

EDITORS NOTE Orthopaedic problems in young children is very common and a cause for concern to parents.

In this issue of Community Paediatric Review we publish an article by Professor Kerr Graham which addresses this important topic. This article takes up the whole issue, which is a departure from the usual format of CPR.

Orthopaedic Problems in Children

Parents frequently consult family doctors, paediatricians and orthopaedic surgeons because of concerns about their children's lower limb alignment or gait. The majority of these children are normal, that is they do not have a specific disease or deformity, but are referred with a normal variation such as flexible flat foot, intoeing, out-toeing, knock knees or bow legs.

It is essential to remember that there can be just as much parental anxiety in respect of a child with a normal physiological variant as with a child with a definable pathological condition. In fact, if there is a failure to address parental concern in an appropriate manner and to offer a convincing explanation regarding natural history, the parents of these children may actually be more concerned, more aggressive and demand more second opinions than the parents of a child who has a condition in which the doctor is taking a more specific interest.

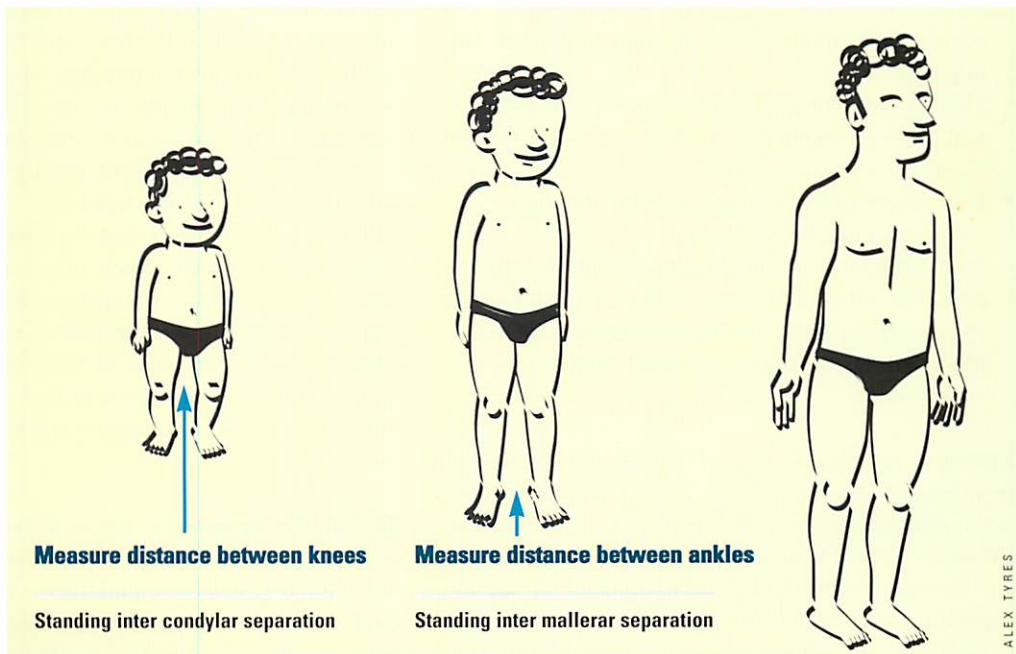


Figure 1. Bow legs and knock knees

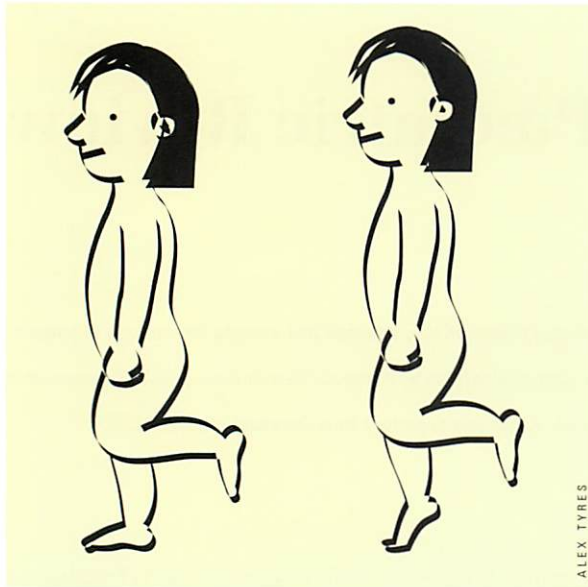


Figure 2. Flat feet – the tip toe test.

