TRACTIONAL INJURY OF RECURRENT LARYNGEAL NERVE: RESULTS OF CONTINUOUS INTRAOPERATIVE NEUROMONITORING(CIONM) IN SWINE MODELS

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Background/Purpose: Recurrent laryngeal nerve(RLN) palsy is the most common complication after thyroiod surgery. However, little is known about the biomechanical properties of RLN and limits of stretching. The aim of this study is toevaluate the tractional injuries of RLN using a swine model via continuous IONM.

Methods: Thirteen living orally intubated pigs underwent tractional injury to the RLNs. During stretching of the RLN, continuous IONM were performed using NIM 3.0 response system. Follow-up examinations were carried out for 7 days and fresh swine RLNs were harvested. All nerves were stretched to failure in an MTS materials testing machine at a rate of 1 cm/min (strain rate of 0.5%/s). Load deformation and stress-strain curves were determined. Histological examination by scanning electron microscopy of nerves was performed.

Results: The average intraoperative tractional force at the time of loss of signals(LOS) in continuous IONM was 3.5N (range 2-6N). At postoperative day 7, we observed normal electromyography of RLNs using continuous IONM in all swines. After harvesting of RLNs, stress-strain curves were determined. The ultimate strain and tensile strength of the RLNs were 21.5% and 6.6MPa, respectively. The swine RLNs have an in situ strain of less than 15%. And, histological analysis by scanning electron microscopy showed no abnormal structural findings in nerves which are strained by less than 15%. We could find that the reversible tractional injury might not induce the structural damage of the swine RLNs.

Discussion & Conclusion: Tractional injury of RLNs caused by force of over 3.5N or strain of over 15% in swine models.