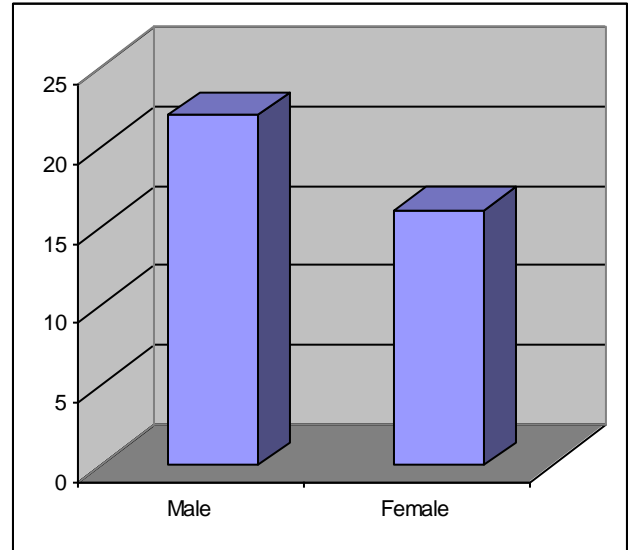
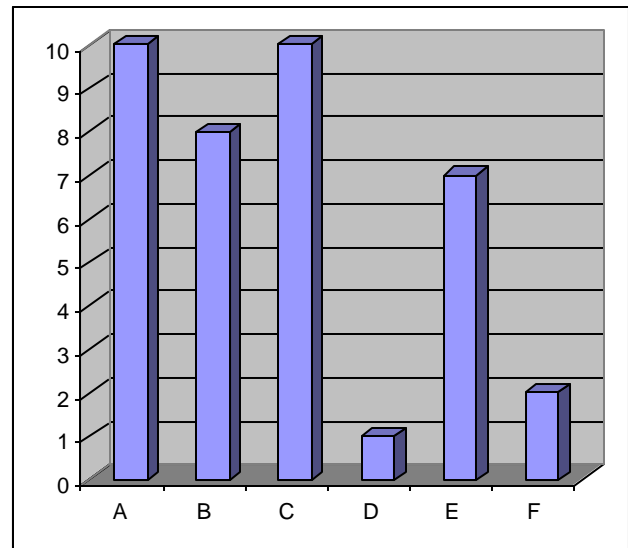


Fig.2: Schatzker classification



**DISCUSSION**

Olecranon fracture is a common orthopedic problem. Because of its subcutaneous nature fracture mostly from direct blow or trauma. Olecranon fractures may

occur indirectly by forces generated within the triceps muscle during a fall on a partially flexed elbow<sup>13</sup>. The clinical picture is usually obvious and conventional radiographs are usually sufficient to describe the lesion<sup>14</sup>.

In this study, the incidence of Olecranon fractures showed a higher prevalence among men i.e. 22(57.9%) while female patients were 16(42.1%). Similarly Chalidis et al<sup>15</sup> and Rommens et al<sup>2</sup> reported increased prevalence in male. And this increased prevalence of Olecranon fracture in male gender in our society may be because of their more involvement in strenuous activities, sports and sports like activities.

Despite of the fact that tension band wiring is considered as gold standard for the treatment of Olecranon fracture<sup>16</sup>, there are certain complications like skin back down, pain at the site of K wires, proximal migration of K wire etc, which is often experienced<sup>17</sup>. Many patient experience pain or discomfort due to subcutaneous position of the K wires and the relevant need for K wire removal may increase up to 87% (26,27)<sup>18</sup>. In this study 3(7.9%) patient had pain at proximal end of K wires, prominent wire in 3(7.9%), broken skin in 4(10.5%), Proximal migration of K wires in 2(5.3%). Rommens et al stated that suboptimal pins placement (K-wires which are not inserted parallel or they do not transverse the opposite cortex of the proximal ulna) was not correlated with increased rate of implant loosening or secondary procedures<sup>2</sup>. As the above finding was also evident in our study, we advocate that insertion of K-wires into the anterior ulnar cortex may increase TBW construct stability and stiffness but it couldn't prevent posterior pin migration when active motion of the elbow joint has been commenced.

Helm et al<sup>19</sup>,<sup>23</sup> reported that 82% of patients in his study population needed hardware removal following tension band wiring, and Hume and Wiss<sup>20</sup> performed a randomized prospective trial with 41 patients with displaced Olecranon fractures treated with either tension band wiring or plating. Eight patients in the tension band-wiring group (42%) complained of pain and hardware problems, compared to one patient in the plating group. We had nearly the same experience and out of 38 patients in 9(31%) patients hardware was symptomatic and was removed at 6 months period, while rest of the hardware is removed in one year average. ulnar nerve palsy some time complicate the treatment of olecranon fracture. its pathogenesis is considered to be multifactorial e.g. aggravation of palsy without clinical symptoms already present at the time of injury; damage of the nerve at the time of injury caused by a high-energy trauma; surgery-related

nerve damage, such as that caused by irritation by the hardware, swelling, or extent of scar formation after surgery; and stenosis of the cubital tunnel due to malunion or displacement of the fractured bone fragments<sup>21</sup>. Hume and Wiss<sup>20</sup> reported electromyography proven ulnar neuropathy due to heterotopic ossification after tension-band wiring fixation in 1 patient out of 41. Finsen et al<sup>18</sup> reported ulnar nerve palsy in 2 patients out of 31, 1 of whom was treated by release of the nerve at the elbow. Rettig et al<sup>22</sup> reported ulnar nerve palsy in 1 patient out of 52, which resolved spontaneously. We had Ulnar Nerve Palsy in 3(7.9%) patient in whom we failed to point out exactly the cause but in all cases ulnar nerve was identified and protected at the time osteosynthesis so re exploration was not done. All three patients had spontaneous recovery at 3 months.

Our study has several weaknesses; it was quasi experimental study in which only the effect of tension band wire was studied. We suggest that further studies should be conducted in which tension band wiring is compared with other new modalities of treatment. Secondly in this study patient functional out comes in regards of daily activities were not assessed. We hope that future research will focus on these weaknesses.

## CONCLUSION

Our results, as well as the results of other investigators, show that TBW provides satisfactory clinical results and healing rates for most Olecranon fractures. However, the heterogeneous nature of Olecranon fractures and the potential for development of posttraumatic osteoarthritis patient with more complex injuries shall be counseled.

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