TELESCOPIC NAILING OF THE FEMUR BY RETROGRADE APPROACH IN AN OSTEOGENESIS IMPERFECTA PATIENT

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CASE REPORT

Rodeo™

Telescopic Nail

As of 2024, Rodeo™ represents the JuniOrtho™ Telescopic Intramedullary Nail (JTIN)' evolution under new brand name.

CASE PRESENTATION

A 2-year-old boy with type 4 Osteogenesis Imperfecta (OI) presented with limited ambulatory capacity and a painful right thigh related to a significant deformity of the femur (Fig. 1). He had a prenatal diagnosis of OI (intrauterine bilateral femoral fractures). The patient experienced several fractures of the right femur, during the first year of his life, which were treated with cast immobilization. Treatment with bisphosphonates were started at the age of one.

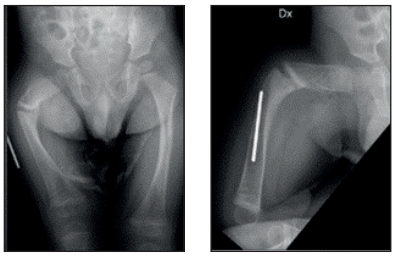

Fig. 1 AP and lateral Radiographs of the femurs of patient at 2 years old

FIRST SURGERY: RIGHT FEMUR

The patient was put in a lateral position, and the fluoroscopy beam was oriented in a horizontal manner (Fig. 2). The drill bit was introduced across a percutaneous incision in the middle of the patellar tendon. Then, drilling was performed perpendicularly to the joint line from the middle of the intercondylar notch as verified by fluoroscopy (Fig. 3). The first deformity was corrected percutaneously.

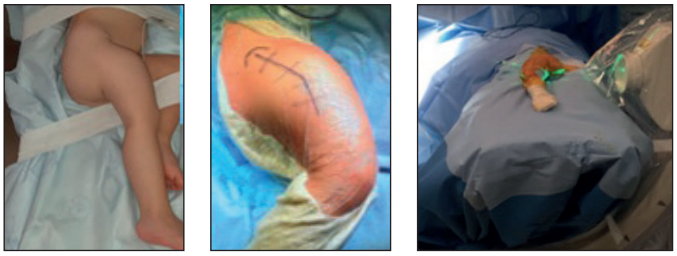

Fig. 2 Patient positioning and C-Arm position.

Figure 3 shows the X-ray control on AP and lateral of the entry point of the drill tip: intercondylar notch (3A). Drilling was performed perpendicular to the articular surface in order to identify deformities and to correct them with osteotomies (3B). When the drill reached the deformity, an osteotomy was performed, slightly more distally than the tip of the drill. (3C, 3D).

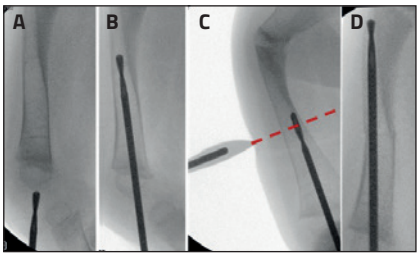

Fig. 3

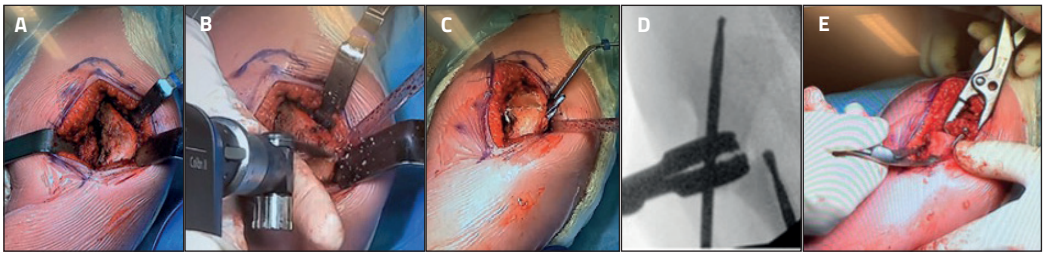

Fig. 4

Fig. 5

The medullary canal was narrow with a significant deformity near the femoral neck (Fig. 4A). An open osteotomy was performed with a saw (Fig. 4B). Given the presence of a severe deformity, a second drill was inserted through the proximal fragment to prepare the path for the first drill (Fig. C) allowing the primary drill to reach the desired exit point more precisely in the femoral neck. The drill bit was then used as a nail guide for the insertion of the nail (Fig. 4D). A JuniOrtho™ Intramedullary Telescopic Nail (JTIN hereinafter) nail with a 3,5 mm diameter and 130 mm length was inserted by first attaching the female part to the drill at the level of the knee, and then pulling out the proximal end of the drill from the gluteal region to advance the female part into the bone. The male part was then inserted into the distal end of the female part followed by insertion of the cap into the proximal end of the female part, fixing it down to bone. The patient was immobilized with a hip spica cast for 5 weeks (Fig. 5).

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FOLLOW UP 3-8 MONTHS AFTER FIRST SURGERY

At 3 months, the plain radiographs highlight the change in the length of the telescopic nail following the growth of the bone (Fig. 6)

The day after the follow-up visit, the patient had a non-displaced fracture of the right tibia and fibula, which was treated with a short cast.

