

## BALL AND SOCKET ANKLE JOINT IN METATARSUS ADDUCTUS VARUS (S-shaped or serpentine foot)

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Metatarsus adductus varus is characterised by fixed adduction and supination of the forefoot and valgus deformity of the heel. On weight-bearing this valgus becomes more pronounced, thus enabling the forefoot to pronate and increase its area of contact with the ground (Figs. 1 and 2).

This rare and unyielding deformity of the forefoot and hindfoot must be clearly distinguished from the common metatarsus varus of infancy which is often passively correctable from the first. Resolution is spontaneous in about 88 per cent of such feet (Ponseti and Becker 1966).

Metatarsus adductus varus on the contrary is an obstinate deformity which resists correction: although the forefoot deformity may yield, the valgus heel defies us. We believe that this difficulty may be due to a ball and socket ankle joint (Figs. 3 and 6). This component in metatarsus adductus varus has apparently not been previously recognised and is of some significance because increased lateral mobility of the ankle will frustrate any attempt to correct the valgus deformity of the heel at the subtalar joint.



FIG. 1

Case 1—Photographs showing the forefoot adduction and severe valgus of the heels.

### CASE REPORTS

**Case 1**—A boy aged six years was admitted for correction of bilateral metatarsus adductus varus deformities. The forefoot deformity had been noticed at birth and had been treated by stretching. When first seen by us at the age of four and a half years he presented with adducted and supinated forefeet which were not fully correctable, and fixed eversion of the heels which increased on standing (Figs. 1 and 2).

It was decided to attempt operative correction in two stages. At the first operation the left forefoot was pronated and abducted by a soft-tissue release and the position stabilised by calcaneo-cuboid fusion (Evans 1961). This corrected the forefoot deformity, and six weeks later the subtalar joint was stabilised by Batchelor's modification of Grice's operation (Brown



FIG. 2

Case 1—Radiographs of the feet. Note the lateral displacement of the navicular on the talus.

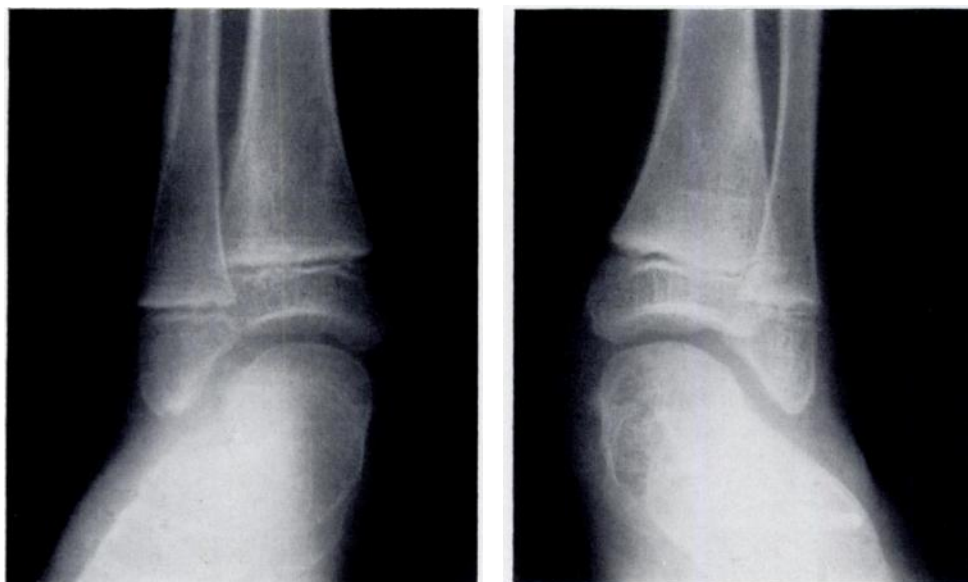


FIG. 3

Case 1—To show the ball and socket ankle joints found after operation on the left foot.



FIG. 4



FIG. 5

Case 1. Figure 4—The left ankle submitted to an eversion strain. The valgus deformity increases. Figure 5—Appearance of heels after operation.

1968). Care was taken to align the calcaneus with the vertical plane of the talus. At operation it was noticed that there was considerable laxity at the level of the ankle joint. When the plaster was finally removed we were at first well satisfied with the result, but to our dismay resumption of unprotected weight-bearing was followed by recurrence of the valgus deformity of the heel notwithstanding a sound subtalar arthrodesis. The ankle joint was inevitably incriminated and a radiograph demonstrated the contours of a ball and socket joint with a free range of lateral rotation. The appearance was similar on the other side (Figs. 3 to 5). This observation prompted us to examine the ankle joints in two similar patients.

**Case 2** (patient of Mr Austin Brown)—A boy presented with a progressive metatarsus adductus varus which was first noticed by his parents at nine months. A left wedge tarsectomy was performed when he was seven followed by a similar procedure on the other foot. Although the forefeet were corrected, valgus deformity of the heels persisted and radiographs confirmed the presence of ball and socket ankle joints (Fig. 6).

**Case 3**—This boy was first seen by us at the age of fifteen months. He was found to have left metatarsus adductus with an everted heel. In addition the left tibia was short and there was an absent fifth ray of the foot. The forefoot was successfully corrected by wedge tarsectomy but the heel remained everted on weight-bearing. A radiograph of the ankle disclosed a ball and socket joint. Although the patient presented clinically with typical metatarsus adductus varus some of the radiographic features resembled those described by Lamb (1958) in association with congenital tarsal coalition.



FIG. 6

Case 2—To show a ball and socket ankle joint on the right side. The left ankle was similar.

### IMPLICATIONS OF THE ANKLE ANOMALY

Metatarsus adductus varus seems to be a separate entity rather than a variation on the theme of metatarsus varus. The term serpentine foot describes the deformity admirably. It is rare and often familial. Kite (1967) reported only twelve serpentine feet among 2,818 patients presenting with metatarsus varus and stressed the difficulties in treatment. He also mentioned the strong hereditary influence, citing a mother and three sons with serpentine feet.

The presence of a ball and socket ankle joint influences our approach to treatment because lateral instability of the ankle will prejudice successful correction if we confine our attention to the subtalar and midtarsal joints. Indeed in the literature available to us there are no convincing claims of success by any means.

Although we are uncertain of the degree of disability arising from severe and persistent heel valgus, we suspect that this is no more than that for which attention to footwear is appropriate provided the deformity is passively correctable to the neutral position. Adduction and supination of the forefoot is however a troublesome deformity which is amenable to correction. We suggest therefore that the forefoot, which is already rigid, be treated but that the relatively mobile hindfoot be left undisturbed, for it would seem unjustifiable to sacrifice any of the movement that remains by arthrodesing the ankle.

### SUMMARY

1. Three children with metatarsus adductus varus have been found to have ball and socket ankle joints.
2. The effect of this finding on treatment is discussed.

We are grateful to Mr Austin Brown for allowing us to report Case 2.

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