

CASE REPORT

Delayed Brachial Plexus Compression from an Organized Hematoma Secondary to Clavicle Screw

Matthew E. Eagles¹, Rajiv Midha²

Abstract

Brachial plexus injuries can lead to lifelong clinical impairment. Herein we present a case-report of an iatrogenic brachial plexus injury that presented almost 5 years after an open reduction and internal fixation of a displaced clavicle fracture. Our clinical and operative findings suggested that the injury was secondary to a clavicle screw that had breached the posterior cortical margin of the bone.

Keywords: Brachial plexus injury, delayed complications, peripheral nerve decompression.

Introduction

Brachial plexus injuries can lead to significant disability and decreased quality of life in affected patients. Injury can be caused by direct trauma to the nerve fibers, or by compression from surrounding structures. Here we present the case of a young male who presented with a brachial plexus injury secondary to an organized hematoma, caused by screws placed for fixation of a clavicle fracture over 4 years earlier.

Case report:

This 22-year-old patient developed the sudden onset, without any injury, of left shoulder pain radiating down his arm 4-weeks before his presentation for neurosurgical assessment. He sought attention at his local emergency department and was discharged home with the presumed diagnosis of a rotator cuff injury and a referral to orthopedic surgery. Two weeks later he began to develop progressive weakness in his left

arm and a worsening of his pain. He was admitted to his local hospital for further workup. Past medical history was significant only for a previous open reduction and internal fixation (ORIF) of his malunited left clavicle fracture with anterior bone plating over 4 years earlier. Physical examination demonstrated a visible, firm supraclavicular mass on the patient's left side (Fig. 1a). He also had left sided mild weakness (MRC Grade 4) and decreased sensation to pinprick in a C5-6 (upper trunk) distribution. Diagnostic imaging revealed a 2.1cm x 3.3cm mass posterior to his left clavicle, which was separate from but compressing his brachial plexus (Fig. 1b). The referring orthopaedic surgeon had referred him for an ultrasound guided biopsy of the mass, which revealed hematoma and no abnormal soft tissue.

The patient initially improved for a few days after hematoma aspiration but then had worsening neuropathic pain and greater weakness in this shoulder and elbow function. A shoulder X-ray demonstrated surgical screws from his previous ORIF beyond the posterior cortical bone (Fig 1c). CT and CTA (not shown) failed to demonstrate any vascular contribution to the presumed hematoma or hemorrhagic tumor. The size of the lesion was similar to the prior MR (Figure 1b).

Surgical exploration of the area demonstrated a firm, well-demarcated mass severely compressing the superior trunk of the brachial plexus, along with its divisions (Fig 2a). The mass was carefully dissected off of the brachial plexus and fully excised (Fig 2b). There were no major vascular attachments noted. It was sent for final pathology, which reported an organizing hematoma with adjacent reactive connective tissue. Orthopedic surgery was then consulted intraoperatively to remove the two protruding screws from the previous clavicle fixation (Fig 2c). One of these (middle one in Figure 1c) was 5-6 mm beyond the posterior cortical margin and intimately related and adherent to the soft tissue mass. A hemovac drain was left in situ for 2 days post-operatively. The patient

✉ Rajiv Midha
rajmidha@ucalgary.ca

¹ MD, Professor and Chairman
Department of Clinical Neurosciences, University of
Calgary, Calgary, Alberta, Canada

² MD, MSc, FAANS, FRCSC
Department of Clinical Neurosciences and Hotchkiss Brain
Institute, Cumming School of Medicine, University of
Calgary, Calgary, Alberta, Canada

recovered nicely and improved to full strength in his left arm on post-operative day 1. His numbness was persistent, but improving, at the time of discharge from hospital.



Fig. 1 (a) Patient positioned with head turned to display supraclavicular mass;



Fig. 1 (b) Diagnostic imaging demonstrating a 2.1 cm x 3.3 cm mass.

