Case reports

Stress fracture of the proximal humeral epiphysis in an elite junior badminton player

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Abstract

An elite junior badminton player presented with a chronic painful dominant shoulder after an intense training course. An acute stress fracture to the proximal humeral epiphysis was found. Two-plane radiography will identify abnormalities of the growth plate but comparative films of the unaffected side may also be required to differentiate subtle changes. Rest with subsequent rehabilitation is the appropriate management of these injuries although ideally they should be subjected to primary prevention.

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Case report

A 15 year old male junior international badminton player developed a painful dominant right shoulder after an intensive five day badminton training camp with the county team. There was no history of an acute injury during the camp but the following week, he was troubled by aching anterior shoulder pain. His normal training programme consisted of one to two hours of badminton, three or four times per week and he had no preceding history of shoulder problems. During the camp, however, he played solidly for six hours each day.

The pain failed to settle spontaneously over the coming weeks so he sought the advice of a physiotherapist. At that time, range of motion of the right shoulder was unaffected but resisted abduction and external rotation were painful. Physiotherapy, mobilisation, and rest produced a reduction in symptoms but these were exacerbated by return to play and during overhead activities of daily living. A specialist opinion was sought eight months after the initial onset. Examination demonstrated tenderness over the anterior aspect of the proximal humerus, limitation of internal rotation in neutral, and painful resisted abduction. Anterior-posterior and axillary radiographs of his right shoulder along with comparative films of his left shoulder were obtained, which showed widening of the anterolateral aspect of the proximal humeral epiphyseal plate (see figs 1 and 2). A rapid onset overuse injury resulting in a stress fracture through the epiphyseal plate was diagnosed.

Restriction to pain-free activities resulted in a three month break from play. Review at 14 months from the time of injury showed improvement in his symptoms such that he was

Figure 1 (A) Anterior-posterior and (B) axillary view radiographs of the right shoulder demonstrating the stress fracture (more obvious on the axillary projection).

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Figure 2 (A) Anterior-posterior and (B) axillary view radiographs of the normal left shoulder shown for comparison.

playing gently for 45 minutes a week. The fracture line remained visible but showed evidence of healing on subsequent radiographs. A structured home rehabilitation programme was commenced for the stabilising musculature of the shoulder. On review at two years, physical examination was normal and the patient had returned to a full training programme, experiencing only the occasional twinge with vigorous smashes from extreme external rotation. Radiographs have confirmed union of the fracture and, although the epiphysis remained open, there was no evidence of growth asymmetry.

Discussion

The proximal humeral epiphysis develops initially from separate ossification centres in the head, in the greater tuberosity, and in the lesser tuberosity. These three centres coalesce to form a single centre at approximately seven years of age. Fusion of the growth plate usually occurs between the ages of 16 and 18 years.¹ Injuries to the proximal humeral epiphysis are uncommon, accounting for 3% of all epiphyseal injuries.² Most commonly these occur in boys aged 10–15 years and are usually the result of acute trauma producing a Type I or Type II Salter-Harris injury.³ Dotter, in 1953, was the first to describe

an overuse injury in sport affecting the proximal humeral epiphysis in Little League baseball pitchers who threw at a competitive level all year round.⁴ Other cases of Little League shoulder have subsequently been reported.⁵

This injury has not been reported previously in racquet sports but has recently been reported in volleyball.⁶ Biomechanically there are similarities between throwing and overhead racquet strokes, and indeed it has been suggested that overuse epiphyseal injuries at the shoulder may occur as the result of any repetitive sporting explosive actions—for instance, baseball and racquet sports—dynamic movements—for instance, swimming—and upper limb weight-bearing activities—for instance, gymnastics.⁷ Common to all these activities are shearing stresses applied to the epiphyseal plate as the limb moves repetitively from cocking to follow through phases. A review of badminton injuries shows a predominance of problems affecting the ankle and foot with Achilles tendinitis and lateral epicondylitis as the two conditions most commonly diagnosed,⁸ although like other racquet sports there is potential for soft tissue injuries of the dominant shoulder.

A high index of suspicion is necessary when dealing with adolescent athletes taking part in sports involving repetitive explosive shoulder movements. If persistent, shoulder pain in these young athletes should be investigated initially with two-plane radiography to exclude an injury. Comparative films of the normal side are readily available and are particularly helpful in the assessment of bony injuries in children. Additional imaging modalities such as bone scans, computed tomography, and magnetic resonance imaging could have been considered in this case. The principal treatment modality in confirmed cases is rest and avoidance of exacerbating activities with rehabilitation of the shoulder girdle and rotator cuff musculature before return to sport. Ultimately, fusion of the epiphysis should normally offer a favourable outcome. The potential of long term complications such as growth arrest and angular deformity in these young athletes is unknown. Prevention is based on sound coaching practice, shoulder conditioning, and the limitation of excessive shoulder activity in these sports.⁹

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