CASE REPORT – OPEN ACCESS

International Journal of Surgery Case Reports 11 (2015) 1–4

Contents lists available at ScienceDirect

International Journal of Surgery Case Reports

journal homepage: www.casereports.com

Secondary frozen shoulder following septic arthritis – An unusual complication of magnetic resonance arthrogram

Aysha Rajeev[a,*], Adrian Andronic[a,b,1], Abdalla Mohamed[a,c,1], Mike Newby[a,d,1], Jagannath Chakravathy[a,e,1]

[a] Associate Specialist Department of Trauma and Orthopaedics, Queen Elizabeth Hospital, Gateshead NE9 6SX, UK
[b] Clinical Fellow Department of Trauma and Orthopaedics, Queen Elizabeth Hospital, Gateshead NE9 6SX, UK
[c] Clinical Fellow Department of Trauma and Orthopaedics, Queen Elizabeth Hospital, Gateshead NE9 6SX, UK
[d] Consultant Department of Radiology, Queen Elizabeth Hospital, Gateshead NE9 6SX UK
[e] Consultant Department of Trauma and Orthopaedics, Queen Elizabeth Hospital, Gateshead NE9 6SX, UK

ARTICLE INFO

Article history:
Received 5 January 2015
Received in revised form 8 April 2015
Accepted 8 April 2015
Available online 11 April 2015

Keywords:
MR arthrogram
Infection
Pain
Stiffness
Arthroscopy
Debridement

ABSTRACT

INTRODUCTION: Magnetic resonance (MR) arthrogram is a commonly used investigation tool to detect various pathologies in the shoulder. The complications following this procedure is minor and rare. Septic arthritis is one of the rare complications which can develop after MR arthrogram. We report a case of secondary frozen shoulder after MR arthrogram induced septic arthritis.
PRESENTATION OF CASE: A young, fit and well female patient underwent MR arthrogram to detect any labral tears. Two days following the procedure, she developed signs and symptoms suggestive of septic arthritis of the shoulder. The patient underwent repeated arthroscopic debridement and washout. The organisms isolated was *Staphylococcus epidermidis*. She was treated with six weeks of intravenous antibiotics. The patient developed stiffness of the shoulder due to secondary frozen shoulder which was treated with arthroscopic capsular release with good functional outcomes at three months.
DISCUSSION: MR arthrogram is a rare cause of septic arthritis of the shoulder. The common method introducing the organisms is from the skin flora or contaminated arthrogram trays. The treatment is repeated arthroscopic washouts and six weeks of appropriate intravenous antibiotics. Residual pain, stiffness and chondrolysis are common sequelae of septic arthritis.
CONCLUSION: Septic arthritis is a recognised and rare complication of MR arthrogram. Early and prompt diagnosis with arthroscopic washout and debridement combined with intravenous antibiotics helps to eradicate the infection. Secondary frozen shoulder is a late complication of sepsis in the joint.

1. Introduction

Magnetic resonance (MR) arthrography of the shoulder is frequently used investigation in the detection of labral-ligamentous complex abnormalities and of partial or full-thickness tears in the rotators cuff [1,2]. It is usually well tolerated procedure without any major complications [3]. Gleno-humeral joint sepsis is a relatively rare complication of intra-articular injections [4,5,6]. The incidence of infections following MR arthrogram is being reported as 0.003% [3]. Patients who develop shoulder joint sepsis generally have associated comorbidities [7,8]. The commonest micro-organism isolated in cases of septic arthritis of the shoulder is *staphylococcus aureus* [7]. We report a rare case of a fit and young female who developed septic arthritis of the shoulder after undergoing MR arthrogram with gadolinium. Inspite of all the necessary aseptic precautions taken during the procedure, patient still contracted *Staphylococcus epidermidis* septic arthritis of the shoulder. The patient also developed secondary frozen shoulder which was managed with arthroscopic capsular release. We perform on an average about 250 cases of MR arthrogram every year. To date only one case of septic arthritis has been reported in our institution following MR arthrogram.

