A Modern Approach To Clavicle Fractures

Historically, most clavicle fractures were treated non-operatively with a brace, sling, or both. Over time, new techniques have evolved that have allowed early return to function. This is important, particularly to tradesman and athletes.

Midshaft fractures

The most common fracture is about halfway between the two ends of the bone (figure 1). These typically have a degree of overlap. The overlap does not prevent the bone from healing. If there is more than 2cm of shortening it can potentially change the function of the shoulder. Also, there may be cosmetic imperfections, as one shoulder tip visibly doesn't sit as far out as the normal one. Non-operative treatment with a brace strapping the shoulder out (figure 2) will reduce this.

Figure 1. A midshaft clavicle fracture with 1cm shortening and minor comminution (small fragments as well). Either operative or non-operative management is reasonable.

Non-surgical treatment for this fracture reduces the pain substantially. Some people are able to function at a desk with that arm by three weeks. Often the clavicle harness (figure 2) is used for four weeks (children) to six weeks (adults). Additionally, a broad arm sling may be recommended, worn outside the clothing, for the first three weeks. Return to sport is usually delayed until solid bone healing is seen on x-ray – this takes around three months. A small proportion (5-10%) either fail to unite or re-fracture with a further injury.

Figure 2. Clavicle harness

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Operative management for these fractures could be by plate fixation. However, more commonly, a screw is placed down the inside of the bone. To do this, an incision is made directly over the break, a drill used to establish the “intramedullary” canal, a guide wire driven out through a separate incision behind the shoulder, back down the bone, then a hollow screw inserted over the top of the wire (figure 3). The break is usually then rigid enough that sports training can resume in one to two weeks, and full activity by six.

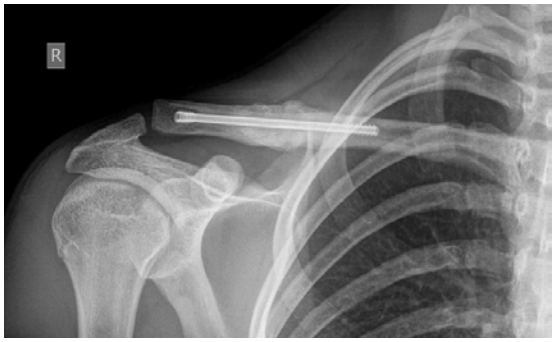

Figure 3. A 4.5mm x 90mm Herbert screw inside the clavicle

Lateral (outer) clavicle fractures

These are a notoriously difficult group. Sling treatment has a high non-union rate, causing ongoing pain and disability. The location usually means the ligaments have either been stripped off the clavicle, or the fracture occurs adjacent to the ligaments. The medial aspect of the bone is then pulled high by the muscles that support the shoulder girdle. There is often a large gap and excessive movement, factors that prevent fracture union.

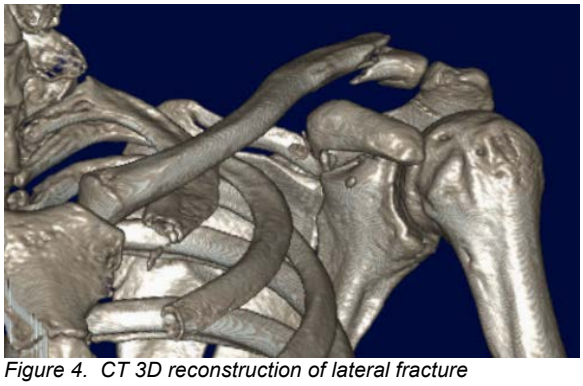
Figure 4. CT 3D reconstruction of lateral fracture

Many different operative interventions have been tried, with mixed success. Hook plates invariably need to be removed and irritate or damage the rotator cuff. Fixation of the medial clavicle to the coracoid often requires the screw to be later removed. However, there is still a place for the different types of fixation.

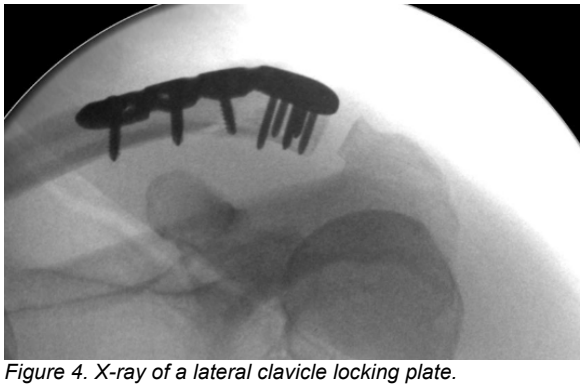
Figure 4. X-ray of a lateral clavicle locking plate.

A recent fixation method is a locking plate whereby multiple screws in different directions are inserted through a plate. The last rotation of the screw locks the two together, preventing any “toggling” action.

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Disadvantages & complications of surgical treatment

Irritation at screw insertion site

When a screw has been inserted down the inside of the clavicle, the tip of the screw at the outer end of the bone may cause some skin irritation, a lump may occur (bursa) or the screw may back out of the bone.

Numbness

Small nerves pass over the front of the clavicle, supplying the skin further down over the front of the chest. In women, this can be quite a large area, and the longer the scar needs to be, the larger the area of numbness. Generally, we prefer the single screw technique to keep the scar short, and perhaps the re-fracture rate is lower. Some cases though must be treated with a plate.

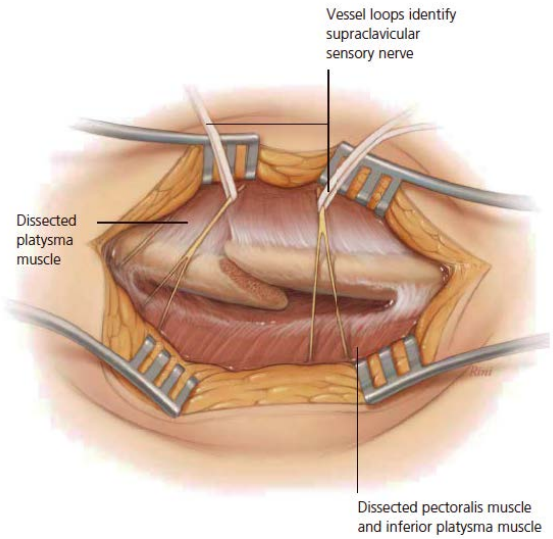

Figure 5. Surgical diagram of nerves crossing the clavicle. These are nearly invisible and often damaged leaving an area of numbness.

Removal of the metal

Generally the metal implanted is left in place forever. Certainly – "if its not bothering you, we shouldn't bother it" is a good principle. Unfortunately plates on the clavicle often cause irritation to bra strap.

Infection

Infections might only be "superficial" or skin deep, but as the clavicle is immediately under the skin, infection can potentially extend to the bone. To minimise the risk, antibiotics and antiseptics are used at the time of surgery. A little pinkness around a normal healing wound is common, but discharge of pus, dark redness, or redness extending more than a centimetre from the wound means you should contact your surgeon.

Fracture around the metalware

Uncommonly, a fracture at either end of the screw could occur. The screw creates a "stress riser" at either end, with a small chance of new fracture with sufficient force. This is difficult to fix, and sometimes no operation is offered for this second fracture. Nick Riewoldt (AFL footballer), sustained a fracture at the end of plate fixation of the clavicle, and did not have further surgery for the re-fracture. In general, we believe the re-fracture risk is lower for intramedullary screw fixation.

Inadequate stability & non union

Despite surgery, sometimes the fracture fails to heal, and sometimes the fixation doesn't achieve the early return of function expected.

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