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Correction of genu valgum deformity with femoral translation osteotomy and antegrade interlocking nail

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Abstract

Introduction: Genu valgum is a common deformity which is treated by almost every orthopedic surgeon. There are various methods to treat this deformity with usually satisfactory results. In adults, a femoral osteotomy is the most used method of correction of deformity. It is usually fixed by a plate. A large skin incision is required. The patient is usually kept non- weight bearing for a varying period.

We present a technique in which a minimally invasive percutaneous osteotomy is performed and fixed with an antegrade interlocking nail. The implant used is familiar, readily available, and cost cost-effective. Weight Weight-bearing is started immediately, and no immobilization is necessary.

Materials and Methods: We analyszed 22 cases of genu valgum treated with this osteotomy in a single centrer. We performed the percutaneous osteotomy and fixation with antegrade interlocking intramedullary nail. All patients were allowed to walk with a walker and full weight bearing from the next day as pain permitted.

Every patient was called for follow- up at 1, 3, and 6 months.

At every follow follow-up, orthogonal X-rays were taken, and the range of motion (ROM) at the knee and hip was recorded.

Results: All 22 cases showed good union at the osteotomy site and full knee and hip ROMrange of motion at 6 months. We had no wound complications or limb length discrepancy in any case.

Conclusion: This technique is a useful tool to add to the orthopedic surgeon's armamentarium. It 'is a cost cost-effective and minimally invasive solution to a very common problem, using familiar implants. A comparative study is warranted to study its superiority to other techniques.

Keywords: Genu valgum, interlocking nail, osteotomy, minimally invasive.

Introduction

Genu valgum is common deformity. [1]. A minor valgus deformity of 5–10° is regarded as physiological. These development-related changes in growth usually correct themselves spontaneously. Deformities up to the age of 12 years can be adequately treated by growth modulation surgery using eight8 plates [2]. Once the second growth is over and epiphyses have fused, spontaneous correction is very unpredictable, and there is a limited role of growth modulation surgery. Therefore, surgical treatment with corrective osteotomy is the method of choice in such cases. Various osteotomies are described in the literature, with various internal and external fixation modalities used to fix them.

We describe a minimally invasive osteotomy method where a translation osteotomy is performed in the distal femur percutaneously and is fixed with an antegrade intramedullary nail (IMN) interlocking nail (IMN). This osteotomy effectively corrects the deformity and allows early weight- bearing and minimal wound complications. The antegrade interlocking nail is a familiar implant to all orthopedic surgeons, is easily available, and is cost- effective.

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Materials and Methods

22 Twenty-two cases, with a mean age of 20.6 years (ages 16 to –29), of which 7 seven were female and 15 males, were

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Figure 1: Pre-operative.

selected for deformity correction over femur interlocking nails. Patients with moderate moderate-to to-severe genu valgum (intermalleolar distance more than 10 cm) with and age > 16 years were selected. 4 Four patients had bilateral disease, 2 two patients had a metabolic disorder, and the rest were had idiopathic genu valgum. All patients were skeletally mature.

Clinically, pre-operative and post-operative intermalleolar distance (in weight weight-bearing position) was measured.

Radiologically, pre-operative and post-operative weight weight-bearing X-rays were taken to measure tibiofemoral and lateral distal femoral angles. Pre-operative range of motion (ROM) at all joints was normal.

Surgical technique

PreThe pre-operative evaluation was done as routine, and physician fitness was obtained. Informed consent was taken. Patient The patient was given spinal anesthesia.

Figure 2: Immediate post post-operative.

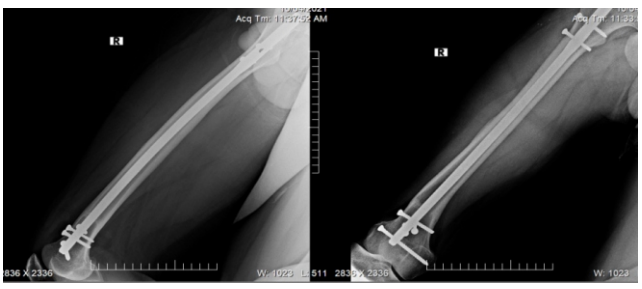

Figure 3: Healed osteotomy.

On a radiolucent table, a supine position with a bolster placed under the ipsilateral buttock was given. Painting and draping were done under all aseptic precautions. A hole was drilled in the proposed osteotomy site to make a vent in the intramedullary canal before reaming.

