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A Traumatic Three-Level Brachial Plexus Palsy With Upper Trunk Avulsion

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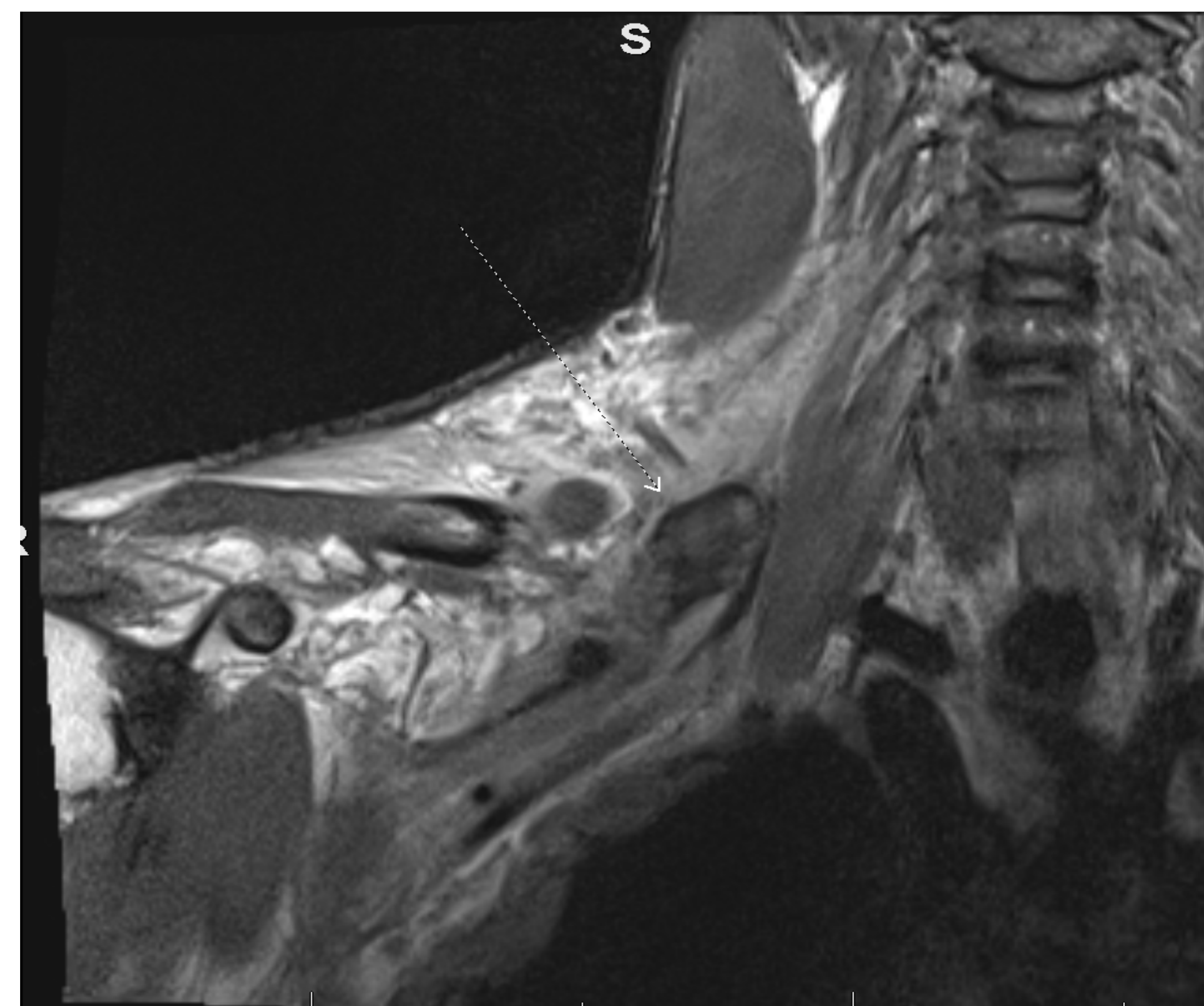
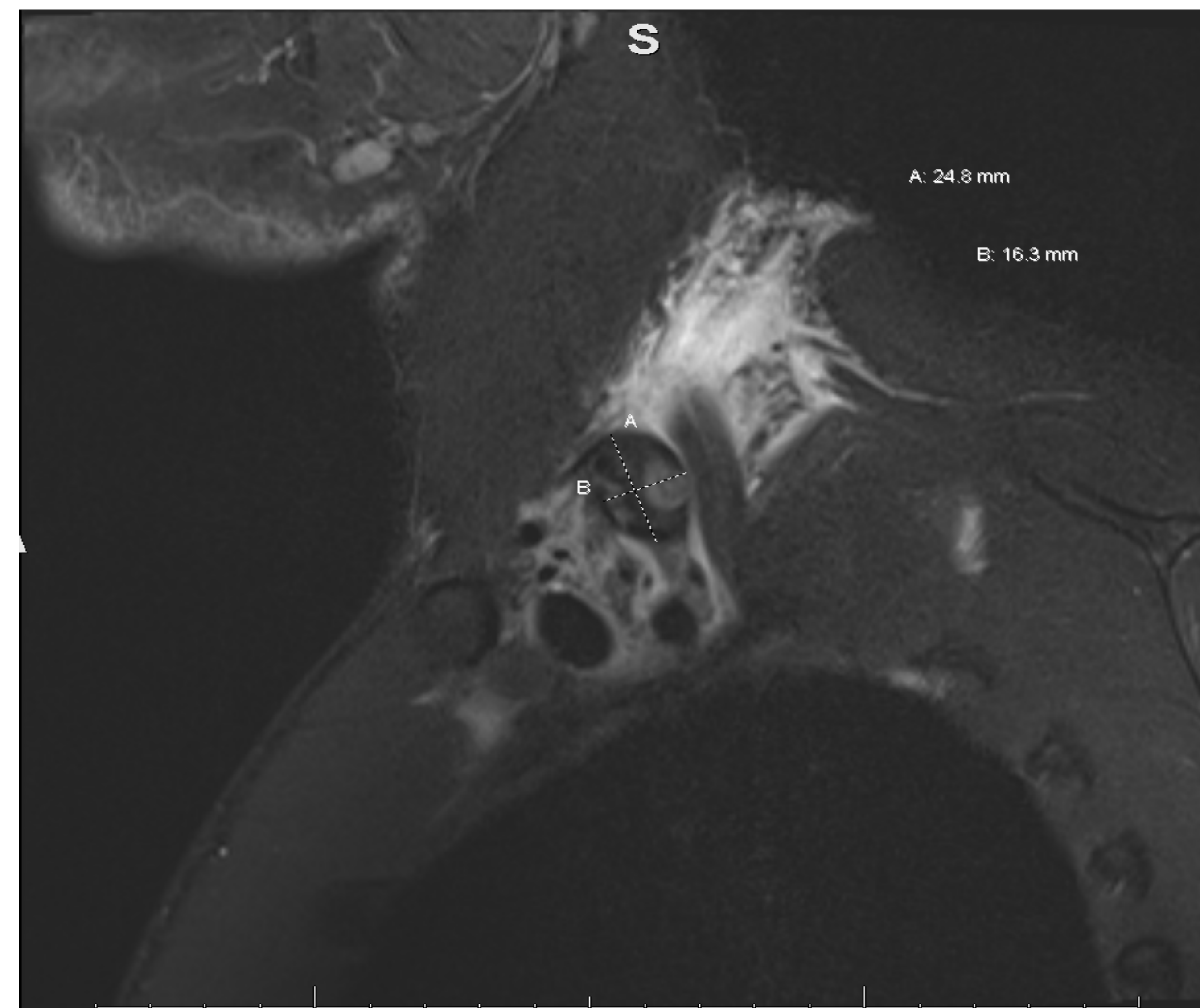


