CASE REPORT
KAZUISTIKA

Arthroscopic Assisted Percutaneous Screw Fixation of a Postage Stamp Anterior Glenoid Fracture

Artroskopicky asistovaná perkutánní fixace zlomeniny typu poštovní známky přední části glenoidu

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SUMMARY

Bio-absorbable anchors are widely used for Bankart repair in shoulder instability surgery. Suture anchor placement for labral repair may give rise to osteolysis and/or create stress risers in the glenoid rim, which may be the underlying reasons for glenoid rim fracture with a fracture line passing through previous anchor placement sites, the so-called "postage stamp fracture". Intraarticular fractures of the glenoid have been treated via open reduction and internal fixation through an arthrotomy, which may lead to potential postoperative complications like infection, neurovascular injuries, joint stiffness, and a long recovery period. Thus, arthroscopic techniques for the reduction and fixation of glenoid fractures have been developed. We present a case of anterior glenoid rim postage stamp fracture 9 years after glenohumeral instability surgery in a 29-year-old male. The fracture and recurrent instability were treated via arthroscopic Bankart revision repair and arthroscopic assisted percutaneous screw fixation, where the arthroscopic fracture reduction and definitive fixation were performed separately and before Bankart repair, which is different from the techniques defined in the literature previously. The patient was able to return to work at 6 weeks, to fitness training without pain or restriction at 3 months, and contact sports 6 months postoperatively.

Key words: Bankart fractures, bony Bankart lesion, osseous Bankart lesion, shoulder dislocation, arthroscopy.

INTRODUCTION

Glenoid fractures comprise about 30% of all scapula fractures and the most common type is Ideberg Type I (anterior rim) fractures (5). Surgical reposition and fixation are usually indicated for intraarticular fractures of the glenoid (4).

Intraarticular fractures of the glenoid have been treated via open reduction and internal fixation through an arthrotomy, which may lead to potential postoperative complications like infection, neurovascular injuries, joint stiffness, and a long recovery period. Thus, arthroscopic techniques for the reduction and fixation of glenoid fractures have been developed. Some of these techniques involve the use of clamps and/or Kirschner wires for provisional fixation (11, 12, 15), while others rely on suture anchor fixation of the labrum, capsulolabral complex, or the fracture fragment itself as the definitive fixation (9, 10). In 2016 Voleti et al. described another technique that involves labral repair as an indirect reduction and preliminary fixation that is followed by the application of an extraarticular screw for definitive fixation (13).

Bio-absorbable anchors are widely used for Bankart repair in shoulder instability surgery (1). It has been stated that suture anchor placement may give rise to osteolysis and/or create stress risers in the glenoid rim, which may be the underlying reasons for glenoid rim fracture with a fracture line passing through previous anchor placement sites, the so-called "postage stamp fracture" (1, 3, 6–8, 14).

We present a case of anterior glenoid rim postage stamp fracture 9 years after glenohumeral instability surgery. The fracture and recurrent instability were treated via arthroscopic assisted percutaneous screw fixation and Bankart revision repair.

CASE REPORT

A 29-year-old male applied to our clinic with right shoulder pain following a fall from the bicycle 5 days ago. Physical examination revealed that right shoulder movements in all plains were reduced and painful. Anterior apprehension test was positive. The neurovascular examination was normal, and no other injuries were identified.

The patient had a history of arthroscopic Bankart repair with 3 bio-absorbable 3.5 mm knotless suture anchors (PushLock®; Arthrex, Naples, FL, USA) with FiberWire No:2 (Arthrex) for right shoulder instability at our institution 9 years ago.

Plain X-rays, computed tomography (CT) scans and magnetic resonance images (MRI) revealed an Ideberg type IB (i.e. fracture fragment >5 mm) displaced intraarticular anterior glenoid rim fracture accompanied by a large on-track Hill-Sachs lesion and a Bankart lesion (Fig. 1). The fracture line was passing through the site of a previous anchor placement. Osteolysis with clear sclerotic lines was to be seen around all 3 anchor placement sites.

Arthroscopic assisted percutaneous screw fixation for the intraarticular glenoid fracture and arthroscopic Bankart revision repair were planned.

