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Retrograde femoral nail for distal femoral fractures

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Abstract

Objective: The objective of this study was to review and evaluate the use of Targon retrograde femoral nail (Targon RF® nail) for distal femoral fractures at Al Jalaa Trauma Hospital, a teaching hospital belongs to Benghazi University. **Subjects and method:** We reviewed 37 fractures in 36 patients treated by Targon RF nail between 2006 and 2015. The fractures consisted of 18 type A1, 14 type A3, 3 type C1, and 2 type C2 fractures. The relationship between clinical results and fracture type, surgical approach, and patient age were retrospectively reviewed. **Results:** All fractures healed clinically and radiologically. Twenty five patients maintained gait performance almost equivalent to that before injury, the rest had less satisfying performance because of associated injuries or fractures which delayed rehabilitation. Average operating time was 115 min±40 min. ROM in the knee of all patients was $-5^{\circ}\pm 5^{\circ}$ in extension and $110^{\circ}\pm 20^{\circ}$ in flexion. Extension lag was affected by age and surgical approach. There were seven cases of valgus/varus deformities, and two cases with loosening of distal and proximal locking screws, but no breakage of screws or nail failure. **Conclusion:** Targon RF nail for distal femur fractures was satisfactory in our patients.

Key words: distal femoral fractures, supracondylar fractures, retrograde femoral nail.

مسامير تارغون المتراجعة لكسور الفخذ القاصية

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المخلص:

الهدف: كان الهدف من هذه الدراسة هو استعراض وتقييم استخدام مسامير تارغون المتراجعة (مسمار تارجون RF®) لكسور الفخذ القاصية في مستشفى الجلاء للإصابات، وهو مستشفى تعليمي تتبع جامعة بنغازي. **طريقة البحث:** قمنا بمراجعة 37 كسرا في 36 مريضا عولجوا باستخدام مسمار تارجون بين عامي 2006 و 2015. وكانت الكسور تتكون من 18 كسرا نوع A1 و 14 كسرا نوع A3 و 3 كسور نوع C1 و كسرين من النوع C2. تم استعراض العلاقة بين النتائج السريرية ونوع الكسر، وطريقة الجراحة، وعمر المريض بشكل رجعي. **النتائج:** شفيت جميع الكسور بدلالة الفحص السريري و عمل الاشعة. حافظ خمسة وعشرون مريضا على أداء مشية يعادل تقريبا تلك قبل الإصابة، والباقي كان أداء أقل بسبب الإصابات أو الكسور المصاحبة التي عطلت إعادة التأهيل. وكان متوسط زمن الجراحة 115 دقيقة ± 40 دقيقة. وكان مدى حركة الركبة لجميع المرضى $-5\pm 5^{\circ}$ في التمديد و $110\pm 20^{\circ}$ في الانثناء. قصور التمديد تأثر بالعمر وطريقة الجراحة. كانت هناك سبع حالات من تشوه الركبة الروحاء أو الفحجاء، وحالتين من ارتخاء براغي الا قفال القاصية والدانية، ولكن لم يوجد كسر للبراغي أو فشل المسامير. **الاستنتاج:** مسامير تارجون RF لكسور عظم الفخذ القاصية أدت الى نتائج مرضية في هذه الدراسة.

الكلمات الرئيسية: كسور الفخذ البعيدة، كسور فوق اللقمة، والأظافر الفخذ إلى الورا.

Introduction

The Targon retrograde femoral nail (Targon RF® nail), (Aesculap, Germany) is solid titanium intramedullary implant designed for treatment of supracondylar fractures and distal femoral fractures. This device is considered superior to side-plate devices like DCS, both biologically and biomechanically [2,3,5].

In this study we reviewed 37 acute supracondylar (s/c) and distal femoral fractures treated with Targon RF nail with respect to knee function, gait performance, surgical approach, and complications.

Materials and methods

Thirty-seven acute s/c fractures and distal femoral fractures in 36 patients were treated from January 2006 to March 2015. All fractures were surgically treated using Targon RF nail. Twenty-five patients were men and 11 were women, with average age of 43.8(16-83) year. The average follow-up was 57.6 months.

The mechanism of injury was R.T.A. or motorcycle accident in 18 patients, 11 patients with simple fall down, and 7 cases had gunshot or blast injuries.

Bilateral s/c fracture was seen in one patient, 11 patients sustained multiple injuries, and 24 patients had isolated s/c or distal femoral fractures. The fractures were classified using AO classification system. They consisted of 18 type A1, 14 /type A3, 3 type C1, and 2 type C2 fractures. Six cases had open fractures. Ten fractures were distal femoral fractures and 27 were s/c fractures.

Ten fractures were pathologic due to: osteoporosis (5 cases), metastatic from breast carcinoma (one case), secondary with occult primary (two cases), simple bone cyst (one case 16 Y.O.), and one case of liver cirrhosis.

There were two cases of nonunion followed conservative treatment. Twenty four fractures involved Rt. femur, and 13 involved Lt. femur. Five fractures were open due to GSW (4cases) and RTA (one case).

Surgery was performed on the 3rd to 7th day following injury, with 2 cases treated initially with other fixation devices one with DCS which had nonunion, and the other with external fixation which was exchanged to RF nail.

One case had malunion due to delay of fixation because of medical condition precluded early surgery.

Open approach was used in 8 fractures, and closed approach in 29 fractures.

