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(Accepted for publication November 6, 1986.)

Abolishing Pain on Injection of Etomidate

To the Editor:—We have been impressed with the rapid awakening and clear postoperative sensorium in adult outpatients undergoing anesthetic induction with etomidate. Pain on injection in these alert, unpremedicated patients can be a problem. This incidence is reported to be as high as 50-60%.^{1,2}

We have found a simple technique which has so far reduced the incidence of pain on injection to zero. Just prior to induction, 25-100 mg of lidocaine is given through an injection port attached directly to the intravenous catheter. As soon as the injection is made, the intravenous drip is turned off for 30 s. Etomidate is then injected.

Using this technique, we have had no pain on injection through either spontaneous complaint or direct questioning in 30 consecutive patients.

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Anesthesiology
66:444-445, 1987

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(Accepted for publication November 10, 1986.)

Trunk Skin Temperature After Sympathetic Nerve Block—Is the Heat Really On?

To the Editor:—In a recent study, Chamberlain *et al.*¹ concluded, based on measurements of trunk skin temperature by infrared thermography, that sympathetic block can extend up to ten segments above the sensory block with spinal anesthesia. A surprising finding, indeed.

The authors can be congratulated for their provoking and stimulating paper, because it reminds us that we are blind when it comes to evaluation of the extent of sym-

pathetic block with spinal or epidural anesthesia. Our assumption, based upon similar size of fibers carrying sympathetic and thermoreceptor traffic, that loss of temperature discrimination has the same level as loss of sympathetic outflow, may not be valid. Thus, the anesthesia community would receive with enthusiasm any monitor which reliably detects the level of sympathetic block, especially in the unconscious patient. Also, the

nagging physiological question of how trunk skin circulation is regulated is unresolved.

Unfortunately, however, the issue is not straightforward, and the conclusions reached by Chamberlain *et al.* may be premature.

1) Apart from tissue conductance and, thus, skin blood flow, skin temperature also depends on core and ambient temperatures.² Changes in skin temperature can qualitatively reflect skin blood flow only to the extent that both core and ambient temperatures are constant. It is questionable if skin temperature can simply be "corrected for cooling" by subtracting changes in oral temperature.

2) Skin temperature may be increased by heat convection from underlying active muscle.³ Could detectable or nondetectable shivering of the upper trunk above the level of motor block explain the observed increase in skin temperature?²

3) Sympathetic block not only prevents neuronally mediated vasoconstriction, but may also block nerve traffic to the adrenal medulla,⁴ thereby possibly influencing blood catecholamine levels. Indeed, studies in both humans⁵ and dogs⁶ have shown that epidural block can lower profoundly plasma norepinephrine concentrations and also influences vasopressin and renin levels.^{5,6} Can these pharmacological effects explain the observed increase in skin temperature, rather than the nerve block itself?

4) Chamberlain *et al.* do not provide the reader with any hemodynamic data, *e.g.*, blood pressure, except for the fact that seven of their 20 patients needed treatment with ephedrine and/or volume after data collection. To what extent can changes in blood pressure or cardiac output alter regional skin blood flow and temperature, either passively or through reflexes?

5) Despite an upper sensory level of only T-5, the authors found increased skin temperatures in all dermatomes (T-1 through L-2) studied. This is surprising, because upper limb vasoconstriction has been demonstrated by whole body scintigraphy⁷ and plethysmography⁸ after epidural block with a level as high as T2-T3 (pinprick). Only after extension of the block above T-1 did arm blood flow increase.⁸ While differences between epidural and spinal anesthesia probably exist, a drop in trunk skin temperature and a variable skin blood flow have been reported after spinal anesthesia with a sensory block of T-10 or above.⁹ In our experiments in conscious dogs,* in which complete sympathetic block (sensory block of T-1, Horner's sign, absence of blood pressure increase after brief clamping of chronically exteriorized carotid arteries) was induced by epidural lidocaine, we have observed a decrease in trunk skin temperature, while the skin tem-

perature in the upper and lower limb simultaneously increased. This was true with constant ambient temperatures both above and below the dog's thermoneutral temperature and with core temperature unchanged.

6) Finally, Chamberlain *et al.*, unfortunately, do not provide us with statistical data showing that trunk skin temperature does indeed significantly increase in the various dermatomes.

Skin blood flow and temperature are influenced by a variety of mechanisms, including those unrelated to the sympathetic nervous system. Accordingly, skin temperature is, at best, an indirect means for assessment of sympathetic function, with no golden standard available for clinical comparison.

While data as such provided by Chamberlain *et al.* are useful for broadening our understanding of the physiology of the autonomic nervous system, caution must be exercised when relating changes in skin temperature directly to sympathetic function.

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