

Avance® Nerve Graft and AxoGuard® Nerve Protector Allow for a Customized Peripheral Nerve Repair.

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Introduction

Peripheral nerve injury affects hundreds of thousands of patients every year in the United States alone. The extent of the trauma and the location of the nerve injury may create disparity in the transected nerve ends. Avance® Nerve Graft and AxoGuard® Nerve Protector provide surgeons with off-the-shelf options to effectively repair complex nerve injuries.

Avance® Nerve Graft is a decellularized and cleansed extracellular matrix scaffold processed from donated human peripheral nerve (Figure 1). Similar to autografts, Avance® Nerve Graft provides the surgeon with desired handling and structural characteristics: pliability of soft tissue, an epineurium to suture the graft in place, and intact endoneurial tubes for the axons to grow through. AxoGuard® Nerve Protector is a multilaminar extracellular matrix that separates and protects the nerve from the surrounding tissue during the healing process (Figure 2).

Case Description

In this case, Avance® Nerve Graft and AxoGuard® Nerve Protector were used in reconstruction of the median nerve. The patient, who had previously suffered a laceration to his right forearm, was a 19-year old male with a Sunderland Grade 6 injury (crushed, avulsed, and transected) of the median nerve. He presented with numbness in the median nerve distribution with some weak residual thenar muscle function consistent with a near complete transection of the nerve.

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 original laceration site was extended proximally and distally. The area was dissected and the median nerve was exposed revealing a partial transection of the median nerve. It was observed that greater than 80% of the nerve was transected.
2. Neurolysis was performed under microscope to remove the scar and damaged tissue, exposing healthy, viable nerve. After exposure, it was observed that three small fascicles were partially transected and two large fascicles were completely transected leading to gaps of 20 mm each (Figure 3).
3. The partial fascicular injuries were repaired with two 8-0 nylon perineural sutures.
4. The completely transected nerve fascicles were resected back to healthy tissue resulting in 20 mm defects in each.



Figure 1: Avance® Nerve Graft provides the surgeon with desired handling and structural characteristics that are similar to an autograft nerve.



Figure 2: AxoGuard® Nerve Protector easily conforms to and wraps the injured nerve minimizing the potential for soft tissue attachments by physically isolating the nerve.



Figure 3: Partially transected fascicles and completely transected fascicles after scar tissue resection.

Preparation and Implantation of AxoGuard® Nerve Protector

- The appropriate size AxoGuard® Nerve Protector was selected based on the diameter of the fascicles and the length of the affected area. A protector wrap of 3.5 mm diameter and 20 mm length was selected so as not to constrict or compress the fascicles.
- AxoGuard® Nerve Protector was prepared by first peeling open the Tyvek® pouch and passing the tray into the sterile field. The product was trimmed to the appropriate length and hydrated in the pre-molded hydration reservoir of the packaging tray. Product was hydrated just prior to implantation in sterile saline to best suit the surgeon handling preference.
- The hydrated wrap was then carefully placed around the group of small partially transected fascicles and secured to itself with interrupted 8-0 nylon sutures.

Preparation and Implantation of Avance® Nerve Graft

- An Avance® Nerve Graft of 2-3 mm diameter and 50 mm length was selected based on the diameter of the transected fascicles and length of deficit.
- The product was removed from the outer packaging and the inner Tyvek® pouch was passed into the sterile field. In the sterile field, the product tray was removed from the inner Tyvek® pouch.
- Sterile room temperature saline was added to the thawing reservoir of the product tray and the allograft was thawed according to the manufacturer's instructions for use.
- The 50 mm Avance® Nerve Graft was carefully transected to produce two processed nerve allograft segments. These were then interpositioned into the fascicular gaps and sutured in place using 8-0 nylon sutures to create a tensionless repair (Figures 4, 5 and 6).
- Upon completion of the procedure, hemostasis was achieved and the incision was closed. Extension beyond neutral was avoided during post-operative therapy.

Results and Conclusion

Avance® Nerve Graft and AxoGuard® Nerve Protector allowed for reconstruction of the complex nerve injury. Being of human tissue origin, Avance® Nerve Graft handled similarly to the native nerve and was easily sutured into place. The graft closely approximated the size of the injured nerve and was easily incorporated into the repair. Repair of individual fascicular groups with appropriately sized processed nerve allograft decreases the potential for fascicular misalignment. AxoGuard® Nerve Protector was flexible, pliable, and easily conformed to the nerve.

At one year the subject is progressing well and is showing return of near normal dexterity with abduction and opposition of the thumb (4+/5 strength per the Medical Research Council grading scale). Follow-up assessment found return of grip strength equivalent to the contralateral hand and resolution of pain through the median nerve distribution. Semmes-Weinstein Monofilament testing revealed return of diminished light touch.

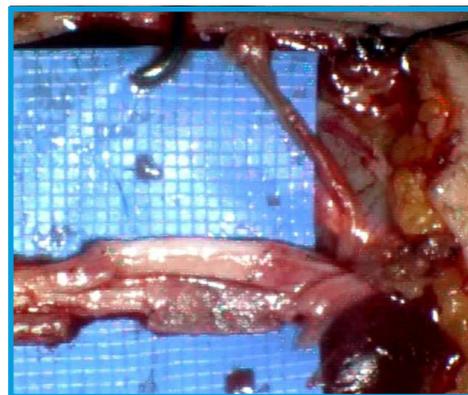


Figure 4: Repair of one fascicular gap using Avance® Nerve Graft and wrapped fascicles using AxoGuard® Nerve Protector.

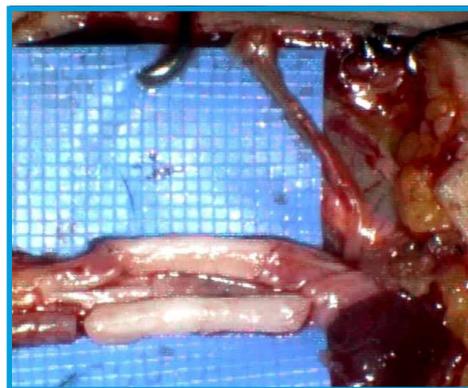


Figure 5: Interposition of Avance® Nerve Graft into second fascicular gap.

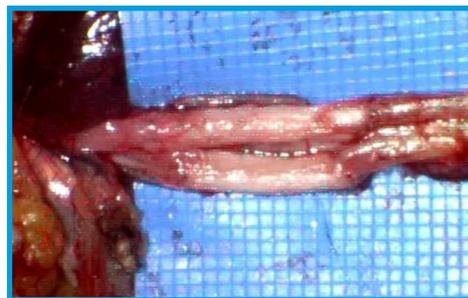


Figure 6: Completed implantation of Avance® Nerve Graft.

For additional information on



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