

Arthroscopic washout of the shoulder for septic arthritis in infants

A NEW TECHNIQUE

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The operative treatment of septic arthritis of the shoulder in infants has been facilitated by the use of a 30° wrist arthroscope. We have treated three children under the age of three years using this technique. After initial aspiration of the joint, an arthroscope was inserted using the posterior approach. Washout was performed under direct vision and complete clearance of pus allowed assessment of the inflammation and the damage to articular cartilage. The procedure was minimally invasive and gave excellent cosmesis without compromising care. Full recovery was achieved with a single intervention.

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Septic arthritis of the shoulder is uncommon. The shoulder is affected in between 3% and 5% of all cases of septic arthritis.^{1,2} It may present with failure to use the arm (pseudoparalysis), pyrexia, and swelling. Presentation may be delayed for up to a week and the long-term outcome depends on early diagnosis and adequate treatment.^{3,4}

The same prognostic factors apply to the shoulder as to other joints.⁵ These include delay in diagnosis and treatment, the age at onset of the infection, and the virulence of the organism. In the shoulder the outcome may be adversely affected by the fact that 80% of growth in the humerus occurs at the proximal growth plate,⁶ and damage to the growth plate and the secondary ossification centres may lead to a short upper arm and a retroverted humeral head.³

Four guiding principles in the management of septic arthritis were defined by Paterson² in 1970. These were treatment with immediate arthrotomy, complete skin closure without drainage, immobilisation of the joint and the admin-

istration of antibiotics. The basic aims of treatment are to sterilise the joint, evacuate the bacterial products and debris associated with the infection, relieve pain and prevent deformity. Currently, aspiration is often used in place of arthrotomy for joints other than the hip. It is felt to be less invasive and to cause less morbidity. Arthrotomy is generally used only when aspiration has failed.^{3,7}

We believe that aspiration may be inadequate in the shoulder and have treated our patients by arthroscopic washout. This view is supported by clinical and animal studies which suggest that washout of the shoulder is required in part because of anatomical considerations specific to it.^{8,9} Formal arthrotomy is not required as adequate washout can be achieved by arthroscopy. Arthroscopy is commonly used in the treatment of septic arthritis of the knee and we suggest that it may be used in the shoulder.

Operative technique. The procedure is carried out under general anaesthesia with the child in the lateral position and the arm draped free.

The joint is approached posteriorly and the entry point identified 1 cm inferior and 1 cm medial to the posterior corner of the acromion. This locates the soft spot at the back of the glenoid (Fig. 1). After confirmatory joint aspiration, a 21-gauge needle is inserted at this point and directed towards the tip of the coracoid. The aspirate is sent for microscopy, culture and sensitivity analysis. With the child's arm held in 45° of abduction by the assistant, a portal for a

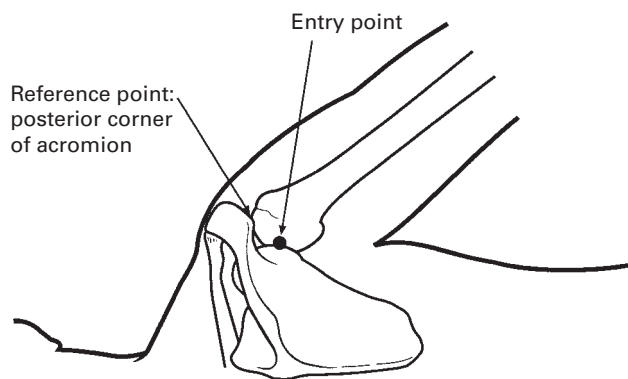


Fig. 1

Diagram showing the posterior portal. The right shoulder entry point is 1 cm inferior and 1 cm medial to the posterior corner of the acromion.

