CASE REPORT

Image-guided scapulothoracic arthroscopy for removing firearm projectiles

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SUMMARY

Scapulothoracic arthroscopy is gaining recognition among arthroscopic procedures as it is considered a relatively low morbidity procedure; also, continuing studies of this technique are making it safer. Scapulothoracic arthroscopy can be used for removal of a foreign body. This case report describes the removal of a firearm projectile using image-guided arthroscopy, highlighting the anatomical aspects and characteristics of the surgical technique. In this case, the patient recovered uneventfully, with complete remission of symptoms in 30 days, returning to his usual activities within 2 months after surgery.

BACKGROUND

Scapulothoracic joint disorders can be didactically divided according to their aetiology.^{1 2} The presence of mechanical symptoms may indicate a bony protrusion or abnormal morphology of soft tissue in the joint,³ or mechanical symptoms possibly due to the presence of a foreign body. The frequent impact of these structural irregularities can cause inflammation, bursitis and scapular crepitus. By contrast, when there are no associated mechanical symptoms, the pain is related to overload syndrome, resulting in symptomatic bursitis. The latter is a feature observed in young and active patients and in throwing athletes.⁴

Scapulothoracic joint arthroscopy was first described by Ciullo and Jones in 1992. Since then, the technique has been improved.^{5–8} Despite having restricted indications, the arthroscopic technique leads to lower morbidity, a better cosmetic result and faster rehabilitation.³

The arthroscopic approach has a number of advantages over traditional open techniques. The muscle detachment performed in open surgery can increase morbidity and dysfunction if the repair fails or if muscle denervation occurs. Rehabilitation protocols can be accelerated to avoid muscle detachment. However, the arthroscopic procedure is technically more demanding, mainly because surgeons are not familiar with the arthroscopic anatomy of the region.³

The aim of this case report is to describe the removal of a firearm projectile by image-guided scapulothoracic arthroscopy.

CASE PRESENTATION

A 55-year-old man, a labourer who practices body-building, presented with pain in the inferomedial region of the left scapula. He had a history of

complications from a gunshot wound sustained 18 months earlier. At the time, the wound had been debrided, but the bullet was lodged between the scapula and the chest cavity. There was a gradual worsening of pain, especially during bench press and rowing exercises, which was becoming continuous showing no improvement with the use of analgesics, anti-inflammatory medications and physical therapy. One local infiltration had been conducted 6 months previously, without pain relief.

The physical examination revealed pain in the inferomedial region of the left scapula during elevation and abduction of the left arm, with no change in the range of motion and no presence of deformities.

Radiography and CT of the scapula revealed the presence of a firearm projectile in the inferomedial region of the scapula (figure 1).

The indication for scapulothoracic joint arthroscopy was due to the persistence of pain, and the mechanical aetiology was owing to a foreign body being present between the scapula and the chest cavity.

The patient underwent general anaesthesia and was placed in the prone position with the affected limb at maximum internal rotation (chicken wing),

Figure 1 CT showing the firearm projectile.

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Figure 2 'Chicken Wing' position (ventral decubitus, with the arm at maximum internal rotation and extension), including a pad under the shoulder.

modified with a pad under the scapula and with lateral support of the shoulder in the medial direction, as described by Andreoli *et al.*⁹ The portals were demarcated 2 cm lateral to the medial border of the scapula (portal 1: Ejnisman portal—level of the superomedial angle of the scapula; portal 2: level of the scapular spine; portal 3: between the scapular spine and the inferior angle of the scapula; and portal 4: level of the inferior angle of the scapula (figure 2)). During surgery, a moderate amount of fibrotic adherence was resected with a shaver blade and radiofrequency. The firearm projectile was located with the aid of a scope (figures 3 and 4). Removal was performed using grasper forceps (figures 5–7). The procedure lasted 38 min.

Postoperative radiography revealed total withdrawal of the projectile.

The patient wore a sling for 1 week. Stitches were removed after 10 days and physiotherapy was started at day 10. A complete

Figure 3 Image-guided arthroscopy.

Figure 4 Intraoperative imaging.

remission of symptoms (absence of pain and full range of motion) was reached within 30 days. After physiotherapeutic strengthening work, the patient resumed his activities after 2 months.

DISCUSSION

Scapulothoracic arthroscopy is a procedure with precise indications, such as snapping scapula,^{5 10–16} foreign body resection,¹⁷ benign tumours,^{13 18–20} fracture malunion²¹ or conservative treatment of chronic refractory pain.⁵

The intra-articular removal of firearm projectile fragments described for other joints, such as the knee, elbow, hip and subtalar joints,^{22–27} was also described in 2003 by Proctor and Starnet¹⁹ for the scapulothoracic joint.

Since its first report by Ciullo,¹⁰ arthroscopic intervention has been increasingly described in the literature. In 1995, Ruland *et al.*¹¹ described the arthroscopic portals that would be safe in their study of the scapulothoracic anatomy. Subsequently, new portals have been described for this procedure.^{6 7 28}

The following anatomical landmarks for portals^{6 8 11 28} were used in our procedure: 2 cm medial to the upper angle of the scapula (Ejnisman portal), 2 cm medial to the level of the scapular spine, and the midpoint between the scapular spine and the lower scapular pole, also at 2 cm medial to the medial border of the scapula. There was also a portal in the lower angle of the scapula. The portals were made 2–3 cm medial to the medial edge of the scapula and under the scapular spine to reduce the risk of injury to the main neurovascular branches.³

The positioning described by Andreoli *et al.*⁹ (specifically, the 'chicken wing'), which is combined with a cushion beneath the shoulder, increases the space between the scapula and the chest

Figure 5 Arthroscopic view of the projectile.

Figure 6 Withdrawal of the projectile.

wall.^{21 28} Potentiation of the opening of this space may be performed through medial compression of the lateral shoulder, thereby causing an additional bayonet apposition of the scapula body.³ We believe this position is safer because it increases the mean distance from the spinal accessory nerve to 3.2 cm, which is in close relationship with the wall of the scapulothoracic bursa, relative to the normal positioning of 2.4 cm. This approach makes the superior medial portal (known as the Ejnisman portal) feasible and safe.

Our intervention lasted approximately 38 min and met the recommendations provided in the literature and in the work of Andreoli *et al*, who demonstrated that the duration of the procedure is important to avoid complications. These authors noted an ideal duration of 30 min and stated that the procedure should not take more than 50 min. In this study, oedema was used as a parameter for possible complications and was classified as follows: mild—localised oedema in the scapular region but with a view of the contours of the scapula; moderate—loss of contour of the scapula; and severe—loss of contour and oedema reaching regions such as the neck, lower dorsal region and contralateral region of the thoracic spine.⁹

There was significant improvement in function and pain. The patient returned to his regular activities 2 months after surgery. Complications of scapulothoracic arthroscopy are rare, and the following should be considered: pneumothorax, neurological or vascular injury and failure of the total resection of pathological tissues. Millett *et al*²¹ stated that they have not found reports of

complications in the literature but emphasise that the procedure is still under development.

We conclude that the arthroscopic procedure to remove a firearm projectile is safe and that the positioning and portals described in the literature should be performed. Arthroscopy has the advantage of being a less invasive and less morbid technique compared with the open procedure.

Competing interests None.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

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Figure 7 Firearm projectile removed in full.

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