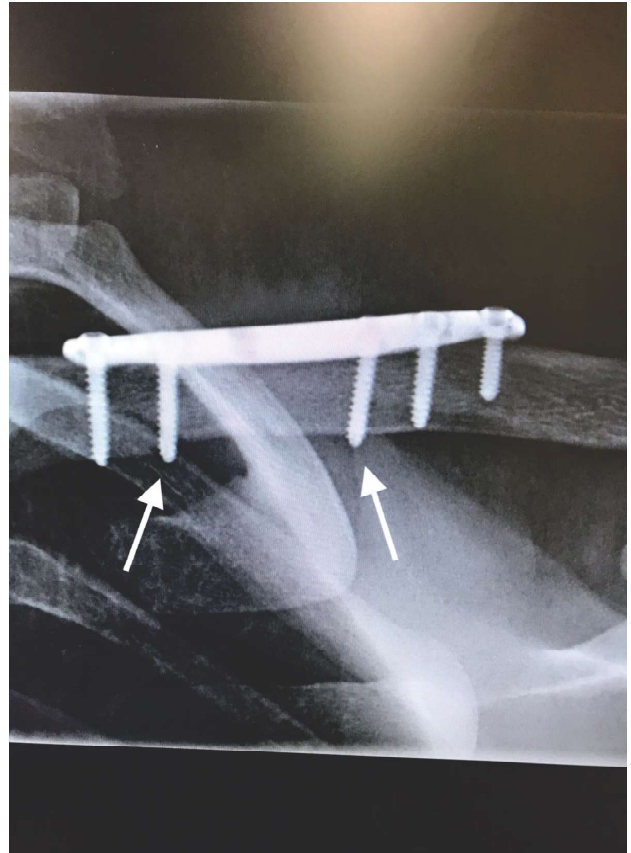


Fig. 1 (c) Plain x-ray showing old clavicle screws beyond the posterior cortical margin of the bone (arrows).

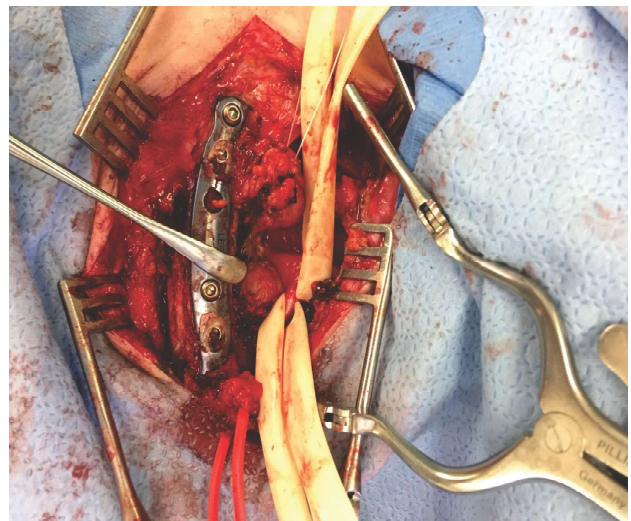


Fig. 2 (a) Initial dissection with Penfield dissector highlighting compressive mass abutting superior trunk of brachial plexus;

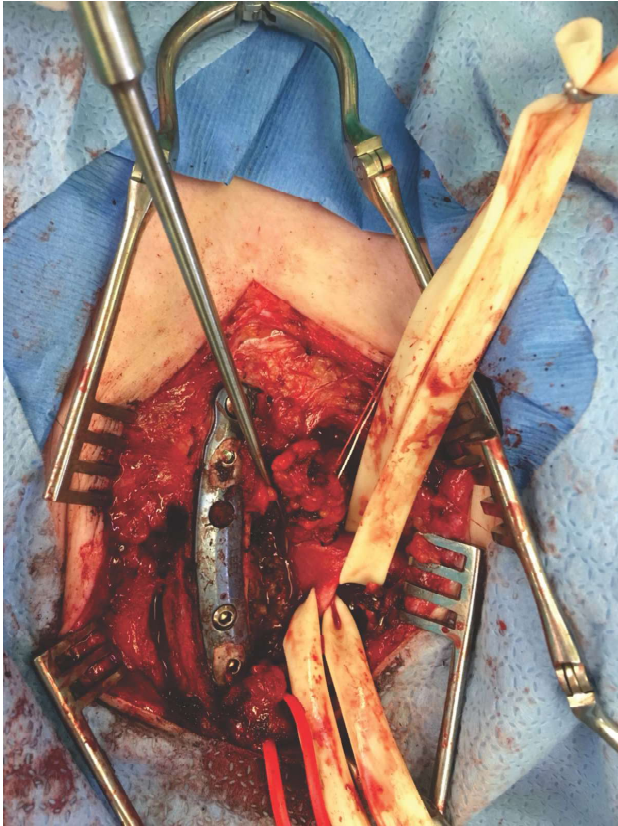


Fig. 2 (b) Superior trunk of the brachial plexus with mass excised;



Fig 2 (c) Clavicle screw measured to be 5-6 millimetres too long.

