Hypertrophic non-union of fully displaced and shortened midshaft clavicle fracture

Patient History
A 43 year old female presented a one year old clavicle non-union. The patient had originally undergone conservative treatment, and without union had developed dramatic shoulder sequelae including pain and loss of function. Radiographs of the clavicle showed a hypertrophic non-union of a fully displaced and shortened midshaft clavicle fracture. The patient was recommended to undergo intramedullary fixation of her clavicle to restore anatomical alignment and length and allow for requisite healing.

Treatment Method
Clavicle non-unions are known to do well when alignment is restored and compression of the fracture is achieved. This patient’s hypertrophic callus was removed and the bone ends were freshened up prior to preparation of the canal for implantation. The Sonoma CRx™-CWG implant was selected because of its minimally invasive intramedullary approach, and its ability to provide rigid fixation and compress the fracture site.

Post-Operative Results
The outpatient procedure allowed the patient to return home the same day. The patient was allowed to return to non weight bearing activities immediately. At four weeks post-operative, the patient was showing signs of bridging callus. At 12 weeks, the patient was allowed to return to full activity.
10 year old clavicle mal-union with severe shortening and misalignment

Patient History
A 42 year old male presented a 10 year old clavicle mal-union. The original fracture had been sustained after a horse jumping accident, in which the horse landed on the patient. The patient originally received conservative treatment, and had chronic weakness and discomfort in his shoulder, as well as an obvious cosmetic deformity. Radiographs of the clavicle showed severe shortening and misalignment. The patient was recommended to undergo osteotomy and intramedullary fixation of his clavicle to restore anatomical alignment and length.

Treatment Method
Clavicle mal-unions are known to lead to strength deficits and shoulder sequelae. Restoring the length and anatomical alignment of the clavicle can resolve these issues. To realign the clavicle, a short oblique transverse osteotomy was created at the original fracture, and the majority of the callus was removed. It is desirable to be able to compress the resulting fracture to increase the stability of the fixation and achieve as much bony contact as possible. The Sonoma CRx™-CWG implant was selected because it provides rigid intramedullary fixation with up to 10mm of fracture site compression.

Post-Operative Results
The patient was able to return home to non weight bearing activities immediately after surgery. At four weeks, the patient had returned to bike riding, and by 12 weeks had returned to full activity. At 24 weeks, the patient elected to remove the implant due to his highly active lifestyle.

Pre-Operative
Iatrogenic malunion with thoracic outlet syndrome symptoms following repair using a pre-contoured clavicle plate

**Patient History**

A 21 year old male presented with thoracic outlet syndrome symptoms in his left shoulder which had sustained a clavicle fracture. The initial fracture was sustained after a fall onto his shoulder, and had been operatively repaired using a pre-contoured clavicle plate.

Pre-Operative

Radiographs confirmed a well healed fracture without obvious deformity of the clavicle. However, when compared to the intact clavicle using radiographs and CT scans, it was apparent that the curvature of his operative clavicle was drastically different than his non-operative clavicle.

Post-Operative

This appeared to cause the clavicle to compress the neurovascular structures beneath the clavicle, resulting in the TOS symptoms. The patient was recommended to undergo corrective osteotomy and intramedullary fixation to restore the natural anatomy of this clavicle.

**Treatment Method**

A corrective osteotomy was made at the original fracture site after the plate was removed. The Sonoma CRx™ clavicle pin was selected as the optimal treatment option because of its ability to restore length and provide intramedullary fixation. With the intramedullary canals prepped and aligned, the CRx was implanted to maintain correct anatomical alignment.

**Post-Operative Results**

The patient was allowed to return home after surgery and instructed to perform passive ROM as tolerable. He commenced active physiotherapy to restore strength and function in his operative shoulder two weeks post-operative. By 12 weeks post-operative, he was asymptomatic and his fracture showed bridging callus on all sides.
CLAVICLE FRACTURE CASE SERIES

Symptomatic malunion following repair using a pre-contoured clavicle plate

Patient History
A 48 year old female presented with a symptomatic malunion in her left shoulder. Her left clavicle had been previously fractured after a fall, and had been repaired using a pre-contoured clavicle plate.

Pre-Operative

Radiographs confirmed that her clavicle had fully healed. However, bilateral radiographs revealed that her operative clavicle was approximately 2cm shorter and more curved than her non-operative. This forced the patient’s shoulder medial and superior, causing great discomfort, limited function, and displeasing cosmesis. As well, the patient, a thin female, was extremely displeased with the appearance of her clavicle due to the prominence of the plate. The patient was recommended to undergo corrective osteotomy and intramedullary fixation to restore the natural anatomy of this clavicle.

Treatment Method
A corrective osteotomy was made at the original fracture site after the plate was removed. The Sonoma CR\textsuperscript{TM}-CWG clavicle pin was selected as the optimal treatment option because of its ability to apply compression to the fracture site. This can be important for older patients to promote healing. With the intramedullary canals prepped and aligned, the device was implanted to maintain correct anatomical alignment.

Post-Operative Results
The patient was allowed to return home after surgery. She commenced active physiotherapy to restore strength and function in her shoulder. By 16 weeks post-operative, she had returned to full activity and had regained full ROM.