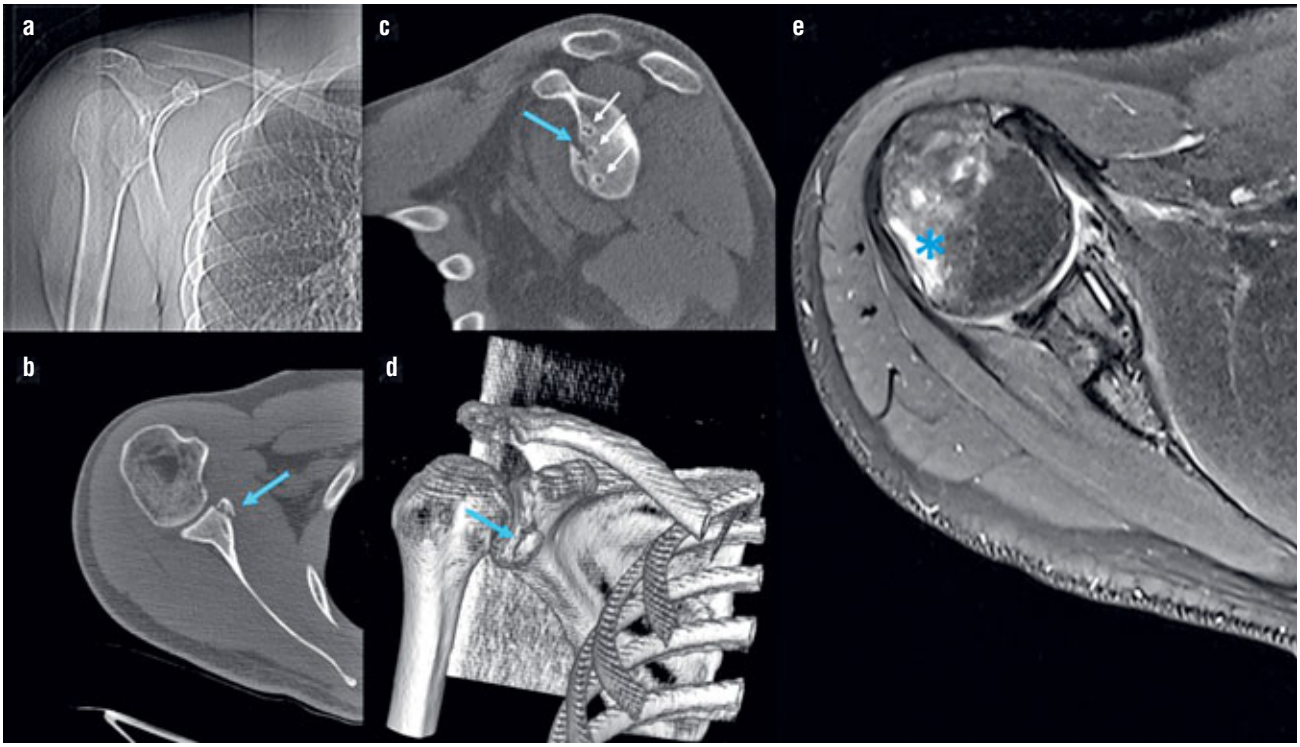

Fig. 1. Plain X-ray (a) and CT scans (b, c, d) showing the anterior glenoid rim fracture (blue arrows) through previous anchor sites; MRI of the Hill-Sachs lesion (asterisk) (e). Note the osteolysis with clear sclerotic lines around anchor sites (white arrows).

