High cervical spinal cord injury

High cervical spinal cord injury is associated with high morbidity and mortality. Traditional treatments carry various complications such as infection, pacemaker failure and undesirable movement. Thus, a secure surgical strategy with fewer complications analogous to physiological ventilation is still required.

Wang et al hope to offer one potential method to decrease the complications and improve survival qualities of patients from the aspect of anatomy. The purpose of the study is to provide anatomic details on the accessory nerve and phrenic nerve for neurotization in patients with high spinal cord injuries.

38 cadavers (76 accessory and 76 phrenic nerves) were dissected in the study. The width, length and thickness of each accessory nerve and phrenic nerve above clavicle were measured. The distances from several landmarks on accessory nerve to the origin and the end of the phrenic nerve above clavicle were measured too. Then, the number of motor nerve fibers on different sections of the nerves was calculated using the technique of immunohistochemistry.

The accessory nerves distal to its sternocleidomastoid muscular branches were 1.52 ± 0.32 mm ~1.54 ± 0.29 mm in width, 0.52 ± 0.18 mm ~ 0.56 ± 0.20mm in thickness and 9.52 ± 0.98 cm in length. And the phrenic nerves above clavicle were 1.44 ± 0.23 mm ~ 1.45 ± 0.24 mm in width, 0.47 ± 0.15 mm ~ 0.56 ± 0.25 mm in thickness and 6.48 ± 0.78 cm in length. The distance between the starting point of accessory nerve and phrenic nerve were 3.24 ± 1.17 cm, and the distance between the starting point of accessory nerve and the end of the phrenic nerve above clavicle were 8.72 ± 0.84 cm. The numbers of motor nerve fibers in accessory nerve were 1,038 ± 320~1,102 ± 216, before giving out the sternocleidomastoid muscular branches. The number of motor nerve fibers in the phrenic nerve was 911 ± 321~1,338 ± 467.

The accessory nerve and the phrenic were similar in width, thickness and the number of motor nerve fibers. And the lengths of accessory nerve were long enough for neuritisation with phrenic nerve [1)]

1)
Wang C, Zhang Y, Nicholas T, Wu G, Shi S, Bo Y, Wang X, Zhou X, Yuan W. Neurotization of the phrenic nerve with accessory nerve for high cervical spinal cord injury with respiratory distress: an anatomic study. Turk Neurosurg. 2014;24(4):478-83. doi: 10.5137/1019-5149.JTN.8335-13.1. PubMed PMID: 25050670.