PARTIAL CUBO-NAVICULAR COALITION AS A CAUSE OF PERONEAL SPASTIC FLAT FOOT

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It is now recognised that congenital fusion between the talus and the calcaneum or between the calcaneum and the navicular bone is found in a high proportion of patients who have peroneal spastic flat foot. This paper presents an example of partial coalition between the cuboid and navicular bones.

In the normal foot there may or may not be a synovial joint between these two bones. Oblique radiographs show well defined articular facets in approximately one quarter of the feet examined. In the remainder there is a space between the adjacent angles of the cuboid and navicular, the edges of the bones being irregular. It is important to appreciate that slight alterations in the obliquity of the x-rays can produce an overlapping of shadows which may suggest bony fusion. Further films, at varying angles, will demonstrate the true situation.

Harris and Beath (1948) suggested that the typical congenital tarsal fusions occur in relation to accessory bones. The os cuboidum secundarium is found on the plantar surface of the foot at the point of contact between cuboid, navicular, calcaneum and talus (Trolle 1948). It may be fused to the navicular or cuboid, but more commonly to the former (O'Rahilly 1953). Jack (1954) suggested that coalition was due to an error in differentiation (possibly hereditary) which may lead to a large complete bony fusion at one extreme or to a small accessory bone at the other. Since an accessory bone may be present between the navicular and the cuboid, it is reasonable to suppose that coalition may occur between the two bones. Dwight (1907) illustrated by radiograph and photograph of the plantar surface of the bones of the foot what he described as synchondrosis of the navicular and cuboid, but it has not been possible to find any account of this particular abnormality as a cause of spastic flat foot.

CASE REPORT

The patient, a boy aged fifteen years when first seen, complained of pain in his left foot. There was no history of injury. The pain had occurred during the previous two weeks with standing and walking. On examination, both feet were valgus, with considerable peroneal spasm in the left foot which prevented supination. This movement was present on the right side and there was no spasm. Radiographs showed that there appeared to be a bridge of bone between the navicular and the cuboid in the left foot (Fig. 1) and a partial coalition between these bones in the right foot (Fig. 2). Later, tomographs were done which showed that the bridge on the left side was also incomplete (Fig. 3).

At first it had been impossible to correct the valgus deformity of the left foot, but after a few days' rest it was found that the peroneal spasm could be relaxed by gentle pressure and full supination was possible. Once this had happened the foot was completely mobile. If the boy was then made to walk a short distance the spasm returned, but could again be overcome. The foot was immobilised in the corrected position in a below-knee walking plaster for six weeks. He was then given an outside iron and inside T-strap, and later a rigid arch support was made to a cast of the foot. These measures failed to control the peroneal spasm (which can still be relaxed after a period of rest), but since he has very little pain more active treatment has not been advised. He has been able to begin work as a cabinet maker.

Radiographs were also taken of the feet of the boy's father, mother and sister, but these did not show any abnormality.
FIG. 1
Antero-posterior and oblique radiographs of left foot showing what appears to be a complete bridge between the cuboid and navicular.

FIG. 2
Antero-posterior and oblique radiographs of right foot showing an incomplete cubo-navicular coalition.
DISCUSSION

The cause of pain in patients with calcaneo-navicular and talo-calcaneal bars has been the subject of controversy. When the bar forms a solid bridge, it is suggested that the interference with the normal smooth action of the subtalar-midtarsal joints explains the clinical picture (Seddon 1932). The additional strain thus thrown on the normal joints may result in osteoarthritic changes. This is typically represented by lipping of the upper part of the talo-navicular joint which Harris and Beath (1948) regarded as almost indicative of a congenital tarsal fusion.

In this case it seems unlikely that partial coalition between the navicular and the cuboid could sufficiently derange the mechanics of the foot to produce pain in the normal peritalar joints. It is, therefore, reasonable to suppose that the pain might arise directly from the site of the abnormal fusion. It was localised to this region and was not spread widely over the foot. When the coalition is incomplete, movement in the involved joint is limited; consequently the union is particularly liable to strains and so may give rise to symptoms. Furthermore, Harris (1956) stated that in his experience incomplete coalition in the calcaneo-navicular bar and talo-calcaneal bridge was more apt to cause pain that a solid bony fusion.

The absence of pain in the opposite foot is not easy to explain, although the same may happen in patients with bilateral incomplete calcaneo-navicular bars. It can only be presumed that the symptoms are set off by an initial acute injury, or that the fibrous union is more lax in this foot (as is suggested by the slightly wider gap seen in the radiographs) and so less liable to strain.
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There is no doubt that in this case there was true peroneal spasm rather than adaptive shortening, because the position of the foot could be fully corrected by gentle pressure. The spasm is probably a non-specific protective reaction to pain, but there is no clear reason why the pronators should be involved. The mechanism described by Lapidus (1946), which implied a lesion of the interosseous talo-calcaneal ligament or subtalar joint, is not applicable.

Although the cubo-navicular coalition must be a very uncommon abnormality it should be looked for carefully in cases of spastic flat foot which do not show an obvious structural anomaly. The cubo-navicular angle should be studied in oblique radiographs, and if the normal gap or joint cannot be successfully demonstrated in a single view further plain films or tomographs will be necessary.

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REFERENCES


Harris, R. I. (1956): Personal communication.


