

Severe septic arthritis of the shoulder with an axillary nerve lesion in a 4-year-old child

Flurina Michelotti · Carlo Camathias ·
Mark Gaston · Erich Rutz

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Introduction

Septic arthritis in children frequently affects the joints of the lower extremity, namely the hip and the knee [1–3]. Infection in the glenohumeral joint is rare [4–7], representing 4% of all joint infections [4, 5]. Arthralgia, joint swelling, fever and pseudoparalysis are the most commonly observed symptoms [1, 4, 5, 8]. Diagnosis and thus appropriate management are often delayed [4] and therefore early disease recognition and treatment play a significant role in minimising the risk of developing complications such as joint surface destruction, growth arrest, adjacent osteomyelitis, and loss of joint movement [1, 4–6]. Brachial plexopathy, is infrequently reported [13], and a lesion to the axillary nerve specifically has not yet been reported in literature to our knowledge. Treatment aims include adequate washout and debridement of the joint with the objective of relieving pain and restoring function [5]. This can be achieved either via arthrotomy or arthroscopically [2, 5]. However there is currently no clear consensus with regard to which management option leads to improved outcome [3, 8], because of the lack of studies describing the results of surgical intervention [9]. The case of a 4-year-old boy with a delayed diagnosis of septic arthritis of the right shoulder with massive abscess formation and an axillary nerve lesion is presented.

Case report

A 4-year-old boy was referred to the University Children's Hospital (UKBB) emergency department with a 10-day history of right shoulder pain, swelling, and restricted shoulder movement. There was a history of a minor trauma (fall) before the onset of symptoms, after which he immediately presented to his local institution, where physical examination showed restriction of abduction, elevation, and external rotation of the right glenohumeral joint. Radiographs showed no osseous lesions, fracture, or subluxation. An ultrasound scan seemed to show partial rupture of the biceps tendon, no joint effusion was found, and a provisional diagnosis of tenosynovitis was made. Initial management included immobilisation of the shoulder and analgesia. Over the following week the pain and swelling worsened with suspected intermittent pyrexia. He was re-evaluated by his paediatrician who suspected septic arthritis of the shoulder and was promptly referred to UKBB. It came to light that the patient's recent past medical history included streptococcal tonsillitis (6 weeks before admission), treated with cefaclor, and otitis media of the right ear (3 weeks before admission), treated with a course of amoxicillin.

Examination on admission to the UKBB revealed a grossly swollen shoulder (Fig. 1) which was hot and tender. No active movement of the glenohumeral joint was possible, including extension. Despite being unable to assess sensory changes of the lateral aspect of the shoulder, because of the age of the child and his lack of co-operation, an axillary nerve lesion was suspected at the time. Blood laboratory examinations demonstrated a C-reactive protein (CRP) of 217 mg/L and a leukocyte count of 29 g/L. An emergency magnetic resonance imaging scan (MRI) revealed a massive abscess in the subcutaneous tissue of

F. Michelotti · C. Camathias · M. Gaston · E. Rutz (✉)
Pediatric Orthopaedic Department,
University Children's Hospital Basle,
UKBB, 4031 Basle, Switzerland
e-mail: erich_rutz@hotmail.com



Fig. 1 Preoperative situation (swollen right shoulder)

the anterior shoulder which communicated with the glenohumeral joint (Fig. 2). Chest X-ray excluded the possibility of a respiratory tract infection.

Emergency treatment was subsequently carried out, with arthrotomy of the right shoulder via a delto-pectoral approach. The abscess was opened and was found to contain a large volume of green purulent fluid. Radical debridement and washout were performed.

Postoperative management consisted of intravenous amoxicillin with clavulanic acid, and initial shoulder immobilization followed by regular physiotherapy on the third postoperative day. CRP and leukocyte values dropped rapidly and were CRP 20 mg/L, leukocytes 12.9 g/L by the fifth postoperative day. Bacterial culture evaluation revealed a pneumococcus infection and, in response, antibiotic treatment was changed on the 3rd postoperative day to clindamycin (i.v. 300 mg 3 times daily for 1 week followed by oral treatment for 5 weeks). Despite several days of physiotherapy, passive and active movement continued to be impaired and again the possibility of a lesion in the axillary nerve was considered. The level of stiffness at the 2 week postoperative phase indicated the need for further examination under anaesthesia followed by arthroscopy (Fig. 3). Adhesiolysis was carried out, and an intact biceps tendon was noted, as well as normal looking cartilage. Intraoperatively an almost full range of movement was achieved and subsequent physiotherapy helped maintain this postoperatively.

The infection had resolved at 6 weeks postoperation, with normalisation of the inflammatory indices. Four weeks after initial admission an EMG confirmed the suspected axillary nerve palsy as a neurapraxia, as it made a full and spontaneous recovery. At 3 months follow up the patient appeared clinically well, with a full range of active and passive movement possible at the right glenohumeral joint. An MRI scan showed normal anatomy, with no signs of osteomyelitis.

The parents of this patient gave their informed consent to our treatment method and publication of this article.

