Problems of Childhood

Knock knees and bow legs

W J W SHARRARD

British Medical Journal, 1976, 1, 826-827

Variations in gait and posture are among the commonest causes for parental concern in childhood. The shape of the legs and the pattern of gait is subject to continuous modification during growth and development particularly during the first six or seven years of life. Many parents are not aware or have not been told that variations may occur and expect the child to have the legs and gait of an adult as soon as he can walk. It is when the child is over 2 and is still showing noticeable eversion or intoeing or is becoming knock-kneed that they become worried and seek medical advice. The doctor must be able to decide whether the posture or gait is (a) within normal physiological limits and only reassurance is required, (b) within normal physiological limits but requires specific measures such as alteration to shoes, or (c) abnormal and needs specialist orthopaedic management.

History

The history may be of an abnormality of gait: "he throws his right leg when he is walking" or "he walks with his toes turned in." The doctor will need to know for how long the child has been walking, how long the abnormal gait has been noticed, and whether it seems to be getting worse. The history may be of an abnormal stance—"his feet seem to go over when he is standing." In this case the doctor needs to know when the child started to stand and what effect it seems to be having on his shoes. Less often the presenting complaint is of a specific abnormality: "he is flat-footed," "he is bow-legged," or "he is knock-kneed."

It is rare for pain to be mentioned as a symptom, partly because most postural abnormalities are not painful and also because, even if the child does suffer discomfort, he is unlikely to tell his parents because he has no means of knowing that aching feet are not a normal consequence of walking. Most of the postural abnormalities to be described are more noticeable when the child is tired or has walked for a distance, which may be misleading to the doctor, who is likely to be examining the child when he is fresh and therefore may not show as much modification in gait or stance as the parents indicate. Other matters that may need to be asked about are a history of injury or, especially in immigrant families, an account of dietary habits that may predispose to rickets.

Examination

There is no better way of ensuring the lack of co-operation by a child of any age than to take him away from his parents, strip him completely naked, and try to get him to lie down on a couch. Some degree of undress will, of course, be essential to the examination but it should take place gradually and always respecting a child's innate modesty. Watch the child walking with his shoes on. If he does not like to go to the consulting room door and back by himself he will almost always agree to do so accompanied by one of his parents. Observation of walking may then be repeated after removing his shoes, socks, and outer garments.

Study his general physique, noting whether he is tall or small for his age, the proportion of trunk and legs, and whether he is thin or obese. Rarely, a florid rickets may be diagnosed by the obvious enlargement of wrists, knees, and ankles. Look for abnormality of gait, such as limp, throwing one leg round the other, toeing in, or toeing out. If there is intoeing, try to see whether or not the knees face inwards to the same degree as the feet.

Get the child to stand facing you with the knees together but not overlapping and in the relaxed position. Observe the inner side of the foot for any prominence of the navicular, the degree of medial arch present in a relaxed position, and the presence of any adduction and inversion or abduction and eversion of the forefoot relative to the hindfoot. Ask him to stand on his toes but beware of a misunderstanding that may arise in a small child, who may take the instruction literally and try to do the impossible by standing on the ends of his toes. Normally when a person rises on to the ball of the feet the medial longitudinal arch becomes more pronounced. Repeat the observations looking at the child from behind and watching for the line of the back of the calcaneus, which may be more or less everted in the stance position and become neutral or inverted when he rises on to his forefoot. Examine the mobility of the hip, knee, ankle, and foot joints. The smaller child is much happier if examined on his parent's lap rather than on a couch. The range of medial and lateral rotation is a particularly important feature at the hips, the range being measured with the hips in extension not in flexion. The degree of knock knee or bow leg and the presence of any asymmetry in deformity between the two limbs is an important feature to look for. The range of dorsiflexion at the ankle should be assessed with the foot inverted, the normal range of dorsiflexion in this position being 20° or 30° in each direction. Limitation of inversion may be accompanied by spasm of the peroneal muscles. Hypermobile joints in association with generalised ligamentous laxity or muscle hypotonia show a relative increase in the range of movement at all joints and, in particular, some degree of genu recurvatum.

The final and very important part of the examination of the legs is an examination of the shoes. Ideally, a pair that has been worn for a while gives a lot of information by showing the degree of flattening of the inner side of the upper of the shoe and the point of maximum wear at the back of the heel, which should normally be just to the outer side of the middle line.

Royal Infirmary, Sheffield S6 3DA

W J W SHARRARD, MD, FRCS, orthopaedic surgeon

Knock knee (genu valgum)**KNOCK KNEE IN CHILDHOOD**

If normality is to be defined as that which is most usual, some degree of knock knee is normal from 3 to 3½. At this age 75% of children have more than 2.5 cm of knock knee as measured by the distance between the medial malleoli with the knees extended. In over 20%, knock knee at this age is 5 cm or more. Laxity of the medial ligament of the knee increases the amount of knock knee when the child is standing compared with when he is sitting. A heavy child is likely to have more knock-knee deformity than one of average weight.

Physiological knock knee of childhood disappears spontaneously by the time the child is 7 whether or not any treatment is given. At the age of 3 to 4 symmetrical knock knee that is less than 5 cm should not be treated. Most parents are happy to be reassured that their child's deformity is within normal limits and will disappear. Some may need their confidence boosted by returning for fresh measurements to be made six-monthly until they are convinced it is disappearing. For those who are still sceptical, radiographic examination may be sufficient to alleviate their anxiety with or without the addition of an orthopaedic opinion.

