

Commonly Used Neurolytic Solutions Significantly Degrade Nylon But Not Teflon Epidural Catheters

David W. Gale, M.D., Somayaji Ramamurthy, M.D., Marc A. Valley, M.D.

Departments of Anesthesiology, Wilford Hall Medical Center-Lackland Air Force Base, TX 78236, and University of Texas Health Science Center-San Antonio, TX 78284.

INTRODUCTION: Indwelling catheters (nylon/Teflon) are frequently used as a conduit to inject various substances including neurolytic solutions in the treatment of particular chronic pain syndromes. In certain clinical situations, these catheters are kept in place for varying periods and serially injected with neurolytic solutions for management of chronic pain until optimal effect has been obtained. There is concern that these substances may disrupt the structural integrity of these catheters, possibly causing premature catheter fracture during removal. This study was designed to investigate the tensile strength of three types of stock epidural catheters after in vitro exposure to clinically used concentrations of five different neurolytic solutions.

METHODS: Ten segments (8cm) each of three different stock epidural catheters were injected with and then soaked in the following neurolytic solutions: 6% aqueous phenol, 6% phenol in 60% glycerol, 10% phenol in non-ionic contrast, 50% ethanol, and 100% ethanol. A normal saline bath served as the control. Additionally, five catheter segments were bathed separately in 1% lidocaine, 0.25% bupivacaine, 60% glycerol, and non-ionic contrast for further comparison. Two nylon (Perifix®, and Epi-Cath®) and one Teflon catheter were evaluated. Samples were incubated at 37°C for 72 hours. We determined the maximum axial load until sample fracture in newtons (N) with an Instron universal testing machine using a crosshead speed of 500 mm/min. and a spacing of 35 mm. Data were analyzed by ANOVA with appropriate post hoc testing, and a p value of <0.05 was considered significant.

RESULTS: All Epi-Cath catheter segments showed significant tensile strength degradation when soaked in neurolytic solutions compared to saline (see Fig.1). All neurolytic soaked Perifix catheters, except for the 50% ethanol solution, had significant decreases as well. 6% aqueous phenol produced the greatest decrease in tensile strength in both of the nylon catheter groups. Neither of the nylon catheters showed any loss of tensile strength when exposed to local anesthetics, contrast, or plain glycerol. None of the tested Teflon catheters demonstrated significant changes when soaked in any of the solutions studied.

DISCUSSION: The effect of neurolytic solutions on catheters needs to be one of the factors considered when type of catheter is being selected. While Teflon catheters were least effected, other considerations include kink resistance and orifice location. The lowest measured load until fracture in any of the samples (6% phenol-Perifix) was 10.8 N which correlates to 1.1kg (1kg=9.8 N). This represents a two third decrease in tensile strength when compared to saline (10.8 N vs. 32 N). Therefore, if during nylon catheter removal resistance is encountered or if stretching of the catheter is observed, it is recommended that the patient should be repositioned and then reattempt removal.

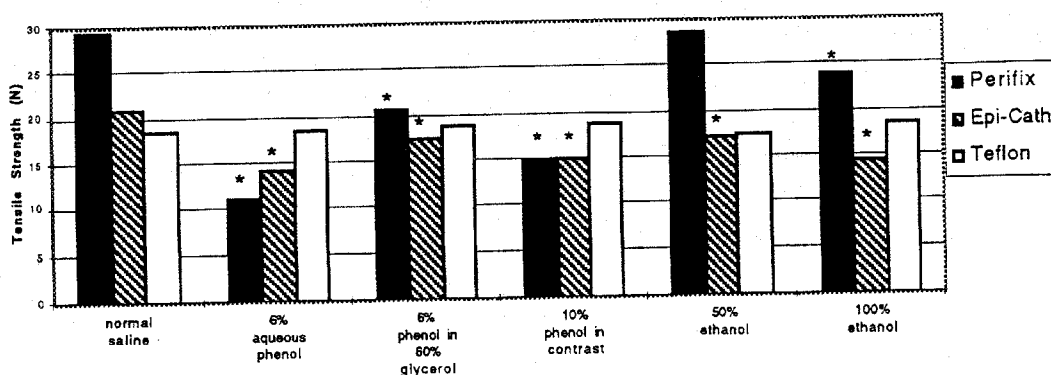


Figure 1- Tensile Strength of Neurolytic Soaked Catheters Compared to Saline - * p<0.05