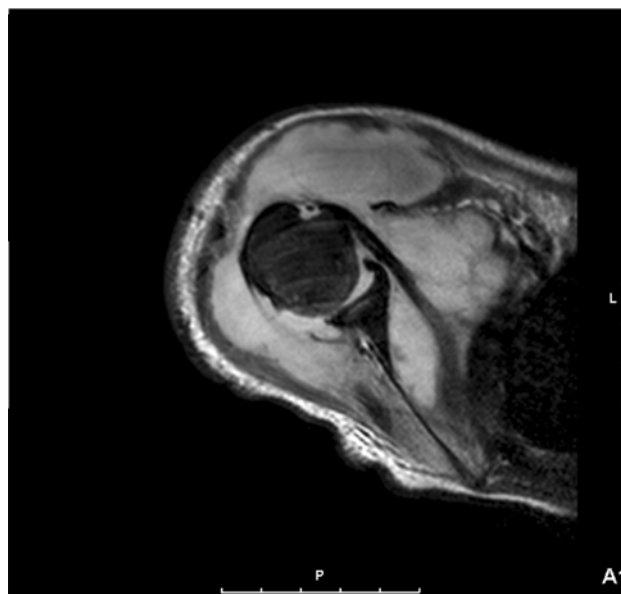


Fig. 2 MRI findings preoperatively showing massive abscess (horizontal and frontal plane)

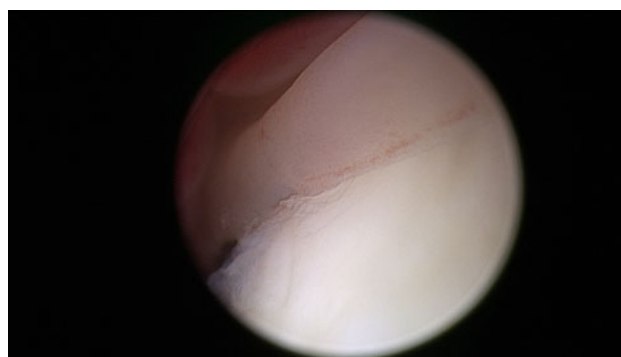


Fig. 3 Intraoperative findings (intact cartilage and intact tendon of the biceps longus muscle)

Discussion

The most common aetiology of septic arthritis is bacterial colonisation of a joint [2], although viral, fungal and mycobacterial arthritis occasionally occur [10]. *Staphylococcus aureus* infection is the commonest cause of septic arthritis in the paediatric population [1, 4, 6] followed by *Haemophilus influenza*, *Streptococcus pyogenes*, and *Streptococcus pneumonia* [1, 7, 9]. Osteomyelitis has been reported to occur in combination with septic arthritis [1, 4]. However it is difficult to determine whether the osteomyelitis precedes the development of septic arthritis or if it arises as a complication. In the case presented here, it is likely that the infection disseminated from either the boy's otitis media or streptococcal tonsillitis or, indeed, both conditions, perhaps representing a series of migrating infections.

The diagnosis of septic arthritis of the shoulder and thus appropriate management, is frequently delayed [1, 4–6], often secondary to misdiagnosis [4]. Misdiagnosis is likely to be related to poor awareness of the condition in children [4], lack of validated clinical practice guidelines [4], normal radiological appearance [7, 13], and the absence of fever [14]. In this case the late diagnosis is likely to be a consequence of initial misdiagnosis of a partial rupture of the biceps tendon secondary to the history of trauma, normal X-ray appearance, and the absence of fever.

If septic arthritis of the shoulder is suspected, needle aspiration of the synovial fluid is necessary [14] to confirm this. Emergency treatment with washout and debridement is then indicated [14]. In the literature, arthroscopy seems to be the preferred treatment option for localised glenohumeral infections, because it is minimally invasive, enables visualization of the joint, and has been shown to result in adequate clearance of infection [5]. Lejman and Schmidt [11, 12], however, recommended an open procedure for adequate treatment of infection and there is no strong evidence to suggest which option is best. Because of the subcutaneous abscess, in this case arthrotomy was chosen, because arthroscopy would not have cleared the soft tissue infection adequately. In terms of postoperative management, it is agreed that bacteria-specific antibiotics should be administered for at least 6 weeks [9], with administration of an intravenous broad-spectrum antibiotic, for example co-amoxicillin, while waiting for the culture results, and that any joint affected should be mobilized as soon as possible [2].

Delayed treatment of septic arthritis in the shoulder results in complications in 30% of affected children [4]. Complications include joint surface destruction, growth aberration, joint instability, adjacent osteomyelitis, movement restrictions, and brachial plexopathy [1, 4, 6, 10, 13]. Prolonged inflammation in the glenohumeral joint

increases the risk of damage occurring to the growth plate [1, 4, 6, 7, 15] and to the articular cartilage [15]. Damage to the growth plate can lead to the development of a short upper arm and deformity of the head of the humerus [5]. As a result, retroversion of the humeral head may develop, which can explain the reported long-term restriction of movement [1, 6]. A shorter humerus can be cosmetically displeasing but does not necessarily mean that functional disorders will ensue [1]. The underlying cause of joint instability is not clear [6] but is likely to be the result of increased intra-articular pressure exerted by the persistent purulent effusion resulting in laxity of the stabilising tissues [2]. Infection in the glenohumeral joint also carries a small risk of neurological damage occurring to the brachial plexus [13] as occurred in this patient. Brachial plexopathy as a complication of septic arthritis is rare and to date there are no reports in the literature describing an axillary nerve lesion as a result of shoulder sepsis, such as occurred here. In our opinion it is very likely that the pressure exerted by the abscess caused the lesion in the axillary nerve.

Septic arthritis of the shoulder is a true orthopaedic emergency, requiring immediate diagnosis and prompt treatment. It should always be considered as a differential diagnosis in a child who presents with arthralgia, restricted movement, and swelling, especially when combined with no radiographic findings and a recent history of bacterial infection elsewhere. If septic arthritis is suspected, use of needle aspiration to exclude the diagnosis is mandatory. Emergency washout is indicated if the diagnosis is confirmed and this can be either via an open procedure or arthroscopically, depending on the extent of the infection. Postoperative management should include early mobilization and bacteria-sensitive antibiotic therapy for a minimum of 6 weeks.

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