

SUNDAY ASPN/ASRM PAPERS

10:00 AM - 10:04 AM

RM304 Correlation of the Axonal Capacity with the Microscopic Diameter of Relevant Facial Nerve Branches for Facial Reanimation in 788 Specimens: A Microscopic and Histologic Study

University Hospital Regensburg, Regensburg

Presenter: **Marc Ruewe, Medical Student**

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Background

Peripheral facial palsy causes severe functional, aesthetic and psychological impairments. Restoration of function and facial expressions is possible through cross-face-nerve-grafts (CFNG) and functional muscle transplantation. Various criteria must be taken into account to choose the right donor nerve for coaptation. Previous studies have shown that an axon capacity exceeding 900 axons is correlated with strong functional results. The aim of our study is to correlate axon numbers with the diameter of zygomatic and buccal facial nerve branches to facilitate donor nerve selection.

Methods

Antegrade microsurgical dissection was performed on 106 hemifaces of fresh unpreserved cadavers. Nerve biopsies were taken in clinically important donor nerve regions of the zygomatic and buccal system. Level I and level II branches were classified as relevant for CFNG coaptation. Nerves were PPD-fixed, sectioned, and stained for digital semi-automated axon quantification. Cross sections were measured by two orthogonal vectors using Zeiss AxioVision software which was first calibrated with a micrometer scale. Nerves in situ were presumed to be round. The measurement included nerve sheath structures and perineurium comparable to a clinical setting.

Results

A total number of 788 branches were evaluated. Quality standards for semi-automated axon analysis and diameter measurement were met by 495 specimens. A diameter of one millimeter correlated with 1834 ± 693 axons ($n= 68$; $r= 0.66$; $p= 0.0001$) in major zygomatic branches and for major buccal branches 1851 ± 913 axons ($n= 58$; $r= 0.37$; $p= 0.004$). In downstream zygomatic branches 1067 ± 531 axons / mm ($n= 161$; $r= 0.61$; $p= 0.0001$) could be found. Downstream buccal branches showed 1208 ± 530 axons / mm ($n= 208$; $r= 0.58$; $p= 0.0001$). Axonal density in the buccal system was consequently higher than in the zygomatic system ($p= 0.006$). Overall axon density decreased from the facial main trunk to the periphery.

Conclusion

In order to achieve a cut-off value of greater than 900 axons, the donor nerve branch in the zygomatic system is required to have a diameter of a minimum of 0.84 mm, and the buccal branches are required to have a diameter of a minimum of 0.74 mm.

10:04 AM - 10:08 AM

RM305 Achieving Favorable Outcomes in Functioning Free Muscle Transplantation Innervated By Cross Face Nerve Grafts for Smile Reanimation: A Multivariate Regression Analysis of Preoperative Factors

Chang Gung Memorial Hospital, Linkou

Presenter: **Johnny Chuieng - Yi Lu, M.D.**

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Background

Cross face nerve graft (CFNG) has traditionally been the choice of donor nerve to innervate functioning free muscle transplantation (FFMT). It offers a more natural, spontaneous smile at a minimal cost of donor site morbidity, but restores adequate symmetric excursion at a slower, more unpredictable, time point. This study aims to investigate critical factors that can predict favorable outcomes when using CFNG.

Methods

We performed a retrospective analysis of 43 patients from years 2008 to 2014 who received the two staged CFNG-innervated FFMT. At least 2 years of postoperative follow up was required for inclusion to this study. Patient outcomes were measured using the SMILE evaluation method developed by Hadlock et al. Predictive factors included age, gender, etiology, presence of synkinesis, side of paralysis, onset of paralysis before the first stage, and time between the two stages of FFMT. Univariate analysis of the variables was analyzed by nonparametric Wilcoxon Rank Sum tests and Kruskal-Wallis H tests. Multivariate Linear regression using forced entry method was performed to evaluate the variance of the overall model and the relative potency of each variable.

Results

At an average follow up period of 33 months, the range of excursion ranged from 0.642 to 20.74, with a mean of 10.84. Univariate analysis showed that patients older than 40 years old ($p < 0.001$), male ($p = 0.012$), and an etiology other than Bell's palsy ($p = 0.008$) had significantly higher excursion. In addition, patients with a longer follow up time more than 2 years also had higher correlation with stronger excursion. The linear regression model for multivariate analysis was significant overall (F 4.787, $p = 0.001$) with R^2 of 0.489, and age (standardized beta coefficient 0.379) and gender (standardized beta coefficient 0.308) were the two primary predictors for more favorable outcome.

Conclusion

Donor nerves such as the masseter motor nerve has gradually become the popular choice among surgeons to achieve strong consistent excursion. However, its morbidities in inducing involuntary muscle contractions during mastication can be debilitating and should not be overlooked. CFNG still offers the most spontaneous smile with natural symmetric appearance in young patients that can cooperate with rehabilitation over the long term. With careful selection of patients preoperatively, CFNG can remain a suitable neurotizer for FFMT in smile reanimation.

10:08 AM - 10:12 AM

RM306 Functional Outcome in Common Peroneal Nerve (CPN) Injury Using Neurolysis/ Primarily Nerve Repair / Nerve Graft, a Comprehensive Single Center 28 Years' Experience

Chang Gung Memorial Hospital, Taipei

Presenter: **Arash Izadpanah, MD, FRCSC**

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Background: Foot drop is a devastating deformity in patient with common peroneal nerve (CPN) injury. The standard surgical treatments are categorized into three main categories, nerve related operations, tendon transfers and free functioning muscle transplantation. The results of Nerve operations (neurolysis, nerve repair or graft) remain controversial. We presented our experience in CPN injury, employing neurolysis, nerve repair, and nerve graft in a single institution.

Methods: Between 1988 and 2016 (28-year period) 38 patients with CPN injury received either neurolysis, primarily nerve repair, or nerve graft. The hospital records were reviewed retrospectively and independently by two authors, and patients were called for a final assessment including range of motion (ROM), passive and active, and muscle strength powers of ankle and toes.

Results: In this cohort, 27 (71%) of all patients, irrespective of type of nerve operation, obtain good to excellent outcomes at their time of their last examination. 100% of patients with neurolysis or primary nerve repair achieved excellent outcomes. 73.4% of patients requiring nerve grafts shorter than 6 cm for CPN injury had good to excellent results compared to 25% in those with grafts longer than 6 cm.

Conclusion: CPN injury surgery is often associated with underwhelming surgical outcomes in printed literature, especially those undergoing nerve related operations. However, with appropriate patient selection and meticulous surgical techniques one could expect good to excellent functional outcomes in such patient population.