2. Case report

A 35 year old female was admitted from accident and emergency department with complaints of pain, swelling and limitation of movements of right shoulder. She was right hand dominant and

☆This case report is rare and unique. MR arthrogram is a commonly done procedure in the radiology department. We recommend strict aseptic precautions should be observed while undertaking this invasive procedure. Secondary frozen shoulder is a late complication of septic arthritis.

* Corresponding author. Tel.: +44 7414262665.
E-mail address: asrajeev18@gmail.com (A. Rajeev).
[1] Tel.: +44 94820000.

http://dx.doi.org/10.1016/j.ijscr.2015.04.015

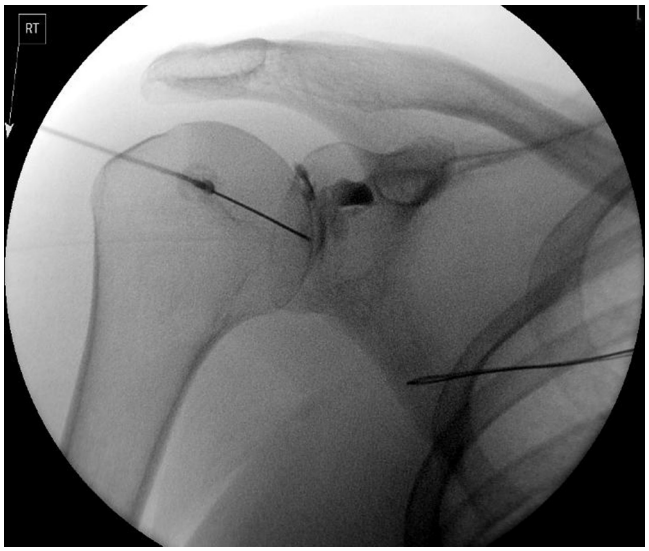

Fig. 1. Arthrogram of the shoulder being performed for the MRI scan.

works as an accountant. There was no significant past medical history. She also complained of feeling hot and unwell. Two days prior to these symptoms she underwent a MRI arthrogram with gadolinium contrast of the right shoulder (Fig. 1).

The patient was seen in the shoulder clinic about four months back with complaints of pain in the right shoulder. On examination of the shoulder at that time revealed full range of movements with positive signs of impingement. She had signs of hypermobility syndrome with Beighton score of 7. She had an ultrasound scan of the shoulder which was normal with no evidence of any rotator cuff pathology. The MRI arthrogram was requested to find the cause of impingement.

On examination at the time of admission she had a temperature of 39.6°. Tenderness in the anterior and lateral aspect of right shoulder. All the movements of the shoulder were grossly restricted due to pain. The blood test showed WBC of 3.2, CRP of 76 and ESR was 46. The X-ray examination of the right shoulder was unremarkable. An aspiration of the shoulder was carried out under aseptic conditions which revealed thick pus. This was sent for Gram stain and culture and sensitive tests. The Gram stain showed Gram positive cocci with plenty of neutrophils and no crystals. The patient underwent arthroscopic washout same day. The culture and sensitive reports was positive for *S. epidermidis* sensitive to flucloxacillin. The patient was commenced on intravenous flucloxacillin.

On the third post-operative day, patients symptoms became worse. The blood tests showed CRP of 126 with WBC 3.9 and ESR of 40. The patient had a repeat arthroscopic washout which revealed articular cartilage fibrillation in the glenoid cartilage (Fig. 2), with pus in the inferior capsule The antibiotics was continued for six weeks. She had a repeat ultrasound scan at 6 weeks which revealed no fluid collection and the aspirate showed no growth of organisms. The sequential blood test for inflammatory markers was also normal (Table 1).

The patient was followed up after 3 months. She complained of pain and limitation of movements. On examination she had 90° of flexion and abduction and no external rotation. She underwent arthroscopic capsular release of the shoulder. The arthroscopy revealed inflamed biceps tendon and scar tissue in the rotator cuff interval. The scar tissue was excised and medial gleno-humeral ligament released (Fig 3). Intensive shoulder physiotherapy was started same day of surgery and continued for six weeks. The check-up at 3 months revealed good functional range of movements.

