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Helena Franco

a) Department of Orthopaedic,
Royal Brisbane and Women's
Hospital, Brisbane, (QLD.)
Australia

b) University of Queensland,
Brisbane, (QLD.) Australia

Henry Burnand

Department of Orthopaedic,
Royal Brisbane and Women's
Hospital, Brisbane, (QLD.)
Australia

James Brown

Department of Orthopaedic,
Royal Brisbane and Women's
Hospital, Brisbane, (QLD.)
Australia

Corresponding Author:

Helena Franco

a) Department of Orthopaedic,
Royal Brisbane and Women's
Hospital, Brisbane, (QLD.)
Australia

b) University of Queensland,
Brisbane, (QLD.) Australia

Scapula fracture with intrathoracic displacement of fracture following a mechanical fall: Discussion and outcome of an unusual presentation

Helena Franco, Henry Burnand and James Brown

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Abstract

Scapula fractures are uncommon, usually associated with polytrauma from high-energy trauma. Intrathoracic displacement of fracture fragments is a rare complication. There is no clear consensus on operative management of scapula fractures since good functional outcomes are reported for non-operative treatment. All five previously reported cases involving intrathoracic displacement resulted from high-impact trauma and were treated operatively. In contrast, we describe the first reported case of a non-operatively treated scapula fracture with intrathoracic displacement, from lower-energy trauma. An 83-year-old female fell down nine stairs, sustaining a right displaced scapular body fracture, extending into the right third intercostal space, with associated second, third and fifth right rib fractures. The patient underwent non-operative management with sling immobilisation, pain management, supervised physiotherapy and monitoring of respiratory physiology. Seven months post-injury, the patient required no analgesia, was managing activities of daily living and had demonstrable improvement in upper limb outcome scores. This is the sixth reported case of intrathoracic displacement of a scapula fracture, and the first resulting from lower-energy trauma successfully managed with multi-disciplinary non-operative treatment.

Keywords: Scapula fracture, scapula, intrathoracic displacement, case report, trauma

Introduction

Scapula fractures represent 1% of all fractures [1], frequently occurring through the body of the scapula, due to high-impact accidents involving falls (12%) and motor vehicle (52%), pedestrians (18%), and motorbikes (11%) [2]. Mortality is reported at 10-14%, typically due to related intrathoracic injuries [3, 4]. Intrathoracic displacement of a scapular fracture fragment is an extremely rare complication.

Five previously reported cases were associated with high-impact trauma and concomitant thoracic injuries. N'Gai Porte, *et al.* reported on a 30-year-old female motor vehicle accident victim with left scapular fracture, displaced inferior fragment, bilateral rib fractures, left pneumothorax, pleural effusion and subcutaneous emphysema. The patient had three weeks of conservative management but underwent open reduction following further displacement on serial imaging. As the fracture fragment remained impacted, left posterolateral thoracotomy was undertaken to divide the scapula body from the ossified fracture fragment. [5] Van Schie-van der Weert, *et al.* described a 43-year-old-male falling from height, sustaining a comminuted scapula fracture with intrathoracic displacement of a large inferior angle fracture fragment and associated third rib fracture. Pulmonary complications dictated open reduction without fixation. He had improved pain two weeks post-surgery but range of motion was not described [6]. Schwartzbach, *et al.* described a 72-year-old female pedestrian struck by a car, suffering a left scapula fracture with intrathoracic displacement of the inferior column and multiple left-sided rib fractures, undergoing open reduction and internal fixation seven days post-injury [7]. Blue, *et al.* reported a 13-year-old male cyclist struck by a truck, sustaining a left scapula fracture with intrathoracic displacement of the inferior fragment, associated bilateral haemopneumothorax, pulmonary contusions and bilateral rib fractures. He underwent open reduction and regained normal range of motion [8]. The final case discussed a snow-boarding accident victim sustaining scapula fracture with intrathoracic displacement of the proximal fragment, with associated acromioclavicular dislocation [9]. This case report describes a right scapular body fracture with intrathoracic displacement through low-energy trauma, undergoing non-operative management with good recovery.

Written informed consent was provided for publication of this report and images following discussion with the patient and her family.

Case Report

An 83-year-old-female was brought into the Emergency Department after falling down nine stairs, landing onto her right side. She was assessed and managed following Advanced Trauma Life Support guidelines. Her initial vital signs were blood pressure of 130/70 mmHg, heart rate 80 beats per minute and respiratory rate of 17 breaths per minute. Her partial oxygen saturation was 97% on room air, with no respiratory distress or dyspnoea. Auscultation revealed reduced air entry into the bases with no crackles. Tertiary survey demonstrated severe tenderness over the posterior right shoulder and scapula, with reduced right shoulder movement. Examination of the elbow, forearm and wrist was unremarkable with full active range of motion and no neurovascular abnormalities.

Medical history included hypertension, hypothyroidism, gastro-oesophageal reflux disease and osteoporosis. She did not take regular anti-coagulants or bisphosphonates. She was right-hand dominant, lived alone, was independent with activities of daily living, including driving and gardening, and received cleaning assistance.

Initial anteroposterior Chest X-ray (Fig. 1) showed no acute fractures, pneumothorax or subcutaneous emphysema. Computed tomography chest scan (Fig. 2) demonstrated right comminuted scapular body fracture, with a fracture fragment through the right third intercostal space into the thorax. There was an associated radiologic flail chest, with multiple displaced right second, third and fourth rib fractures and small adjacent pleural haematoma, measuring 37 x 8mm with no pneumothorax. No acute intracranial, spinal or intra-abdominal injuries were identified.



