Physeal Injury during Distal Femoral Osteotomy in Deformity Correction for Genu Valgum

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Introduction

Genu valgum is one of the most common lower limb deformities to present in an orthopaedic outpatient clinic.1) Medial Closed wedge osteotomy (Coventry type) is one the standard methods of surgical treatment to correct genu valgum. Other methods of surgical correction include lateral opening wedge osteotomy, dome osteotomy, Illizarov’s distraction method and hemiepiphysiodesis. Being simple reproducible technique medial closed wedge osteotomy is widely used.2) Here we report an inadvertent complication, Salter-harris type 4 physeal injury during medial closed wedge osteotomy.3).

Case report

A nine year old male child came to orthopaedic clinic with complaints of deformity in both knees and frequent falls during walking. On clinical examination he had bilateral genu valgum deformity. Laboratory investigations showed normal calcium, phosphorus and alkaline phosphatase. X-rays scanogram revealed bilateral genu valgum deformity of 200 in each knees. Diagnosis of Idiopathic genu valgum was made and planned for deformity correction by Medial closed wedge osteotomy (Coventry).

Operative procedure

The procedure was done in supine position under spinal anaesthesia with pneumatic tourniquet. Lower limb was kept in figure of four positions. A 3–4 cm longitudinal incision was given proximally from adductor tubercle. Belly of vastus medialis was elevated from the inter-muscular septum. A leash of physeal vessels was always seen traversing transversely in the surgical field. The osteotomy was carried out 3–5 mm proximal to this site. A small incision is given in the periosteum and it is elevated. K-wires were passed under radiological guidance for provisionally marking the tract for osteotomy. Anterior, medial and posterior femoral cortices were cut with osteotome and bony wedge was removed. Lateral cortex was left intact. Then the deformity was corrected by manually closing the osteotomy by applying the varus stress and plastically deforming the lateral cortex. Clear popping sound was heard while closing the osteotomy. Then it was stabilised by K-wires.

Radiological examination showed an intra-articular Salter-Harris type 4 fracture extending from the osteotomy site to the intercondylar region (Fig 1A). Then closed reduction of the fracture was done and stabilised with additional K-wires in the inter-condylar region (Fig 1B). Similar procedure of deformity correction was done in the contralateral knee uneventfully. Patient was immobilised in long knee cast.

Suture removal and change of cast was done at 2 weeks. The second cast was removed at 4 weeks; along with the removal of K-wires and range of motion exercises were begun. Full weight bearing was allowed after complete union of bone after 8 weeks. A scanogram was taken after bony union to assess for limb alignment, showed satisfactory correction of deformity in both sides. After a follow up period of one year, the patient revealed no limb length discrepancy or angular deformity in the side of physeal injury.

Discussion

Various treatment options for genu valgum in adolescents have been described. With open physeis, temporary hemiepiphysiodesis has been described. Figure of 8 plates or staples have been used with good success. However these procedures have their own problems. Correction is slow and not predictable. Risk of problems related to implant including infection, screw breakage. Rebound growth after implant removal is always a risk.4) Closing wedge osteotomy on other hand is better suited where little follow up is required after surgery. Correction is instantaneous and there are no risks of rebound growth.5)

Physeal fractures were not widely reported during osteotomy and deformity correction by Coventry method. In our case the physeal fracture was not expected initially as the osteotomy site was well above the physeal bar. The reason for physeal fracture during the deformity correction was found out to be the inadequate osteotomy of the posterior femoral cortex. Posterior femoral cortex is stronger compared to other cortices with considerable amount of cortical bone. Hence while the force was applied to close the wedge the osteotomy extended through the growth plate and into the epiphysis.

We recommend complete osteotomy through the posterior cortex after taking proper guard with homani’s retractor before closing the wedge. This avoids the shift of osteotomy line through the growth plate and further complication. Identification of physeal injuries intra-operatively and prompt fixation of the fracture would decrease complications like growth arrest and angular deformities.

Conclusion

Supracondylar medial wedge closed osteotomy is simple, stable, low cost osteotomy for surgical correction of genu valgum. Injuries to growth plate are rare during supracondylar osteotomies. Complete osteotomy of posterior cortex is recommended before closing the osteotomy wedge to avoid this complication.
Fig 1A: After closure of the Medial wedge osteotomy fracture line (arrow) extending through the growth plate, epiphysis and into the inter-condylar region.

Fig 1B: Salter Harris type 4 fracture reduced by closed means and stabilised by additional K-wires both medially and laterally

References


