

these patients may lead to pulmonary edema. Diuretics may be used safely to mobilize fluid in these patients.

A number of published articles indicate that ADH can cause oliguria. These studies are reviewed in our article.¹ In support of this concept, we occasionally produce oliguria when administering large doses of dDAVP to brain-dead patients prior to organ procurement. It is unclear whether ADH alone is causing the oliguria in our patients. We have postulated a variety of mechanisms for the oliguria.¹ Decreased ultrafiltration pressure, increased glomerular capillary osmotic forces, decreased renal blood flow, and excesses of other circulating factors (*i.e.*, prostaglandins) may have contributed to the oliguria.

We have not made any statements suggesting that furosemide prevents renal failure, nor have we stated that azotemia develops in normovolemic oliguric patients without furosemide treatment.

We agree that many of our patients were hypotonic and hyponatremic. These patients are unable to excrete free water due to ADH excess. Administration of hypotonic fluids to these patients may result in pulmonary edema or further hyponatremia. One of the points of our article is that overzealous fluid administration, in an attempt to improve urine output in these patients, may be deleterious. We agree that the avoidance of such therapy and the use of furosemide/free-water restriction may prevent these complications. Urine indices may be helpful in separating these patients (normovolemic oliguria) from those with hypovolemic oliguria.

Proposing a new classification of oliguria in which ADH excess is listed as a prerenal cause of oliguria should clarify the issue rather than cause further misconceptions. Oliguria associated with ADH excess should caution one against the use of exogenous fluid since the standard treatment for SIADH is free-water restriction.

The lungs of most of the patients in this study were being mechan-

ically ventilated in the SIMV mode in the intensive care unit when oliguria developed and when the measurements were made. In addition, the majority were receiving 5 cm or less of PEEP. The mode of ventilation and level of PEEP were not different from those of patients who did not develop oliguria. Thus, we believe that the degree of ventilatory support was not a major factor in the etiology of the oliguria.

We have measured ADH concentrations in a number of postoperative, volume-replete, intensive care unit patients without oliguria. The ADH concentrations in these patients were uniformly less than 1.5 pg/ml (lower than in our oliguric patients). We have not measured free-water clearance. We believe that excess ADH contributed to the oliguria in our patients but was not the sole factor. The oliguria most likely resulted from a combination of factors (*i.e.*, excess hormonal effects, altered renal blood flow, and altered glomerular regulation).

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REFERENCE

1. Zaloga GP, Hughes SS: Oliguria in patients with normal renal function. *ANESTHESIOLOGY* 72:598-602, 1990

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Role of Intravenous Regional Bretylium in Reflex Sympathetic Dystrophy

To the Editor:—Sympathetic blockade is an important modality in the treatment of reflex sympathetic dystrophy. After the description by Ford *et al.*¹ of use of intravenous regional bretylium for the treatment of reflex sympathetic dystrophy, this technique was used in four patients with proven reflex sympathetic dystrophy with disappointing results.

Four patients with the diagnosis of sympathetic dystrophy, as confirmed by bone scan, electronic thermography, differential neural blockade, and response to sympathetic blocks, were treated with intravenous regional bretylium because of short-lived response with sympathetic blocks. The patients were two males and two females, 38, 39, 55, and 72 yr of age. Duration of sympathetic dystrophy ranged from 3 to 9 months. Of the four patients, two suffered reflex sympathetic dystrophy of the upper extremities, and the other two suffered that of the lower extremity. After the initial diagnosis, they were treated with either stellate ganglion block or lumbar sympathetic block.

Because of failure in obtaining significant, long-lasting relief with the above treatments, treatment with intravenous regional bretylium was begun. The four patients received a total of eight blocks. Blocks were performed with lidocaine 0.5%, 50 ml for upper extremities and 75 ml for lower extremities with double tourniquets using pressures of 300 or 400 mmHg for upper and lower extremities, respectively, after exsanguination. In addition, all patients were administered 100 units heparin. Tourniquets were inflated for 30-40 min. Bretylium

dose was 2.0 mg/kg in the first two patients for their first treatment. Subsequent doses in these two patients and all four treatments in the other two patients were 3.0 mg/kg. All of the patients experienced pain relief and increased mobility for a variable period after the deflation of the tourniquet. In the three patients, this improvement lasted to a maximum of 15 min after six treatments, whereas in one patient, the improvement was of 6 h duration after the first treatment and of less than 15 min duration after the second treatment. Side effects were minimal except for postural hypotension in one patient; this was controlled by intravenous fluid administration.

