LETTERS TO THE EDITOR

Surgical interruption of the superior vena cava

To the Editor:

We read with interest the article by Gonzales-Fajardo and associates on complications arising from surgical interruption of the superior vena cava (SVC) (J THORAC CARDIOVASC SURG 1994;107:1044-9) and fully support the conclusions regarding the dangers of acute interruption of the SVC.

During the past 18 months we have routinely used the Invos 3100 regional cerebral oximeter (Somanetics Inc., Troy, Mich.) in more than 230 patients having cardiac surgery at our institution. The monitor uses near infrared spectrophotometry to measure regional cerebral oxyhemoglobin saturation (rSO_2) beneath a forehead-mounted sensor. During one such operation (patch closure of a secundum atrial septal defect, carried out by a trainee under consultant supervision), the SVC cannula was pulled back into the right atrium before discontinuation of bypass. Unfortunately, unbeknown to the consultant, the trainee then tightened the vascular tourniquet around the SVC, completely occluding this vessel. Within seconds, the rSO_2 reading had dropped from 63% to 37% and the monitor alarm sounded. Perfusion pressure and pump flow were satisfactory, and the pulse oximeter reading was 100%. A search of the operative field revealed the error and the tourniquet was released after approximately 1½ minutes of complete SVC occlusion. The rSO_2 reading rose to 65% within 1 minute, and no cerebral sequelae resulted.

This case supports the findings of Gonzales-Fajardo and colleagues in their animal studies, which revealed serious cerebral consequences associated with acute SVC occlusion and suggested that rSO_2 monitoring offers a method of detecting such venous obstruction in clinical practice, even though the perfusion/oxygenation side of the cerebral circulation is generally of more immediate concern. Furthermore, we suggest that monitoring rSO_2 allows the surgeon to observe the effect of temporary SVC clamping and thus determine the need for shunting on the basis of whether there is a significant drop in rSO_2 .

In clinical practice, shunting will not be necessary in some patients because of the development of collateral vessels. In these, the rSO_2 reading would be expected to remain unchanged during temporary SVC occlusion.

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[*Postscript*] We would like to point out that there is considerable evidence that the Invos 3100 oximeter does measure the oxyhemoglobin saturation of cerebral tissue under the sensor rather than that of superficial tissues. Cerebral saturation is clearly related to both blood flow

and oxygen content, but in the case of acute SVC occlusion it is the change in arteriovenous pressure difference in the face of a normal flow that determines the cerebral insult. The Invos machine detected this problem in our patient and allowed speedy remedial action. If applied in situations in which the SVC is to be deliberately clamped, we consider that a significant drop in rSO_2 would indicate the need for shunting, and we believe that our comments are valid.

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One-lung ventilation during surgical procedures on the main bronchus and carina

To the Editor:

In the April issue of the JOURNAL we read the letter by Dr. Inoue¹ concerning the Univent endotracheal tube (Fuji Systems Corporation, Tokyo, Japan) and its clinical conditions of use. In a list of conditions in which the use of this tube is inappropriate, the author includes lung lavage, differential lung ventilation, and suction of tenacious secretions from below the bronchial blocker.

Not mentioned in this list is an important clinical condition in which the use of the Univent tube is also inappropriate, that is, when bronchoplastic procedures in the main bronchus or tracheal carina are required. In fact, with this as well as with all other bronchial blocker-based systems for one-lung ventilation,² the bronchial blocker must be positioned in the main bronchus of the "surgical" lung, thus occupying the space where the surgical procedure may be carried out. Through the bronchial blocker, the dependent lung can be simply deflated or inflated but not ventilated and thus the blocker cannot be positioned in the recumbent, "nonsurgical" lung.

The problem may be solved with a standard double-lumen tube or with an endobronchial tube in which the bronchial extremity of the device is large enough to allow lung ventilation and thus can be positioned in the recumbent, "nonsurgical" lung.

We had favorable clinical experience with a method for one-lung ventilation developed in our institution (Fig. 1).³ The separate ventilation is achieved by means of a cuffed endobronchial tube (Portex Ltd, Hithe, Kent, United Kingdom), whose tip is positioned in a main bronchus after passing through a standard tracheal tube. The tubes assembled in this way define two independent channels, each in communication with one lung. The two channels are sized so that they provide similar resistance to gas flow. The distal end of the right endobronchial tube is fitted with a side branch originating immediately after the cuff, forming a 45-degree angle with the major axis of the tube. This branch is inserted into the right upper lobar bronchus; in this way the advancement of the tube is stopped before its cuff obstructs the origin of the right