

Valgus rotational -dome shaped -tibial osteotomy in treatment of tibia vara

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Abstract

The choice of surgical treatment of tibia vara depends upon the age of child, and severity of the deformity Eighteen patients with 28 extremities suffering from Blount disease ,10 patients (55.6%) had bilateral deformity. There were 12 (66.6%) males, and 6 (33.4%) females. The mean age at presentation was 15.8 years (range 9.3 – 20.8 years) .All patients were evaluated clinically . Radiographic measurement of tibio-femoral angle were recorded, the average angle was 14 varus as positive angle . All were treated by dome shaped valgus rotational proximal tibial osteotomy and followed up a period ranged between 9 – 34 months. Results showed that there were correction of the varus deformity and improvement of alignment of lower extremities .The mean tibiofemoral angle measurement was 4 valgus as negative angle and 15 patients (83.4%) had full correction . No pain or ligamentous laxity of the knee was recorded and the range of knee motion was regained . 3 patients (16.6%) had under correction varus alignment as positive angle .

Valgus rotational dome shaped tibial osteotomy is a safe, stable and reliable method to accurately achieve angular and rotational correction of late onset form of Blount disease. There were no complication, and the healing was rapid.

Introduction

Blount disease is an uncommon growth disorder characterized by disordered ossification of the medial aspect of the proximal tibial physis, epiphysis, and metaphysis. This progressive deformity is manifested by varus angulation, internal rotation of the tibial, and genu recurvatum in the proximal metaphyseal region immediately below the knee. Fig (1) The natural history of it lead to irreversible pathologic changes, especially at the medial portion of the

proximal tibial epiphysis because of growth disturbances of the subjacent physis. The etiology remains controversial, but it is most likely secondary to a combination of hereditary and developmental factors.(13,14,16) The path physiology of Blount disease most likely is due to a combination of excessive compressive forces on the proximal medial metaphysis of the tibia and altered endochondral bone formation (3,9,13).



Fig (1) Clinical photograph. of 20 years old femal with bilateral Tibia vara

It can occur in growing child of any age, and is classified in to two groups. Early onset group (in children age less 3 y) is termed infantile type, and the late onset group includes the juvenile form (in children aged 4-10y) and adolescent form (in those aged 11 years or older) of the disease. The diagnosis of both forms of Blount disease is based on history, physical examination, and most importantly,

radiographs of the knee joint (1,2,3,4,5,6).

Langenskiold was classified tibia vara into six progressive stages relative to the degree of Tibial metaphyseal-epiphyseal, and metaphyseal-diaphyseal changes as observed on radiograph. The difference in roentgen graphic features between infantile and adolescent tibia vara is due to a difference in the osseous response because of age Fig (2)(7,8).

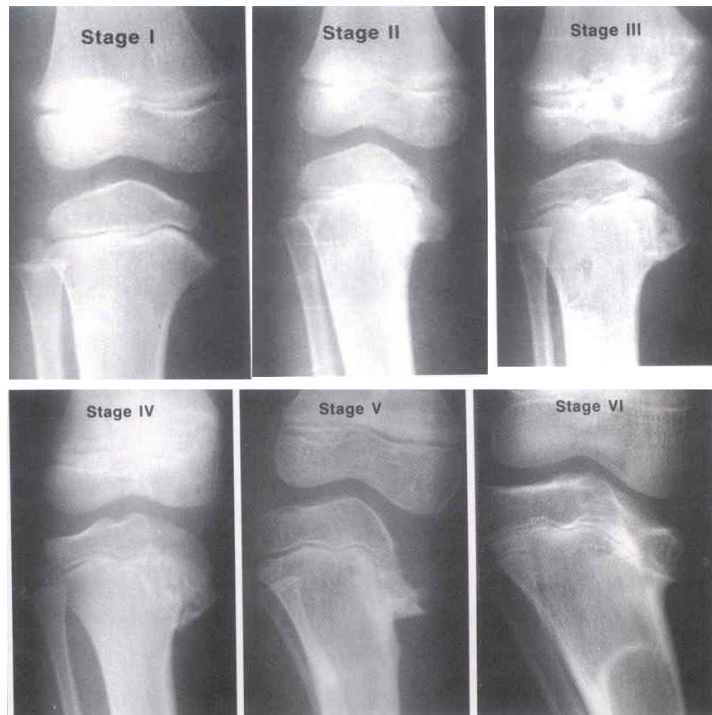


Fig (2) : Radiographs demonstrate stages of Blount's disease.(langenskoid classification)

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The form of management will vary depending upon the age of child and severity of deformity. It can be categorized into no operative and operative. Observation and bracing with knee – ankle – foot – orthosis KAFO is recommended most frequently for children before 2 years age. No recommendation for surgical treatment has been made for children younger than 2 years because the existing deformity may be an exaggerated physiologic genu varum. If the deformity persists or increases with orthotic treatment, and the disease progresses radiographically to advanced stage II,III, the surgical correction should be performed. Furthermore, surgery is recommended for severe deformity, ligamentous laxity of the knee, and disabling the child (3,10,14,15).

