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## Is the Application of an Esmarch Bandage Justified?

*To the Editor:*—In the recent literature there were reported three cases<sup>1-3</sup> of massive pulmonary embolism (two of them fatal<sup>2,3</sup>) following the application of an Esmarch bandage. In two patients<sup>1,2</sup> this event was preceded by 2 weeks of immobilization without anticoagulation. The third patient, however, was anticoagulated and not immobilized for a week before her fatal embolism. Dislodgement of a venous thrombus during application of the Esmarch bandage was most probably the direct cause of embolism in all three cases.

The necessity of a bloodless operative field in limb surgery is indisputable. There are two common means to achieve this goal: 1) exsanguination through an Esmarch bandage and application of tourniquet ischemia; and 2) drainage through vertical positioning of the limb for a few minutes and application of tourniquet ischemia.

There is no doubt that in the second case some blood still remains in the extremity. However, this is manifested only by slight oozing during the incision. Later, there is no bleeding.

Seeing no important differences between these two

methods, I do not think the application of an Esmarch bandage prior to tourniquet ischemia is necessary. Especially, not if the possibility of thrombus dislodgement is obviously present. Three reported cases of pulmonary embolism within 2 years should be a serious warning for our surgeons.

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## Acute Tolerance to Thiopental is Alive and Well

*To the Editor:*—Hudson *et al.*,<sup>1</sup> using power spectral analysis of the electroencephalogram (EEG) to measure the effects of thiopental on the brain, were unable to demonstrate the development of acute tolerance during three sequential infusions of thiopental,  $9.6 \pm 2.0$ ,  $5.6 \pm 0.9$ , and  $5.2 \pm 1.2$  mg · kg<sup>-1</sup>, respectively. But does this disprove the existence of acute tolerance to thiopental? I think not.

We<sup>2,3</sup> first encountered acute tolerance to thiopental in humans more than 30 years ago. Plasma thiopental concentrations at awakening in subjects receiving large doses (43-67 mg · kg<sup>-1</sup>) of thiopental were considerably greater than those at awakening in the same subject after smaller doses (22-40 mg · kg<sup>-1</sup>) (fig. 1, table 1). Indeed, extrapolation of point 4, "orientation," from curve BB ("3.25 grams") to curve AA ("2.0 grams") in figure 1 shows that awakening after the larger dose occurred at a plasma drug level corresponding to deep anesthesia

following the smaller dose in the same subject. Dundee *et al.*<sup>4</sup> later reported analogous findings in surgical patients receiving smaller doses (2-15 mg · kg<sup>-1</sup>): the larger the dose, the higher the plasma thiopental level at awakening.

Earlier studies in dogs by Shideman *et al.*<sup>5</sup> demonstrated a related form of acute tolerance to thiopental: when doses of 10 mg · kg<sup>-1</sup> were repeated at short intervals after apparently complete recovery from the depressant effects of the previous dose, the plasma levels at which the righting reflex returned were successively higher with each additional dose. Altenburg *et al.*<sup>6</sup> also found another form of acute tolerance to thiopental in dogs, using CMR<sub>O<sub>2</sub></sub> rather than awakening as the parameter of interest: pretreatment with thiopental decreased sharply the rate of decline of CMR<sub>O<sub>2</sub></sub> produced by subsequent infusion of the drug.

All of the above studies validate the concept of acute tolerance to thiopental by comparing the effects of two