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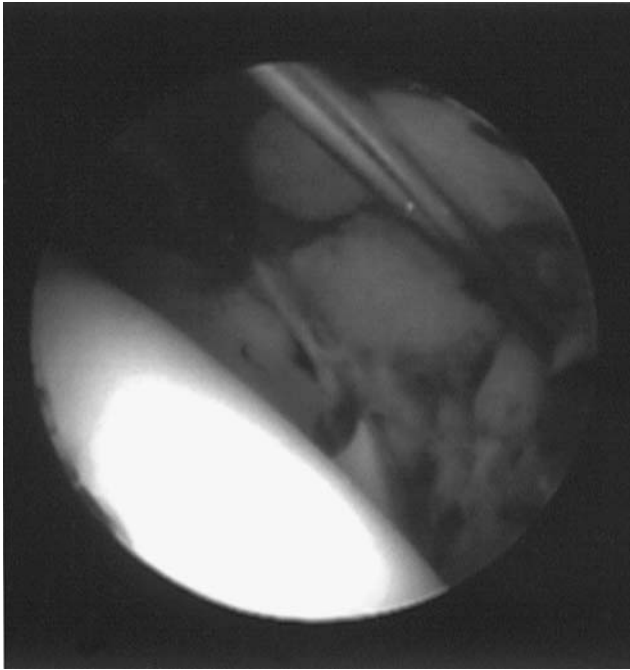


Fig. 2

Arthroscopic view showing the head of the humerus and the needle.

30° wrist arthroscope is made at the same posterior entry point and the scope inserted, again in the direction of the tip of the coracoid. Infants generally have considerable joint laxity and minimal distraction is required. An initial arthroscopic examination of the joint is made. Figure 2 shows synovitis within the joint.

For the washout, a small Fraser sucker is passed down the sheath of the arthroscope. Alternatively, a sucker can be inserted through an anterior portal just lateral to the tip of the coracoid. Either allows a good washout and direct vision ensures clearance of debris, particularly from the synovial sheath surrounding the biceps tendon. An assessment of the articular surface can also be made.

The portals are closed with steristrips and covered with dressings. The shoulder is placed in a collar-and-cuff sling. Early active mobilisation is encouraged. Formal physiotherapy is rarely required. The sling is removed at one week and the patient reviewed at two weeks, one month, and three months when bilateral shoulder radiographs are taken.

This method gives an excellent cosmetic result with minimal morbidity.

Illustrative case reports

Case 1. An eight-month-old girl presented with a history of general malaise for two days and favouring of the right arm rather than the left. On initial examination she was flushed and irritable with a pyrexia of 38.3°C. Examination of the right arm showed that the wrist and elbow moved without

discomfort, but that the shoulder could be moved only with difficulty and pain. Initial laboratory findings showed a white cell count of $15 \times 10^9/l$ and an ESR of 46 mm/hour. A provisional diagnosis of acute septic arthritis of the right shoulder was made. Aspiration of the shoulder yielded 2 ml of cloudy fluid. Arthroscopic washout was undertaken. A single dose of intravenous cefuroxime was given after the sample had been taken for microbiology. She started a two-week course of oral flucloxacillin and left hospital the following day wearing a collar-and-cuff sling. The aspirate contained numerous pus cells, but no organisms were seen or grown on culture. She was seen at one and two weeks and at one month and three months. All symptoms had settled by the first visit although normal movements were not regained until the second visit. At three months, she was asymptomatic, examination was normal and radiographs showed no evidence of damage or retardation of growth.

Case 2. An eight-month-old boy presented after being unwell for three days with a history of not using his left arm for 12 hours. He was flushed with a temperature of 39.4°C. Examination of the left arm was generally painful, but worse on movement of the shoulder compared with the elbow or wrist. The initial laboratory findings showed a white cell count of $24.2 \times 10^9/l$ an ESR of 100 mm/hour and a level of C-reactive protein (CRP) of 168 mg/l. A provisional diagnosis of septic arthritis of the left shoulder was made. Aspiration of the shoulder yielded 3 ml of frank pus. Arthroscopic washout was undertaken and a course of intravenous cefuroxime started after the microbiological sample had been taken. The aspirate grew *Streptococcus pneumoniae* and appropriate oral antibiotics were started. His arm was supported in a collar-and-cuff sling and he left hospital after three days. He was seen at one and two weeks, and at one and three months. All symptoms had settled by the first visit although normal movements were not regained until the second visit. At three months, he was asymptomatic. Examination revealed symmetrical movements and radiographs showed no evidence of damage or retardation of growth.