Note: Figure 2 – if the arch appears when walking on Tip-Toe the feet are flexible and the flat arch is of no significance and requires no treatment apart from explanation.

The general principles of the management of these children are outlined here:

Principles of the management of child with normal physiological variant

- These conditions are very common because they are normal variations.
- A reasonable description of normal is the mean value of the measurement plus or minus two standard deviations. This is of value to doctors, not to parents.
- These conditions generally resolve spontaneously and there is usually little evidence that intervention changes the natural history.
- Over investigation and over treatment of these children should be resisted.
- Within the large group of normal children with physiological variants, there will be a small number with specific pathology. These children need to be identified, investigated, diagnosed and treated appropriately.

Intoeing Intoeing is one of the most common gait problems reported by parents. There are not usually any other significant symptoms such as pain or deformity elsewhere. There is usually a marked contrast between the parent and the child. The parent is anxious regarding this “deformity” whereas the child runs around the consulting room in a carefree fashion, frequently not demonstrating anything like as much intoeing as the parents claim is the case at home.

There are essentially three causes for intoeing, resulting from problems at three different levels, ie the foot, the tibia and the femur. These problems tend to present at three different age groups and the assessment, management and natural history of each is quite different.

Intoeing: metatarsus adductus This can be considered as the first cause of intoeing because it presents in the youngest age group, either at birth or in the early months of life. When the child is examined the forefoot is adducted and the sole of the foot may have a “kidney shape”. Metatarsus adductus is easily distinguished from congenital talipes equino varus (CTEV) in the majority of cases by examination of the position of the heel and the range of dorsi flexion at the ankle. In true CTEV, there is obvious restriction of dorsi flexion at the ankle and the heel is in varus. In metatarsus adductus the heel is neutral or in valgus and there is a normal range of ankle dorsi flexion.

The deformity is often bilateral, but not usually symmetric and probably arises from intra uterine positioning. There is some evidence that it is perpetuated by the infant sleeping in the prone position. With the current concern regarding the association between sudden infant death syndrome (SIDS) and prone nursing, the condition has become much less frequent in most orthopaedic clinics. In terms of natural history the condition is known to resolve spontaneously in the majority of children. However, in about 15% of children, resolution of the deformity is either slow or incomplete. It would seem reasonable therefore to observe the child for the first three months of life and to advise against prone nursing. If there is delay in resolution, then simple conservative treatment with corrective serial casts can be considered.

A significant number of children with metatarsus adductus also have developmental dysplasia of the hip (DDH). The difficulty is that the hip problem may be an acetabular dysplasia which may only be detected by ultrasound or x-ray examination of the hip and is not apparent clinically. It is therefore very important that all children presenting with metatarsus adductus have a proper clinical examination of their hips and either an ultrasound or x-ray examination according to the age at presentation.

Medial tibial torsion Medial or internal tibial torsion is very common in toddlers and usually presents as intoeing between one and three years of age. It is probably a “packaging defect”, the result of intrauterine positioning. It frequently coexists with and may be confused with bowing of the tibia, physiological genu varum.

