

Segmental clavicle fracture following a road bike injury

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DESCRIPTION

A previously healthy man in his 70s presented with right-sided shoulder (clavicle) pain after a road biking injury. He fell forward after hitting a pothole while riding his bike. He initially presented with pain exacerbated by range of motion of the right shoulder that improved with rest. His symptoms were unchanged with deep breaths, and he denied any current shortness of breath, abdominal pain or neurological symptoms. His vital signs were significant for tachycardia to 108 beats per minute, but he was oxygenating at 98% on room air with a normal blood pressure and respiratory rate. His physical examination was significant for a deformity with tenderness to palpation over the right clavicle. He had normal neck range of motion without tenderness to palpation of the cervical spine. His right upper extremity was neurovascularly intact including over the distribution of the axillary nerve. He had decreased range of motion of the right shoulder in all directions. The patient underwent plain radiography series of the clavicle, shown in [figure 1](#). He was diagnosed with a displaced segmental fracture of the middle and lateral (distal) right clavicle.

The patient was placed in a sling for comfort. He was given medication for pain and instructed to follow up with orthopaedic surgery within a week. Given the unstable nature of this fracture with significant displacement, conservative management was not recommended due to risk for long-term functional deficits. He underwent an open reduction and internal fixation of his right clavicle a week later. He was doing well with normal healing ([figure 2](#)) at his 6-week postoperative follow-up visit.

Clavicle fractures make up about 2%–5% of all fractures and are common in sports.^{1–3} Due to



Figure 1 Anteroposterior (A) and cephalad (B) plain radiography of the right clavicle showing comminuted clavicle fracture consisting of a midshaft fracture angulated inferiorly with a displaced lateral fracture (Neer classification type I). There is also a chronic fragmented intra-articular lateral clavicle fracture (arrow) given sclerotic margins with degenerative changes of the acromioclavicular joint.



Figure 2 Six weeks postoperative anteroposterior plain radiography view revealed stable implant position and interval fractures healing.

its anatomic location and supporting structures, the midshaft is the most commonly fractured portion of the clavicle.² Rarely, there are reports of segmental fractures of the clavicle, where two or more portions of the clavicle are fractured simultaneously.^{1,3–10} A subset of segmental fractures that involve the medial and lateral clavicle are labelled as bipolar segmental fractures.^{3,5,7} One study found that segmental fractures made up 0.8% of all clavicle fractures.⁹ Segmental fractures usually involve the midshaft and lateral clavicle, but can be present in any combination of locations.^{1,7} The exact mechanism of these fractures are unknown.¹⁰ However, it seems these types of injuries require high velocity impact including direct trauma to the clavicle

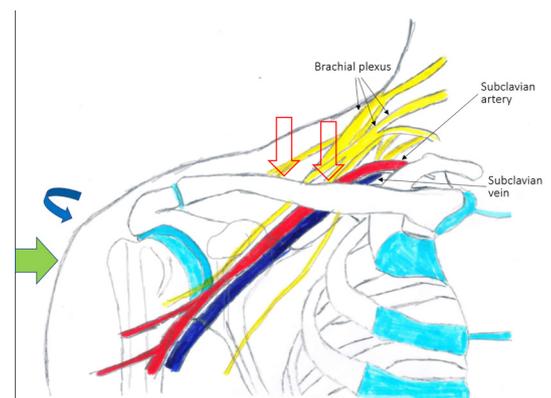


Figure 3 Anatomical diagram of the shoulder with associated neurovascular structures. Segmental clavicle fractures can occur as a result of a direct trauma (open red arrows) such as colliding with a pole or assault with an object. Another possible mechanism is the result of a fall to the ground on an adducted shoulder (typical mechanism for midshaft clavicle fractures). It is speculated that a combination of direct force on the point of shoulder girdle (green arrow) and an indirect force from behind the shoulder causing anterior movement of the lateral shoulder (blue arrow) may also cause segmental clavicle fractures. (Figure illustrated by MK).



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(figure 3, illustrated by MK).^{1 3 6 8 10} Segmental fractures should raise suspicion for assault¹ or other high velocity injury where two separate forces may be concurrently acting on the clavicle.^{1 4 6 7} History taking should be directed towards questions concerning self-defence or high-impact trauma. Because midshaft clavicle fractures are common, associated medial and lateral portions of a segmental clavicle fractures may be missed.^{1 5} With a clinical concern but unclear plain radiography findings, CT scan of the clavicle may be ordered to further evaluate for subtle fractures or for surgical planning.⁵

The teaching point in this case is that while the midshaft fracture garners attention, it is the lateral third fracture which is most concerning. While midshaft fractures historically have often been treated conservatively, the literature increasingly indicates that lateral clavicle fractures may benefit from surgical stabilisation.^{1 3 5 7 8 10 11}

When serving as a provider in a trauma centre, urgent care clinic or emergency room, injuries of this nature do require careful evaluation of the lungs, chest and spine. Due to the proximity of the brachial plexus and the subclavian artery and vein, injury to the neurovascular structures may also result as a

consequence of clavicle fractures. Careful neurological, vascular and cardiopulmonary evaluation are essential.

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Case reports provide a valuable learning resource for the scientific community and can indicate areas of interest for future research. They should not be used in isolation to guide treatment choices or public health policy.

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Learning points

- ▶ Although, sport-related clavicle fractures are common, segmental fractures are rare.
- ▶ Segmental clavicle fractures should alert the clinician to other possible mechanisms of injury than a simple fall.
- ▶ Associated injuries to the shoulders, ribs, chest wall, lungs, pericardium and spinal column should be considered.
- ▶ Due to the unstable nature of segmental clavicle fractures, referral to orthopaedic surgery for surgical fixation is typically recommended.

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