Fig 1: Anteroposterior Chest X-ray demonstrating no acute fractures.



Fig 2: Computed tomography chest scan demonstrating right scapular body fracture.

Management options were discussed with the patient and family. She was managed in a broad arm sling. During admission, she had stable respiratory function and underwent daily chest physiotherapy. The small haemothorax resolved after three days with an intercostal catheter. The rib fractures were managed conservatively. She had regular review by the Acute Pain Management Service before discharge from the service nine days post-injury, undergoing rehabilitation with physiotherapy and occupational therapy. Sixteen days post-injury, she was transferred to the rehabilitation facility. Seven months post-injury, she reported improved pain and required no regular analgesia. She was independent with cooking and groceries, and able to recommence driving and sewing. On examination seven months post-injury, she had 140 degrees flexion, 130 degrees abduction and 80 degrees external rotation without pain. Four months post-injury, she recorded 47.5 on a Disabilities of the Arm, Shoulder and Hand (DASH) score. Seven months post injury, she recorded 15.0 on the DASH score, and reported 90 out of 100 for perception of health on EQ-5D-5L Health Questionnaire.

Discussion

This case report differs from previously described cases regarding patient demographics, injury mechanism, management and recovery outcomes.

Scapula fractures usually occur in males between 40-60 years [10]. Only one previously described case was a similar demographic, being a 72-year-old female pedestrian. All previously described cases were significant high-impact trauma. This patient sustained a comparatively low-energy blunt injury after falling down nine stairs.

Initially, the scapula fracture was not identified on trauma chest X-ray.

An estimated 43% of scapula fractures are missed on initial trauma supine chest X-ray, possibly caused by fractures being overlooked due to associated regional injuries (72%), partially included or excluded on trauma films (19%), or radiologically obscured by artefacts (9%) [11]. High clinical suspicion of an underlying scapula fracture must result from localised bruising, tenderness on palpation, reduced scapulothoracic movement or holding the arm in an adducted position to limit pain [6]. Further imaging is recommended with thoracic and shoulder CT scan to define the presence of a fracture and any displacement or associated injuries [9]. Scapula fractures are commonly associated with multiple bony or major soft-tissue trauma, most commonly rib fractures and lung injuries, including pulmonary contusions and hemopneumothorax [3]. This patient sustained an isolated chest wall injury with associated ipsilateral rib fractures and no respiratory compromise. Recommended treatments for scapular fractures complicated by intrathoracic displacement of fracture fragments vary according to previously reported cases. In the reported case, non-operative or operative management options were considered. Due to a thick muscle envelope, scapula fractures managed non-operatively have predictable early healing with simple immobilisation and early range-of-motion exercises [12]. Literature shows good long-term functional outcomes and pain reduction with non-operative treatment, irrespective of the scapular fracture location [2]. Criteria for operative management based on anatomical deformity are controversial, due to insufficient evidence to determine the potential of operative management to improve functional outcomes [13]. Consideration must include risks such as wound breakdown, infection, hardware removal, poor functional outcomes and rare complications such as brachial plexus palsy [14, 15]. Given risks associated with operative fixation, including excessive dissection required for exposure, and this patient's baseline function, non-operative management was recommended. Following physiotherapy rehabilitation, she had significantly improved range-of-motion and functional outcomes. Seven months post-injury, the patient experienced near-full return to activities of daily living, performed independently or with physiotherapy-recommended modification. The recovery is evidenced by improvement in the DASH score from 47.5 four months post-injury to 15.0 seven months post-injury. Compared to previously documented cases, this is the first case managed successfully with conservative management. Two cases underwent delayed operative management due to failed conservative management, including the 72-year-old female [7].

This case demonstrates that conservative management with physiotherapy can be considered for elderly patients with scapula fracture and intra-thoracic displacement. Shared decision-making, monitoring of respiratory physiology and careful pain management are important factors for non-operative treatment. This case also describes the longer-term outcome, in contrast with previously described cases. There remains a paucity of cases to establish conclusions on optimal treatment. Management should be determined on a case-by-case basis, considering pain control and prevention of pulmonary complications.

Conclusion

Scapular fractures typically result from significant trauma with associated injuries, including major thoracic injuries.

This case report described the first reported scapular fracture with intrathoracic displacement following low-impact trauma, with non-operative management and return to pre-injury function. As there is insufficient evidence for comparison between operative and non-operative management of scapular fractures, it is recommended that management be individualised based on patient factors, associated injuries and pre-injury functional capacity.

Statements

Acknowledgments

No further acknowledgements.

Statement of ethics

Study approval statement: This study protocol was reviewed and approved by the Chairperson of the Royal Brisbane and Women's Hospital Research Ethics Committee reviewed the project (Reference number: LNR/2020/QRBW/63901) on 27 April 2020 and stated that the project is compliant with the National Health and Medical Research Council (NHMRC) guidance Ethical Considerations in Quality Assurance and Evaluation Activities 2014. As such, the Chairperson recommended that review by the Human Research Ethics Committee is not required.

Consent to publish statement: Written informed consent was obtained by the patient for publication of the details of their medical case and any accompanying images.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

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