Other full case

A 4-year-old boy with post-traumatic winging of the scapula

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Summary

The authors report the case of a 4-year-old boy who presented to the emergency department with acute post-traumatic winging of right scapula following a fall onto his back. The x-ray of his right shoulder showed no fracture. An MRI Scan of cervical spine and brachial plexus did not reveal any abnormalities. He was managed conservatively with regular physiotherapy. At 2 years follow-up, there was no improvement in the winging of his right scapula. He was asymptomatic at rest but complains of pain in the right scapular and shoulder region during swimming limiting his swimming activity. Currently he was being evaluated by the orthopaedic team for corrective surgery.

BACKGROUND

Scapular winging is uncommon but potentially disabling condition that can affect the ability to lift, pull and push heavy objects as well as to perform daily activities of living, such as brushing teeth. Scapular winging by disrupting the scapulohumeral rhythm contributes to loss of power and limited flexion and abduction of the upper extremity.¹ The most common cause of winging of scapula is palsy of serratus anterior secondary to long thoracic nerve injury. Patients with serratus anterior palsy may present with pain, weakness, limitation of shoulder elevation and winging of scapula. Post-traumatic winging of scapula is more commonly reported among adults and less commonly in children. Most cases resolve by 6–9 months. However, in our reported case, the patient persists to have winging of the right scapula even after 2 years following the initial injury (figure 1).

CASE PRESENTATION

A 4-year-old boy fell onto his back after being pushed by one of his friends while playing. Later that day he complained of pain and discomfort at his right scapular region. His parents noticed the prominence of his right scapular border and brought him to the local emergency department. On examination, he had a prominent winging of his right scapula. Rest of his musculoskeletal and neurological examination were normal. He was otherwise fit and well with no other significant medical problems in the past. There was no significant family history of any medical problems.

He had an x-ray of his right shoulder, which showed no fracture. A diagnosis of serratus anterior palsy secondary to injury of long thoracic nerve was made. He was reviewed by paediatric neurology and orthopaedic specialists. An MRI scan of his cervical spine and brachial plexus

Figure 1 Winging of the right scapula.

did not reveal any abnormalities. Electromyographic (EMG) and nerve conduction velocity studies were considered but not done due to the anticipated technical difficulties in a 4-year-old and possible risk of pneumothorax. He was managed conservatively with regular physiotherapy. At 2-year follow-up, there was no improvement in the winging of his right scapula. He was asymptomatic at rest but complained of pain in his right scapular and shoulder region while swimming with functional limitation during swimming. He is being evaluated by the orthopaedic team for further corrective surgical procedures.

INVESTIGATIONS

EMG and nerve conduction studies are very helpful to confirm the diagnosis of serratus anterior muscle palsy and long thoracic nerve injury. Plain radiographs of the cervical spine, chest and shoulder are helpful to rule out structural abnormalities or bony disease. CT and MRI scans are helpful in specific cases such as cervical disc herniation or when neoplasm is suspected.

DIFFERENTIAL DIAGNOSIS

Winging of scapula can be produced by many conditions and for easy understanding can be grouped into four anatomical types.²

- (1) Nerve lesions – damage to long thoracic nerve causing serratus anterior palsy, damage to spinal accessory nerve leading to trapezius palsy.
- (2) Muscle lesions – congenital absence of the serratus anterior and trapezius in muscular dystrophy (particularly fascioscapulohumeral dystrophy).
- (3) Bone lesions – scoliosis, craniocleidodysostosis, localised skeletal lesions.
- (4) Joint lesions – severe contractures secondary to degenerative and inflammatory joint diseases, avascular necrosis of the humerus.

TREATMENT

Physiotherapy is often useful. Various braces and orthotic devices are of doubtful benefit and cumbersome to wear. Operative treatment is considered if there is no improvement to conservative treatment after 2 years.¹

OUTCOME AND FOLLOW-UP

All patients with scapular winging should be referred for orthopaedic evaluation.

Most cases of acute serratus anterior palsy resolve spontaneously in 6–9 months and maximum in 2 years. In our reported case, there was no improvement after 2 years following conservative management and hence the patient is being evaluated for further corrective surgical procedures.^{1 3}

DISCUSSION

Winging of scapula was first reported by Velpeau in 1825.⁴ The exact incidence of winging of scapula in children is unknown. Post-traumatic winging of scapula in young children is rare. It is more commonly reported in young athletes. Stability of the scapula is secured mainly through two muscles, the serratus anterior and the trapezius. Therefore, dysfunction of either of these muscles and more commonly serratus anterior can cause winging of the scapula.

The long thoracic nerve is purely a motor nerve that originates from ventral rami of the fifth, sixth and seventh cervical roots. It is the sole innervation to the serratus anterior muscle. Unilateral winging of scapula is most commonly the result of neuropraxia of the long thoracic nerve supplying serratus anterior muscle.

The nerve has a long and superficial course and is therefore susceptible to injury. The mechanisms postulated to cause injury to the long thoracic nerve include⁵ entrapment of the fifth and sixth cervical roots as they pass through the scalenus medius muscle³ when traction applied to the scapula the nerve can get compressed as it crosses over the second rib and⁶ during passive abduction of the arm, the inferior angle of the scapula can cause compression over the nerve.^{2 3 5 7} Most injuries of the long thoracic nerve are neuropraxias and caused by trauma, such as blow to the thorax or sudden depression of the shoulder girdle, as occurs during fall.⁵ Overuse of shoulder and strenuous exercise have also implicated as possible causes. Other causes of winging of scapula include neuromuscular, musculoskeletal and structural causes.^{2 6}

The scapular winging becomes more prominent when the patient is pushing against a wall. Examination of the cervical spine is important to rule out cervical disease. The diagnosis of long thoracic nerve injury is largely clinical. Plain radiographs of the cervical spine, chest and shoulder are helpful in ruling out structural abnormalities or bony disease. EMG and nerve conduction studies are very helpful to confirm the diagnosis of serratus anterior muscle palsy and long thoracic nerve injury. CT and MRI scans are helpful in specific cases such as cervical disc herniation or when neoplasm is suspected. Most cases of acute serratus anterior palsy resolve spontaneously by 6–9 months and maximum by 2 years.^{1–3 8}

Serratus anterior paralysis and scapular winging will persist in approximately 25% of patients treated conservatively and such patients are candidates for surgical reconstruction. In adults, the dynamic muscle transfer of the sternal head of the pectoralis major to the inferior angle of the scapula extended or reinforced by a fascial auto graft has shown consistently positive results with improved function, resolution of winging and relief of pain. Recently, surgical neurolysis or nerve transfer to the long thoracic nerve has shown early promising results.^{1 2}

Learning points

- The most common cause of winging of scapula is palsy of serratus anterior secondary to long thoracic nerve injury.
- Investigations include plain radiographs of the cervical spine, chest and shoulder, EMG studies and nerve conduction studies. CT and MRI scans are useful in specific cases.
- EMG studies and nerve conduction studies may be technically difficult in young children.
- Most cases of acute serratus anterior palsy resolve spontaneously by 6 months to 2 years.
- Operative treatment is considered if there is no improvement to conservative treatment after 2 years.

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