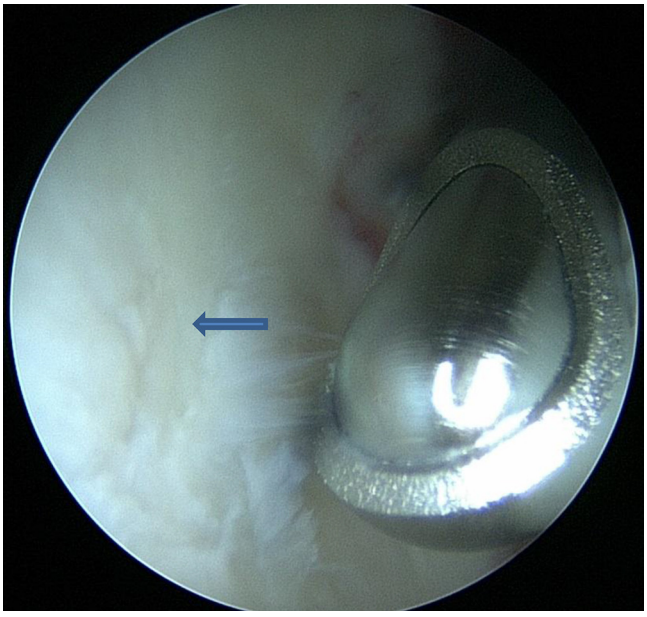

Fig. 2. Arthroscopic picture showing fibrillation of glenoid articular cartilage.

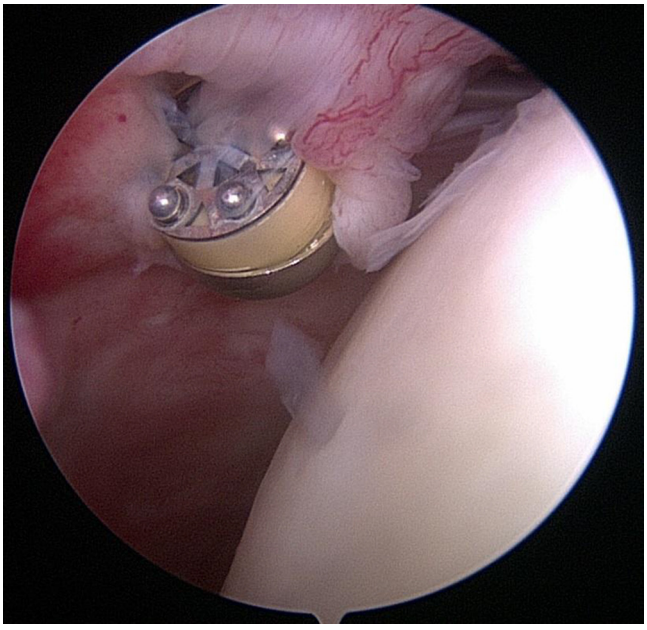

Fig. 3. Arthroscopic release of scar tissue in the rotator cuff interval.

3. Discussion

MR arthrogram is a relatively safe procedure with very few complications including infections [3]. This case report shows a rare cause for septic arthritis of the shoulder. Septic arthritis can

Table 1
Sequential inflammatory blood markers of the patient.

TIME	CRP(mg/L)	WBC(10^9/L)	ESR(mm/h)
Admission	76	3.2	46
3rd Post operative day	126	3.9	40
6th Post operative day	45	5.9	32
9th Post operative day	8.6	6.0	29
12th Post operative day	4.6	7.5	27
30th Post operative day	<2	4.6	9
42nd Post operative day	<2	6.0	7

be effectively and successfully treated with repeated arthroscopic washout and debridement [9,10]. The definitive source for the infection in our case is not very clear. The patient did not have any systemic illness which should have contributed to the cause of infection. The arthrogram in our hospital in performed in theatre suite under sterile environment. The skin is cleaned with chlorhexidine solution. The arthrogram tray is sterilised in the sterilization department and disposable needles are used. The patient is then transferred to the MRI unit to perform the scan.