If the degree of knock knee at the age of 3 or 4 is between 5 and 10 cm and the deformity is bilateral and symmetrical no special investigation is usually needed unless there are other clinical signs such as enlargement of joints that might indicate the presence of a specific abnormality. This degree of knock knee does, however, require regular observation and measurement at six-monthly intervals for the peace of mind of both parents and doctor to make sure that the deformity is indeed decreasing. Children with this degree of knock knee are almost always somewhat obese, usually from eating too much. If the child is distinctly overweight in relation to his height and age an inquiry into diet and correction of dietary habits predisposing to obesity should be attempted. Do not leave the parents to do it all on their own. The use of a weighing scale at the time of six-monthly visits until the condition is corrected is a powerful incentive to parent and child. With this degree of knock knee there is often abnormal wear on the inner side of the shoes for which an inside raise to the heel and sole of the shoe may be indicated (see later under flat feet).

Knock knee deformity at the age of 3 to 4 in which the distance between the medial malleoli of the ankle is more than 10 cm should be investigated radiologically to make sure there is no developmental or metabolic abnormality in the epiphyses. Unilateral knock knee is almost always a pathological lesion arising because of disturbance of epiphyseal growth by previous trauma, osteomyelitis, or a developmental bone abnormality. Radiological examination will confirm or exclude an abnormality of this type.

ADOLESCENT KNOCK KNEE

A very few children who have had knock knee deformity in earlier childhood continue to show considerable deformity after the age of 7. More often, a child who has not been knock-kneed previously starts to show knock knee at the age of 10 or 11. Many children with knock knee of late onset are of heavy build, taller and heavier than the mean for their age, and much of the bulk is distributed in the thighs. There is the clinical impression that the legs are showing a growth spurt at an earlier time than normal and one or both parents may show a similar appearance in their legs. If, at the age of 10, a child of this type shows knock knee deformity not greater than 4 to 5 cm no treatment or action is required except regular observation to ensure that the deformity does not increase beyond this degree. Knock knee deformity of 10 cm or more at the age of 10 or 11 is very unlikely to correct spontaneously and requires investigation and possible surgical treatment by stapling of the inner femoral or tibial epiphyses or both. Reliable correction of deformity can be obtained, the

staples being left in for 12 to 18 months, during which time normal activity is allowed. If epiphyseal growth is nearing completion or the epiphyseal plates are closed supracondylar lower femoral osteotomy is an alternative method of correction.

Other causes of knock knee in late childhood are all rare. A progressive knock-knee deformity may be due to a generalised bone disease such as dysplasia epiphysealis multiplex or mucopolysaccharidosis but the general manifestations of these diseases are usually obvious. Severe progressive unilateral or sometimes bilateral knock knee may be the presenting symptom in dietary rickets in a child from an Asian immigrant family; in vitamin D resistant rickets; or in one of the varieties of rickets associated with renal disease. Clinical evidence of rickets affecting other epiphyses indicates the need for radiological and biochemical investigation.

Bow leg (genu varum)

A mild degree of bow leg in infancy is normal. If the child is overweight the deposit of fat on the outer sides of the thighs and legs combined with the abducted posture of the hips produced by nappies may give rise to parental concern. If, in addition, the child walks with some out-toeing and on a wide base, the appearance of bow leg is even more definite. At any age, bow leg of more than 5 cm between the medial femoral condyles when the medial malleoli of the ankle are touching and the patellae are facing forward requires rickets to be excluded by clinical and radiological examination. If the radiological findings are negative the parents may be assured that the bowing will correct itself within the next year and will almost certainly turn into a knock-knee deformity after that. If the child is overweight the parents should be advised about proper diet for the child and the use of less bulky nappies.

Bow leg in childhood or adolescence is uncommon. An uncommon familial form of bow legs is one in which the bowing is in the lower third of the tibia so that the ankles seem to curve quite sharply towards each other. One or other of the parents is likely to have the same deformity. No kind of conservative treatment is helpful and surgical correction by osteotomy is seldom advisable because the deformity is not severe enough to require it and the appearance, if an osteotomy is done, is still unsatisfactory.

As in knock knee, unilateral bow leg, especially a sharp curvature starting just below the knee, is likely to be due either to a rare variety of epiphyseal abnormality known as Blount's disease or to previous injury or infection affecting the upper tibial epiphysis. This variety requires orthopaedic advice and surgical treatment.

Bow legs should not be confused with anterior bowing of the tibia. Although rare, any anterior tibial bowing in infancy indicates a serious condition such as the preliminary stages of congenital pseudarthrosis of the tibia, congenital absence of the fibula, or osteogenesis imperfecta. Urgent radiological investigations and orthopaedic advice are essential.

If a person has had malaria is he ever suitable as a blood donor?

In the tropics it is impossible to rule out all blood donors who give a history of malaria, since this would eliminate nearly all possible donors. If the malaria, whether falciparum or vivax, has been adequately treated the risk of malaria is virtually nil. This may not, however, have been done and, therefore, one cannot take the risk. In an area non-endemic for malaria, the risk of transmitting falciparum malaria after five years is virtually nil and for vivax it is very marginal. In endemic areas of malaria, however, a patient may have had a parasitaemia without any overt symptoms. Provided the blood is being used for people who are already semi-immune, there is no great risk of the recipient's developing malaria. If, however, the blood is used for non-immune individuals, then the recipient should be covered with a three-day course of chloroquine, which will destroy all the blood forms whether they are due to vivax or falciparum.