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Invited Commentary

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The historical development of the various mechanistic methods employed by surgeons in their attempts to avert fatal pulmonary infarction has been reviewed accurately by Bernstein. Although the role of surgical intervention in any form for this purpose continues to be questioned by some clinicians, their number is diminishing. The precise indications for operation are also approaching unanimity.

When intervention is elected, the surgeon now has at his disposal a variety of technical procedures, most of which have some merit. Considerable confusion still exists as to which method is preferable under the various clinical circumstances that may be encountered. The earlier reluctance of the profession to accept the principle of partial caval interruption, as opposed to widespread acceptance of total caval ligation, has largely waned. The action is now moving on to the development and evaluation of intra-

luminal caval devices that may be introduced through a peripheral transvenous approach. There should not be needless competition among the various methods, whether they be operative or nonoperative; continuing evaluation of each is necessary and appropriate.

Bernstein presents strong evidence in favor of 4 important concepts. These are: (a) patients should be advised to have surgical intervention on the basis of specific, and essentially conservative, indications. (b) Both partial caval interruption and total ligation have a place in the surgeon's armamentarium; each has its specific indications and contraindications. (c) When partial caval interruption is indicated, a trans-abdominal approach, with placement of some type of filtering device in or around the retroduodenal infrarenal vena cava and ligation of the gonadal veins, is preferable for most patients at this point in time. (d) The intraluminal, transvenous methodology is growing in importance but is most appropriately indicated at present for very poor-risk patients, including those who have had intraluminal (transvenous) pulmonary embolus extraction as developed by Greenfield. We strongly support each of these concepts.

A strict protocol for the selection of patients for

operation, which included most of the criteria presented in this article, was adopted early in our clinical investigation [1]. This protocol, which acknowledges the importance of anticoagulant therapy in the primary management of patients with initial thromboembolic problems, has served us well over the ensuing 20 years. The temptations to broaden the indications have been frequent and many, but we have rejected them as not being in the best interests of the patient. A few new indications have been added over the years, namely, a single, large life-threatening embolus which seriously compromises pulmonary function or has necessitated pulmonary embolectomy. As a consequence, our 20-year experience with partial caval interruption by the filter technique [2] encompasses only 140 patients. These patients were carefully selected from a patient population in an environment that has included university, Veterans Administration, county, and private hospitals. By estimate, 5 patients have been rejected for operation for each patient who has been accepted for intervention. We do not have hard data concerning the ultimate fate of those patients who have been rejected, and an objective follow-up study of them is timely. However, rarely have they returned with a major embolic insult and none has been fatal to the best of our knowledge. The development of more precise diagnostic methods, both invasive and noninvasive, has sharpened our diagnostic accuracy in thromboembolism. In our own practice, pulmonary angiography has served as the final arbiter when doubt exists as to whether or not a pulmonary embolus has actually occurred.

We continue to prefer the transperitoneal placement of a retroduodenal, infrarenal caval filter, utilizing standard cardiovascular instruments and sutures, when partial interruption is indicated. This stems partially from a paternalistic allegiance to the method which we introduced, but there are more important reasons. We have been pleased with the results which have been achieved with the method as regards caval patency, prevention of fatal recurrent emboli, low incidence of nonfatal emboli, and reduction in extremity morbidity. Bernstein has presented the comparative data pertaining to these considerations. More important, however, we have felt obligated to acquire and offer for critical analysis a continuity of experience with a single operative technique. We would hope that this experience has helped encourage worldwide acceptance of the validity of the partial interruption concept.

The major deterrent to the wider acceptance of the handsewn filter technique stems from the fact that it is more demanding and potentially more time-consuming than is the placement of a premanufac-

ured device, which we acknowledge. Although these objections can be circumvented by experience and confidence in the method, the caval clips rightfully have been accepted more enthusiastically by practicing surgeons. The important technical consideration which must be observed in the placement of the filter, in any form, have been emphasized appropriately by Bernstein. As a point of difference, however, we have not as yet identified, by venography or autopsy, a suprafilter thrombus or embolus originating at the filter site. We are aware that this has been found in association with the more constricting caval plication [3]. Excellent results have been achieved by many investigators with the Moretz clip and its modifications. I, too, would favor the Adams-James DeWeese clip, and not completely because of fraternalistic allegiance!

The emerging importance of the transvenous intraluminal devices will be presented in another section of this symposium. Suffice it to say that these devices, particularly those which are being studied by Mobin-Uddin, Hunter [4], and Greenfield are meritorious and deserving of continuing critical appraisal. In my own opinion, based upon both its design and my limited personal experience with it, the Greenfield filter should prove to be particularly useful.

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Invited Commentary

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Bernstein's presentation of the problem of inferior vena cava (IVC) interruption in the management of venous thromboembolism and his conclusions are in