INTRAOPERATIVE NEUROMONITORING FOR THE EARLY DETECTION AND PREVENTION OF RECURRENT LARYNGEAL NERVE TRACTION INJURY IN THYROID SURGERY: A PORCINE MODEL

Wu, Che-Wei[1]; Dionigi, Gianlorenzo[2]; Kim, Hoon Yub[3]; Chiang, Feng-Yu[1]
[1]Department of Otolaryngology- Head and Neck Surgery, Kaohsiung Medical University Hospital, Kaohsiung Medical University, Kaohsiung, Taiwan; [2]Endocrine Surgery Research Center, Department of Surgical Sciences, University of Insubria, Varese, Italy; [3]Department of Surgery, College of Medicine, Korea University, Seoul, South Korea,

Background/Purpose: Medical traction of the thyroid is a necessary component of thyroid surgery. However,this surgical maneuver can cause traction injury of the RLN,and this complication has been reported to be the most common mechanism of nerve injury. Aim of this study was to investigate the EMG signal pattern during an acute RLN traction injury and establish reliable strategies to prevent the injury using IONM.
Methods: Eight piglets(16RLNs) underwent IONM via automated periodic vagal nerve stimulation and had their EMG tracings recorded and correlated with various models of nerve injury(12 nerves for traction,2 for electro-thermal, 1 for clamping, and 1 for transection).
Results: Progressive EMG amplitude decrease(more marked and consistent) combined with a latency increase was observed under RLN traction. A normal EMG gradually returned after the traction was relieved. The mean restored amplitude were 35%(n=4),14%(n=4),and 98%(n=4) under 3 different nerve traction experiments, respectively:1) traction was terminated as soon as loss of signal(LOS);2) traction was continuous applied for 1minute after LOS;and 3) traction was terminated as the amplitude decreased>50%. The EMG recovery became worse after repeated nerve traction and it was restored to 98%,74%,and 49% of the recovery(n=4) after the first, second, and third traction experiment, respectively. Neither progressive EMG loss nor gradual EMG recovery was observed among the electro-thermal, clamping, and transection injury models.
Discussion & Conclusion: RLN traction injury showed graded partial EMG changes and can be detected by IONM. The EMG amplitude decrease is a more sensitive and consistent indicator than the latency increase during RLN traction. Early release of the traction before EMG has degraded to LOS offers a good chance of EMG recovery.