# Understanding The Difference and Prognosis of Pre and Post Ganglionic Brachial Plexus Injuries: A Case Report

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## introduction

Brachial plexus injuries (BPI) occur mainly as post-traumatic injuries in adults, often secondary to traffic accidents. [1]. The most important step when examining a BPI is to determine whether it is affected proximal to the roots (preganglionic) or distal (postganglionic) (2). Preganglionic lesions involve the CNS and have a poor potential for recovery of motor function. Spinal nerves have the ability to move free of attachment within the intervertebral foramina (IVF). However, there are fibrous attachments from C4-C7 where the spinal nerves are tethered to the transverse processes after they exit the IVF (3). Explaining why fractures at this point increase the likelihood of these injuries. Postganglionic lesions are located distal to the dorsal root ganglion, involving the PNS, which is capable of regenerating through axonotmesis and carries an improved prognosis.

- Investigating pre-ganglionic BPI injuries a CT myelogram should be performed 3-4 weeks post-injury. Allowing for the maturation of the meningocele, caused by avulsion of the cervical root healing. For all BPI injuries, MRI is essential for visualization. Consistent with BPI is pseudomeningocele's (T2 emphasize water content), empty nerve root sleeves, and lateral cord shift. While EDX evaluation can distinguish injuries, confirm the diagnosis, determine the severity of discontinuity, and are usually performed 3-4 weeks post-injury.(4) EMG findings can reveal fibrillation potentials in as early as 10-14 days following an injury in proximal and 3-6 weeks in distal muscles. These studies are crucial for determining, location, extent, and prognosis of the patient with BPI.

## Conclusion

Pre and post ganglionic brachial plexus injuries are devastating injuries portending serious lifestyle changes. Newer surgical techniques using nerve transfers in addition to nerve graft and repair have shown promising results in promoting upper extremity function. providing a patient with proper rehabilitation and surgical repair strategy is integral in improving their function and prognosis.

## Reference and Diagnostic Imaging

Image A: Brachial plexus

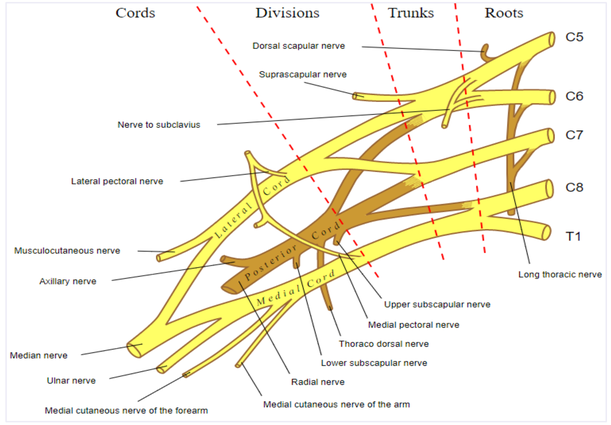
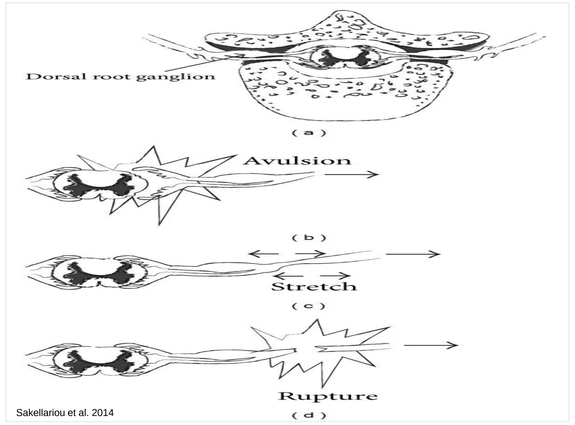
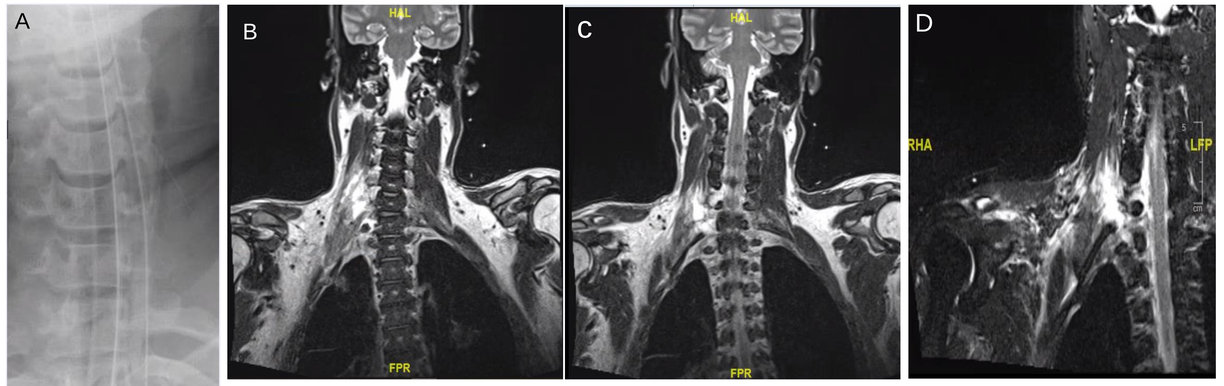



