

Clinical Experience with Avance® Nerve Graft a Processed Human Nerve Allograft, for the Revision of Prior Nerve Reconstructions in the Hand.

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Introduction

Peripheral nerve injury affects over 300,000 patients per year in the United States alone¹. Historically, surgeons seeking an off-the-shelf option for nerve repair have used hollow tube conduits comprised of synthetics or cross-linked collagen. However, these conduits only provide gross guidance through the formation of a thin fibrin cable. As the gap length to bridge increases, so do failure and revision rates²⁻⁴.

Avance® Nerve Graft, an allograft tissue, offers an off-the-shelf option for nerve reconstruction as well as for revising prior nerve reconstructions in the hand (Figure 1).

In this case, Avance® is used for a revision of prior digital nerve reconstructions. The patient, a 30 year old construction worker, sustained a table saw injury to the left hand with vascular, tendon and nerve involvement. The vascular and tendon injuries were repaired using standard techniques. The segmental defects in the common digital nerves of the ring, middle and index fingers were less than 20mm in length. These defects were repaired using collagen tube conduits with a standard entubulation technique. The patient was followed for 10 months with no measureable recovery of sensation and limited progression of Tinel's sign.

Note that the following is only an example of a surgical technique for revision of a digital nerve injury reconstruction. 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 previously damaged nerve segment was exposed under an operative microscope. The presence of neuromas and thin tissue connections were observed in the common digital nerves leading to the ring, middle and index fingers which had previously been repaired with nerve conduits (Figure 2). The nerve was dissected so that the nerve stumps could be clearly identified and easily visualized.
2. The nerve branches were isolated and neurolysis performed to explore for intact fascicles. The neuromas required complete resection to identify healthy nerve tissue (Figure 3).
3. Each nerve stump was then visualized and trimmed to viable tissue. This resulted in approximately 30mm segmental nerve gaps in each of the injured nerves.
4. The freshened nerve ends were measured to determine the appropriate diameter of Avance® Nerve Grafts to reconstruct the segmental deficits. Nerve grafts either 1-2 or 2-3 mm in diameter and 30mm in length were selected for tensionless repair.

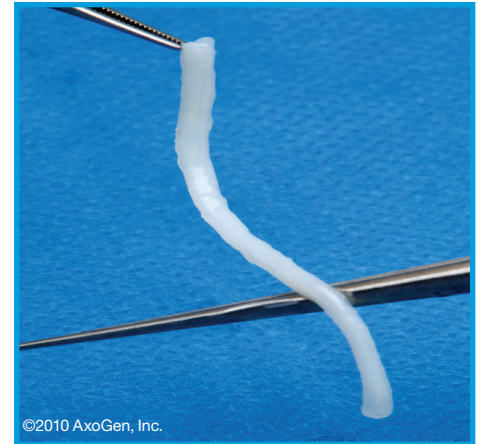


Figure 1: Avance® Nerve Graft. Avance® provides the surgeon with desired handling and structural characteristics that are similar to an autograft nerve.



Figure 2: Nerve exposure after repair with collagen conduits. Upon exposure of digital nerves, multiple neuromas and thin tissue connections were observed.

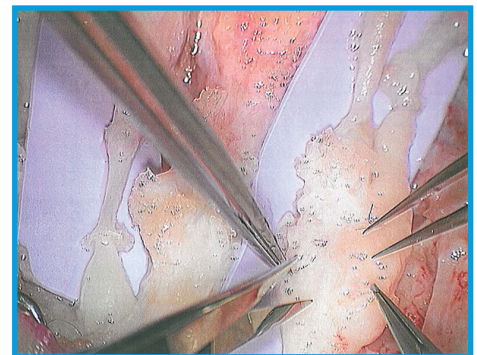


Figure 3: Dissection of Neuromas. The neuromas required complete resection to expose healthy nerve tissue.

Preparation of Avance®

- 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 rehydration reservoir of the product tray, and Avance® was thawed for 5-10 minutes according to the manufacturer's instructions for use (Figure 4).

Implantation of Avance®

- Allografts were trimmed to length. The product was inter-positioned into each of the nerve gaps, and repairs were performed using epineurial 8-0 Nylon microsutures.

Outcome

Avance® is an allograft tissue that provides an off-the-shelf option for bridging nerve gaps. It is decellularized and cleansed to preserve the tissue's extracellular matrix so that it provides scaffolding to support the body's own regeneration process. The graft provides nerve tissue for reconstruction without the need for an autologous donor nerve and the associated donor site morbidity. Avance® allows the ability to select the appropriate size nerve graft to more readily match the native nerve. Handling characteristics in this case were excellent, and the wound healed with no signs of irritation or infection. At one year the subject is progressing well with complete resolution of pain and recovery of static 2-point discrimination of 8mm at the level of the PIP.

References

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- Lohmeyer J, Zimmerman S, Sommer B, Machens HG, Lange T, Mailander P. Bridging peripheral nerve defects by means of nerve conduits. *J Reconstr Microsurg* 2009 Jan;25(1):55-61.
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Figure 4: Preparation of Avance®. Graft was thawed with room temperature saline.



Figure 5: Nerve gap repair with Avance®. Avance® was implanted into the nerve gaps and secured in place using 8-0 nylon sutures.

For additional information on



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