Four patients with reflex sympathetic dystrophy did not show any significant improvement with bretylium intravenous blockade, similar to those in the report by Hanowell *et al.*² Tourniquet-induced analgesia, as described by Ramamurthy *et al.*,^{*} also was not observed in our patients. However, all of these patients responded to sympathetic blockade, even though the relief was variable. While there is no explanation for the contrasting experience with bretylium, as well as the concept

* Ramamurthy S, Hoffman J, Walsh N, Schoenfeld L: Role of tourniquet-induced analgesia in iv regional sympatholysis (abstract). *ANESTHESIOLOGY* 65:A207, 1986

of tourniquet-induced analgesia, the search for a more reliable and effective agents should continue.

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In Reply:—We welcome the opportunity to again respond to Dr. Manchikanti. As we have stated previously, as no controlled clinical trials have proven the benefit of intravenous regional bretylium (IRB) in reflex sympathetic dystrophy (RSD), the issue remains controversial.¹ We have clinical experience and basic science evidence for the effectiveness of bretylium in producing temporary sympathetic blockade. We have demonstrated by thermography the presence of sympathetic blockade 36 h after IRB. As pointed out by Dr. Manchikanti and others (Hanowell,² Ramamurthy³), there may be large variability in the response to sympatholytic techniques in individual patients, and one technique may be more efficacious at sympathetic blockade than another in a given patient. We have found this true in our practice.

However, the broader issue is the effectiveness of this blockade for the treatment of RSD. Clearly, sympathetic blockade is not a curative therapy for RSD and may be beneficial only to the extent that it allows for more active physical therapy. It does not surprise us, therefore, that the four patients in Dr. Manchikanti's study who did not obtain relief with stellate or lumbar sympathetic block may also not respond to IRB.

The problem is not the lack of an "effective" sympatholytic agent, but rather the lack of an understanding of the pathophysiology of this symptom complex. Until this basic knowledge is available, we must continue to emphasize the multidisciplinary, multimodality approach to the therapy for RSD.

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Doppler-guided Axillary Block in a Burn Patient

To the Editor:—Axillary nerve blocks can be difficult to perform if one cannot palpate the axillary artery pulsations to locate the axillary sheath. A 58-yr-old woman with a burn to the dorsum of her left hand came to the operating room for a tangential escharotomy and placement of a split-thickness skin graft. Her past medical history included long-standing rheumatoid arthritis, hypertension, stable angina, and congestive heart failure.

Multiple observers were unable to palpate the axillary artery due to the large size of her arm and her significant vascular disease. With the use of a Doppler Flowmeter (Parks Medical Electronics Inc.) probe, the axillary artery was easily located. A 22-G × 2-inch short beveled needle was advanced parallel to the Doppler probe, and a paresthesia was obtained. The local anesthetic was injected and a successful block occurred. A field block was used for the donor site on the right thigh.

REFERENCES

1. Ford SR, Forrest WH, Eletherington L: The treatment of reflex sympathetic dystrophy with intravenous regional bretylium. *ANESTHESIOLOGY* 68:137–140, 1988
2. Hanowell LH, Kanefield JK, Soriano SG: A recommendation for reduced lidocaine dosage during intravenous regional bretylium treatment of reflex sympathetic dystrophy. *ANESTHESIOLOGY* 71:811–812, 1989

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REFERENCES

1. Ford SR, Johnston RV: Intravenous guanethidine and reserpine in reflex sympathetic dystrophy (letter to the editor). *Pain*, in press.
2. Hanowell LH, Kanefield JK, Soriano SG: A recommendation for reduced lidocaine dosage during intravenous regional bretylium treatment of reflex sympathetic dystrophy. *ANESTHESIOLOGY* 71:811–812, 1989
3. Ramamurthy S, Hoffman J, Walsh N, Schoenfeld L: Role of tourniquet-induced analgesia in iv regional sympatholysis (abstract). *ANESTHESIOLOGY* 65:A207, 1986

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To our knowledge, there has been only one prior report¹ of the use of a hand-held Doppler probe to assist in locating the axillary artery for a difficult axillary block. This technique has also been used for difficult intercostal² and supraclavicular brachial plexus³ nerve blocks. It should be considered for any difficult nerve block where vascular landmarks are used but are not readily found.

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