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Treatment of Humeral Diaphyseal Fractures with Flexible Intramedullary Wires (Kirschner Wires): About 40 Cases

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Abstract **Case Report**

Humeral fractures constitute about 3% of all fractures. The treatment of this fracture continues to progress. However, operative treatment has a predominant role in the management of this fracture. One such fixation method is the use of flexible intramedullary bundle nailing also known as the Hackethal technique. This is a preliminary study of 40 patients, all of whom have been involved in some form of trauma and fractures of the humeral shaft, either alone or in combination with other fractures. Hackethal's bundle nailing technique is relatively easy but it requires rigorous surgical procedure performed by an experienced surgeon.

Keywords: Humerus, fracture, radial nerve, Hackethal, bundle nailing.

INTRODUCTION

Humeral fractures constitute about 3% of all fractures. Treatment of this injury continues to evolve as advances are made in both non-operative and operative treatments. Most of these fractures are treated non-operatively, however both patient and fracture characteristic need to be considered to select the appropriate treatment option.

Operative treatment however has a prominent place in this management. One of such methods of fixation is the use of flexible intramedullary pins also known as the Hackethal's technique.

CASE REPORT

This is a preliminary study of 40 patients who were all involved in a form of trauma and sustained humeral shaft fractures either in isolation or in association with other injuries. All the patient has given their informed consent for the case to be published.

All patients had open reduction and intramedullary fixation with two or three prebent 2.5 or 3.5mm diameter Kirschner wires introduced in a retrograde fashion. No image intensifier used. Simple arm support or immobilization Dujarier for 3-4 weeks.

The X-rays were taken before, immediate post-op and at follow up. Follow period was between 3months- 3years.

Number of patients is 40 including 37 closed fractures and 3 open fractures, aged between 21 and 59 years.
Sex: 24 men (64%), 16 women (36%).
Fractured limb : 23 right (61%), 17 left (39%).

All patients were right-handed. The causes are 34 road accidents (86%), fall in 6 cases (14%).

During our experience, we have favoured the supra-Olecranian approach. However, the introduction of a large enough number of pins to fill the medullary canal is difficult due to the fact that the external abutment is oblique with a flared shape of the humeral paddle when viewed from the front.

After 10 weeks, satisfactory post-operative case was 35 (85%) and 2 cases of aseptic pseudoarthrosis.
We had 1 case of infection.
Two cases were lost to follow-up
Pre-operative radial nerve injury: 4 patients, however all recovered completely.