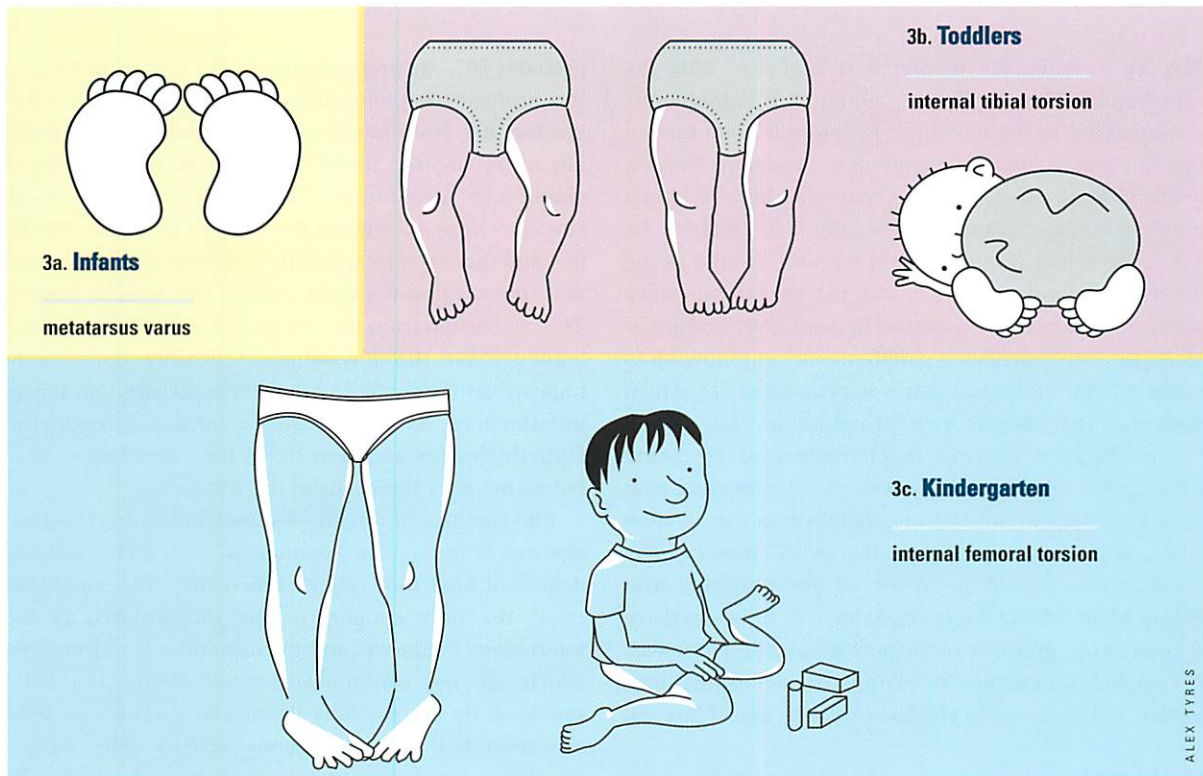


Figure 3. Varieties of intoeing at various ages.

The natural history is for spontaneous resolution, conservative treatment is of doubtful value and operation is almost never required in (otherwise) normal children. A number of orthotic devices have been used, principally boots on a curved metal bar with the feet turned outwards ("Denis Browne splint"). This is used as a night splint and is a potent cause of disturbed sleep and family distress. It may speed resolution of the deformity but this has never proven.

Intoeing: medial femoral torsion (inset hips) In childhood the principal cause of intoeing is medial femoral torsion or "inset hips". This is most frequently seen in children between the ages of 5 and 10 years. The typical presentation is of mild moderate intoeing which is symmetric in nature. The child often has signs of generalised joint laxity and may have associated features such as flexible flat feet. Parents complain that their children look awkward and trip frequently, but the degree of disability is usually very slight. Some children like to sit in the "TV" or "W" posture.

Examination reveals a characteristic shift of the arc of hip rotation inwards, hence the synonym "inset hip". This is the reason why the children can sit comfortably in the "W" position. It is doubtful if sitting in this position actually causes the condition, but there is some evidence that habitually sitting in this posture slows down the natural tendency to spontaneous recovery.

The natural history of the condition is for a

spontaneous resolution during the growing years. There is no evidence that any form of exercise or orthotic devices make any difference whatsoever. The condition can be treated surgically, but the vast majority of children improve spontaneously and do not require intervention. The timing of surgery is important. Surgery should not be performed at an early age, because the degree of natural recovery cannot be known; there would also be a significant risk of recurrence. Improvement probably slows down and stops at the age of about 10-12 years.