Results

By the end of follow up period (5-9)years, all fractures had united clinically and radiologically. Five cases developed superficial infection, and three cases developed D.V.T. all were treated conservatively. Fifteen fractures were fixed using long version RF nail with locking proximal screws inserted in 12 fractures and 3 fractures were press fit proximally. Twenty nine fractures were treated by closed approach, and 8 fractures by open method. The average operating time was 105min±25min. Operating time was longer for type C fractures than type A fractures, and for open approach than closed approach. The knee ROM was $-5^{\circ}\pm 8^{\circ}$ of extension, and $105^{\circ}\pm 35^{\circ}$ in flexion. The extension lag was smaller for closed approach ($-3^{\circ}\pm 5^{\circ}$) than open approach ($-8^{\circ}\pm 5^{\circ}$). No significant difference was seen in final knee flexion among fracture type and surgical approach. Final knee arc was inversely correlated to patient age with patients younger than 55 years had very good knee ROM. Gait performance at final follow up was satisfactory for isolated s/c fractures and distal femoral fractures, but less satisfactory for multiply injured patients. There were 7 varus/valgus deformity greater than 5° at fracture site, 3 cases of loosening of distal locking screws one of them had also backing out of proximal locking screw. There was no case of screw or nail breakage.

Discussion

The results of gait performance and knee arc of motion were almost similar to those from previous reports of first- generation retrograde I.M.nail [1,4,6,]. Postoperative gait performance was satisfactory for more than 90% of patients. Knee ROM, however was not satisfactory especially for elderly patients and multiply injured patients, and final knee arc was inversely correlated to patient age and other associated fractures and injuries in this study.

A few reports have mentioned the relationship between age and knee ROM after retrograde nailing of distal femoral and s/c fractures. Lucas, however, reported there was no relationship between patient age and postoperative knee ROM. We think this disparity may be due to the many severely injured younger patients included in Lucas's report.

The reason for poor postoperative ROM in aged patients in our report may be explained by the preexisting osteoporosis, senile dementia, or osteoarthritis.

An unaccepted high rate of fatigue failure of the nail at the unused screw holes was reported for the first generation nail [1,4,6]. RF nails used in our study had larger diameter, increased wall thickness, with smaller diameter interlocking screws. There was no fatigue failure of the nail, while failure of distal interlocking screws and proximal screw was reported in 3 cases of the 36 cases.

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Generally the closed surgical approach has some advantage over open approach, shorter duration of surgery, minimal soft tissue invasion, and less blood loss. It is unknown for type C fractures whether closed approach has any advantage over closed one as all type C fractures were treated by open approach.

We found that final knee extension lag was smaller with closed approach, however we think this difference may depend on fracture type and patient age and presence of other injuries rather than the approach itself.

Table 1 Numbers of locking screws for standard and short nails

Proximal		Distal		
One	Two	One	Two	Three
19	3	2	17	3

Table 2 Numbers of locking screws for long version nails

Proximal		Distal		
One	Two	One	Two	Three
3	12	1	11	3

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Figure1 Backing out of two distal locking screws with delayed union



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Figure 2 Supracondylar fracture of right femur in 53 Y O female with ipsilateral neck femur fracture fixed with femoral neck plate and Targon RF nail

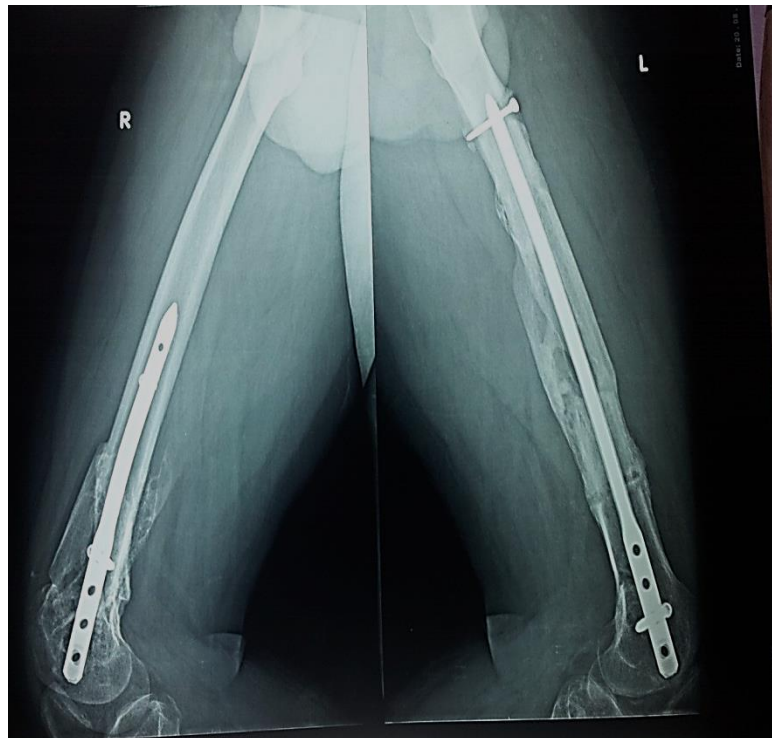


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Figure 3 Pathological fracture due to simple bone cyst in 16 YO female



Fig. 4 Fracture of both femurs in 35 YO male, left is segmental open type 1 fracture treated by long version RF nail, right is supracondylar comminuted fracture treated by standard RF nail with sound union



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