Metacarpophalangeal joint dislocation of the thumb in children

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There are few reports describing dislocation of the metacarpophalangeal joint of the thumb in children. This study describes the clinical features and outcome of 37 such dislocations and correlates the radiological pattern with the type of dislocation.

The mean age at injury was 7.3 years (3 to 13). A total of 33 children underwent closed reduction (11 under general anaesthesia). Four needed open reduction in two of which there was soft-tissue interposition. All cases obtained a good result. There was no infection, recurrent dislocation or significant stiffness.

So-called ‘simple complete’ dislocations that present with the classic radiological finding of the joint at 90˚ dorsal angulation may be ‘complex complete’ injuries and require open reduction.

Dislocation of the metacarpophalangeal (MCP) joint of the thumb in children is uncommon, and rarely reported. A study on a relatively small group of children was published by Sulko¹ in 2004, whereas the condition is well described in adults.²⁻⁹

Farabeuf,³ in 1876 classified MCP joint dislocations into three types: incomplete, simple complete and complex complete. Incomplete dislocations are those where the collateral ligaments are intact; in simple complete dislocations are those where the collateral ligaments and the volar plate rupture but the latter is not interposed in the joint, which is usually extended at 90˚; and in complex complete dislocations, the volar plate is displaced and interposed, with the metacarpal and proximal phalanx usually lying parallel to each other. He suggested that complex complete types require open reduction via a dorsal incision and that simple dislocations with no soft-tissue obstruction should be managed by closed means.

Kaplan¹⁰ described the anatomy of similar dislocations in the index finger and a volar approach for open reduction.

McLaughlin¹¹ explained that, if not reduced through a proper technique, namely hyperextension of the dorsally angulated proximal phalanx with a gentle push over the base of the phalanx and the metacarpal head, simple complete dislocations could be made complex and require operation.

The aim of this study was to report our experience of this uncommon injury and to assess whether closed or open reduction is required.

Patients and Methods

A retrospective review of case notes was performed for 37 children with 37 dislocations of the MCP joint of the thumb who underwent treatment between 1990 and 2005. Radiographs were available for 23 patients. The mean age for the entire group was 7.3 years (3 to 13); there were 29 boys and eight girls; 22 dislocations were right-sided. All were closed injuries, and only one reported a transient paraesthesia on the radial side of the thumb. There were 20 injuries sustained during outdoor activities, the usual mechanism being an axial blow with forced hyperextension of the joint. Generalised hypermobility was documented in one case. Of 37 patients, 34 presented within 24 hours of the injury, two at one week and one at two weeks. The mean follow-up was for six weeks (2 weeks to 6 months). One patient was lost to follow-up and one moved elsewhere.

Results

Of 37 dislocations 36 were dorsal (97.3%) and one was volar. The radiological appearance in the 23 cases available suggested a simple complete injury, with the proximal phalanx angled dorsally at more than 60˚ (Fig. 1). However, two of these were found to have soft-tissue interposition and were therefore classified as complex complete dislocations. Closed reduc-
tion was achieved in 33 cases (89%). Of these, 11 required a general anaesthetic and manipulation, mostly by the technique of McLaughlin, after which the thumb was immobilised in a spica cast for two to five weeks. The others were reduced in the Accident and Emergency Department under either ring block anaesthesia, Entonox (BOC Gases medical, Manchester, United Kingdom) inhalation, sedation, analgesia, or a combination of these methods.

Four dislocations required open reduction. All had between one and four unsuccessful attempts at closed reduction. The surgical approaches were volar in two, dorsal in one, and dorsoulnar in one. In one of these cases the fibrocartilaginous volar plate, flexor pollicis longus, capsule and collateral ligament were found interposed in the joint, blocking reduction. Through a volar incision, reduction was achieved and the joint found to be stable. This patient had mild stiffness at 12 weeks follow-up, but the overall result was good. In another case the volar plate was avulsed over the dorsum of the metacarpal head, thus blocking reduction. No soft-tissue interposition was noted in a case in which the joint reduced spontaneously after exposure. There was instability of the ulnar collateral ligament in one case with a history of recurrent dislocation. At operation there was no soft-tissue interposition, the ulnar collateral ligament was reconstructed with a suture and the joint immobilised with a Kirschner wire which was removed at three weeks, with further immobilisation in a thumb spica for two weeks.

Of the 37 patients 35 had excellent results at follow-up, determined as a normal range of movement of the MCP and no pain. Two MCP joints, one treated by closed reduction, the other by open reduction had mild stiffness with a range of movement 10° to 45°. There was no incidence of infection, recurrent dislocation or severe stiffness.

Discussion
The anatomy of dislocation of the MCP joint of the thumb is well understood. Various interposing structures have been found to be responsible for the failure of closed reduction, namely the volar plate, the flexor and adductor tendons, the extensor expansion, the transverse and collateral ligaments, and the capsule and sesamoid bone or fragments thereof, in adolescents.

In a study on fresh cadavers, Stener explained that dorsal dislocation of the MCP joint may injure not only the volar plate, but also the collateral ligaments, and thus stressed the need for open reduction.

Volar dislocations are very rare and only a few case reports have been found. We did not encounter any associated injuries such as simultaneous dislocation of the MCP and carpometacarpal joints (‘floating thumb metacarpal’).

We observed that if the classic radiological finding of the joint at 90° is encountered, closed reduction can be achieved in most patients: 89% in our series. The technique of McLaughlin is usually successful, but simple axial traction should be avoided as this may cause interposition of the volar plate and increase the likelihood of open reduction being necessary.

Two children who underwent open reduction had interposition of the volar plate and presented with radiographs consistent with a simple dislocation. Despite the attraction of a clear classification into simple and complex dislocations, we have shown that, on occasions, the simple dislocations may be irreducible by closed means, and some may be complex injuries.

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Supplementary Material
A table showing the demographic details of the 23 patients for whom radiographs were available, is available with the electronic version of this article on our website at www.jbjs.org.uk

References