Discussion

The majority of acute brachial plexus injuries occur in poly-trauma patients and they are often associated with injuries to the shoulder girdle or nearby vasculature¹. Injury to the brachial plexus has been reported secondary to a hematoma from acute vascular injuries², and as a rare complication of intramedullary fixation for displaced clavicle fractures³. However, to our knowledge, no patient has presented with an acute brachial plexus injury in such a delayed fashion after fixation of their clavicle fracture. Furthermore, anterior plating for displaced clavicle fractures (as our patient had) is thought to be safer, with less risk to nearby neurovascular structures⁴. It was also unusual that there was no identifiable vascular noted at the time of surgical exploration. Nonetheless, the final pathology report diagnosed the mass as an organizing hematoma with adjacent reactive connective tissue. We believe the hematoma that caused brachial plexus compression in our patient was secondary to erosion of a retroclavicular blood vessel by the screw that was beyond the posterior margin of the bone by several millimetres. What caused the sudden onset of symptoms is unclear, but we speculate that expansion of the hemorrhagic mass must have occurred quickly and compromised the plexus in a tight space.

Diagnosis of brachial plexus injuries requires on a combination of history, physical examination, electrodiagnostic and diagnostic imaging findings⁵. These injuries can lead to significant disability and impaired quality of life in affected patients⁶, and complete recovery is not a guarantee even with surgical management⁶. Controversy exists on the timing of surgery in brachial plexus injuries. However, the evidence is beginning to point towards improved outcomes with early surgical intervention in this patient population⁷. Given our patient's precipitous decline and identifiable pathology on diagnostic imaging, we felt it prudent to perform an emergency decompression of his brachial plexus, and achieved the desired outcome with the restoration of strength in his left arm.

In light of our case, surgeons using anterior plating for displaced clavicle fractures should take even more caution not to breach the posterior cortex of the bone with their screws. Also, it is important to be mindful that surgical complications can present in a delayed fashion as it did in our case, almost 5 years after the patient underwent his initial surgery. Lastly, and most importantly, emergent surgical decompression of an acutely entrapped brachial plexus may lead to motor

recovery and obviate the potential disability associated with these injuries.

Conclusion

Excessively long clavicle screws pose a risk to the underlying neurovascular anatomy. Care should be taken when plating the clavicle that the screws do not breach the posterior cortical margin of the bone. Prompt decompression of an acutely entrapped brachial plexus may lead to a rapid return of motor function.

References

1. Midha R. Epidemiology of brachial plexus injuries in a multitrauma population. *Neurosurgery* 1997;40:1182-8.
2. Fuller GN, Dick JP, Colquhoun IR. Brachial plexus compression by hematoma following jugular puncture. *Neurology* 1994;44:775-6.
3. Ring D, Holovacs T. Brachial plexus palsy after intramedullary fixation of a clavicular fracture. A report of three cases. *The Journal Of Bone And Joint Surgery American Volume* 2005;87:1834-7.
4. Hussey MM, Chen Y, Fajardo RA, Dutta AK. Analysis of neurovascular safety between superior and anterior plating techniques of clavicle fractures. *Journal of Orthopaedic Trauma* 2013;27:627-32.
5. Limthongthang R, Bachoura A, Songcharoen P, Osterman AL. Adult brachial plexus injury: evaluation and management. *The Orthopedic Clinics of North America* 2013;44:591-603.
6. Rasulic L, Savic A, Zivkovic B, Vitosevic F, Micovic M, Bascarevic V, et al. Outcome after brachial plexus injury surgery and impact on quality of life. *Acta Neurochirurgica* 2017;159:1257-64.
7. Jivan S, Kumar N, Wiberg M, Kay S. The influence of pre-surgical delay on functional outcome after reconstruction of brachial plexus injuries. *Journal of Plastic, Reconstructive & Aesthetic Surgery : JPRAS* 2009;62:472-9.