Brachial plexus injury

Brachial plexus injury occurs when these nerves are stretched, compressed, or in the most serious cases, ripped apart or torn away from the spinal cord.

Classification

Yang et al. described a modified pathological classification (PC) of brachial plexus injury (BPI) and its magnetic resonance (MR) imaging characteristics. The reliability and diagnostic accuracy of MR imaging for detecting nerve injury was discussed. Between 2006 and 2010, 86 patients with BPI were managed surgically in our department. Their preoperative MR images and surgical findings were analyzed retrospectively. The PC of BPI was classified into five types: (I) nerve root injury in continuity (including Sunderland grade I-IV injury); (II) postganglionic spinal nerve rupture with or without proximal stump; (III) preganglionic root injury (visible); (IV) preganglionic nerve root injury and postganglionic spinal nerves injury; (V) preganglionic root injury (invisible). The main MR imaging characteristics of BPI included traumatic meningocele, displacement of spinal cord, the absence of nerve root, “Black line” sign, nerve root/trunk injury in continuity, and thickening and edema of nerve root. The accuracy of MR imaging for detecting C5, C6, C7, C8, and T1 nerve roots injury were 93.3, 95.2, 92.3, 84, and 74.4%, respectively. The modified PC provides a detailed description of nerve root injury in BPI, and MR imaging technique is a reliable method for detecting nerve root injury [1].

see Upper brachial plexus injury.

see also Bilateral brachial plexus injury.

Etiology

Brachial plexus injury etiology.

Epidemiology

see Brachial plexus injury epidemiology.

Diagnosis

The COVID-19 pandemic and the need for social distancing created challenges for accessing and providing health services. Telemedicine enables prompt evaluation of patients with traumatic brachial plexus injury, even at a distance, without prejudice to the prognosis. A study by Gushikem et al. aimed to verify the validity of a range of motion, muscle strength, sensitivity, and Tinel sign tele-assessment in adults with traumatic brachial plexus injury (TBPI).

A cross-sectional study of twenty-one men and women with TBPI admitted for treatment at a Rehabilitation Hospital Network was conducted. The participants were assessed for range of motion, muscle strength, sensitivity, and Tinel sign at two moments: in-person assessment (IPA) and tele-assessment (TA).

The TA muscle strength tests presented significant and excellent correlations with the IPA (the intra-rater intraclass correlation coefficient, ICC ranged between 0.79 and 1.00 depending on the muscle tested). The agreement between the TA and IPA range of motion tests ranged from substantial to moderate (weighted kappa coefficient of 0.47-0.76 ($p < 0.05$) depending on the joint), and the kappa

coefficient did not indicate a statistically significant agreement in the range of motion tests of supination, wrist flexors, shoulder flexors, and shoulder external rotators. The agreement between the IPA and TA sensitivity tests of all innervations ranged from substantial to almost perfect (weighted kappa coefficient 0.61-0.83, $p < 0.05$) except for the C5 innervation, where the kappa coefficient did not indicate a statistically significant agreement. The IPA versus TA Tinel sign test showed a moderate agreement (weighted kappa coefficient of 0.57, $p < 0.05$).

The present study demonstrated that muscle strength tele-assessment is valid in adults with TBPI and presented a strong agreement for many components of TA range of motion, sensitivity, and Tinel sign tests [2)]

Differential diagnosis

Differentiating preganglionic from postganglionic injuries

Initial exam seeks to differentiate preganglionic injury (proximal to dorsal root ganglion) which cannot be repaired surgically, from postganglionic injuries.

see Clues to preganglionic injury.

see Postganglionic injury.

Treatment

Brachial Plexus Injury Treatment

Outcome

see Brachial plexus injury outcome.

Case series

see Brachial plexus injury case series.

Case reports

A middle age male presented a right total brachial plexus injury after motorcycle accident one year ago. Subsequent electromyographic evaluation was consistent with C5, C6, C7, C8 and T1 root avulsion. The patient was submitted to a right Phrenic nerve transfer to the musculocutaneous nerve , using sural nerve graft [3)].

1)
Yang J, Qin B, Fu G, Li P, Zhu Q, Liu X, Zhu J, Gu L. Modified pathological classification of brachial plexus root injury and its MR imaging characteristics. J Reconstr Microsurg. 2014 Mar;30(3):171-8. doi: 10.1055/s-0033-1357498. Epub 2013 Oct 25. PubMed PMID: 24163228.
2)
Gushikem A, Gomes Costa RR, Lima Cabral AL, Lopes Bomtempo LF, de Mendonça Cardoso M. Validity of range of motion, muscle strength, sensitivity, and Tinel sign tele-assessment in adults with traumatic brachial plexus injury. Acta Neurochir (Wien). 2022 Mar 28. doi: 10.1007/s00701-022-05164-3. Epub ahead of print. PMID: 35348897.
3)

Macêdo LP, Freire Filho JBM, de Souza FHM, Almeida NS, Azevedo-Filho HRC. Transfer of the phrenic nerve to musculocutaneous nerve via sural nerve graft after total brachial plexus injury. Br J Neurosurg. 2021 Jun 26:1-2. doi: 10.1080/02688697.2021.1908518. Epub ahead of print. PMID: 34180321.