An incision was made over the greater trochanter. Entry into the intramedullary canal was made from the pyiriformis fossa, and intramedullary reaming was performed using serially increasing sizes of reamers. The reamer was advanced till the site of the deformity and then taken out. Then, the appropriate diameter of the IMN intramedullary nail was selected and inserted into the canal. The IMN was advanced till the site of osteotomy.

A stab incision was then made on the lateral aspect of the thigh at the site of the osteotomy. Using a 3.5 mm drill bit and sleeve, a percutaneous complete osteotomy was performed in the distal femur. The cortices were then osteotomized using a sharp osteotome. The deformity was then corrected with a gentle varus force at the site. The nail was then advanced carefully across the osteotomy site under C-arm guidance. Then, the locking screws were inserted into the IMN, and one or preferably two poller screws were inserted to give more stability. Careful and gentle back-hammering of nails was done. Then proximal locking screws were inserted. After confirmation under C-arm, closure was done, and a dressing was applied.

We suggest a floppy lateral position and adducting the hip for easy access to the entry point of the nail. Once the guide wire is inserted, the osteotomy can be performed, and the poller screws are inserted in the distal fragment in the supine position. The IMN must have locking screws in the anteroposterior (AP) direction distally for added stability. When inserting screws in this direction, we suggest using a K K-wire for the pilot hole, and using a stopper for the drill to prevent excessive drill migration posteriorly. For the osteotomy, translation is used more than angulation. So Hence, the IMN should be seated more laterally in the distal fragment in the AP view, and should be centered in the lateral view. We recommend using two poller screws, one medially and one laterally. Three locking bolts, 2 two from lateral to medial, and one AP should be inserted for added stability.

The post-operative protocol included early full weight bearing as tolerated, usually on post post-operative day 2 using a walker. Knee flexion and extension was were started on post post-operative day 1. Patient The patient was discharged on the 3rd day after surgery and asked to come for follow follow-up after 15 days, 1 month, 3 months, and 6 months. Weight Weight-bearing radiographs were obtained at 1 1-month, 3 3-months, and 6-months intervals. Knee ROM was measured on each visit.

Results

All osteotomies united within 3 months, except in 3 three patients, which showed union after a 4-month duration. A full

Figure 4: Intra-operative images – -– entry point anteroposteriorAP.

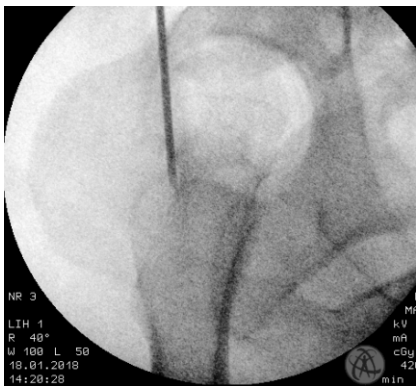

Figure 5: Intra-operative images – -– entry point lat.

Figure 6: Intra-operative images of intramedullary nail passage.

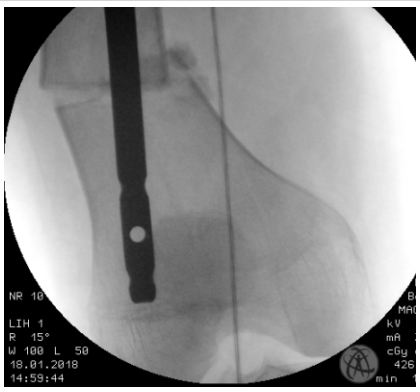

Figure 7: Intra-operative images – intramedullary nail passage across osteotomy.

Figure 8: Intra-operative images – Distal locking screws inserted.

Figure 9: Intra-operative images – checking alignment.

ROMrange of motion were was achieved post operatively at the hip and knee joints.

ROM of all patients was at pre-operative levels at 6 6-month follow follow-up. There was no wound complication or implant failure in any case.

Case 1: 19 19-year year-old male, with unilateral deformity.

Case 2: A 21-year-old male with right genu valgum operated

Discussion

Children start developing physiologic genu valgum starting by age 2 [1], and it becomes most prominent between ages 3 to –4. After that, it typically decreases to a stable, slightly valgus position by age 7 years. At birth, there is between 15 to and 20° degrees of varus tibiofemoral angulation. As the child grows, this corrects to neutral by about age 2 and between 10 to and 15° degrees of valgus tibiofemoral angulation between ages 3 and 4. At this point, the limb's valgus angulation then starts to gradually decrease to approximately 3-–5° degrees of valgus by age 7 [3,4].

