 DOI: 10.18231/2395-1362.2017.0046

Management of neglected genu valgum by limb reconstruction system

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Abstract

Introduction: Genu valgum or Knock-knees refers to the abnormal coronal alignment in which the leg is shifted away from the midline which is a common deformity in children. While most deformities are physiological and resolve spontaneously, some may extend beyond physiological limits. Majority of them are idiopathic where as others are due to traumatic, metabolic or other local and systemic diseases.

Materials and Method: The study was conducted at Department of Orthopedics of Era's Lucknow Medical College from July 2014 to May 2016. It comprises of 6 patient of skeletally mature age in whom the epiphysis have been fused, with idiopathic neglected genu valgum having tibiofemoral angle >20 degrees which were treated by osteotomy and gradual distraction with Limb Reconstruction System (a type of External Fixator).

Aim: To study the management of neglected idiopathic genu valgum by Limb Reconstruction System.

Results: Limb Reconstruction System was found to be very effective procedure for gradual correction of genu valgum, which was easy to perform and involved lesser complications.

Keywords: Genu valgum, Limb Reconstruction System, Osteotomy.

Introduction

Genu valgum refers to the abnormal coronal alignment in which the leg is shifted away from the midline and is one of the common deformity in children. While most of these deformities are physiological and resolve spontaneously, some may extend beyond physiological limits. Majority of them are idiopathic where as others are due to traumatic, metabolic or other local and systemic diseases.[(1)] Valgus alignment of the lower extremities is normal in a child between 2 and 8 years old. The maximum amount of physiological valgus occurs between 2- 4 years of age, after which the alignment of the lower extremity assumes a mild valgus femoral–tibial angle, the normal alignment in an adult.

After 8 years old, correction of excessive physiologic (idiopathic) genu valgum may be indicated when there is gait disturbance, difficulty running, knee discomfort, patellar mal-alignment, ligamentous instability, or cosmetic concern. This condition also predispose to arthritic changes in knee, hip and ankle joint.[(2,3)]

The mechanical axis of lower extremity drawn from center of femoral head to the midpoint of the talus dome normally passes through the center of the knee joint. Any deviation of this axis medial and lateral to the center of the knee joint results in genu varum and genu valgum deformity, respectively.[(4,5)]

The origin of this deformity can be from distal femur mostly but can also originate from proximal tibia, which can be confirmed radiographically.

Previously various types of osteotomies like lateral opening wedge, medial closing wedge dome osteotomy, V osteotomy has been described which has been internally fixed with various implants such as K wire, distal femoral plates (which involved longer operating time and more blood loss).[(6,7,8,9)] Our management was based on principle of distraction osteogenesis with gradual correction of deformity which is relatively a safe and easy procedure and involved less operating time and lesser complications.

Materials and Method

The study was conducted at tertiary care hospital of Era's Lucknow Medical College & Hospital and involved 6 patients comprising a total of 8 knees. Two patients had bilateral deformities. All patients were of skeletally mature or going to be mature in 1 year having a mean age of 17.75 years.

All patients attending outdoor clinic were thoroughly assessed clinically, radiologically and relevant blood investigations were also done. Genu valgum patients having a tibiofemoral angle >20º and intermalleolar distance of >10cm were included. Patients with ligament laxity, multiplanar and flexion deformities were excluded. All the patients underwent radiographical evaluation by X-rays and CT scanogram of lower limbs to calculate the tibiofemoral angle and origin of deformity. Blood investigations like complete blood count, serum calcium (total and ionic), alkaline phosphatase, phosphorus, renal function tests (serum creatinine, blood urea) were also done. Clinically the assessment for origin of deformity was done by knee flexion test. The deformity measurement was based on tibiofemoral angle and intermalleolar distance. The intermalleolar distance can be measured in standing, sitting and supine position, in our study the intermalleolar distance was measured in standing

position with patella facing forwards and both knees in contact with each other. The tibiofemoral angle was measured radiographically as the angle between mechanical axis of femur, which is a line from the center of the femoral head to the center of the distal femur or center of the knee and tibial axis, which is a line extending from the center of the proximal tibia to the center of the ankle.

Both these measurements were evaluated pre-operatively and post-operatively and their results were assessed.

Surgical Technique: After proper informed and written consent patient were taken to operation theatre.

The surgery was performed under regional anesthesia with the patient supine on radiolucent table. A longitudinal incision (approx 3 cm) is made over outer aspect of thigh just above the lateral femoral condyle. A plane is made between vastus lateralis and lateral intermuscular septum and bone is exposed subperiosteally. Using osteotome, complete osteotomy was done at the level of initiation of deformity and keeping the cut parallel to the joint line. Then 4-6 schanz screws (2-3 each in the proximal and distal segment) were applied followed by compression of the Limb Reconstruction System. Distraction is started at 7 post op day at the rate of 0.25mm every 6 hourly (1mm per day). Stitches were cut on 12 post op day and follow up was done every weekly for 1 month, then every 2 weeks thereafter. As this method included gradual correction so the patient has to be kept non weight bearing for 4-6 weeks. Passive range of motion exercises of knee was started at 7 post op day. Active range of motion exercise was started at 21st post operative day. LRS was removed at mean of 9 weeks (8-10 weeks). Partial weight bearing was started at 6 weeks. Full weight bearing was allowed on an average at 10 weeks.

