Peripheral Nerve

Carpal and ulnar tunnel surgeries commonly result in favorable outcomes and high patient satisfaction. Nonetheless, 1%–31% of patients report persistent or recurrent carpal or ulnar tunnel syndrome due to perineural fibrosis. Various treatment options exist for recurrent compression neuropathies, including repeat decompression, neurolysis and tenosynovectomy, hypothenar fat pad flaps, and nerve wraps. Revision procedures continue to be a difficult prospect because access to the nerve is complicated by dense fibrous scar tissue.

Nerve wraps are bioabsorbable materials made of autologous tissue or collagen that supply a noncompressive encasement to a previously injured or compressed nerve. They are placed at the interface between a nerve and adjacent tissue. The nerve wrap’s wall contains a central slit that facilitates placement around the injured nerve. Once hydrated, it morphs into a soft, nonfriable, and maneuverable wrap that vascularizes and subsequently remodels into the patient’s tissue. This new tissue minimizes the potential for soft tissue attachment and enables nerve gliding.

**CASE REPORT**

A 41-year-old, right-hand-dominant woman experienced repeated bouts of carpal and ulnar tunnel syndromes, which were treated with a small intestine submucosa matrix wrap around the median and ulnar nerves in the wrist. Here, we report a case of necrotic granulomatous inflammation 2.5 months after AxoGuard xenograft nerve wrap was placed around the median and ulnar nerves. As a salvage, NuShield placental allograft was wrapped around the median nerve, which has shown promising results at several months follow-up. Placental allograft nerve wraps represent a useful tool in compression neuropathy resistant to autografts, xenografts, and revision decompression operations.

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performed during removal of this inflamed hypertrophic tissue. The dense inflamed portions of tissue were consistent in size and shape with the previously placed nerve protector wraps (Fig. 3). Histological specimens from median and ulnar nerves demonstrated necrotic granulomatous inflammation with giant cells (Fig. 4).

There was a small area of median nerve fascicle disruption that was repaired. Because the epineurium surrounding the median nerve was involved in the significant area of inflammation and dense tissue, it was necessary to protect the nerve fascicles with additional wrap. Use of autologous vein or a hypothenar fat flap for wrapping the nerve if needed was discussed, but the patient did not want any additional incisions for flap harvest. Additionally, coverage was needed proximal to the wrist crease, and neither of the flap options would provide that. An allograft was selected to help reduce the risk of postoperative neuroma formation because the patient had a poor response to the AxoGuard nerve protector. NuShield human placental allograft was used on the median nerve at the area of excision of the inflamed connective tissue. Upon further inspection of the ulnar nerve in the hand and wrist, there was no evidence of fascicular or epineural injury; therefore, no wrapping of the ulnar nerve was performed at this level.

Postoperatively, she showed improved range of motion of the left hand and continued paresthesias of the ring finger but otherwise improved at follow-up after 6 months. Longer-term results are pending.

**DISCUSSION**

Nerve wraps can be harvested from an autologous vein but have also been bioengineered from materials such as
type I collagen, polyvinyl alcohol, and porcine intestinal submucosa, which are now clinically licensed. However, there is a lack of comparative data for functional outcomes and complication profiles between different nerve wrap types. Here, we aimed to describe a case of epineural inflammation following AxoGuard small intestinal submucosa placement around the median and ulnar nerves for recurrent compression neuropathy.

Autograft wraps using the great saphenous vein have been extensively studied for revision compression neuropathy and showed promising results in human and animal studies. The vein’s biological compatibility facilitates a smooth gliding surface while simultaneously decreasing inflammatory responses and local fibrosis. This raised caution for use of allografts as nerve wraps, but the two studies investigating their use reported subjective and objective improvement without the need for subsequent revision procedures.

CONCLUSIONS

This case report explored the use of a xenograft nerve wrap in treatment of revision compression neuropathy, which resulted in an unfavorable outcome. As a salvage to reduce postoperative pain, amnion-based wraps were found to mitigate the complication and could provide superior results when compared with those achieved using xenograft-based nerve wraps. The available literature is largely case series or reports, which exemplifies the need for well-designed analytical studies to determine the optimal barrier method for revision compression neuropathy.

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