

**CASE STUDY**

# Reconstruction of congenital pseudarthrosis of the clavicle in a 21 year old

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Mr Kemble Wang is an Australian and USA-trained orthopaedic surgeon with specialist interest in adult, adolescent, and paediatric shoulder/elbow/wrist/hand reconstruction. He specialises in paediatric upper limb problems and its adult sequelae. He practices at the Royal Children's Hospital and Box Hill Hospital, Melbourne, as well as in private practice. He is a member of the Australian Shoulder and Elbow Society, Australian Hand Surgery Society, and the Australian Paediatric Orthopaedic Society. He is the current scientific secretary for the Victorian Branch of the Australian Orthopaedic Association.

## The Case

**Patient Profile**

21 year old otherwise healthy woman with isolated problem. She had known pseudarthrosis of the clavicle since shortly after birth but this was managed non-operatively initially.

**Clinical Findings/Preoperative analysis**

In the years leading up to surgery, patient developed increasing symptoms of pain, grinding, and discomfort with backpacks and bra straps. She also had symptoms of brachial plexus/thoracic outlet syndrome with neuropathic pain radiating distally on elevation and abduction of the shoulder (Figure 1, 2).



Figure 1



Figure 2

### Surgical treatment

Surgical treatment was open reconstruction of pseudarthrosis with Medartis Superior and Anterior clavicular locking plates. The morphology and angulation of congenital clavicular pseudarthroses are in general very different to traumatic clavicle fractures or non-unions.

The bone is often dysplastic. The clavicle is short and narrow and there may be significant angulation at the pseudarthrosis site, sometimes beyond 90 degrees. Because of these shape differences, it is useful to have a plating system that contains both anterior and superior plates, with plates of multiple curvatures (Figure 3).

The ability to bend the plates in all three planes is also helpful to ensure good fit. Because the dysplastic clavicle is smaller and narrower than normal clavicles, a smaller system (2.8 mm screw diameter) such as the Medartis system is usually more appropriate than a larger system (3.5 mm screw diameter).

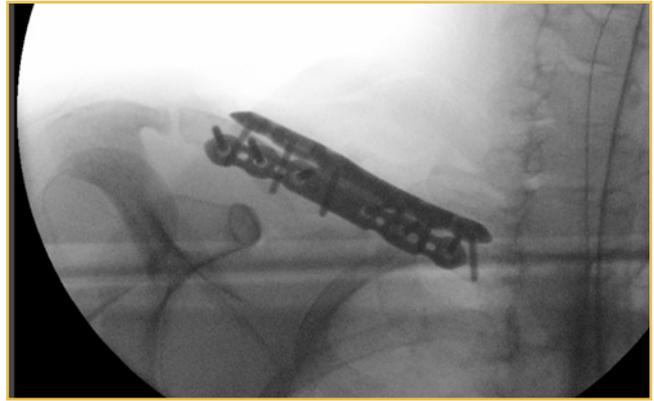


Figure 3

### Intraoperative findings

As per usual with clavicular pseudarthrosis, there was significant "elephant footing" at the ends of the bones (Figure 4).

There was also significant angulation present as the medial and lateral clavicular growth plates continue to grow normally. The correction of the angulation together with elephant footing means there is usually enough excess bone to be used as local autologous bone graft without having to use distant bone graft options (Figure 5).

A superior as well as anterior medartis clavicle plate was used here for fixation. Double plating is preferred in pseudarthrosis reconstruction, particularly in older adolescents and adults, as this confers greater stability in a situation where otherwise there is minimally bony stability, and union is expected to take longer than clavicular fixation done for standard fractures.

Care was taken to avoid dissecting outside the subperiosteal plane particularly inferiorly and posteriorly. Subclavian vessels are always close by. Vessel repair sutures and haemostasis equipment are recommended to have on standby in case of vascular misadventure.



Figure 4



Figure 5

### Postoperative treatment

Starting day 1 post-operatively, pendulars, elbow ROM, active assisted forward flexion to 90 degrees, and external/internal rotation with the shoulder in adduction is allowed. A sling is otherwise used for 6 weeks, with an x-ray at 6 weeks (Figure 6) and CT at 12 weeks (Figure 7, 8, 9).

### Conclusion

Complete union was achieved at 3 months. Preoperative symptoms resolved post surgery.



Figure 6

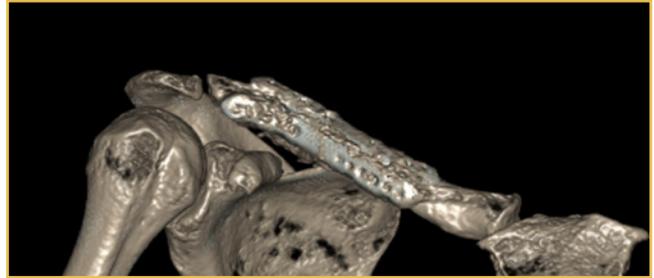


Figure 7



Figure 8

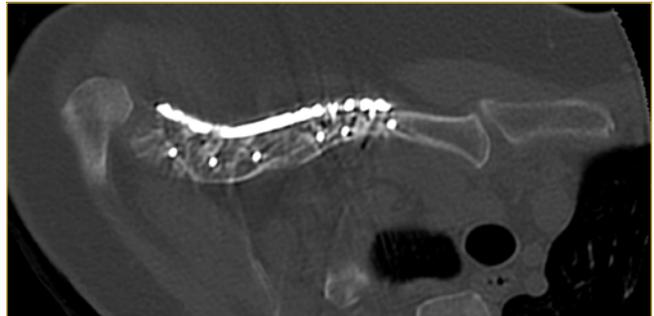


Figure 9

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