The value of MRI in the assessment of an elbow injury in a neonate
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We describe the use of MRI to establish the exact diagnosis in a swollen elbow in a neonate. Urgent diagnosis was needed for medical and social reasons. We accomplished this without the use of an invasive procedure or anaesthesia for a fracture that is recognised to be difficult to diagnose in patients of this age group.

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Case report

A 19-day-old baby was brought to our Paediatric Department by his mother. She had noticed that he was unable to move his right arm, and that it was also very painful. There had been no history of injury. Until that time he had been thriving. The pregnancy and delivery had been normal with no abnormalities noted at his postnatal examination. There was no family history of osteogenesis imperfecta.

Examination revealed a child who was distressed but afebrile and systemically well. The right elbow was grossly swollen and hanging by his side. There was a suspicion of increased varus-to-valgus excursion. There was no evidence of neurological deficit.

We initially suspected a dislocation of the head of the radius (Fig. 1a). Further radiographs of the elbow (Figs 1b and 1c) suggested that the humerus was in AP alignment but that the ulna was in a lateral profile. These features raised the possibility of dislocation or fracture of the elbow.

A full skeletal survey was normal. In order to elucidate the diagnosis arthrography was considered but it was felt that MRI would be a suitable non-invasive alternative.

The MR scan confirmed a transcondylar fracture with posterior angulation of the unossified physis (Gartland type II with an element of rotation) as seen in Figure 2.

In such cases in which a history of trauma is denied, there must always be the suspicion of non-accidental injury. As the diagnosis had been accurately made, there could be no doubt in the parents’ minds that an injury had occurred. The injury was treated by longitudinal traction for two weeks in hospital which also allowed us to carry out further assessment of the parents and the child. The help of the social-service team and paediatric experts was also sought.

Figure 1a – Oblique radiograph of the right elbow suggesting radiocapitellar dislocation. Figure 1b – AP radiograph of the right elbow revealing no fracture and no evidence of radiocapitellar dislocation. Figure 1c – Lateral radiograph of the right elbow demonstrating the proximal radius and ulna in the true lateral plane but with the distal humeral metaphysis appearing to be in the AP plane.
Figures 2a and 2b – MR sagittal fat-suppressed T2-weighted fast spin-echo scan and diagrams of the right elbow showing a fracture through the distal humeral physis with considerable posterior displacement, angulation and rotation of the trochlear and capitellar epiphyses with posterior periosteal stripping. There is extensive soft-tissue oedema and joint effusion posteriorly. Figure 2c – MR coronal T1-weighted fast spin-echo image and diagram of the right elbow showing a normal radiocapitellar articulation but with the capitellar and trochlear epiphyses and a small portion of the lateral aspect of the metaphysis not in continuity with the main metaphysis.
At follow-up at one month, the elbow had a normal valgus angle with a full range of movement and further imaging was therefore unnecessary.

Since no satisfactory explanation for the fracture had been obtained, the child was placed on the At-Risk Register.

Discussion

Since the first report of neonatal chondroepiphyseal injury in 1926, there have been only 12 further cases reported involving the elbow. Downs and Wirth described one such injury, and highlighted the difficulty in making the diagnosis, suggesting that clinical examination was the only way of doing so. The classic sign described in chondroepiphyseal injuries of this nature is ‘muffled crepitus’ at the elbow, since the two cartilaginous surfaces rub together.

Subsequently, several methods of imaging have been suggested. Plain radiographs in this age group are very difficult to interpret. Ultrasound has been used for imaging soft tissues, and ‘narrow interval tomography’ has also been discussed. Some authors have described arthrography as the ‘method of choice’ for such investigations. It is, however, an invasive procedure requiring general anaesthesia and considerable skill in locating the joint in such a small infant.

Several studies have examined the role of MRI in the evaluation of skeletal injuries in children. This gives excellent soft-tissue contrast and spatial resolution, facilitating the assessment of extraosseous and cartilaginous components of joint injuries that are radiologically occult. It requires at least one sequence to be taken in two different planes to allow the full extent of the injury to be demonstrated. T1-weighting enables good anatomical delineation to be made, as well as reasonable contrast between the chondroepiphysis and the joint fluid.

A T2-weighted sequence with fat suppression is sensitive to soft-tissue or bone oedema and joint effusion. If the scan is carefully timed to follow a feed, it should be possible to perform MRI in infants without the use of sedation or general anaesthesia.

As demonstrated in this case, the differential diagnosis was rapidly resolved by MRI and our suspicions of non-accidental injury highlighted without recourse to any invasive procedure. We would therefore advocate the use of MRI as a safe and effective imaging technique for evaluating musculoskeletal injury in the neonate when plain films are equivocal, particularly as it can be performed without sedation.

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References