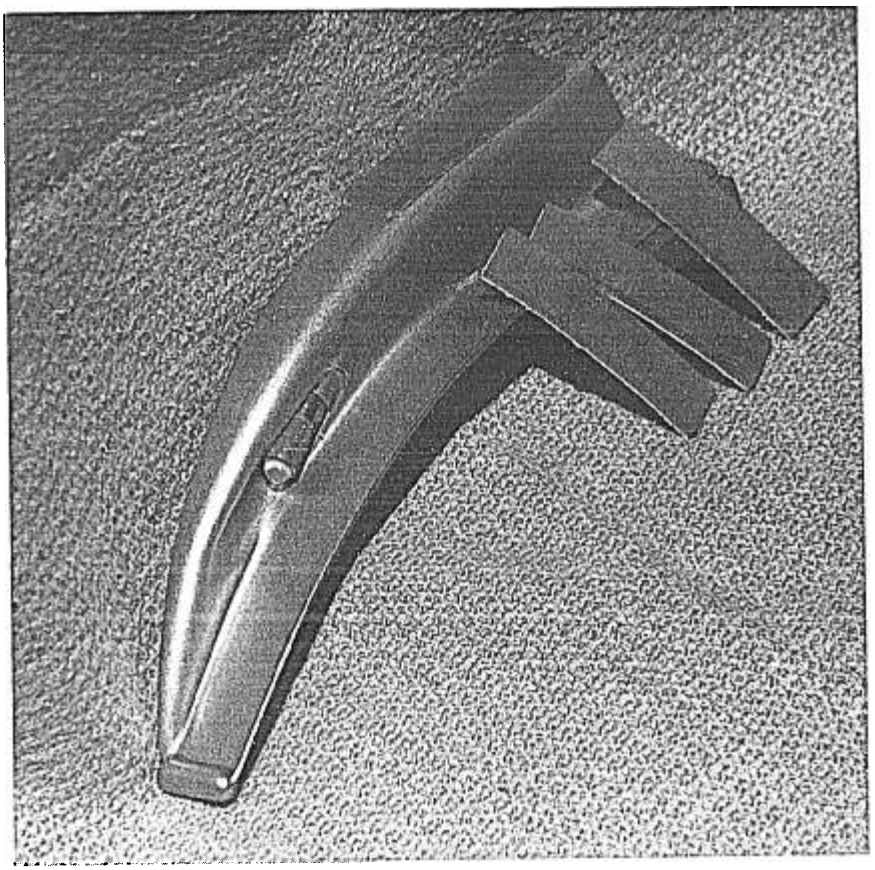

FIG. 2. Macintosh 3 blade and precut strips of polyurethane sheeting.

the material, indicating that the operator has been using the incisors for a fulcrum.

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(Accepted for publication August 12, 1989.)

Anesthesiology
71:811–812, 1989

A Recommendation for Reduced Lidocaine Dosage during Intravenous Regional Bretylium Treatment of Reflex Sympathetic Dystrophy

To the Editor:—Ford *et al.* report four cases of Reflex Sympathetic Dystrophy managed by the injection of bretylium 1 mg/kg in 0.5% lidocaine.[1] The volume of 0.5% lidocaine injected in the lower extremity was 100 ml in three patients. The weights of these patients were not specified; however, this lidocaine dose would likely result in complications of lidocaine toxicity in the event of tourniquet failure.

We have administered a lower dose of lidocaine for iv regional bretylium block. Four female patients, ages 37–42 yr, were administered 1 mg/kg of bretylium in 0.25% lidocaine with 100 U of heparin. One hundred milliliters of local anesthetic with bretylium was injected after exsanguination of the lower limb and inflation of a double tourniquet. All patients experienced pain relief during administration of the block and none had tourniquet pain. No patients had complications from the procedure; however, pain relief lasted only 2–7 h after deflation of the tourniquet. Each of these patients additionally received conventional therapy with lumbar sympathetic block. With this therapy, one patient had a duration of pain relief for only 4 h, but the remainder had pain relief for 5–9 days.