Coronal plane angulation: Bowlegs and knock knees

Coronal plane angular deformities in the lower limbs are very common in normal children. This is because there is a normal sequence of maturation in which infants and toddlers commence life with bowed legs; they have a very short period in which the legs are straight before they become knock-kneed between the ages of 5 and 8 years before straightening up to the normal adult configuration with straight lower limbs. It is very important therefore to realise that it is unusual for toddlers and children to have absolutely straight legs - mild bowing in the toddler and mild knock knee in the child is the norm. Out of every hundred children who attend orthopaedic clinics with bow legs or knock knees only two will have a definable disease as a cause for the deformity and probably only one will require operative correction.

Bow leg When the toddler first begins to walk the appearance of bowing is very common. It is frequently accompanied by some degree of internal tibial torsion and the one deformity accentuates the other. Bowing seems to be pronounced in overweight children [and a simple method of clinical assessment is to measure the ICS or intercondylar separation. With the toddler in the standing position, and the ankles together the distance between the knees is measured in centimetres or finger breadths. This provides a simple means of follow up to assess whether the condition is improving or not, which is often all that parents wish for reassurance].

Physiological bowing is characterised by being symmetrical, not excessively severe and improving with time. Pathological bowing may be asymmetric, is often more severe and deteriorates with time. X-ray examination should be reserved for children who appear to be outside the normal range or in whom there is reasonable grounds to suspect a specific pathology. This includes: unilateral or asymmetric deformity; short stature and syndromes; children over the age of 5 years.

Knock knees Genu valgum or knock knee deformity is usually normal in children between 5 and 8 years. In normal children the deformity is symmetric, not excessive and improves with time. A simple method of monitoring the condition clinically is to get the child to stand with the knees touching and measure the distance between the medial malleoli of the ankles, the inter-malleolar separation. There is no indication that the natural history is affected by exercises, shoe inserts or night splints. The majority of children straighten spontaneously. Pathological genu valgum is usually more severe, asymmetric and increasing with time and observation. Causes include trauma (proximal metaphyseal greenstick fracture of the tibia or growth plate injury), rickets, skeletal dysplasias and congenital limb deficiencies.

A small number of children with physiological genu valgum do not correct completely or enough to be happy with their appearance and correction can then be offered.

Flat feet Almost all infants have "flat feet" with no obvious medial longitudinal arch. In the majority,

probably 80%, an arch will develop by the age of 6 years. It is probable that most of the enthusiasm for "treating" flat feet has been based on the observation that using any of the popular forms of treatment, the majority of children are noted to get "better". More recently many surgeons have questioned the value of treatment for flat feet and there is now scientific evidence which confirms that intervention does not change the natural history. The conclusion from this study is that there is a natural tendency for the physiological flexible flat foot to improve with growth and development and that this is uninfluenced by most popular forms of treatment. Orthotic devices can slow down the rate of shoe wear but do not alter the shape of the feet.

The findings of flexible flat foot in children include absence of the medial longitudinal arch and a variable degree of hind foot valgus. When the child stands "at ease" the only support to the medial arch is the interosseus ligaments and intrinsic muscles of the foot which are not continuously active. When the child stands on tip toe, the long flexor and extensor muscles are recruited into continuous activity. The medial longitudinal arch usually appears and the heel tilts into neutral or varus. This "tip toe test" can be used to explain the nature of the condition to parents and to reassure them that the internal structure of the foot is essentially satisfactory.

Although it has now been demonstrated that shoe modifications and inserts do not change the foot, there is some evidence that orthotics may prolong the life of the shoe by decreasing deformation and wear. If excessive shoe wear and cost of replacements are important to the parents, the Helfet heel cup may be helpful.

Pathological flat feet in children with neuromuscular disease such as cerebral palsy or spina bifida sometimes require surgical stabilisation by means of a subtalar fusion or triple arthrodesis. In children with normal flexible flat foot, surgery is very rarely required and the results are frequently indifferent.

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