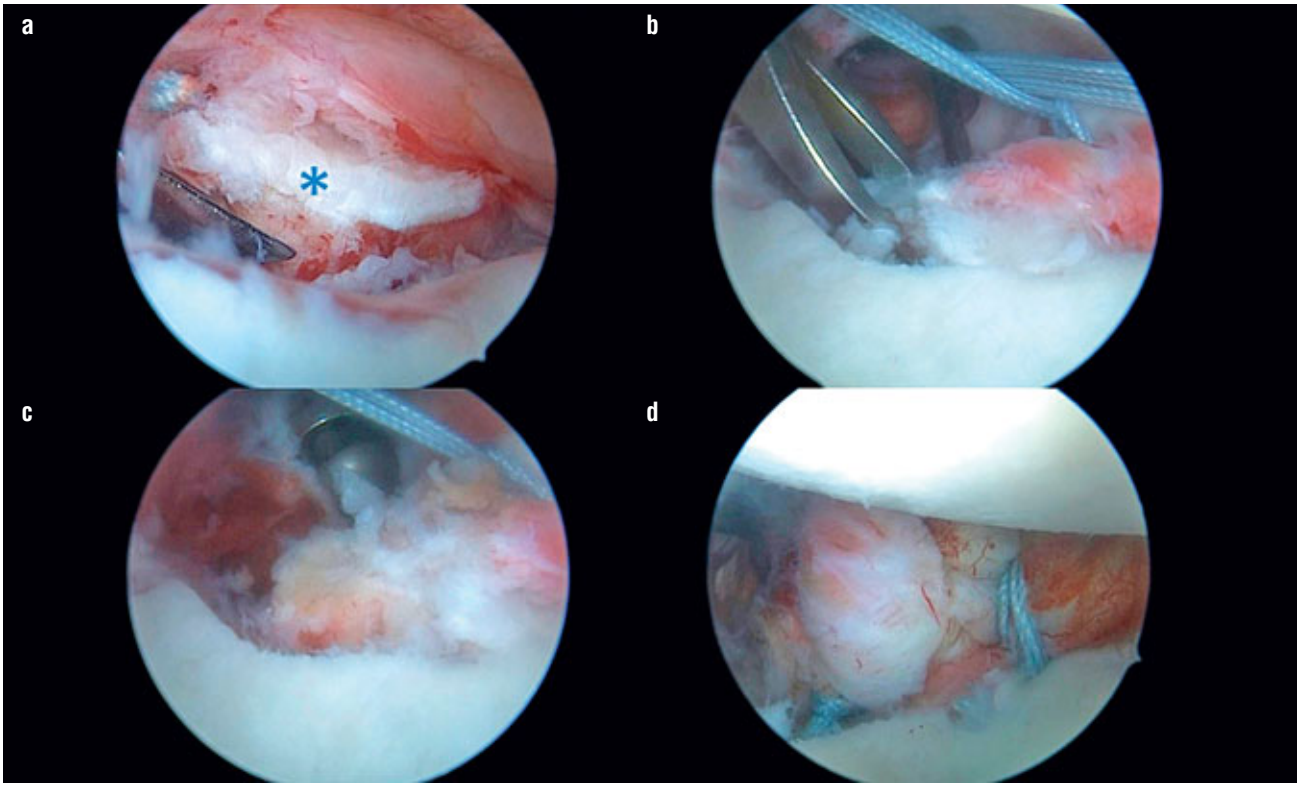

Fig. 2. a – arthroscopic view of the displaced glenoid rim fracture (asterisk); b – reduction of the fracture fragment and preliminary fixation with a Kirschner wire; c – application of the cannulated screw; d – arthroscopic view after fracture reduction, fixation and Bankart repair.