Lumbar Pain Following Spontaneous Rupture of an Intrathecal Baclofen Infusion Catheter

Lavern Benti-Bruce, M.D., and Karen M. Park, M.D.

Fellow, Assistant Professor, Department of Anesthesiology, Georgetown University Medical Center, 3800 Reservoir Rd, NW, Washington D.C. 20007

Introduction: Intrathecal administration of baclofen is a safe and effective mode of therapy for severe spasticity (1,2). Via a surgically implanted intrathecal catheter, long term continuous infusions using a computer assisted delivery device are possible (3). Complications are rarely reported (4,5). The authors describe a patient who suffered severe back pain after six months of well-controlled spasticity.

Methods: A 26 year old former policewoman was referred for implantation of an intrathecal baclofen infusion system. In 1987, the patient suffered a skull fracture and coma while deployed with the military in the African continent. Three years later, she developed facial sinusitis which rapidly progressed to life-threatening encephalomyelitis. After prolonged intensive care, she recovered with persistent diminished sensation, altered proprioception below the level of T4, and truncal and lower extremity spasticity. An oral regimen of baclofen, dantrolene, diazepam, and hyoscyamine were ineffective. Implantation of an intrathecal catheter and infusion pump system (Medtronic Corp, Minneapolis, MN) proceeded without incident. The patient's spasms were well controlled with 150 micrograms of baclofen daily. She returned to work as an office manager and functioned well. Six months later, she presented with complaints of worsening back pain and increasing spasticity. An MRI of the lumbar area, myelogram and CT scan demonstrated a small supraspinous fluid collection at the L2-3 catheter entry site into the spinal canal. In addition, two other sites of extravasation were noted: 15 cm from the cephalad tip in the subarachnoid portion of the catheter; and in the distal catheter proximate to the subcutaneous connection with the pump tubing.

Results The catheter was replaced by a new, reinforced model: 4.2F-O.D. 1.4 mm compared with 4.0F-O.D. 1.2mm. The patient's back pain resolved within days and her spasms returned to satisfactory control.

Discussion: To our knowledge, this is the first report of spontaneous breakdown of a Synchronomed catheter causing back pain presumably as a consequence of extravasated drug into the paraspinal tissues. Of note, contrary to medical advice, this patient attempted to return to her previously active life style once her spasms were controlled. She admitted to excessive physical activity with much bending and lifting. We postulate that the repeated stresses on the catheter placed in a fairly mobile area of the spine led to its breakdown at multiple sites. Another possibility is that the tear in the subarachnoid portion of the catheter occurred during initial placement. When the stylet is removed from the catheter with the 15 gauge spinal needle in place, there is some degree of wrinkling of the catheter against the sharp needle point which may cause occult disruptions. Since postoperative contrast studies are not performed routinely, this etiology will remain unrecognized. We recommend that during placement of the catheter, the entire needle be removed before withdrawing the stylet. However, patients must also be admonished on the potential grave consequences of excessive levels of physical activity with this device in place.

References:

1. Penn RD, et al: Lancet 2: 125-27, 1985.
2. Muller-Schwede G, et al: J Neurosurg 71: 273-75, 1989.
3. Penn RD, et al: J Neurosurg 66:181-85, 1987.
4. Penn RD, et al: Lancet 1:1078, 1984.
5. Parke B, et al: Arch Phys Med Rehab 70:30-32, 1989.