The three most commonly associated complications after a MR arthrogram are infection [3], pain [11] and chondrolysis [12]. Hugo et al. in 13300 MR arthrograms documented a complication rate of 3.6%. It included 29 cases of septic arthritis. The other side effects include are chemical synovitis, vagal reaction, and urticaria [13]. Newberg et al. in their study showed the risk of joint infection after intra-articular contrast media administration was three per 12,6000 cases (0.003%).

Vollman et al. reported three cases of intra-articular infection which followed injection for magnetic resonance arthrography. In order to find the root cause and to reduce the risk of arthrogram related infection, representatives from radiology, infectious disease medicine, and microbiology departments were consulted. They concluded that the source of infection was from oral contamination from barium swallow studies which preceded the arthrogram injections in the same room. They recommended that the risk of arthrogram related joint infections may be lowered with separation of sterile and non-sterile procedures and with adequate preparation of the fluoroscopy suite [14].

Busfield, in his case report, is the first to detail the clinical course of a patient with sepsis of the native shoulder after MRI with gadolinium arthrogram. This was performed by an interventional radiologist for rotator cuff evaluation. The intraoperative cultures grew *Streptococcus sanguinis*, a common oral bacterial flora. The patient was treated with arthroscopic washout and antibiotics with good results [15].

The other main side effect after the MR arthrogram is pain. Saupe et al. evaluated 1085 patients who underwent MR arthrogarm. They concluded that MR arthrography temporarily increases joint-related contrast medium pain. Such pain depends on patient age but does not depend on joint type, injected contrast medium volume, sex, or radiologist experience [11].

Sepsis in the shoulder joint sometimes can cause restriction of movements which can lead to secondary frozen shoulder [16,17]. Leslie et al. in their series of septic arthritis of the shoulder found that 61% of patients had restriction of movements of shoulder following sepsis. Out of a total of eighteen patients eight patients had no active movements and three patients had flexion less than 45° [17].

Chondrolysis is late sequelae of septic arthritis [18]. Haviv et al. reported a case of rapidly progressive chondrolysis in a young patient following MR arthrogram of the hip. The patient developed septic arthritis following MR arthrogram which was treated with arthroscopic debridement and wash out. The organism isolated in their case was *Streptococcus viridans*. The patient had six weeks of intravenous antibiotics and went on to develop chondrolysis of the hip joint [12]. Our patient showed some articular cartilage changes during the arthroscopic washout. She should be followed up long term to find out whether she develops chrondrolysis of the shoulder joint in future.

In our case, the patient was a young female with no significant past medical history of any illness. She developed denovo sepsis of a native shoulder joint after undergoing MR arthrogram. Even though no identifiable source of infection was found, we think that the infection was caused either from the skin flora contaminant or from the arthrogram tray. The pathogen isolated was *S. epidermidis*. She was treated with arthroscopic washout and antibiotics which controlled the infection. She developed post sepsis stiffness of the shoulder joint which was treated with arthroscopic soft tissue release with good functional pain free movements.

4. Conclusion

Septic arthritis of the gleno-humeral joint is a rare but recognisable complication of MR arthrogram. High index of suspicion and prompt diagnosis with arthroscopic washout and debridement yields good functional outcomes. The patient should be monitored for secondary frozen shoulder and chondrolysis which are the late complications of septic arthritis. Strict aseptic techniques should be carried out in performing such invasive radiological procedures.

Conflicts of interest

No conflicts of interest.

Competing interest

There is no competing interest in relation to this article. No financial or funding has been received from anybody or organisation.

Sources of funding

No source of funding for the research got for this study.

Ethical approval

Ethical approval has been got from the hospital trust.

Consent

Informed consent has been obtained.

Authors contribution

Aysha Rajeev – Has contributed to study concept, design data collection, data analysis and writing ofthe paper. Adrian Andronic – Preparation of case report.Abdalla Mohamed – Preparation of case report. Mike Newby – Review of the paper. Jagannath Chakravarthy – Contributed towards the management and follow up of the patient.

Guarantor

The author takes full responsibility for the work.

