

Extrusion of a NeuroTube: A Case Report

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Background: Peripheral nerve injury is a common result of trauma. In cases of nerve gap, treatment may involve placement of a nerve conduit. This case involves a polyglycolic acid nerve conduit tube that was extruded through soft tissue. To our knowledge, this reactive process has only been previously documented in one article. This complication is not commonly known among hand surgeons, hence our interest in documenting it.

Case Report: We present the case of a 33-year-old male who injured his right nondominant thumb in a workplace saw accident. His complex wound involved the radial digital nerve, and the nerve was repaired using a polyglycolic acid nerve conduit. By postoperative week 4, part of the nerve conduit was extruding through the wound. No signs of infection were noted, and the remainder of his wounds had healed. The patient declined a nerve graft, so his wound was debrided with no further attempts at nerve repair. The wound healed uneventfully, and the patient returned to full duty without restrictions.

Conclusion: We believe this is the first documented case of extrusion of a nerve conduit through healthy soft tissue. Recent advancements in nerve allografts and conduits hold promise but are not yet in widespread use. We recommend the use of a collagen conduit to avoid extrusion of polyglycolic acid-based materials.

Keywords: *Extrude, hand injuries, peripheral nerve injuries, polyglycolic acid*

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INTRODUCTION

Peripheral nerve injury is a common result of trauma. If a nerve cannot be primarily repaired because of segmental gap, the gold standard treatment is a sensory nerve autograft to bridge the gap. This treatment has often resulted in disappointing clinical results, leading to the use of nerve conduits as axonal guidance channels. We present the case of a polyglycolic acid nerve conduit tube that was extruded through soft tissue. To our knowledge, this reactive process has only been previously documented in one article.¹ This complication is not commonly known among hand surgeons, hence our interest in documenting it.

CASE REPORT

The patient, a 33-year-old male, was operating a circular saw at work when he injured his right nondominant thumb. Approximately 5 days after his injury, the patient presented with a complex wound involving the radial aspect of the interphalangeal joint of the thumb. He had loss of sensation over the radial half of the digit. Flexor pollicis longus and extensor pollicis longus tendons were intact, and the skin was well approximated. The patient elected to proceed with surgery. We discussed with him the possible need for a nerve conduit if his radial digital nerve was significantly injured.

In the operating room, the patient's wounds were debrided. Because of the segmental loss and debridement of the devitalized tissue, a significant gap in the nerve measured approximately 9 mm. The gap could not be

approximated, and we decided to proceed with a nerve conduit. A 2.3 × 40 mm NeuroTube (Synovis Micro Companies Alliance, Inc.) was cut to approximately 20 mm, and the ends of the nerve were placed inside it. The ends of the nerve were then secured to the tube with a 9-0 nylon stitch, placing two stitches on each end of the tube and into the epineurium of the nerve. The wounds were closed with 5-0 nylon in a simple interrupted fashion. The patient's initial recovery was unremarkable, but by postoperative week 4, part of the nerve conduit was extruding through the wound (Figure).

No signs of infection were noted. The remainder of the patient's wounds had healed. We discussed performing a nerve graft with the patient, but he declined because he did not want to take any more time off from work. Consequently, we debrided the wound and the extruding nerve conduit and made no further attempts at nerve repair. The wound healed uneventfully, and the patient returned to full duty without restrictions.

DISCUSSION

Very little has been written in the literature about polyglycolic acid and the extrusion of sutures or other materials with a polyglycolic acid base. Weber et al reported 46 cases of polyglycolic acid nerve conduit implantation, including 3 that extruded.¹ In all 3 cases, the conduit was placed under damaged soft tissue. Extrusion was attributed to the necrosis of skin flaps and not to intrinsic conduit



Figure. The extruded NeuroTube prior to debridement.

properties. In our case, the overlying soft tissue was intact and the extrusion of the NeuroTube occurred through healthy soft tissue. Many anecdotally documented cases of the extrusion of Vicryl stitches and other polyglycolic acid-based sutures exist. Although patients may refer to the extrusion as a suture allergy, most surgeons view this occurrence not as an allergy but as suture reactivity.

Known factors that contribute to suture reactivity include the duration the material remains in tissues, size of the suture, anatomic location of sutures, and material properties. More reactivity occurs the longer the sutures are within the tissues. Larger caliber sutures are also known to cause more reactivity. A 1-unit increase in suture size can result in a 2- to 3-fold increase in tissue reactivity. Synthetic or wire sutures are less reactive than natural sutures made from

silk, cotton, or catgut.² In general, a monofilament suture is less reactive than a braided suture. Some correlations point to the chest, back, extremities, and sebaceous areas of the face as being more reactive than other parts of the body.²

This case documents a possible complication of a nerve conduit created with polyglycolic acid. It is unclear if this nerve conduit extrusion was related specifically to the conduit's polyglycolic acid properties or to the patient's own genetic or immunologic factors. We believe this is the first documented case of extrusion of a nerve conduit through healthy soft tissue, and surgeons using this implant should be aware of the potential complication. Recent advancements in nerve allografts and conduits hold promise but are not yet in widespread use.³

CONCLUSION

We recommend use of collagen conduits to avoid this complication seen with polyglycolic acid-based materials.

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