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Medial scapular winging following trauma—a case report

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A 51-year-old right-handed man sustained a direct injury to his right shoulder, falling from a staircase and hitting the edge of the step with the inferior angle of his right scapula. He was initially treated with muscle strengthening and range-of-motion exercises for several weeks. Although pain and swelling at the lower edge of his right scapula had receded, with full range of motion, he had persistent shoulder weakness. Subsequently, the patient complained of winging of the right scapula, which he experienced as being pushed out of his chair by the protruding scapula during active forward flexion of the arm in a seated position, e.g. when driving a car.

The patient was seen for the first time in our outpatient clinic 2 months after the injury. On initial examination, medial winging of the right scapula was noted, which was aggravated during forward flexion of the arm against resistance (Figure 1). There was a slight tenderness over the inferior medial border of the scapula. The patient had a full active range of motion in the glenohumeral joint without signs of cuff pathology. However, he had a disturbed scapulothoracic rhythm. Plain

radiographs did not show any abnormalities. Injury to the long thoracic nerve was suspected, but was excluded by neurophysiological studies. An ultrasound investigation showed a defect of the serratus anterior muscle at the insertion on the scapula. Magnetic resonance imaging revealed a small hematoma at the anatomic insertion region of the serratus anterior muscle on the scapula, with retraction and incipient atrophy of the muscle (Figure 2). A computed tomography with 3D reconstruction showed a small osseous fragment of the inferior angle of the scapula with dislocation in the direction of the retracted serratus anterior muscle (Figure 3).

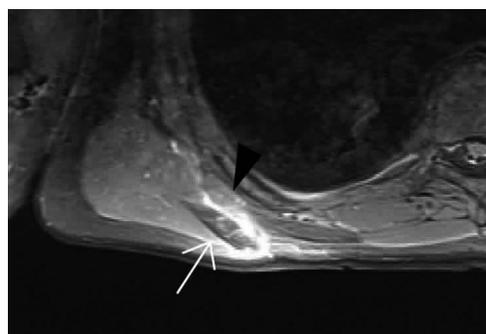


Figure 2. A T2-weighted magnetic resonance image showing focal fluid collection at the anatomic insertion region of the retracted serratus anterior muscle (black arrowhead) at the inferior angle of the scapula (white arrow).

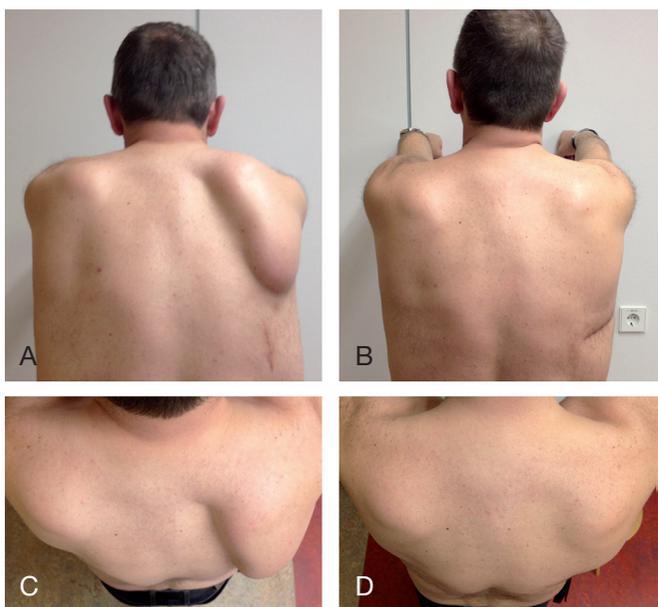


Figure 1. Medial scapular winging on the right side preoperatively (A, C) and normal scapular position 3 months postoperatively (B, D). The patient is pushing both hands against the wall with his arms in 90 degrees of ante flexion.



Figure 3. Computed tomography with 3D reconstruction showing the dislocated fragment of the inferior angle of the right scapula.