- The x-ray of patient attached does not appear to be a skeletally mature patient.
- Why tibial correction not done in few cases why only femoral used.
- If the space for pins was less why T clamp or swivel clamp not used.
- Apart from x-ray was any other method used for deciding the deformity.
- Please mention the degrees of mLDFA, mMPTA, and AMA in each case.
- Patients selected were either skeletally mature or going to be mature within 1 year.
- As the deformities were in femur in all cases, therefore corrective osteotomy were done in femur only in all cases.
- Swivel clamp was used in all cases.
- Only XRAY was used to decide for deformity.

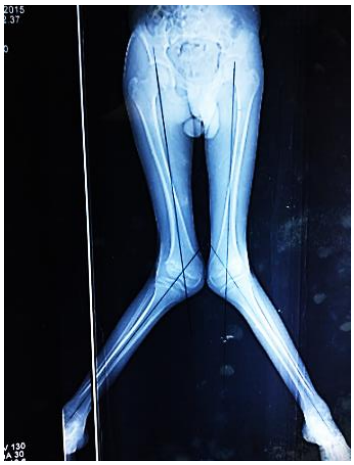
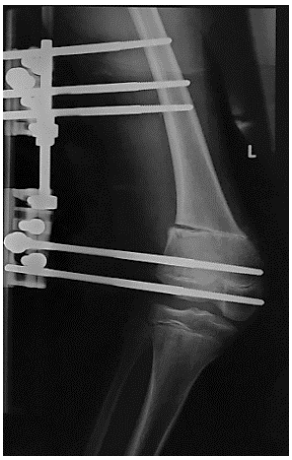
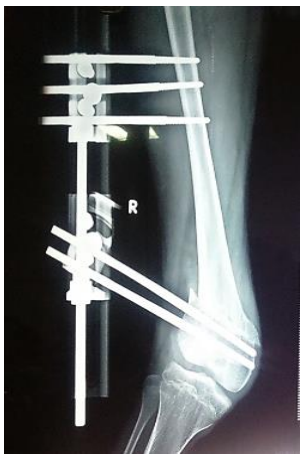
Results

8 osteotomies were done on 6 patients; 2 patients having bilateral deformities. The average age at operation was 17.75 years. There were 3 females and 3 males. All patients presented with pain and gait abnormalities. The mean pre-operative intermalleolar distance and average femorotibial angle were16.75 cm (range 11 to 24 cm) and 37.5^0 (32^0 to 45^0) respectively. The final result was a mean intermalleolar distance of 2.35 cm (0.5 to 4.5 cm) and the average femorotibial angle of 6.75^0 (5.5^0 to 10^0).

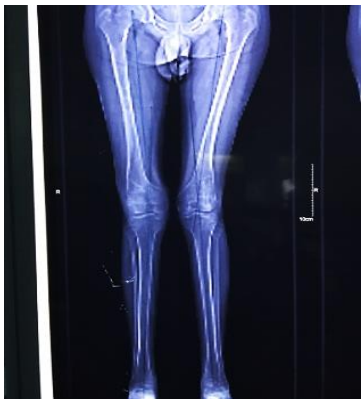
Complication: One patient had pin tract infection that responded well to antibiotics and debridement. In one patient with bilateral deformity, one knee had under-correction.

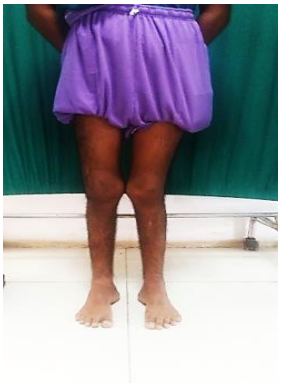
Case no.	Age	Side	Pre op IMD	Pre op FTA	Post op IMD	Post op FTA
1	18	Right	19 cm	34^0	4.5 cm	7^0
2	18	Left	19 cm	37^0	4.5 cm	6^0
3	17	Right	24 cm	45^0	4 cm	5.5^0
4	17	Left	24 cm	35^0	4 cm	10^0
5	16	Left	12 cm	36^0	0.5 cm	6.5^0
6	17	Right	11 cm	39^0	0 cm	6^0
7	20	Right	12 cm	32^0	1 cm	7^0
8	19	Right	13 cm	42^0	0.5 cm	6

IMD – intermalleolar distance, FTA – femorotibial angle

Pre operative Left knee immediate post op Right knee immediate post op





Scanogram after correction Clinically before correction Clinically after correction

Conclusion

Valgus alignment of the lower extremities is normal in a child between 2 and 8 years old. The maximum amount of physiological valgus occurs between 2- 4 years of age, after which the alignment of the lower extremity assumes a mild valgus femoral–tibial angle, the normal alignment in an adult.

Persistent valgus alignment even after 8 years of age leading to difficulty in walking and gait abnormalities should be treated by hemiepiphysiodesis or osteotomy depending upon whether the patient is skeletally immature or mature.

Hemiepiphysiodesis is done in skeletally immature patients. It can be done by stapling, percutaneous drill hemiepiphysiodesis, transphyseal screws, tension band plates or eight shaped plates.

Osteotomy is done in skeletally mature patients. It can be done in single sitting but due to complications gradual correction by distraction osteogenesis can be preferred.

Distraction osteogenesis with LRS shows the satisfactory results with favorable outcomes and fewer complications.

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