The Importance of Clinical Examination in Traumatic Brachial Plexus Injuries

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We present an interesting case of Horner's syndrome in a preganglionic brachial plexus injury. This case highlights the limitation of 1.5 T magnetic resonance imaging (MRI) in traumatic brachial plexus injuries and the importance of meticulous clinical examination.

A 25-year-old man presented to the accident and emergency department of our regional trauma unit following a road traffic accident. He arrived intubated and ventilated with multiple injuries. The following injuries were identified initially: occipital condyle fractures, right orbital and maxillary sinus fractures, right pneumothorax with associated rib fractures, multiple transverse process fractures, T8 vertebral body fracture, right clavicular fracture, right femur, patella, tibia and fibular fractures, a left wrist fracture, a left internal carotid artery dissection, and subarachnoid hemorrhage. Initial MRI scanning demonstrated a traumatic syrinx within the cervical spinal cord, an epidural hematoma from C4 to T1 and some spinal cord contusion. Further 1.5 T MRI of the brachial plexus suggested a contusional injury with no evidence of root avulsion and no pseudomeningocele formation or convincing focal areas of T2 signal hyperintensity at the site of the exiting dorsal and ventral roots.

Once extubated, physical examination revealed complete paralysis of his right upper limb (corresponding to nerve roots C5–T1) resulting in flail arm (►Fig. 1A). Above this level, he had weakness of the trapezius (cranial nerve XI and nerve roots C3–4) and supraspinatus (C4–6). The rhomboids (C4–5) were the only normally functioning muscle group. There was no sensation distal to the elbow (C6–8) with some altered sensation along the lateral upper-arm (C5). No convincing Tinel sign was demonstrated in the supraclavicular fossa. These findings were associated with an ipsilateral Horner's Syndrome (C8–T1) (►Fig. 1B), and a chest X-ray revealed an elevated right hemidiaphragm (C3–5) (►Fig. 1C). After initial management of the patient's injuries, he was managed in specialist peripheral nerve unit, where nerve conduction studies demonstrated a combined right pan brachial plexopathy with evidence of nerve root avulsion. Taken together, the findings suggest an almost

Fig. 1 Evidence of brachial plexus injury. (A) Flail right arm, (B) right-sided Horner's sign showing miosis and ptosis, and (C) chest X-ray demonstrating right hemi-diaphragm elevation.

complete preganglionic brachial plexus injury possibly extending to include nerve roots C3 to C4, but with some preservation of the C5 nerve route. The patient symptoms were consistent at follow-up 9 months post injury with associated muscle wasting.

After discussion regarding nerve transfers and reconstruction, the patient was managed conservatively without surgical exploration. This approach was chosen due to limited reconstructive options secondary to the extent of the polytrauma and to ensure no compromise of function in the left upper limb. This case highlights the challenges faced in assessing, addressing, and managing brachial plexus injuries in trauma patients.

The use of MRI scanning for detecting root avulsions in traumatic brachial plexus injuries has been recently evaluated.¹ Wade et al report a 79% diagnostic accuracy of 1.5-T MRI scanning for the diagnosis of C5 to T1 nerve root avulsions and demonstrate that 1.5-T MRI imaging will miss one in five cases of nerve root avulsion.¹ The above case highlights this point and the importance of clinical examination to aid accurate diagnosis. MRI imaging in the presented case was undertaken in the week after injury, and it may be that local edema in the weeks post injury hamper the diagnostic

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accuracy of MRI scanning. However, interestingly, Wade et al found no association between the time from injury to scanning and accuracy of imaging.¹

In summary, we present a case of preganglionic brachial plexus injury not identified on MRI scanning. MRI scanning should not be relied upon for a definitive diagnosis of nerve root avulsion in traumatic brachial plexus injuries. However, it does offer a helpful adjunct to clinical examination, particularly when accurate examination may not be possible in critically unwell patients, for example. To improve diagnostic certainty in these injuries, meticulous clinical

examination with MRI scanning, preferably 1 month post injury in a 3-T MRI machine, is recommended.

Conflict of Interest

None.

Reference

- 1 Wade RG, Itte V, Rankine JJ, Ridgway JP, Bourke G. The diagnostic accuracy of 1.5T magnetic resonance imaging for detecting root avulsions in traumatic adult brachial plexus injuries. *J Hand Surg Eur Vol* 2018;43(3):250–258