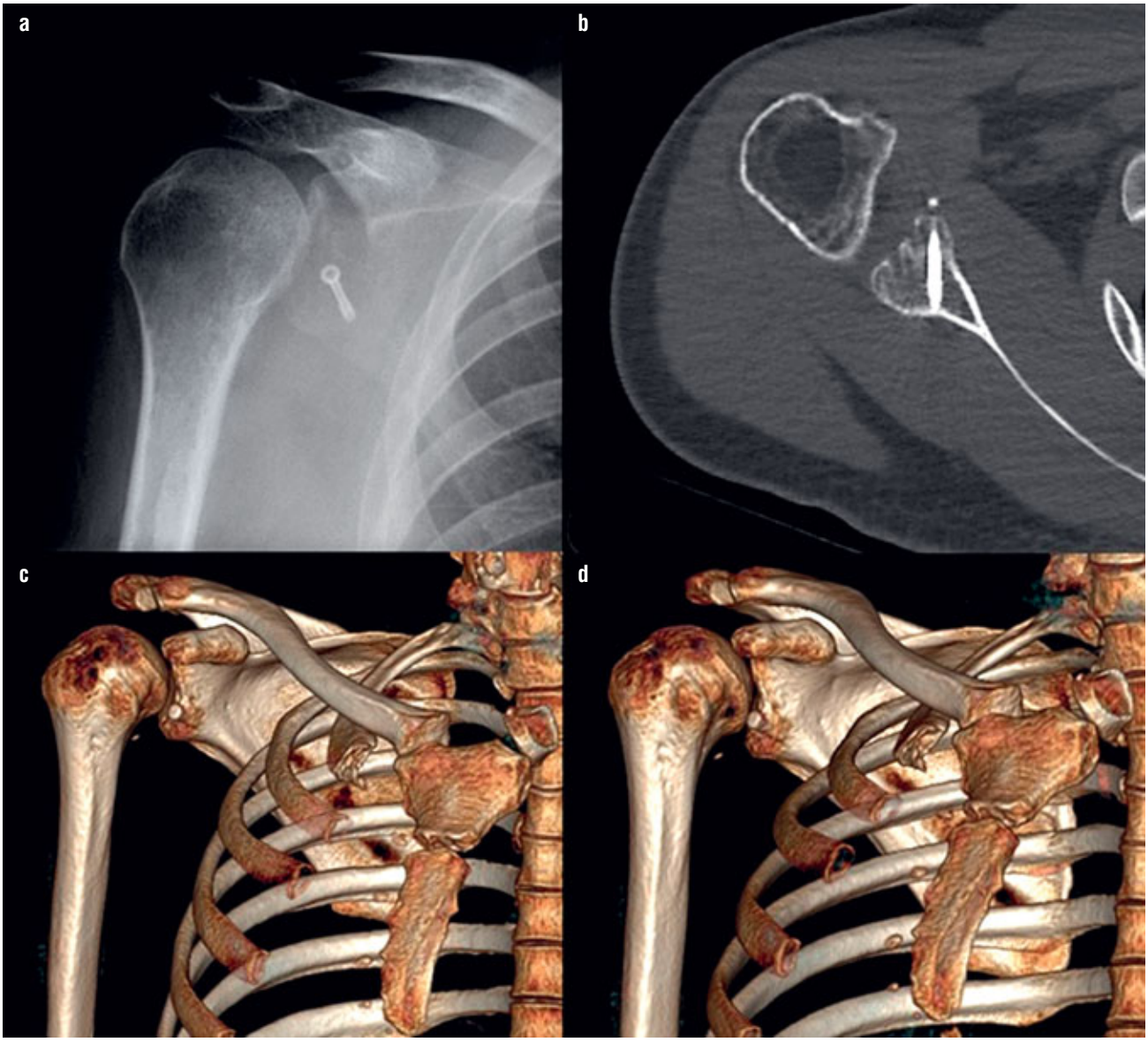

Fig. 3. Plain anteroposterior X-ray (a), horizontal (b) CT scan and 3-dimensional CT reconstructions (c, d) 6 months after arthroscopic assisted percutaneous screw fixation showing union of the fracture.

The procedure was performed under general anesthesia. The right upper extremity was prepped and dressed sterile. Lateral traction was applied with the traction kit to the right shoulder in the left lateral decubitus position. The joint was visualized via the posterior portal. The displaced anterior glenoid rim fracture fragment that was displaced anteriorly and inferiorly was visualized (Fig. 2a). It was also observed that the labrum was completely separated from the bone forming a Bankart lesion. The Hill-Sachs lesion was large, and we decided to repair the anterior lesions (i.e. glenoid rim fracture and Bankart lesion) first and then to evaluate stability and Hill-Sachs engagement. A self-looped No:2 Fiberwire (FiberSnare®; Arthrex, Naples, FL, USA) was passed with a suture lasso through the most inferior part of the loosened anteroinferior joint capsule via the anterosuperior and anteroinferior portals, so that a full wedge effect from the most inferior of the anteroinferior capsule was achieved. While this Fiberwire was held in traction in a superiorly oriented direction, two more Fiberwires were passed through the capsulolabral junction and around the labrum on the fracture fragment. The fracture site was debrided, and the fracture fragment was reduced with a grasper (Fig. 2b). Once the reduction was anatomic on arthroscopic view and transthoracic and axillary C-arm images; a Kirschner wire (K-wire) was applied percutaneously to fix the fragment to the fracture site. A 3.75 mm cannulated, partially threaded titanium screw (Arhrex, Naples, FL, USA) was applied over this K-wire to achieve definitive fracture fixation (Fig. 2c). The three Fiberwires passing through the capsule and around the labrum were pulled superiorly and medially and fixed to the glenoid with three newly placed 3 bio-absorbable 2.9 mm knotless suture anchors (PushLock®; Arthrex, Naples, FL, USA), hence providing capsular shift and completing Bankart repair

(Fig. 2d). Humerus was rotated externally and the Hill-Sachs lesion was seen not to be engaging, thus no further surgical intervention was required. Once the fracture reduction had been arthroscopically and radiologically confirmed to be anatomic, surgery was ended. No complications were encountered.