At 5 months post-surgery, the patient was able to walk without assistance (Fig. 7).

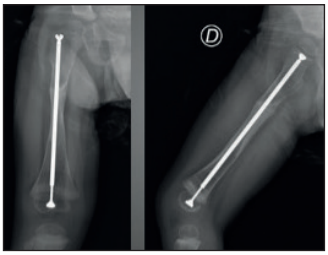

Fig. 6

Fig. 7

SECOND SURGERY: LEFT FEMUR

At 8 months post-surgery, a progressive deformity of the right tibia, due to the malunion of the last fracture, was observed. This deformity created difficulties with walking, including a limping, that resulted in multiple falls and eventually a new fracture of the left femur at the apex of the deformity.

The femur fracture was treated with closed reduction and fixation with a 3,5mm diameter and 150 mm long JTIN nail; whereas, the tibia was treated by performing an open osteotomy and implanting telescopic sliding elastic nails (Fig. 9). Afterwards cast immobilization was performed.

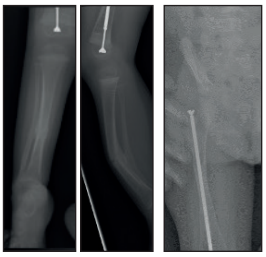

Fig. 8 X-ray deformity of the right tibia and fracture of the left femur

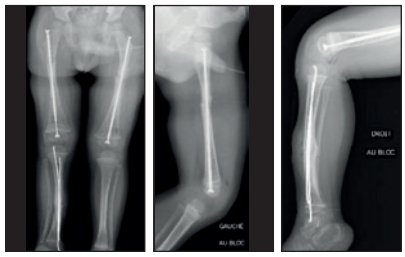

Fig. 9 Post-op x-rays

3 MONTHS FOLLOW UP AFTER THE SECOND SURGERY

The patient was independently mobile, including the ability to run (Fig. 10).

After a fall, a peri-implant fracture occurred in the right femur. Despite the fracture, there was no damage of the JTIN nail (Fig. 11).

Fig. 10 Patient walking

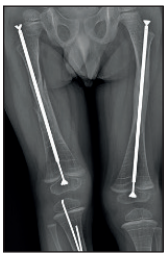

Fig. 11 Refracture on the right femur

LAST FOLLOW UP: 22 MONTHS RIGHT FEMUR 11 MONTHS LEFT FEMUR

Complete healing of the fracture without cast immobilization was achieved with functional telescopic effect of the nail still evident. Unassisted weight-bearing was again possible 3 months later.

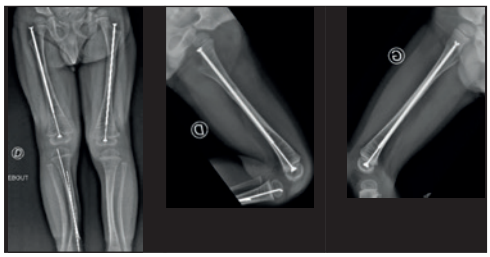

Fig. 12

SURGEON'S COMMENTS

Telescopic nailing is a gold standard technique for the treatment of fractures or deformities in young OI patients to allow them to stand upright and walk unassisted.
In the case presented here, the JTIN telescopic nail was applied using a retrograde approach.
Here some advantages of the system:

- The drill bit drives into the intramedullary canal the nail, providing the bone alignment during the surgery.
- No nail cutting required reduces the number of surgical steps and offer an efficient sliding of the nail components.
- The retrograde approach facilitates the position of the femoral neck in valgus, protecting the femoral neck from possible fractures during the growth.
- The manual reaming perpendicularly to the knee joint allowed to identify deformities and to perform osteotomies to straighten the femoral shaft.
- The specific design of the end cap is made to respect the bone during the fixation and have a solid anchorage of the nail.
- The JTIN system requires few ancillary instruments where the drill bit plays an important role as it acts as the nail guide.

Cast immobilization with a hip spica cast in internal rotation was necessary to avoid consolidation in external rotation. Cast immobilization also reduces pain and drug consumption. By undergoing intensive physiotherapy, the patient was able to recover normal range of motion of the hip and knee as well as return to walking quickly after each surgery or fracture. During the follow up, the patient had two fractures of the right femur around the nail and 3 fractures of the right tibia. In spite of these injuries, at the last follow up (22 months for the right femur, 11 months for the left), both nails still exhibited their telescopic effect with the caps of the nails firmly anchored in the bone (Fig. 12). The femurs had a good alignment in all planes with a horizontal knee joint line and the femoral neck in valgus. In my experience, retrograde femoral telescopic nail approach represents an easy, safe technique in OI patients with no major complications that can be used to achieve good control and correction of multiple deformities, especially valgus position of the femoral neck with a precise, robust anchoring in the distal epiphysis.

Contributing surgeon: Zagorka Pejin, MD, Hôpital Necker Enfantes Malades, Paris (FR), is a paid consultant for Orthofix.

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Note: This case report shows an individual's response to treatment. The information contained in this case report is provided for informational and educational purposes. It is not intended to guarantee the response other people may have to the treatment as responses to treatment can and due vary. Proper surgical procedure is the responsibility of the medical professional. Each surgeon must evaluate the appropriateness of a technique based on his or her personal medical credentials and experience.

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