References

[1] W.E. Palmer, J.H. Brown, D.I. Rosenthal, Labral-ligamentous complex of the shoulder: evaluation with MR arthrography, Radiology 190 (1994) 645–651.
[2] K. Meister, J. Thesing, W.J. Montgomery, P.A. Indelicato, S. Walczak, W. Fontenot, MR arthrography of partial thickness tears of the undersurface of the rotator cuff: an arthroscopic correlation, Skeletal Radiol. 33 (2004) 136–141.
[3] A.H. Newberg, C.S. Munn, A.H. Robbins, Complications of arthrography, Radiology 155 (1985) 605–606.
[4] R. Birkinshaw, J. O'Donnell, I. Sammy, Necrotising fasciitis as a complication of steroid injection, J. Accid. Emerg. Med. 14 (1) (1997) 52–54.
[5] I.H. Jeon, C.H. Choi, J.S. Seo, K.J. Seo, S.H. Ko, J.Y. Park, Arthroscopic management of septic arthritis of the shoulder joint, J. Bone Joint Surg. Am. 88 (8) (2006) 1802–1806.
[6] B.G. Yangco, B.F. Germain, S.C. Deresinski, Case report: fatal gas gangrene following intra-articular steroid injection, Am. J. Med. Sci. 283 (2) (1982) 94–98.
[7] E. Cleeman, J.D. Auerbach, G.G. Klingenstein, E.L. Flatow, Septic arthritis of the glenohumeral joint: a review of 23 cases, J. Surg. Orthop. Adv. 14 (2) (2005) 102–107.

[8] P. Mehta, S.B. Schnall, C.G. Zalavras, Septic arthritis of the shoulder elbow and wrist, Clin. Orthop. Related Res. 451 (2006) 42–45.
[9] S.J. Kim, N.H. Choi, S.H. Ko, J.A. Linton, H. Park, Arthroscopic treatment of septic arthritis of the hip, Clin. Orthop. Rel. Res. 407 (2003) 211–214.
[10] Y. Yamamoto, T. Ide, N. Hachisuka, S. Maekawa, N. Akamatsu, Arthroscopic surgery for septic arthritis of the hip joint in 4 adults, Arthroscopy vol. 17 (3) (2001) 290–297.
[11] N. Saupe, M. Zanetti, C.W. Pfirrmann, T. Wels, C. Schwenke, J. Hodler, Pain and other side effects after MR arthrography: prospective evaluation in 1085 patients, Radiology 250 (3) (2009) 830–838.
[12] B. Barak Haviv, R. Thein, A. Burg, S. Heller, S. Bronak, S. Velkes, Chondrolysis of the hip following septic arthritis: a rare complication of magnetic resonance arthrography, Case Rep. Orthop. vol 2013 (2013) (2013) 3, Article ID 840681.
[13] P.C. Hugo III, A.H. Newberg, J.S. Newman, S.M. Wetzner, Complications of arthrography, Semin. Musculoskelet. Radiol. vol. 2 (4) (1998) 345–348.
[14] A.T. Vollman, J.G. Craig, R. Hulen, A. Ahmed, M.J. Zervos, M. van Holsbeeck, Review of three magnetic resonance arthrography related infections, World J. Radiol. 5 (2) (2013) 41–44.
[15] B.T. Busfield, Glenohumeral joint sepsis after magnetic resonance imaging arthrogram, Am. J. Orthop. 41 (6) (2012) 277–278.
[16] R. Garofalo, B. Flanagin, E. Cesari, E. Vinci, M. Conti, A. Castagna, Destructive septic arthritis of shoulder in adults, Musculoskelet. Surg. 98 (Suppl. 1) (2014) 535–539.
[17] B.M. Leslie, J.M. Harris, D. Driscol, Septic arthritis of the shoulder in the adults, JBJS 71-A (1989) 1516–1522.
[18] T.R. Nunn, W.Y. Cheung, P.D. Rollinson, A prospective study of pyogenic sepsis of the hip in childhood, J. Bone Joint Surg. (Br) 89-B (2007) 100–106.