THE BIPARTITE TARSAL SCAPHOID

J. J. WILEY, D. E. BROWN

From the Children’s Hospital of Eastern Ontario, University of Ottawa

Brailsford introduced the descriptive term “listhesis of the tarsal scaphoid” to describe the clinicopathological changes associated with congenital bipartition of this bone. This uncommon condition involves the separation and displacement of two scaphoid fragments, producing a fixed flat foot deformity, which eventually becomes symptomatic. Six cases are described, the lesion being bilateral in three. No particular definitive treatment is advocated, other than symptomatic management.

Brailsford (1953) used the descriptive term “listhesis of the tarsal scaphoid” to describe an uncommon clinical entity associated with a flat foot. This lesion which is also called bipartite scaphoid was first described by Müller (1927, 1928) and was initially thought to be the end-result of childhood Köhler’s disease. The lesion was eventually shown to be a distinct entity (Brailsford 1935; Zimmer 1937). After his initial report of five cases, Brailsford subsequently included some 20 cases of the lesion in his textbook (Brailsford 1953).

The purpose of this paper is to reiterate the features of this entity and add a further six cases to the reported literature.

CLINICAL MATERIAL

Four of the six patients reviewed were male. The ages ranged from 8 to 53 years. Both unilateral and bilateral involvement were noted. There was no preceding history of trauma in any of the patients. As noted in Table 1 the presenting features, with one exception, were painful flat feet. The one exception (Case 5) did not demonstrate the typical deformity of flat foot; in fact she presented with a varus deformity of the hindfoot.

One patient with bilateral involvement had symptoms confined to one side only. All patients demonstrated a degree of stiffness of the subtalar and midtarsal joints. In one patient (Case 4) peroneal muscle spasm could be easily elicited on forced inversion of the hindfoot.

Table 1. The presenting features of the six cases

<table>
<thead>
<tr>
<th>Case</th>
<th>Sex</th>
<th>Age (years)</th>
<th>Involvement</th>
<th>Pain</th>
<th>Flat feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>M</td>
<td>8</td>
<td>Bilateral</td>
<td>Bilateral</td>
<td>+ +</td>
</tr>
<tr>
<td>2</td>
<td>F</td>
<td>12</td>
<td>Right</td>
<td>Right</td>
<td>+</td>
</tr>
<tr>
<td>3</td>
<td>M</td>
<td>15</td>
<td>Left</td>
<td>Left</td>
<td>+</td>
</tr>
<tr>
<td>4</td>
<td>M</td>
<td>16</td>
<td>Bilateral</td>
<td>Left</td>
<td>+ +</td>
</tr>
<tr>
<td>5</td>
<td>F</td>
<td>44</td>
<td>Right</td>
<td>Right</td>
<td>+ o</td>
</tr>
<tr>
<td>6</td>
<td>M</td>
<td>53</td>
<td>Bilateral</td>
<td>Bilateral</td>
<td>+ +</td>
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</tbody>
</table>

The radiographic appearance of the lesion is consistent in each case. The dorsoplantar view of the foot (Figs 1 and 2) demonstrates the lateral displacement of this dorsal fragment which appears to be superimposed over the second and third cuneiform bones. The other scaphoid fragment, the medial-inferior portion, is subluxated medially around the head of the talus allowing it to approximate to the first cuneiform. On the lateral radiograph of the foot (Figs 3 and 4) an
oblique cleft separates the smaller dorsolateral fragment from the remainder of the tarsal scaphoid. The dorsolateral fragment is minimally displaced dorsally. This diverging displacement of the two scaphoid fragments prompted the descriptive term "lithesis" by Brailsford. No radiological evidence of avascular necrosis of the tarsal scaphoid was noted. No evidence of adjacent bone or joint involvement was seen other than expected degenerative changes of the joint at the site of lesion. Radiographs of these patients at follow-up failed to demonstrate any further displacement of the scaphoid fragments.

CASE REPORTS

Case 1. An eight-year-old boy presented with bilateral pes planus, minimally symptomatic, and genu valgum deformities of a minor degree. Radiographs of both feet revealed the typical features of a bipartite tarsal scaphoid (Figs 3 and 4).

Case 2. A 12-year-old girl presented with a history over the previous year of intermittent pain in the right foot associated with weight-bearing. Clinically, she demonstrated a mild pes planus with no restriction of midtarsal and subtalar movement. Radiographs of the right foot revealed the typical features of a bipartite tarsal scaphoid with early degenerative changes at the talonavicular joint. Her symptoms have been relieved with a moulded arch support.

Case 3. A 15-year-old boy complained of pain in the left foot with pes planus for approximately one year. Radiographs (Figs 5 to 8) of the foot revealed a bipartite tarsal scaphoid. The rather large size of the normal scaphoid on the right foot is of interest.

Case 3. Figures 5 and 6—Oblique radiographs of both feet, the arrows outlining the dorsolateral fragment of the bipartite scaphoid on the left foot. Figures 7 and 8—Lateral radiographs of both feet demonstrating the scaphoid lesion on the left foot.
Case 4. A 16-year-old boy presented with bilateral pes planus (Fig. 9) painful on the left side only. Identical radiographic findings were noted on both feet, consistent with bipartite tarsal scaphoids.

