Morbidity following a modified sural nerve harvesting procedure in pediatric patients

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Introduction

Nerve grafts are used for the reconstruction of peripheral nerve defects (both congenital and traumatic) when primary coaptation of the damaged ends cannot be achieved due to insufficient length⁴. The sural nerve is commonly used for this purpose because it is a purely sensory nerve innervating the lateral foot. Therefore, its harvest is thought to result in minimal morbidity, justifying its use for the reconstruction of more impactful motor and sensory deficits⁵.⁶ While sural nerve harvest is common for reconstruction of peripheral nerve injuries, there is a tremendous paucity of literature in both adult and pediatric populations. Only one study describes sensory deficits following this procedure in children¹. All patients in this study underwent bilateral sural nerve harvest in the neonatal period for the reconstruction of obstetrical brachial plexus palsy. Therefore, this study may not accurately describe the sensory deficits expected following unilateral harvest in older children. Therefore, it’s important to investigate outcomes in older children with unilateral sural nerve harvest in order to better inform patients of the expected outcome.

Objectives

To provide the first analysis of sensory outcomes following sural nerve harvest in older children using a modified technique of unilateral sural nerve harvest.

Methods

A cross-sectional study was conducted on pediatric patients older than six years of age who had undergone unilateral sural nerve harvest. Patients were recruited during routine clinic visits at a minimum follow-up of six months. Patients with any cognitive or developmental delay were excluded. Sensory threshold testing was conducted on four standardized locations in the sural nerve distribution of both feet using Semmes Weinstein monofilaments. The questionnaire revealed that only two patients expressed concerns about foot functionality, both in relation to physical activity, and no patients reported pain in their feet.

Surgical Technique

The sural nerve is known to arise from both medial and lateral sural cutaneous components, which then become confluent as the sural nerve travels down the posterior leg (A). Dissection begins in the popliteal fossa and the tibial contribution to the sural nerve is isolated (B). Delivery of the graft material is made with a counter incision in the lower calf (C). This is in contrast to traditional techniques in which the dissection begins distally and proceeds proximally, harvesting the entire sural nerve.

Results

Fifteen patients were included in the study. Mean age at operation was 10.7±4.2 years with a mean follow up time of 1.8±1.4 years. Sensory thresholds were restricted to the two most sensitive Semmes Weinstein monofilaments in the control group, indicating no sensory deficit. In contrast, after sural nerve harvest, 25% of all locations tested demonstrated abnormal sensation. Significant sensory deficits were found at all four locations in the sural nerve distribution (p<0.05). The questionnaire revealed that only two patients expressed concerns about foot functionality, both in relation to physical activity, and no patients reported pain in their feet.

Discussion

Comparison of our technique to previous pediatric studies is not possible due to the much younger age of patients in traditional techniques of sural nerve harvest would require age-matched controls, owing to the much younger age of patients in previous pediatric studies.

Future Work

This study is limited largely by its cross-sectional nature and by its small sample size. Therefore, larger prospective studies in the future will help to validate these findings. Future comparison studies against traditional techniques may also prove useful to microvascular surgeons.

References


Table 1: Patient Demographics

Table 2: Sensory Testing

Table 3: Sensory Distribution by Site

Note: SW score >2.0 is abnormal

Figure 1. Semmes-Weinstein Monofilament testing. Points are marked along a line drawn horizontally at the midpoint between the lateral malleolus and the sole of the foot.

Figure 2. Sample of the functional sensory and pain questionnaire. The questionnaire encompasses three main domains: sensory (pain, cold), ambulation, and appearance.

Figure 1. Semmes-Weinstein Monofilament testing. Points are marked along a line drawn horizontally at the midpoint between the lateral malleolus and the sole of the foot.

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