

CASE REPORT

Fracture shaft of clavicle, an indirect injury from bench pressing

I P S Gill, Chima Mbubaegbu

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Injuries related to weight training are becoming increasingly common as the trend for body resistance training grows. There have been numerous injuries related to repeated stress, but this appears to be the first reported case of a fracture of the shaft of clavicle related to violent muscular contraction. It occurred in a 28 year old man during bench pressing. He was treated conservatively and the fracture united in six weeks. Resistant trainers should be made aware of the risks of heavy weight training and need proper supervision.

Weight training in its various guises has become common as society has become more health conscious. Strength building attained by weight training is also useful in other sports where explosive power is needed. The development and hypertrophy of the muscles which occurs with training can sometimes result in their power being more than the supporting bony structures can cope with. This has been shown in various reports of stress fractures during weight training and in athletes.¹⁻⁵ We report a case of fracture of the clavicle occurring because of violent muscle contraction during bench pressing.

CASE REPORT

A 28 year old right hand dominant man presented to the accident and emergency department of our hospital with sudden onset of pain in the region of the right clavicle. He was lifting approximately 60 kg of weight doing bench presses lying on his back when he suddenly heard a crack in his right shoulder. This particular lift was performed at high speed (ballistically). He was unable to continue after this. From the history there was no abnormality in the movement of the bar (of the bench press) during this particular episode. He practised a regular regimen of weight training, doing bench presses and resistance training lifting weights.

He was a manual worker by occupation but was not involved in any rigorous sporting activity. He had no previous history of shoulder or clavicular pain before this episode. He also did not give any history of steroid intake.

On examination, he had marked bruising and swelling over the right clavicle. He also had tenderness and deformity of the clavicle but there was no distal neurological deficit. On examination of his back, he had marked hypertrophy of the muscles at the back of the scapula and shoulder involving the trapezius and the clavicular portion of deltoid and pectoralis major on the right side (fig 1). His anterior chest wall muscles were equally developed on both sides. Radiography showed a displaced fracture of the middle of the right clavicle (fig 2).

He was treated conservatively in a cuff and collar sling. The fracture went on to unite without complications in six weeks.

DISCUSSION

The power of muscles can be improved by performing explosive movements in the weight training room. Weight training is a means of general conditioning and can also be used for strength training, which may be transferred to other sports that require explosive action.¹ Many resistance trainers measure their strength by how much weight they can bench.

The clavicle is a rigid S shaped strut that transmits forces from the arm to the trunk. The attached muscles may cause deformity after clavicular injury but their role in actually causing a clavicular shaft fracture because of their hypertrophy and explosive contraction has not been reported.

Injuries associated with weight training are on the increase as the trend for resistance training grows.⁶ Several types of injury have been reported during weight training, which include shoulder dislocations, tendon ruptures of pectoralis major, biceps and triceps, stress fractures of the distal clavicle, humerus, radius and ulna, and compressive and stretch neuropathies.² Many of these injuries involved great stresses around joints resulting in dislocations, or repetitive force resulting in stress fractures or damage to the muscles themselves.

Weight trainers also have an increased incidence of both proximal and distal clavicle osteolysis.⁷ Bench press, dips, and overhead presses place a great deal of stress on the acromioclavicular joint, and many repetitions over the years can cause osteolysis, even at a fairly young age.³ Their occurrence in bench pressing has been thought to reflect the repetitive stresses of "locking out" weights anteriorly in the bench press, as the arms are fully extended over the body; this causes impaction forces at the acromioclavicular and sternoclavicular joints.⁸ Bilateral shoulder dislocations have also been reported during bench pressing.⁹

To the best of our knowledge, this is the first report of fracture of the shaft of the clavicle caused by a single event of muscle contraction. Our patient had marked hypertrophy of the muscles at the back of the scapula on his dominant side, though his anterior chest wall muscles were equally



Figure 1 Hypertrophy of the back muscles on the right side.

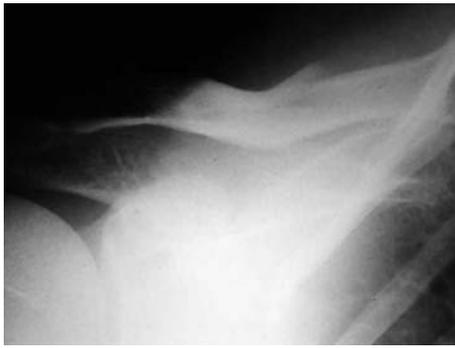


Figure 2 Fracture of the right clavicle.

developed on both sides. This hypertrophy could have been caused by the patient using the dominant arm to lift more weight during resistance training, and by the fact that he was a manual labourer by occupation. The contribution of his unequal muscle development at the back to his injury is unclear. Violent contractions of the clavicular portions of the deltoid and pectoralis major muscles may have contributed to the fracture. This had been suggested as a possible mechanism in a clavicular fracture that occurred in a javelin thrower.⁴ It may be that the clavicle had already become weak owing to regular resistance training, and this was the final event that led to failure of the bone, although this is not supported by the history as he was asymptomatic previously.

Small deviations in technique can result in injury.⁵ However, our case did not appear to have a problem with technique but rather his sheer strength overcame the resistance of the bone. Proper supervision and instruction is necessary in weight training, but it may not be possible to prevent all such injuries. People involved in resistance training should be made aware of the risks that are associated with muscle bulk development in bony struts with muscles acting at their ends.

Take home message

- Clavicular stress fractures may occur in athletes, but this seems to be the first report of a true clavicular fracture caused by a single event of violent muscular contraction.
- Most injuries related to weight training are the result of repeated stress or poor technique, but in this case hypertrophy of muscles may have led to their strength outstripping that of the supporting bony structures.
- People involved in resistance training should be made aware of these risks.

Authors' affiliations

I P S Gill, C Mbubaegbu, Homerton University Hospital, Orthopaedic Department, London, UK

Correspondence to: I P S Gill, 2 Bevan Drive, Longbenton, Newcastle Upon Tyne NE12 8WD, UK; ipgill@yahoo.com

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