



Clinical Outcome for Surgical Treatment of Traumatic Neuroma with a Processed Nerve Allograft: Results of a Small Prospective Case Series

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Introduction

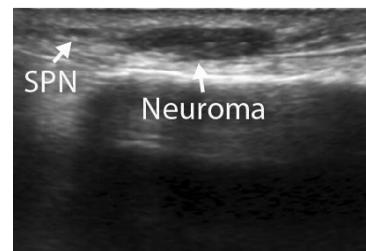
The surgical treatment of traumatic neuromas remains an important clinical problem in peripheral nerve surgery. Excision of the neuroma may provide pain relief, but symptoms often recur. The best surgical treatment is to reconnect the severed nerve ends after excision of the neuroma. In large motor nerves an autograft can be used for this purpose, however in small sensory nerves this would mean that one sensory nerve has to be sacrificed to reconstruct the other. An alternative is to use a processed nerve allograft. The goal of the present study was to evaluate the recovery of pain and sensation after surgical reconstruction of painful traumatic neuromas in the lower extremity using an allograft.

Methods

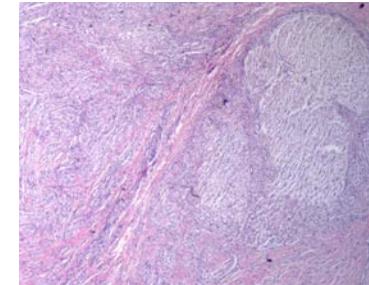
Four patients with a traumatic painful neuroma of a small sensory nerve in the lower extremity were surgically treated with a decellularized allograft (Axogen). Nerves repaired concerned the superficial peroneal nerve (SPN) (n=3) and the sural nerve (n=1). Characteristics of the patients are presented in the table below.

Pt. No.	Age (years)	Gender	Mechanism of injury	Preoperative Ultrasound	Tinel Sign	Affected nerve	Preoperative interval (days)
1	19	m	Autograft harvest	+	+	Sural nerve	393
2	21	m	Scooter accident	+	+	Superficial peroneal nerve	425
3	42	f	Open biopsy peroneal nerve	+	+	Superficial peroneal nerve	0
4	50	m	Plate osteosynthesis	+	+	Superficial peroneal nerve	191

Ultrasound imaging was performed in all patients (see Figure on the right) to measure the size of the neuroma, the diameter of the affected nerve and the distance between the nerve ends in order to determine the required dimensions of the allograft prior to surgery.

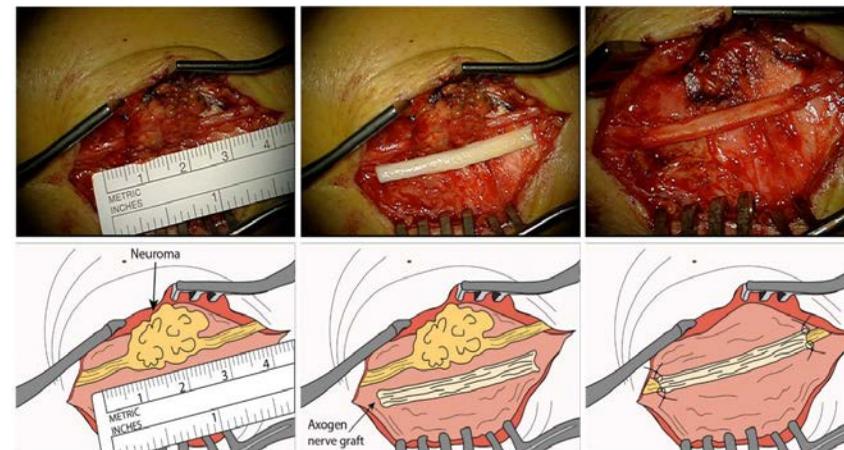


Patients were followed prospectively for at least one year. Diagnosis of a traumatic neuroma was confirmed with histopathologic analysis of transversal sections stained with H&E (see Figure on the right). Clinical outcome was assessed using the Likert scale. Recovery of sensation was tested using Semmes-Weinstein monofilaments.



Results

Neuromas were intraoperatively identified. One case concerned a neuroma-in-continuity (NIC) and three cases an end-neuroma. In all four cases a 3 mm diameter allograft was used to reconstruct a defect in the superficial peroneal (n=3) or sural nerve (n=1) after excision of the neuroma (see Figure below). The length of the allograft ranged from 30 mm (n=3) to 35 mm (n=1) (see Table on the right).



Pt. No.	Neuroma type	Allograft diameter (mm)	Allograft length (mm)	Follow-up (months)	Postoperative Likert	Postoperative Tinel sign	Semmes Weinstein Monofilament Test
1	End	3	30	12	4	+	5.18
2	End	3	30	18	4	+	4.56
3	End	3	30	12	1	-	3.61
4	NIC	3	35	12	1	-	3.61

Complete relief of pain symptoms (Likert 1) was achieved in two patients: both cases concerned the reconstruction of a neuroma with an interval of less than one year between injury and reconstruction (0 and 191 days). In the other two patients the interval between injury and reconstruction was longer than one year (393 and 425 days). Recovery of sensation using the Semmes-Weinstein monofilaments was only achieved in the two patients with good clinical outcome. No substantial sensory recovery was found in the other two patients.

Conclusions

The results of this small prospective case series demonstrate that processed nerve allograft can be an effective surgical treatment for the reconstruction of small sensory nerves after excision of the neuroma, in terms of pain relief and recovery of sensation, if the interval between injury and reconstruction is less than 1 year. For patients with an interval of more than one year after injury no recovery of pain symptoms and protective sensation was found. Since each repair strategy has its own advantages and disadvantages, careful consideration of each individual neuroma should be executed in order to find a directed surgical strategy. The findings from this study, combined with the feasibility of this approach, demonstrate that processed nerve allografts hold promise for the treatment of sensory nerve neuromas.

Disclosure

There is no actual or potential conflict of interest in relation to this poster presentation.