Growth modulation surgery is the procedure of choice in skeletally immature children. Excellent results with the use of 8 eight plates are reported, and it is generally considered a safe procedure. [5]. Use The use of epiphyseal staples, and permanent hemi-epiphysiodesis are also described in children. [2,6,7].

Distal femoral osteotomy is a method of choice for the treatment of genu valgum deformity after skeletal growth is complete or deformity is too severe. [8]. Pre-operative planning with tibiofemoral angle, malalignment test, and mechanical axis deviationMAD is important for the accuracy of correction. All of these parameters should be brought within normal range to get a good result. [4].

The medial closing wedge osteotomy or a lateral opening wedge osteotomy can be used for the genu valgum correction [9]. These osteotomies are usually performed using a large skin incision and significant soft soft-tissue dissection. They are usually fixed with locking plates. In many cases, special pre-contoured locking plates are required. Availability and cost are issues associated with these implants. Post-operatively, delayed weight bearing and knee mobilization may be advised. In the case of open wedge corrections, the addition of bone grafts or bone substitutes may be required. [10]. Limb length discrepancy may also be an issue with larger deformities.

Figure 10: Pre-operative X-ray.

Figure 11: Immediate post-operative X-ray.

Figure 12: At 9 years follow-up X-ray shows complete healing.

Wound complications and infection are other complications associated with these techniques. Hardware Hardware-related problems, including infection and pain at hardware sites, are reported, often requiring hardware removal. [8,10,11].

In this article, we present a simple, reproducible surgical technique of distal femoral osteotomy for deformity correction, which is fixed using a femur IMN. We believe this procedure has reliable bony healing, inherent construct stability, and minimal hardware complications. Early weight bearing is possible. Since we are not removing any wedges, there is no issue of limb length discrepancy. Follow Follow-up radiographs shows that there is a complete healing of the deformity at the osteotomy site and there is no recurrence of any deformity is seen.

Through this article, we hope orthopedic surgeons will be confident enough to perform this procedure in any setting or level of expertise.

Since the osteotomy is performed percutaneously, there is less chance of wound complications and deep infections. The interlocking nail is a very familiar implant to most orthopedic surgeons and is cost- effective and easily available. No special implant or instruments are required for this technique.

Drawbacks The drawbacks of the procedure is are: it can be difficult in severe deformities and may require additional screws outside the nail in the distal femur. It cannot be used in patients with very narrow canals and very short femurs. So Hence, pre-operative assessment of canal diameter and femur length are is essential. It can be difficult to obtain entry into the intramedullary canal in very obese patients. Potential risks of intramedullary reaming, like such as pulmonary embolism and pathological fracture, are present.

Figure 13: Clinical photo, at 9 years follow up-1.

Figure 14: Clinical photo, at 9 years follow up-2.

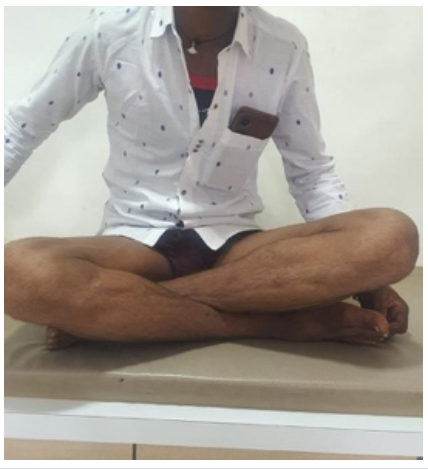

Figure 15: Clinical photo, at 9 years follow up-3.

Conclusion

This translation osteotomy is a useful addition to the armamentarium of the deformity correction surgeon. It is a minimally invasive technique using familiar implants and instruments with less post post-operative morbidity and early recovery. A comparative study is warranted to study its advantages over the other osteotomies and other fixation methods.

Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his consent for his images and other clinical information to be reported in the Journal. The patient understands that his name and initials will not be published, and due efforts will be made to conceal his identity, but anonymity cannot be guaranteed.

Conflict of Interest: NIL; **Source of Support:** NIL

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