Tension at Nerve Repair Sites: What is the Effect of Trimming a Nerve?

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INTRODUCTION

• Tension at nerve repair sites is associated with impaired nerve regeneration and thus poor clinical outcomes.
• Lacerated nerve ends that have edema, scar, and/or hemorrhage, without exposed axons, limit the potential growth of regenerating axons.
• It is often necessary for nerve ends to be trimmed prior to direct repair or nerve grafting.
• Purpose: To determine what effect trimming nerve ends has on the tension at the repair site.

RESULTS

• Tension without Trimming: The average tension required to oppose the nerve when no trimming occurred was 1.3 N.
• Tension with 2 mm Trimmed: Tension increased to 3 N when 2 mm of nerve was trimmed.
• Tension with 5 mm Trimmed: When 5 mm of nerve was trimmed, the tension increased to 7.1 N (p<0.05).

METHODS

• The common digital nerves to the 2nd, 3rd, and 4th webspaces were exposed in six cadaveric hands.
• Each nerve was then sharply lacerated.
• With the aid of a digital caliper, one nerve was trimmed 2 mm (equivalent to trimming 1 mm of each cut end of a nerve) and one nerve was trimmed 5 mm (equivalent of trimming 2.5 mm of each nerve stump.) The nerve trimming distance (0, 2, or 5 mm) was randomized in each hand.
• Following transection and trimming, the nerves were reapproximated, such that they were just “kissing” and the tension required to do so was measured with a tyrolean tensiometer.
• The tension required to make the nerve ends oppose each other was measured 10 times for each nerve.
• Statistical analysis was then performed.

CONCLUSIONS

• Removing the damaged nerve tissue plays a critical role in preparing a transected nerve for repair. As one trims a lacerated nerve to expose “good” nerve ends, significantly more tension is required to permit a direct repair.
• The exact threshold of acceptable tension at a nerve repair site remains unknown.
• It is important to recognize that if significant trimming of the nerve ends is performed, one may want to consider utilization of a nerve conduit or nerve graft to minimize the tension at the site of the nerve repair.