The patient used an arm-sling for 3 weeks. Follow-up of the patient was performed at the first, 3rd and 6th weeks as well as after 3 and 6 months postoperatively. Range of motion exercises and proprioceptive physiotherapy was initiated at 3 weeks after surgery. Patient's shoulder functions and quality of life were evaluated with Oxford Shoulder Score; Disability of the Arm, Shoulder, and Hand (DASH) score; Western Ontario Shoulder Instability Index (WOSI) score and 12-Item Short Form Health Survey (SF-12) preoperatively, on the 6th week, 3rd month, and 6th month postoperatively. Plain X-ray and CT scans at 6 months postoperatively are given in Figure 3. All functional and quality of life scores improved clinically significantly and progressively (Table 1). The patient was able to return to his job as an office worker at 6 weeks. After 3 months of physiotherapy, external rotation was 65°, and the patient returned to fitness training without pain or restriction. Contact sports were allowed after 6 months postoperatively. The patient and his family were informed that data from the case would be submitted for publication and gave their consent.

DISCUSSION

Incidence of postage stamp fractures related to traumatic recurrence after primary Bankart repair surgery is 35–75% (1,6). Several characteristics that have been observed in these cases are male sex, age<25, use of conventional knot-tying anchors, fixation with ≥3 anchors, sports-related trauma, and osteolysis around anchor sites (14). Larger anchor size has been thought to increase the stress riser effect (3). In a recent systematic review (14), however, no relationship between anchor size and fracture risk was identified. Similarly, the relationship between the anchor material and the risk for fracture is controversial. Almost all glenoid rim fractures after Bankart repair are seen to occur through previous anchor placement sites (3, 14), and the presence of osteolysis is very common in these cases (1, 6). Due to their role in the setting of osteolysis, the use of bioabsorbable anchors has been linked to postage stamp fractures (1). But some reviews have found no correlation between anchor material and fracture risk (14).

Table 1. Functional and quality of life scores at each follow up

	Oxford Shoulder Score	WOSI Score	DASH Score	SF-12 Score (physical)	SF-12 Score (mental)
Preoperative	13	70.4%	70.8	38.3	40.4
Week 6	31	46.6%	17.5	43.6	48.0
Week 12	43	10.4%	6.7	51.8	57.3
Week 24	48	4%	2.5	57.2	58.8

Our patient had several risk factors for a postage stamp fracture that were mentioned in the literature: male sex, sports-related trauma and the presence of osteolysis. These characteristics complied with the current literature. Although most postage stamp fractures are seen in the time phrase 1 to 2 years after shoulder instability surgery (14), our patient had a postoperative period of 9 years without any problem. Moreover, the anchors used in the index surgery were knotless, a feature reported to be associated with a lesser incidence of postage stamp fractures (14). Although the bio-absorbable nature of these anchors is a controversial risk factor (1, 14), our case may be evidence that bio-absorbable anchors, compared to metal ones, are not completely free of complications.

Postage stamp fractures have been revised with either arthroscopic bony Bankart repair or open Bristow-Latarjet procedure. The preferred surgical technique is mostly dictated by the surgeon's experience; except for fractures that cause a glenoid bone loss >25%, where open Bristow-Latarjet procedure is indicated (2). Several arthroscopic or arthroscopic assisted techniques have been described for the treatment of anterior glenoid rim fractures. Some of those techniques employed suture anchor fixation of the labrum, capsulolabral complex, or the fracture fragment itself as the definitive fixation (9, 10), while others utilize labral repair with anchors as an indirect reduction and preliminary fixation followed by the application of an extraarticular screw as a means of definitive fixation (8). In some techniques, clamps and/or Kirschner wires are used for provisional fixation (11, 12, 15).

Combining and using different parts and methods of the above-mentioned techniques, we aimed to restore an anatomy as close to the natural anatomy as possible. We reduced the fracture and provided definitive fixation with a cannulated screw, followed by the repair of the labrum and the capsule over the anatomically reduced bone with smaller size (2.9 mm) bio-absorbable anchors. Compared to other techniques described in the literature, the main difference of our technique was that direct and arthroscopic fracture reduction and definitive percutaneous screw fixation were performed first, so that anatomic joint restoration and a stable bony foundation for Bankart repair were achieved; rather than fixing the soft tissues and the bony fragment together. Thus, anatomic restoration of the glenoid joint surface, both bone and soft tissue stability and an anterior wedge effect were achieved. Complication risks were minimized by performing the procedure arthroscopically.

CONCLUSIONS

We advocate arthroscopic assisted percutaneous screw fixation for the treatment of anterior glenoid rim postage stamp fractures that occur after shoulder instability surgery as a safe and effective treatment option.

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