Case History

- 27 year old safety received a hit to the right shoulder, head forced to the left during a tackle.
- Immediate inability to move his right arm and pulled from play.
- Evaluation: Decreased sensation in the thumb, lateral arm, deltoid and inability to move the shoulder, elbow or wrist in the RUE. No concussion.
- Diagnosed with a “severe stinger” and did not return to the game.
- History: Three weeks prior he sustained a concussion and a left sided stinger for which he was medically cleared to RTP. Cervical x-rays were unrevealing at that time. No other past history.

Tests/Results

- MRI: see images and caption to the right
- EMG of the RUE: Active ongoing axonal denervation affecting the upper and middle brachial plexus and many C5, 6, 7, 8 supply muscles of the RUE. The study suggests complete axon discontinuity at C5 and C6.
- Cervical Spine CT Myelogram: No ventral rootlets at C5 or C6, consistent with a C5-6 preganglionic injury.
- US of the RT brachial plexus: Loss of fascicular architecture of the C5 and C6 nerve roots from the interscalene triangle extending to the superior trunk.



MRI: Focal hematoma along the course of the right brachial plexus trunk measuring 2.5 x 1.6 x 1.9 cm in size. Appearance consistent with a high-grade postganglionic supraclavicular brachial plexus trunk injury. Posttraumatic cord contusion extending from C3-C5. No evidence of central canal stenosis or cord compression.

Discussion

- Final Diagnosis: Right brachial plexopathy with C5 and C6 root avulsion.
- Presented as a severe stinger but diagnostic imaging revealed avulsed C5 and C6 nerve roots along with damage to the right brachial plexus.
- Paralysis of the rotator cuff, deltoid, triceps, biceps, brachialis, brachial radialis, digital and thumb extensors and latissimus along with sensory deficits along shoulder and dorsal thumb.
- 4 months of conservative treatment, including rehab and medications, were tried initially with minimal functional improvement.
- Ultimately underwent neuroplasty including multi-neural transfers¹:
 - Spinal accessory nerve transferred to the suprascapular nerve.
 - Medial pectoral nerve transferred to the axillary nerve.
 - Ulnar and median fascicles transferred to portions of the inferior plexus including brachialis and long head triceps branch respectively.
 - Neurolysis performed to the radial nerve.
- Risk Factors: Possible improper tackling techniques by the athlete suggested by sustaining left sided stinger 3 weeks prior.
- Conclusion: Severe blows to the neck/shoulder have potential to avulse the C5-C6 nerve roots causing significant dysfunction and disability.

Outcome

- 4-month post-operative: EMG revealed axonal regeneration to all 3 heads of the triceps, the biceps and brachialis. There was limited axonal regeneration to the middle deltoid, ECR, EDC and ECU. The FCR, pronator teres, FDS and palmaris longus are all normal.
- 7-month post-operative: Able to abduct the right shoulder to 30 degrees. There was no appreciable active external rotation of the shoulder or wrist and digital extension. Triceps strength was 4+/5. Biceps/brachialis was 3+/5 through 80 degrees. Trace movement of forearm supination and forward shoulder flexion. Absent sensation remained over the lateral deltoid and lateral forearm.

References

1. Garg R., et al., “Comparison of Nerve Transfers and Nerve Grafting for Traumatic Upper Plexus Palsy: A Systematic Review and Analysis.” *J Bone Joint Surg Am.* 2011; 93:819-829