

## Comparative Study In The Treatment Of Nerve Defects Using Muscle Stuffed Vein Versus Commercial Neurotube® In An Athymic Rat Model

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### INTRODUCTION:

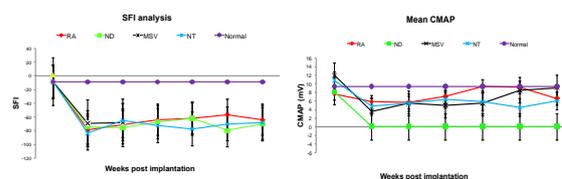
Peripheral nerve injury with nerve defects remains a challenge for clinicians. The gold standard utilizes autologous nerve grafts to bridge the defect but has donor site morbidities and unpredictable outcome. The search for the perfect neural tube continues as understanding of nerve regeneration improves. We intend to compare the clinical outcome between tissue engineered biological nerve tube construct made of a vein filled with skeletal muscle with the commercially available absorbable polyglycolic acid woven mesh tube.

### MATERIALS & METHODS:

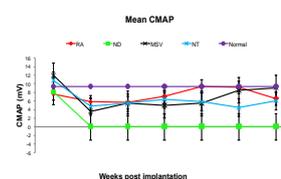
This is a single centre prospective study conducted in Universiti Kebangsaan Malaysia. There are 4 groups each consisting of 3 adult athymic rats: nerve defect (ND), reverse autograft (RA), absorbable polyglycolic acid mesh tube (NT), and muscle stuffed vein (MSV). A 15mm defect was surgically created in the right sciatic nerve. Gait analysis, pinch test and nerve conduction study (NCS) were performed at 2 weekly intervals until 12 weeks.

### RESULTS:

Gait was analyzed with sciatic function index (SFI). The MSV group suffered from autotomy of the toes of the operated limb at 5 weeks. All the rats had obvious calf muscle wasting and clawing of toes. Sensory recovery was noted via a positive pinch test by postoperative 10 weeks. Mean amplitude and latency values were assessed from NCS. By 12 weeks RA group regained the normal values, where as MSV group achieved 75% and NT group 70% of the baseline reading. Overall there was no significant difference between all the groups in SFI, pinch and NCS values.



**Figure 1:** The mean SFI results predict the functional recovery.



**Figure 2:** Mean compound muscle action potential (CMAP) measured from NCS.

At 12 weeks the rats were euthanized and sciatic nerve harvested. The MSV graft was well incorporated and of similar diameter as the sciatic nerve. The NT was in continuity and was of similar appearance to muscle.

### DISCUSSION:

The conduits available are all comparable to the gold standard autologous nerve graft. This study specifically focuses on the effectiveness of NT and MSV using athymic rats in a consistent nerve gap. Other studies comparing NT and MSV had similar results but all had variable nerve gaps. Battiston et al compared Neurotube® with vein-muscle grafts in patients with nerve repair, the Neurotube group had greater gaps. No difference in sensory recovery was seen. Rinker et al, in a similar study, reported equal outcome of NT and vein conduits in nerve gaps 4 to 25mm. Previous individual studies of MSV and NT has reported favourable outcomes. We evaluated clinical outcome of MSV and NT in a controlled environment. The results are comparable to the previous studies.

### CONCLUSION:

NT and MSV are good alternatives to the autologous nerve grafts. MSV is a cheaper alternative to NT.

### REFERENCES:

1. Battiston B et al. *Microsurgery* 2005;25(4):258-67.
2. Sabongi et al. *Neural Regen Res.* 2015;10(4):529-533
3. Rinker et al. *J Hand Surg Am.* 2011;36(5):775-81