The surgical treatment of tibia vara is open for various controversies. Many different types of osteotomy have been described including opening and closing wedge, dome, and oblique osteotomy.(9,10,11,12)

In this study, the evaluation of results of valgus rotational – dome shaped - tibial osteotomy in the treatment of late onset form of tibia vara.was done

Material and methods

18 patients (28 extremities) with Blount disease were collected from orthopedic department of National Institute of Neuromotor system and Rehabilitation. 10 patients 55.6% had bilateral deformity. There were 12 patients (66.6%) males, and 6 patients (33.4%) females.The mean age at presentation was 15.8years (range 9.3-20.8 years).

Preoperatively, clinical evaluation of patients showed that the main complained in all patients (100%) was

progressive deformity, cosmetic dissatisfaction. Other complains included pain which occurred after prolonged activity in 26% and limping gait with activity in 62.1%.Only Three 16.6% patient had ligamentous laxity . Radiographic assessment was done from standing anteroposterior view to allow accurate measurement of the knee alignment and to identify the pathological changes in the proximal tibia. Measurement of tibio- femoral angle was made, It is formed by the line of the shaft of femur and the line of the shaft of the tibia .The varus alignment was recorded in degrees as positive angle and valgus alignment as negative angle.

Surgical technique: -

The approach to the fibula was a standard postero-lateral approach at the level of the junction of proximal and middle thirds of the fibula, taking precaution to prevent injury to the peroneal nerve.

An anteriomedial longitudinal incision was made over the proximal tibia. The periosteum of the tibia was elevated, and retractors were placed posteriomediaally and posteriolaterally to protect the soft tissues. Level of osteotomy was determined just distal to the tibial tuberosity in the metaphyseal bone. Osteotomy was done by share small osteotome after drilling its crescent plane. Through dome shaped osteotomy, angular and rotational correction was obtained and over correction of 5° of valgus was achieved intra operative using knee joint line measurement. The periosteum over the osteotomy was re approximated, skin and subcutaneous tissue was closed, and above knee cast was applied for 8 weeks then weight bearing was allowed. Fig (3).

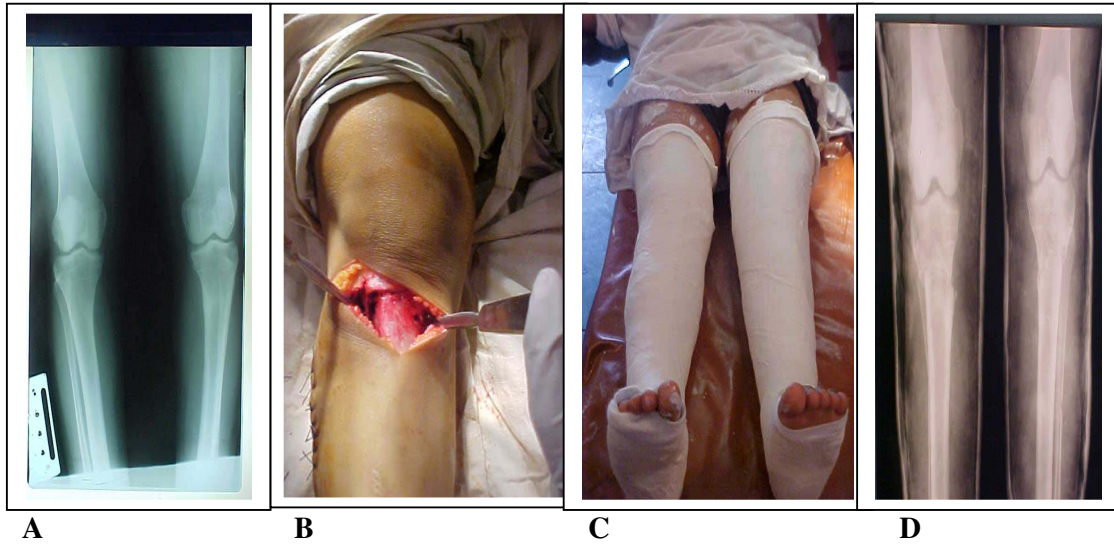


Fig (3).

- (A) Xray of 20 years old female with bilateral adolescent Tibin vara
- (B) Level of dome-shaped osteotomy just distal to the tibial tuberosity
- (C) Immobilization of correction of osteotomy with above knee Cast.
- (D) Immediate postoperative Xray

In four obese large adolescent child, internal Fixation was used to avoid the risk of loss of correction. Postoperative bracing with knee stabilizer was recommended to maintain the correction of the deformity in three patients .All patients were followed up clinically and radiologically. The average follow-up time was 16.9 months (range 9-34 months).Fig(4)

no pain with activity was recorded in all patients and three patients with ligamentous laxity of the knee were noteded. and knee stabilizer was recommended . The range of motion of the knee was regained in all patients within 6 weeks after removal of the cast and there was improvement of gait. During the follow up period ,no recurrence of deformity or loss of correction was recorded.