Case 3. A 26-month-old girl presented with failure to use her right arm for a week. She was reported to be intermittently pyrexial but was afebrile on admission. Examination was equivocal with an apparently good range of movement of the right shoulder, elbow and wrist. Inflammatory markers were as follows: a white cell count of $8.5 \times 10^9/l$, an ESR of 81 mm/hour and a CRP level of 124 mg/l. A bone scan showed mild uptake in the right shoulder. The inflammatory markers remained high and a group-G streptococcal throat infection was diagnosed. MRI of the right shoulder showed an effusion within the joint. Aspiration revealed turbid fluid and at arthroscopy there were fibrin clots, but the articular surface was preserved. A washout was undertaken. Intravenous cefuroxime was started at this stage and continued for one week. No organisms were grown from the aspirate. She was well at the time of discharge and when reviewed at two and four weeks and at three months. She

made a full recovery and there was a normal radiological appearance.

Discussion

Arthroscopic washout of the shoulder in infants is a new technique. It avoids a formal arthrotomy, but ensures full washout. Aspiration alone may not achieve adequate clearance of septic and inflammatory debris from the joint. A general anaesthetic is required for both procedures. Arthroscopy also allows direct assessment of the articular cartilage. It is cosmetically acceptable with a low morbidity and allows rapid return to normal activity.

The clinical review by Paterson² of 50 children with proven suppurative arthritis treated by arthrotomy showed no failures of treatment if the surgery was carried out within five days of the onset of symptoms. Using methods other than arthrotomy such as aspiration, there were 15 failures in 49 children.⁷ By contrast, the series presented by Bos et al³ suggested that arthrotomy may not be necessary. They reported that even in children in whom septic arthritis had caused clear radiological abnormality and an altered range of movement, there was negligible functional loss. Most orthopaedic surgeons do not favour using aspiration alone in the treatment of septic arthritis, but acknowledge that formal arthrotomy of the shoulder is an extensive procedure in the infant. There is therefore a strong case for using arthroscopy which is a minimally invasive technique allowing full visualisation and washout of the joint.

The shoulder presents specific and conflicting anatomical considerations. It differs considerably from the hip. The glenoid allows a much greater range of movement than the acetabulum. Bos et al³ concluded that little functional impairment results from the sequelae of septic arthritis of the shoulder because, unlike the hip, it has an excellent range of movement and is not restricted by rigid anatomical structures. Most growth of the humerus, however, occurs at the proximal growth plate⁶ and damage can lead to significant shortening.

In 1981 Schmidt, Mubarak and Gelberman⁸ highlighted the anatomical peculiarities of the shoulder which make repeated aspiration unsatisfactory. They indicated the importance of the synovial sheath surrounding the biceps

tendon which forms a pouch in which pus may become loculated. One patient required re-exploration of the joint for retained pus in this region and another suffered a rupture of the biceps tendon. These findings led the authors to conclude that exploration of the synovial sheath of the biceps tendon was an essential part of the procedure. Arthroscopy achieves this very successfully.

An animal study of septic arthritis of the knee in rabbits confirmed the need for adequate lavage in order to prevent the destruction of articular cartilage.⁹ The animals which had been treated by surgical lavage were examined two weeks after inoculation and had no significant loss of collagen in contrast to that observed in the joints which were not treated by lavage. They concluded that a substance which causes the breakdown of collagen in cartilage was washed out of the joint by lavage and this would not be achieved by aspiration alone.

Shoulder arthroscopy in our three young children with septic arthritis of the shoulder achieved adequate drainage and washout with minimal morbidity and no necessity for further procedures. So far, follow-up has shown no radiological changes. The cosmetic result has been excellent and there has been no functional deficit.

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