Comparison between Role of Epiphysiodesis Vs Tibial Osteotomy in Treatment of Varus Deformity of the Tibia

Essay

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List of Abbreviations

a	Anatomical
A	Anterior
AD	Angular Deformity
aJCD	Anatomic axis to Joint Center Distance
aJCR	Anatomic Axis to Joint Center Ratio
aJED	Anatomic axis to Joint Edge Distance
aJER	Anatomic axis to Joint Edge Ratio
AP	Antero-Posterior
ADTA	Anatomic distal tibial angle
ANSA	Anterior neck shaft angle
C.T	Computer Tomography
D	Distal
F	Femur
JLCA	Joint Line Convergence Angle
L	Lateral
Lat.	Lateral
LDTA	Lateral Distal Tibial Angle
LLD	Limb Length Discrepancy
LPFA	Lateral Proximal Femoral Angle
LTA	Lesser Trochanter to Articulal Surface Distance
m	Mechanical
M	Medial
M/L	Medial / lateral
MAD	Mechanical Axis Deviation
ALDFA	Anatomical Lateral Distal Femoral Angle
MPTA	Medial Proximal Tibial Angle
MPFA	Medial Proximal femoral Angle
MRI	Magnetic Resonance Imaging
MLDFA	Medial lateral distal femoral angle
NSA	Neck shaft angle
P	Posterior
P	Proximal
PDFA	Posterior Distal Femoral Angle
PPFA	Posterior Proximal Femoral Angle
PETS	Percutaneous Epiphysiodesis using Transphyseal Screws
PPTA	Posterior Proximal Tibial Angle
SD	Standard Deviation
T	Tibia

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Introduction

Genu varum or bowleg is a common childhood deformity and one of the most common causes of parental concern. In the majority of cases, it is physiologic in origin and will correct with normal growth and development, however, there are pathologic genu varum disorders that may progress and produce functional impairment.[(1)]

The history will frequently distinguish physiologic from pathologic genu varum. The birth history, the age at which developmental milestones occurred, a nutritional history, and the previous percentiles for height and weight can help in determining the type of deformity. Also the orthopaedist must know about the onset, history of injury or illness, deformity progressing, and family history of short stature or other family members affected. [(2)]

Also measurement of the intercondylar distance when the child stands and in the upright position and determine the lateral knee thrust while walking, range of motion of the hip, knee and ankle and assess the presence of ligamentous laxity can help in determining the degree of deformity. In addition, measurement of the rotational or torsional change if present, obtaining serial photographs, if possible, and placing them in the child’s chart as an aid in documentation of improvement or worsening over time. [(3)]

There are different methods for treatment of varus deformity of the tibia in children, according to multiple factors such as :physiological or pathological, age of patient, degree of severity and others. Tibial osteotomy is indicated for the child who is first seen for treatment after the age of three years who is a poor candidate for brace therapy and who has persistent genu varum despite brace therapy.

Multiple techniques have been described for the performance of this procedure in children.All involve placement of the osteotomy distal to the tibial tubercle to prevent damage to the tibial apophysis and subsequent genu recurvatum. Concomitant osteotomy of the fibula is necessary to permit adequate correction of the genu varum and internal tibial torsion.(4)

Epiphysiodesis: can be applied by several techniques. It is indicated if the growth plates are still open and the varus deformity is not too severe. It is contraindicated if a patient is near skeletal maturity. Greater preoperative deformity may reflect a more dysfunctional medial physis that is unable to produce corrective growth. [5]

This can be accomplished in a variety of ways, including permanent physeal ablation, physeal screw placement, staples and recently, the tension band plate (eight-Plate). The permanent methods of physeal ablation require exact timing of the surgery because overcorrection can occur if growth estimates are incorrect.[5]

This essay will stress on role of epiphysiodesis and tibial osteotomy in Treatment of varus deformity of the tibia.

Aim of the Work

The aim of the work is to review the literature on role of epiphysiodesis and tibial osteotomy in treatment of varus deformity of tibia, reporting of types, indications and methods of both. The review compare between role of epiphysiodesis and tibial osteotomy in the treatment of varus deformity of tibia.

Normal development of the mechanical & anatomical alignment of the lower limb

At birth the lower limb is not only poorly developed, but occupies the fetal position of flexion, a position that is maintained for six months or more. In preparation for standing and walking the limb not only become more robust, but also undergoes an extension and medial rotation that carry the flexor compartment around to the posterior aspect of the limb.

The inverted foot of the newborn gradually becomes everted harmoniously with these changes in position of the knee and hip joints. Growth of the limb proceeds more rapidly at the knee than at the hip or ankle, and it is not symmetrical across the lower epiphysis of the femur, so bowlegs and knock-knees are normally appear in the child (Fig. 1)(1)

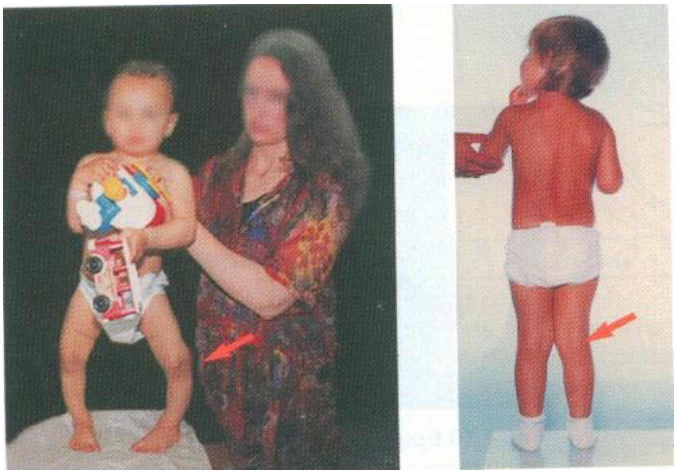

Fig.(1-1): Physiologic bowlegs 13-month-old infant

Physiologic knock-knees 3-year-old (1)

Mild to moderate bowing of lower extremities is a common finding in infants and young children, it is the result of molding of the lower extremities in utero.

The bowed appearance of the lower extremities is actually a combination of external or lateral rotation of the hip (tight posterior capsule) and internal or medial tibial torsion. This physiologic genu varum tends to persist during the first year of life with only minimal improvement.(2)

After a child begins to walk, the bowing corrects spontaneously and complete correction may require up to 36 months of ambulation. Physiologic genu valgum may appear by 3 - 4 years of age, this is true genu valgum, and not the result of a torsional combination from *in utero* positioning and this deformity also undergoes spontaneous correction with normal adult knee alignment of mild genu valgum obtained by 5 - 8 years of age (2).

Salenius and Vanakka, analyzed the tibio-femoral angles clinically and radiographically in 1,279 children between birth and 16 years of age, (the tibio-femoral angle is the angle formed by lines drawn along longitudinal axis of tibia and femur). They found a mean varus alignment of 15° in newborns and the angle was decreased to approximately 10° of varus alignment by age 1 year, and between 18 and 20 months of age neutral alignment occurred. The maximum valgus of approximately 12° was achieved by 3-4 years of age (The results were similar for boys and girls), finally by age 7 years, the children's valgus alignments had corrected to those of normal adults (8° in women, 7° in men) (Fig.1-2).(3)