Results

Clinical results were showed that



Fig (4):-Case Report:- 16 years old adolescent male with Right Tibia vara. (a) preoperative Xray : Tibiofemoral angle (18°) varus alignment as positive angle .(b) Xray: 8 months following dome shaped- osteotomy , full correction valgus alignment as negative angle .

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The alignment of lower extremities and varus deformity at knee joints was recorded through measurement of the tibio-femoral angle. 15 patients (83.4%) had full correction valgus alignment as negative angle, 3 patients (16.6%) had under correction varus alignment as positive angle. Pre operatively, the average of the tibio-femoral angle was 14° varus (range 10-35°), post operatively, the average angle was 4° valgus (range 2-10°). $p < 0.001$ (high significant). No loss of correction after dome shape osteotomy was recorded during the follow up.

Discussion

Any degree of clinical varus between the ages 2 up to 12 years is considered abnormal physiologic varus alignment. The role of physicians is determined if the bowing is physiologic (part of normal development) or pathologic (due to some disease process) through clinical and radiological assessment. The diagnosis of Blount disease is based on physical examination, and radiographs of the knee. The tibiofemoral angle is a measure of the degree of the deformity of the extremity and the tibial metaphyseal diaphyseal and metaphyseal epiphyseal angles are critical in assessing the staging the severity of the deformity.

Surgery was recommended primary when the deformity does not improve with orthotic treatment and/or radiographically the disease progresses to a stage II or III. The absolute indications of surgery when the child complains of pain, and varus deformity, depression of tibial plateau, ligamentous laxity of the knee and radiologically in child with the advanced stage II-III deformity with tibiofemoral angle $> 15^\circ$, tibial metaphyseal diaphyseal angle of

14°, and tibial epiphyseal- metaphyseal angle of 30°.

Many different techniques of tibial osteotomy have been described. In this study, I described valgus rotational dome shaped tibial osteotomy in treatment of late onset form of Blount disease. Various considerations should be put in mind with surgery for favorable results including the location and time of osteotomy, amount of correction, and method of fixation of the osteotomy.

Early surgical intervention during the initial stages of the disease process will result in a decreased incidence of recurrence and knee pathology at maturity.

Location of the tibial osteotomy was done in the metaphyseal bone with a sharp osteotome or chisel, (not using an electric cutting saw which can induce thermal necrosis of the bone ends). This location promotes greater healing potential. In the more skeletally mature adolescent child, it was carried out through the physeal scar, whereas, in the younger child it was carried below the insertion of the patellar ligament because the proximal tibial physis is still open.

It was a safe technique in a multiplan correction of the deformity (angular – rotational) and permit stabilization of the fragments of the bone ends and favorable results were obtained in children in whom slight over correction was achieved at surgery and the tibiofemoral angle was recorded 5° valgus.

The recent trend to use external fixation devices to gradually correct leg discrepancy has led to usage in correction of deformity in Blount disease. But casting immobilization with/ or without internal fixation is less time consuming, and less labor-intensive than external fixation method.

The use of casting alone was safe and stable. The use of staples or pinning or various forms of plates for secure the osteotomy correction in heavy weigh adolescent child was recommended. The postoperative care was included close clinical monitoring and protection of the knee with knee stabilizer in case of residual ligamentous laxity.

Conclusions

The goal of early surgical intervention during initial stages of the disease process is to create a horizontal knee joint for weight bearing, decrease the incidence of recurrence of deformity, and decrease the symptoms and knee pathology at maturity. Valgus rotational dome shaped tibial osteotomy is a safe, reliable method to accurately achieve angular and rotational correction of the late onset form of Blount disease with Langenskiold grade II through IV. The osteotomy is stable, healing is rapid, and these are no complication. Close clinical monitoring and bracing are needed in obese old adolescent with sever deformity or residual ligamentous laxity of the knee to avoid the recurrence of the deformity.

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شق عظمي أعلي عظمة الساق (شكل قبة) في تصليح التشوه الداخلي للساقين عند مفصل الركبة (مرض بلونت)

د/ حسام محمد قنديل

زميل جراحة العظام والكسور (قسم جراحة عظام الأطفال)
بالمعهد القومي الحركي العصبي والتأهيل

التشوه الداخلي للساقين عند مفصل الركبة من التشوهات الغير نادرة
وتصيب الأطفال في أعمار مختلفة ومرض بلونت غير معروف الأسباب ولكن
التغيرات الباثولوجية بالمركز العلوي لنمو عظمة الساق تم تحديدها عن طريق
الأشعة التشخيصية.

العلاج الجراحي لمرض البلونت يشمل عدة عمليات جراحية معتمدة علي
سن المريض وشدة التشوه المصاحب له ودرجة الإصابة بالمرض.
ويعتبر عملية الشق العظمي أعلي عظمة الساق علي شكل قبة يسمح
بتصليح التشوه ذات المحاور الثلاثة مع الثبات والأمان وعدم الارتجاع وبدون
مضاعفات.

وتمت الدراسة علي 18 مريض (28 طرف سفلي يعاني من مرض بلونت
)، وتم إجراء العمليات بالطريقة المذكورة أعلاه، وتسجيل النتائج المصاحبة لها.