Image B: pre and post ganglionic injury mechanism




Img A: A/P C-spine XR; Cervical radiograph on admission. Limited study. Unable to evaluate the fracture involving the spinous fracture C7.

Img B & C: Coronal T2 MRI; There is a pseudomeningocele within the right neuroforamina at C6-C7 suggesting and avulsion of the C7 nerve root (preganglionic injury). There is extensive edema within the right paraspinal soft tissues including the scalene muscles.

Img D: Coronal T2 MRI; Apparent discontinuity involving the trunks and divisions of the right brachial plexus with thickening of the lateral, posterior and medial cords of the right brachial plexus. Suggestive of stretching injury involving the cords with apparent postganglionic transection or rupture of the divisions and trunks of the right brachial plexus.

## Case Report

Patient is a 31 year old Male with no past medical history while operating a motorcycle was struck by an automobile . Pt suffered a splenic laceration, liver laceration with hemoperitoneum, right colon/cecum serosal injury, right forearm degloving injury, right knee ligamentous injury, C3-C6 cord compression, C7 spinous process fracture, and left knee tibial plateau fracture s/p ORIF. Further imaging of the brachial plexus revealed pseudomeningocele of C5-C6 nerve root, avulsion of C7 roots, and discontinuity of the trunks and divisions of the right brachial plexus

Upon admission to acute rehabilitation, patient had gross atrophy of the left deltoid and infraspinatus, numbness over the deltoid, and scapular winging. On sensory exam, only diminished sensation in the medial antebrachial cutaneous and medial brachial cutaneous nerve distribution and altered ulnar nerve sensation in the fingers. On motor exam, trapezius had strength to resistance. FCR, PL, FCU, FDS and intrinsics had strength to antigravity. Remaining RUE muscles tested had no contraction. Indicating severe pre and post ganglionic BPI to the left upper extremity. Rehab therapies were focused on ROM/strengthening, Neuromuscular reeducation, and biofeedback. Patient has made several improvements with pain reduction, mobility/transfers but minimal changes on exam. Pt was ultimately discharged home with plan for nerve grafting/ gracilis muscle transfer 6 months after discharge.

## Discussion

In this case, imaging confirmed pre-and postganglionic injuries. Supraclavicular (pre-ganglionic) injuries are more common and arise mainly by a caudal force on the shoulder affecting the upper brachial plexus are associated with root avulsion, carrying a poor prognosis. Infraclavicular plexus injuries (post-ganglionic) injuries have a better prognosis as they may resolve through (axonotmesis) or with surgical repair. As in this patient, proximal plexus injuries are associated with transverse process fractures, as the C4-C7 nerve roots are tethered to the cervical transverse process. Fractures at these levels have strong evidence of preganglionic root injuries. The goals of rehabilitation are to improve the bicep and stabilize shoulder function while reducing neuropathic pain.

## References

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