To explain our findings, we considered the following. 1) Our patients may have been different from those described by Ford *et al.* with respect to their underlying mechanism of pain. Their favorable response to lumbar sympathetic block, however, suggests sympathetically mediated pain. 2) The local anesthetic is an active component of iv regional treatment of RSD. Reduction of the concentration of local anesthetic may have resulted in decreased efficacy of the regional block. If, in fact, bretylium proves to be the agent responsible for pain relief using

this technique, the lower dose of lidocaine we describe could reduce the likelihood of local anesthetic toxicity in the event of tourniquet failure.

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(Accepted for publication August 12, 1989.)

Anesthesiology
71:812, 1989

In Reply:—We appreciate the interest and comments of Dr. Hanowell. As stated, we used bretylium 1 mg/kg in 0.5% lidocaine. However, the usual volume for lower extremity procedures was 70 ml. With this volume, lidocaine toxicity should be less of a problem. Obviously the volume and concentration should be appropriate for the patient's size. We included the lidocaine because it was incorporated in previous iv regional blocks using other sympatholytics and because we were concerned about pain during the 30-min tourniquet inflation. Pain could also be produced by the initial norepinephrine release known to occur with bretylium. The recommendation for 0.25% lidocaine is well taken although the question remains whether lidocaine is at all necessary. McKain has shown no prolonged sympatholytic effects of lidocaine in the iv regional technique, and therefore, we do not believe that the reduction of the concentration of lidocaine decreases its efficacy.

The lack of prolonged response in the four patients described by Hanowell *et al.* could be due to differences in patient population. Another possible explanation is that the tourniquet inflation times were of inadequate duration. Applying information from the basic science literature, it would seem that compared to an agent like guanethidine, a longer inflation time would be required to obtain adequate results. We use a minimum of 30 min. Our recent experience has been that even the responders to this technique initially need frequent therapy, *i.e.*, every 3–4 days.

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(Accepted for publication August 12, 1989.)

Anesthesiology
71:812–813, 1989

Phrenic Nerve Block as a Complication of Local Anesthetic. Infiltration for Internal Jugular Vein Catheterization

To the Editor:—Complications of internal jugular vein cannulation include carotid artery puncture,[1,2] pneumothorax, and thoracic duct injury and lymph leak.[3] We report on an additional complication of this technique.

A 58-yr-old female was admitted for cadaveric kidney transplantation. In preparation for the operation, a central venous catheter was inserted into the right internal jugular vein. The routine chest x-ray taken afterwards revealed elevation of the diaphragm at the side of the internal jugular vein catheterization. Fluoroscopic examination was performed showing a paradoxical movement of the diaphragm (fig. 1). A chest x-ray taken 3 h later showed both sides of the diaphragm at the same level. Reversible phrenic nerve block following infiltration with 5 ml of 2% lidocaine was suspected as the cause of the elevated diaphragm, and the patient underwent kidney transplantation the same day. The operation and the postoperative course were uneventful.

Many complications after internal jugular vein catheterization have been described.[3–6] Phrenic nerve block as complication of percutaneous catheterization of the internal jugular vein apparently has not been reported before. The phrenic nerve originates from the cervical plexus, passes along the ventral side of the anterior scalene muscle, and may coincidentally be injured during percutaneous catheterization of the internal jugular vein. In the case reported, local infiltration of lidocaine is suspected of inducing phrenic paresis. This hypothesis is supported by the rapid resolution of the symptoms. However, mechanical compression by a hematoma cannot be ruled out.

Although this represents a rare complication of internal jugular vein catheterization, one should be aware of it especially in patients with severe pulmonary compromise on the contralateral side. Moreover, it further illustrates the importance of a chest x-ray before catheterization on the contralateral side after an unsuccessful attempt on one side. Furthermore, one should use only small quantities of local anesthetic, mainly to the skin and subcutaneous tissue, to avoid this problem.

To the best of our knowledge this is the first report of phrenic nerve paresis following internal jugular vein catheterization and thus should be added to the list of complications of central venous access.