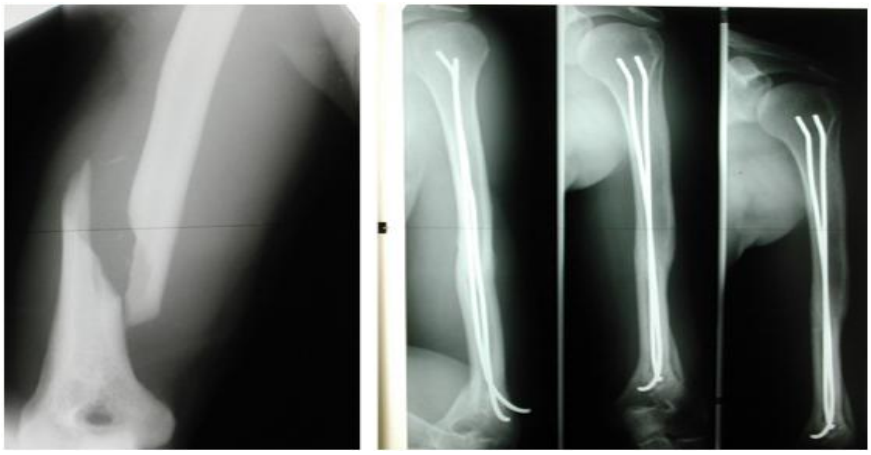

Fig-1: Case 1 of Hacketal's bundle nailling

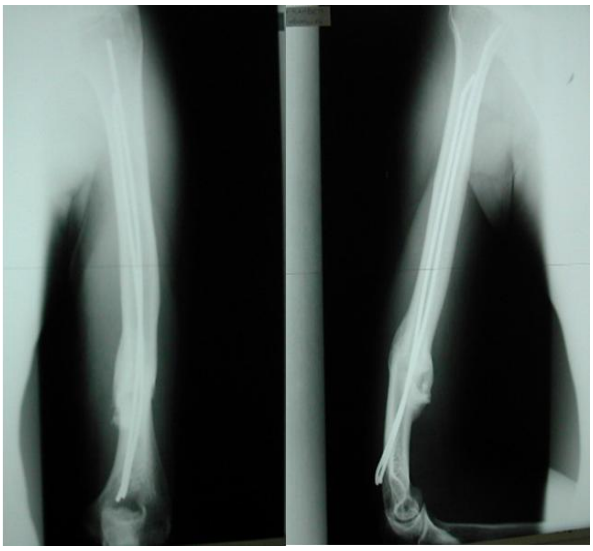

Fig-2: Case 2 of Hacketal's bundle nailling, bony callus

Fig-3: Case 3 of Hacketal's bundle nailling + strapping

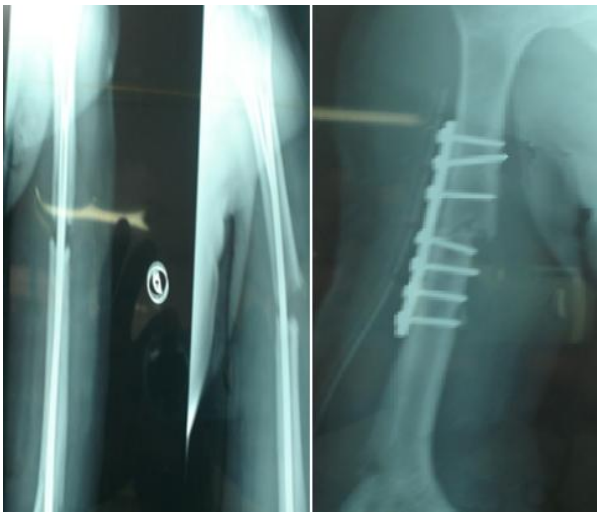

Fig-4: Case 4 : Pseudarthrosis cure and plate osteosynthesis

DISCUSSION

Fractures of the humeral diaphysis is a therapeutic problem with several complications.

Our rate of 10% post-traumatic radial paralysis is comparable to the average in the literature; 8.6% for Diémé [1], 7.73% for Putz [2], 10% for Coudane [3].

Closed-focus centromedullary bundle nailling has the advantage of being a simple surgical technique that avoids the risks inherent in opening the fracture site and reduces the risk of radial nerve injury and septic risk [4].

The rate of pseudarthrosis is comparable to ours, which is 8%, 2% for Putz [2], 4.6% for Gayet [5], 12% for Zaraa et al., [6]. The same complication rate found in the literature for pinning osteosynthesis varies from 2.8% to 21% depending on the series for pseudarthrosis and from 0.8% to 2.4% for infection [2].

In our experience, we have favored the supraolecranial approach, since it has been observed that the epicondyle approach does not allow the

introduction of a large enough number of pins to fill the medullary canal, since the external abutment is oblique with a flared shape of the humeral paddle when viewed from the front.

The consolidation times are in accordance with those in the literature. 10 weeks for our series, 9.4 weeks for Durbin [7] and 8.5 weeks for Putz [2]. With plate osteosynthesis, consolidation can be achieved in 11 to 19 weeks [2]. Anterograde nailing allows consolidation in 12.6 weeks for Ingman and Water [8] and 13.7 weeks for Rommens et al., [9].

CONCLUSION

Intramedullary bundle nailling of the humeral shaft is a simple, very safe, inexpensive and less complicated treatment method that allows early functional recovery and is easy to remove.

Hackethal's technique is relatively easy but it requires rigorous surgical procedure performed by an experienced surgeon.

Consent: All The patient has given their informed consent for the case to be published.

Competing Interests: The authors declare no competing interest.

Authors' Contributions: All authors have read and agreed to the final version of this manuscript and have equally contributed to its content and to the management of the manuscript.

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