

Clinical Experience with AxoGuard® Nerve Protector used to Protect an Injured Radial Nerve

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Introduction

Peripheral nerve compression injuries affect hundreds of thousands of patients each year in the United States alone. These injuries can be treated with decompression and have been shown to benefit from protective wrapping of the injured nerve to reduce the risk of scar tissue attachment^{1,2}.

AxoGuard® Nerve Protector is an off-the-shelf option used to wrap and protect injured peripheral nerves while minimizing the risk of soft tissue attachments (Figure 1). AxoGuard® Nerve Protector is composed of a multilaminar extracellular matrix which is revascularized and gradually remodeled into the patient's own tissue. In this case, it is used as a protective material around the radial nerve after decompression and neurolysis.

Case Description

The patient was a 65-year old female who had undergone radial head replacement 8 weeks prior. The patient presented with severe pain, swelling and paralysis. Nerve conduction studies and EMG were positive for compression median neuropathy and complete block of conduction of the radial nerve distal to the spiral groove. She was preoperatively treated for complex regional pain syndrome (CRPS); however there remained persistent severe deficiency of radial nerve function. The patient elected to undergo surgery to allow exploration of the affected area.

Note that the following is only an example of a surgical technique for treatment of a nerve injury. The methods described here may be adapted by the surgeon to fit the specific case being treated.

Surgical Method

Nerve Exposure and Assessment

1. The procedure was performed with the patient under tourniquet and general anesthesia. A Lazy S incision was made along the volar elbow from the distal biceps-brachioradialis interval to the proximal forearm. Careful dissection allowed for identification of the radial nerve trunk between the biceps and brachioradialis.
2. Gentle soft tissue dissection allowed for identification of the radial nerve in the area anterior to the radiocapitellar joint where, due to dense surrounding scar tissue, the distal area of the radial nerve trunk was thickened and more swollen than the proximal area (Figure 2). External neurolysis was performed to remove the scar tissue.
3. Bifurcation of the radial sensory nerve and deep posterior interosseous nerves were neurolysed in the same fashion as the radial nerve trunk (Figure 3).
4. The wound was covered with a moist dressing and the tourniquet was released for 20 minutes to allow for tissue re-perfusion. The extremity was then exsanguinated and the tourniquet was inflated again.
5. Meticulous blunt and sharp dissection of dense scar and bony tissue was done to expose the anterior aspect of the nerve and free it from its posterior adherence to the radius bone.
6. Once the main radial nerve trunk and all its branches were released and neurolysed, an external epineurotomy was performed. Nerve fibers were observed to be in continuity.

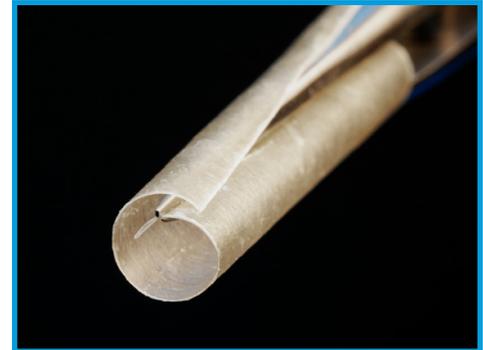


Figure 1: AxoGuard® Nerve Protector is the only porcine submucosa extra-cellular matrix product used to wrap injured nerves.

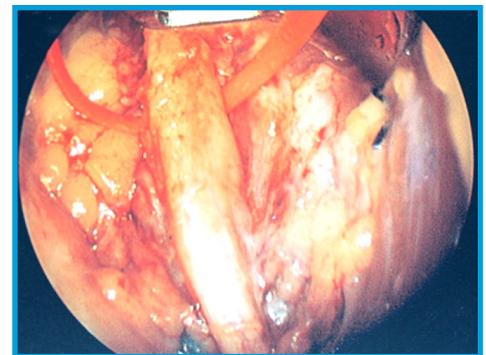


Figure 2: The radial nerve close to the injury zone.

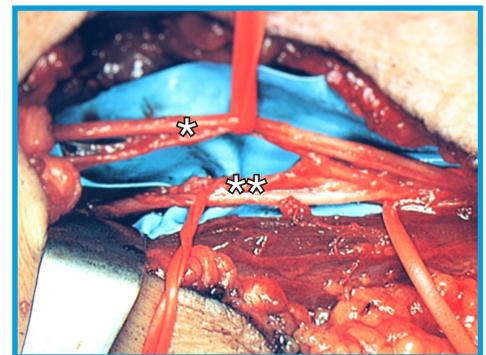


Figure 3: Radial sensory nerve (*) and deep posterior interosseous nerve (**) after neurolysis.

Preparation of AxoGuard® Nerve Protectors

- The appropriate size AxoGuard® Nerve Protectors were selected based on the diameters of the radial nerve trunk, sensory branch and posterior interosseous nerve so as not to constrict or compress the nerve following wrapping. An AxoGuard® Nerve Protector of 10 mm diameter was selected for the radial nerve trunk. Two AxoGuard® Nerve Protectors of 7 mm diameter were selected for wrapping of the sensory branch of the radial nerve and the posterior interosseous nerve.
- The wraps were briefly hydrated in the pre-molded hydration reservoir of the packaging tray in sterile saline just prior to implantation.

Implantation of AxoGuard® Nerve Protectors

- Individual AxoGuard® Nerve Protectors were placed around the radial nerve trunk, sensory branch and posterior interosseous nerve to minimize the risk of nerve re-entrapment in each of these areas by providing a protective barrier which allows the nerve to glide.
- The AxoGuard® Nerve Protectors were folded over the nerve and sutured to themselves then sutured to the fascia to keep the wrap in place (Figure 4).
- Upon completion of the procedure, the tourniquet was released, hemostasis was achieved, the wound was thoroughly irrigated and the incision was closed.



Figure 4: AxoGuard® Nerve Protectors providing a protective barrier.

Results and Conclusion

AxoGuard® Nerve Protector is an off-the-shelf option used to wrap and protect injured peripheral nerves while preventing soft tissue attachments. When hydrated, the AxoGuard® Protectors were easily positioned, conformed to the nerve and sutured into place. On follow up, the wound had healed with no signs of irritation or rejection. At 6 days post-op, the patient reported 90% improvement from pre-operative pain at rest as well as with motion and was able to rotate forearm and move elbow without signs of pain. At 5 weeks post-op, the patient reported complete pain resolution and was able to return to work. At 3 months post-op, the patient presents with excellent motor function of radial nerve and is able to extend her fingers and wrist. At this point, outcome of the radial nerve surgery is excellent with complete resolution of pain and CRPS as well as excellent recovery of motor nerve function.

References

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- Kokkalis, Pu, Small, et al. Assessment of Processed Porcine Extracellular Matrix as a Protective Barrier in a Rabbit Nerve Wrap Model. *J Reconstr Microsurg.* 2011; 27(1):19-28.

For additional information on

AXO GUARD®
Nerve Protector

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