5 months after the injury, due to persistent shoulder weakness and scapular winging, the inferior angle of the scapula was explored. With the patient in a prone position, a longitudinal 10-cm incision was made in the skin lines at the inferior angle of the scapula. The groove between the teres major and latissimus dorsi muscles was opened, the muscles were retracted, and the fracture site at the inferior angle of the scapula was visualized. The dislocated bone fragment was palpated approximately 10 cm towards the axillary region. It could easily be mobilized and realigned to the inferior angle of the scapula. The size of the fragment was approximately 1 cm × 2 cm, and a substantial part of the serratus anterior muscle was attached to it. After debridement of the fracture site, two 4.5-mm HEALIX BR anchors with orthocord sutures (DePuy Mitek, Johnson and Johnson, Diegem, Belgium) were inserted in the inferior angle of the scapula. 3 transosseous tunnels were drilled through the avulsed fragment such that the fragment could be repositioned and fixated to the inferior angle of the scapula using these sutures. Postoperatively, the shoulder was immobilized in a sling for 6 weeks. Gentle muscle strengthening together with active and passive range-of-motion exercises of the shoulder was started 6 weeks after surgery. 3 months after surgery, the patient had regained full strength and a normal range of motion of the right shoulder without any sign of scapular winging (Figure 1).

Discussion

Traumatic medial scapular winging is most commonly caused by long thoracic nerve injury resulting in serratus anterior paralysis. This condition is treated nonoperatively with good functional results (Martin and Fish 2008). A rare cause of medial scapular winging is direct traumatic injury to the insertion of the serratus anterior muscle. Since Fichet—in 1930—for the first time described injury to the serratus anterior muscle itself, 3 cases of scapular winging due to direct injury to the tendo-osseous junction of this muscle have been reported (Fichet 1930, Heyse-Moore and Stoker 1982, Burdett-Smith and Davies 1988, Mansha et al. 2010). A surgical repair of an avulsed serratus anterior muscle leading to scapular winging has been reported twice before in English language. In the case described by Hayes and Zehr (1981), the insertions of both the rhomboid major and the serratus anterior muscles were found to be entirely detached from the medial scapular border together with a bony avulsion fragment of the inferior angle of the scapula. 9 months after trauma, the avulsion fragment was excised, and the torn rhomboid major and serratus anterior muscles were re-attached to the scapula with interrupted sutures, resolving persistent scapular winging and shoulder weakness. In a second, more recent case report, Mansha et al. (2010) described the successful surgical treat-

ment of posttraumatic scapular winging caused by a fracture of the inferior angle of the scapula, with a substantial portion of the serratus anterior muscle attached to it. In this case, the fragment was re-fixated to the scapula by transosseous sutures, 2 years after trauma.

Similar to the technique described by Mansha et al. (2010), in our case the fragment was not excised but re-attached to the scapula by the use of bone anchors, retaining the intact tendo-osseous junction and allowing anatomical restoration of the muscle insertion. For fixation of the avulsed fragment, we used helical bone anchors on the side of the scapula body instead of transosseous sutures because of the expected higher pull-out resistance. Contrary to our expectations, the retracted muscle could easily be brought to its original length.

The serratus anterior, the trapezius, and the rhomboid muscles contribute to stabilizing the medial border of the scapula to the thoracic wall. Loss of function of the trapezius and rhomboid muscles will result in lateral winging. Loss of function of the serratus anterior muscle will lead to medial winging of the scapula (Martin and Fish 2008). The broad flattened serratus anterior muscle, which is solely innervated by the long thoracic nerve, originates from the outer surface of the first to the eighth or ninth rib, and has 3 functional components: the superior component inserting at the medial angle; the middle component inserting at the medial border; and the inferior component inserting at the inferior angle of the scapula (Johnson 2008). The main function of all 3 components as a whole is to rotate and protract the scapula on the thoracic wall in order to optimize the position of the glenoid for maximum efficiency of glenohumeral joint movement, while keeping its medial border stabilized to the thoracic wall (Martin and Fish 2008).

In contrast to thoracic nerve injury, the most common cause of traumatic scapular winging, a fracture of the inferior angle of the scapula is rare. In these cases, surgical repair is indicated. This can even be performed successfully several months after trauma.

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