TOTAL DISLOCATION OF THE CUBOID BONE

Report of a Case

DENIS S. DRUMMOND and DAVID E. HASTINGS, TORONTO, ONTARIO, CANADA

From the Department of Orthopaedic Surgery, the Wellesley Hospital, Toronto, Ontario

Because of the complexity of the architecture of the foot radiographic diagnosis is often difficult and injury sometimes unrecognised. Dislocations may be missed on plain radiography because in two dimensions it is difficult to appreciate displacement of a single bone or disruption of its articulation. Moreover, isolated tarsal dislocations are uncommon and unfamiliarity alone may contribute to missed diagnosis. So far as we know, isolated dislocation of the cuboid bone without fracture has not been described. This report deals with our experience with a patient with this injury.

CASE REPORT

A man of forty-three fell ten feet from a tiled roof, landing on the inner side of his right foot. He was seen in the emergency department of the hospital, where antero-posterior and lateral radiographs were interpreted as normal; the foot was therefore strapped and the patient discharged.

FIG. 1
Radiographs showing dislocation of the cuboid bone without fracture.

Because of increasing pain he returned to the fracture clinic the next day. The right foot was severely swollen but no other obvious deformity was noted. The ankle moved freely, but subtalar movement was stiff and painful, and there was tenderness over the dorso-lateral aspect of the forefoot. The initial radiographs were re-examined and infero-medial dislocation of the cuboid bone was diagnosed (Fig. 1).

Treatment—After rest in bed for two days with elevation of the foot, open reduction was undertaken. The cuboid bone was exposed through a curved lateral incision and by reflecting the extensor digitorum brevis. Total dislocation without fracture was confirmed, the cuboid being displaced downwards and medially. The articular surfaces of the calcaneus, navicular, lateral cuneiform and bases of fourth and fifth metatarsal bones were clearly seen outlining the void created by the dislocation of the cuboid. Although no fracture was found, the dorsal soft tissues including the interosseous ligaments were torn (Fig. 2).

Reduction was easily accomplished by inverting the foot to open the space normally occupied by the cuboid and pushing the cuboid laterally into this space with a periosteal elevator. The foot was then everted, and upward and lateral pressure through the sole of the foot was maintained until crossed Kirschner wires were inserted, one into the lateral cuneiform and the other across the calcaneo-cuboid joint (Fig. 3). Thereafter the foot was immobilised in a below-knee plaster for six weeks. The Kirschner wires were then removed and walking encouraged.

FIG. 2

Diagrammatic illustration of the cuboid bone and its interosseous ligaments. The anatomical relationship of the cuboid to its five articulations is shown.

FIG. 2

Progress—Twelve weeks after the injury the patient was free from pain and back at work. There was no residual oedema of the foot and he had a full range of movement at the subtalar and midtarsal joints.

FIG. 3

Radiograph after operation, showing the reduction held by Kirschner wires.

DISCUSSION

On anatomical grounds it is not surprising that this injury is uncommon. Jones (1944) and others have observed that the inner and outer sides of the foot differ in structure and function (Fig. 4). The more medial longitudinal arch is made up of several bones which articulate through curved surfaces. These form an elastic dynamic organ of propulsion, and have been likened to a reed which bends before the wind. Conversely, at the lateral border a more static relationship exists, which is important to the stability of the foot. This outer part of the foot has been likened to a rigid oak which breaks before the force of the wind (Jones 1944).

The cuboid thus has a very stable relationship to the five bones with which it articulates, and it is not surprising that crushing fractures have often been reported (Hermel and Gershon-

Cohen 1953, Dewar and Evans 1968), and that dislocation without fracture is uncommon. It is of note that the dislocations of a single tarsal bone which we have found reported occurred in the more mobile medial part of the foot (Böhler 1935; Watson-Jones 1955; Somgyi, Berentey and Forgács 1958; Pennal 1963).

We believe that in the case reported here the force producing the medial and downward displacement of the cuboid was directed laterally and dorsally on the forefoot. The space normally occupied by the cuboid and bounded by its five articulating surfaces then closed and expelled the cuboid, tearing the interosseous ligaments. Reduction was accomplished by reversing this process. Internal fixation was required because of instability.

FIG. 4

SUMMARY

1. A case of total dislocation of the cuboid bone without fracture is described. This is an uncommon injury and to our knowledge has not previously been reported.
2. Its rarity is explained in the light of the structural anatomy and function of the foot.
3. A mechanism of injury is postulated and a method of reduction and fixation described.

FIG. 4

A diagram of the foot to show the medial and lateral functional units.

REFERENCES

- BÖHLER, L. (1935): *The Treatment of Fractures*. Fourth edition translated by Ernest W. Hey Groves, p. 486. Bristol: John Wright & Sons Limited.
- DEWAR, F. P., and EVANS, D. C. (1968): Occult Fracture-subluxation of the Midtarsal Joint. *Journal of Bone and Joint Surgery*, **50-B**, 386.
- HERMEL, M. B., and GERSHON-COHEN, J. (1953): The Nutcracker Fracture of the Cuboid by Indirect Violence. *Radiology*, **60**, 850.
- JONES, F. W. (1944): *Structure and Function as Seen in the Foot*, p. 246. London: Baillière, Tindall and Cox.
- PENNAL, G. F. (1963): Fractures of the Talus. *Clinical Orthopaedics and Related Research*, **30**, 53.
- SOMGYI, S., BERENTHEY, G., and FORGÁCS, St (1958): Seltene Luxationen der Fußwurzelknochen. *Zentralblatt für Chirurgie*, **83**, 983.
- WATSON-JONES, Sir R. (1955): *Fractures and Joint Injuries*. Fourth edition, Vol II, p. 884. London and Edinburgh: E. & S. Livingstone Ltd.