Case 5. A 44-year-old woman presented with a history over the previous two months of spontaneous pain in the right foot. Although there was no history of trauma, a long-standing varus deformity of the hindfoot had preceded the onset of pain. Marked stiffness of both the subtalar and midtarsal joints was noted. Her left foot was essentially normal. Radiographs of the right foot revealed the bipartite tarsal scaphoid. She underwent a triple arthrodesis with a satisfactory result.

Case 6. A 53-year-old man presented with a long history of stiff and painful flat feet. Attempted passive subtalar movement reproduced his pain. Radiographs of his feet revealed the typical lesion with associated displacement of the scaphoid fragments (Figs 10 and 11).

DISCUSSION

Most of the cases described in the literature involve young adults or middle-aged patients. In Braifsord’s series of 20 patients only two were under the age of 40 years. Müller (1927) described a case in an 18-year-old girl. In our own series four patients were under 16 years old. It is probable that the lesion exists in childhood but remains unrecognised until there are significant signs and symptoms. The deformity in the foot becomes apparent only after the bipartite fragments of the tarsal scaphoid separate, producing a rather large medial prominence simulating a pes planus deformity. Eventually there is stiffness and pain which occur with advancing degenerative changes in the joint; such changes begin early in life (de FineLicht 1941).

No treatment, other than conservative management of the foot pain, has been described (Zimmer 1937) although we found that a triple arthrodesis produced a satisfactory result in Case 5. Although the exact cause remains unknown, the following theories have been advanced to explain the origin of the bipartite tarsal scaphoid.

Healed childhood osteochondritis (Köhler’s disease). There is no reported evidence either clinically or radiologically to suggest that this condition results in anything else but a normal configuration of the tarsal scaphoid (Simons 1930; Waugh 1956).

Accessory bones. Two accessory bones related to the tarsal scaphoid are similar in location to the dorsal fragment of the bipartite scaphoid. The os supranaviculare, sometimes called the trochlear process of the astragalus, is a rare accessory bone located dorsally between the talus and the scaphoid. It is usually triangular in shape, of normal osseous structure, and generally coalesces with the scaphoid. The os infranaviculare is situated between the scaphoid and the first cuneiform, usually overriding the latter. The normal shape or structure of the tarsal scaphoid is rarely distorted (Köhler and Zimmer 1968).

Fragmentation. Fragmentation of the primary ossific nucleus of the tarsal scaphoid is not uncommon although no cases are known in which such fragmentation evolved into the classical bipartite scaphoid deformity. The so-called accessory scaphoid, or os tibiale externum is considered the usual result of persistent fragmentation of the primary centre.

Avascular necrosis of the lateral third of the tarsal scaphoid. This has been previously reported together with a description of the precarious vascular supply of the lateral portion of the tarsal scaphoid (Waugh 1956). The resulting lesion, usually seen in adults, is a true avascular necrosis with extensive collapse of the involved part of the scaphoid. Although remotely
similar radiologically, this lesion is not the classical bipartite tarsal scaphoid in which normal viable bone has been noted when the fragment was excised (Zimmer 1937; Köhler and Zimmer 1968).

Trauma. Brailsford (1935) attributed the bipartite scaphoid to trauma, occurring as isolated or repeated episodes. Fractures of the scaphoid in a sagittal plane combined with vascular injury may in fact produce a radiographic picture quite similar to the congenital bipartite scaphoid.

One patient, a 22-year-old man (not reported here), sustained a displaced fracture of the tarsal scaphoid in a head-on car collision. Follow-up radiographs (Fig. 12) revealed a dorsolateral location of the outer third fragment, a medio-inferior displacement of the medial fragment, and typical shortening of the midtarsal region of the foot.

Although certain fractures can produce a radiographic and clinical picture of a congenital bipartite scaphoid, it is unlikely that a traumatic incident could produce such similar, consistent deformities, or even be implicated in the bilateral cases. In fact a history of trauma was lacking in the six cases described in this study.

Ossification centre. Phylogenetically two tarsal ossification centres, comparable in site to the tarsal scaphoid, can be found in certain primitive reptiles. In mammalian development, however, this particular bone appears as a single centre. It is possible that bipartition may arise from heterogeneous ossification centres. This developmental theory has been argued by Trolle (1948) who states that a true bipartition would produce two similarly sized bones which together would equal the total size of a normal scaphoid, and the two fragments would be in relatively normal anatomical location. In fact one patient (Case 3) may confirm at least part of this theory since the total size of the bipartite fragments as seen on the left foot is approximately equal to the rather large scaphoid on the normal right foot. The bipartite fragments are not equal in size and with dynamic loading of a foot with weight-bearing the loose scaphoid fragments do not remain in the normal anatomical position. This case in particular lends support to the possibility of heterogeneous ossification centres which may be phylogenetic, neogenetic or anomalous in origin.

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REFERENCES


