

# Vettath's Anastamotic Obturator—Our Experience of 269 Proximal Anastomoses

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**Background.** Coronary artery bypass grafting (CABG) has come full circle—it started as an off-pump affair, then became an on pump one and now we are trying to keep off the pump again. One of the main reasons for this has been the neurological sequelae subsequent to CABG. But neurological problems kept causing concern even in off-pump CABGs (OPCAB). Side clamping the aorta was thought to be the major factor and thus came the concept of 'no touch proximal anastomoses' onto the aorta (1). Though a variety of proximal anastamotic devices are available in the market, high cost is a matter of real concern in third world countries like India. Hence, this endeavor of ours to fabricate an anastamotic device of our own—the Vettath's anastamotic obturator' (VAO) for proximal anastomoses of saphenous vein grafts (SVG) onto the aorta.

VAO is a stainless steel rod with three grooves and a guard at the end, which sinks into the aorta, through a punch hole, cordoned off by two wide purse string sutures.

**Methods.** After trials on perfused animal heart models, we started using this device on humans. We have performed 269 proximal anastomoses using the VAO in 177 of our OPCAB patients in the past 1 year (till July 2003). Ninety-five of them had single top ends, 72 had 2 top ends and 10 had 3 top ends onto the aorta. We have used this on disease free islands on four patients with palpable aortic plaques.

Initially all anastomoses were of the proximal first type (to ensure that the flow was adequate). Now-a-days, with confidence, distal first anastomoses are being performed.

**Results.** We had no operative mortality in this group. None of our patients needed IABP support. One patient reported back with angina, after 3 months—he was studied and his grafts were found to be patent. All patients, except three, are being followed up till date and they are leading active symptom free and event free lives.

**Discussion.** It is logical to think that avoidance of side clamp on the aorta reduces the risk of neurologic complications. Vettath's anastamotic obturator is an indigenous, cheap and reusable alternative to the other costlier devices, which serve the same purpose. Though there is a small learning curve, results are gratifying and complications are few.

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## Introduction

With the advent of beating heart surgery, more than 50% of coronary artery bypass graft surgeries are performed in most coronary centers without the use of the heart–lung machine. But the neurologic problems caused by side clamping of the aorta in performing the proximal anastomoses still remain. Hence, there has been a great deal of research to find an effective alternative so as to avoid side clamping the aorta. A couple of anastamotic devices have already arrived on the market, but because the costs of these devices are prohibitive, we designed our own device for performing these proximal anastomoses.

## Patients and Methods

From July 2002 to July 2003, we performed 235 coronary artery bypass graft surgeries on the beating heart with 177 of these procedures performed off-pump and 58 of them carried out with pump assistance. Initially, the proximal anastomoses of these vein grafts were performed with aortic side clamp. Of late, all our top ends are being performed with the Vettath's anastamotic obturator (VAO). One-hundred and seventy-seven patients have had their proximal saphenous vein graft (SVG) anastomoses performed with our VAO.

Before the VAO devices were used on patients, they were used for anastomoses on the aortas and pulmonary arteries of various perfused animal heart models. The aortic and pulmonary artery pressures were maintained at 110–120 mmHg systolic pressure while these anasto-

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Figure 1. Vettath's anastomotic obturator.

moses were being performed. These conduits were then explanted and examined for suture placement to see if all the aortic layers were included.

### Vettath's Anastomotic Obturator (VAO)

This metallic instrument is made of solid steel (Fig. 1). It is 18 cm in length and comes in small and medium sizes, 5 mm and 6 mm in diameter, respectively. The holding part is smooth. The inserting bit has a ridge 2.5 cm from the end of the VAO. This ridge projects perpendicularly like a shelf 2 mm from the steel rod. There are three equidistant grooves in the inserting end that are each 1 mm deep and these grooves extend up to 1.5 cm from the inserting end of the obturator (Fig. 2).

The ridge helps to prevent the blood from spurting directly into the eye. The grooves allow the needle to pass through the rod and thereby include the aortic intima in the suture.

### Surgical Technique

The VAO allows us to anastomose the proximal end of the vein graft, before or after the distal anastomoses. The aortic site proposed for anastomoses is marked with diathermy.



Figure 2. Inserting end with three grooves and a ridge.

Two 3.0 polypropylene purse-string sutures are applied 1 cm away from the site. The aorta is stabbed with a no. 11 blade knife, followed by a 4 mm or 4.5 mm aortic punch for the 5-mm or 6-mm VAO, respectively. The punch hole is blocked with the left index finger. VAO is introduced into the punch hole. The purse strings are tightened just enough to prevent excessive bleeding. Once the obturator is in and the snare is tightened, the proximal vein anastomosis is performed as usual with 5.0 or 6.0 polypropylene suture.

The sutures in the vein have to be inside out, and in the aorta, they have to be outside in. The aortic sutures are placed so that the needle passes through the aortic wall, goes into the groove of the obturator, and comes out between the aorta and the metal, thus taking the intima. The sutures are placed all around the aortic punch hole and are loosely held. Once the suturing is complete, the obturator is removed, and the left index finger is positioned on the aortic punch hole to prevent bleeding. The loose sutures are pulled and tightened with a nerve hook. The assistant holds the two ends of the sutures firmly with controlled traction during this procedure. Once all of the sutures are in place, the two ends are tied snugly (Fig. 3). The two snares on the purse string are removed, and they are tied in place with care, to avoid a purse string effect. The vein is then deaired, and haemostasis is attained.

### Results

We have performed 269 proximal anastomoses on 177 patients. Initially, most of the anastomoses were performed with the proximal anastomosis first so that the flow in the vein graft could be fully assessed, but with our experience, we now perform most of our proximal anastomoses last. We have had no postoperative ischemia, enzyme level changes or perioperative infarction in any of our patients. We have had no perioperative mortality in our coronary patients. One patient presented with angina after 12 weeks, and check angiogram results showed a perfectly patent graft. We are planning to follow up these patients and to repeat coronary angiography after 1 year to see if the vein graft remains patent.

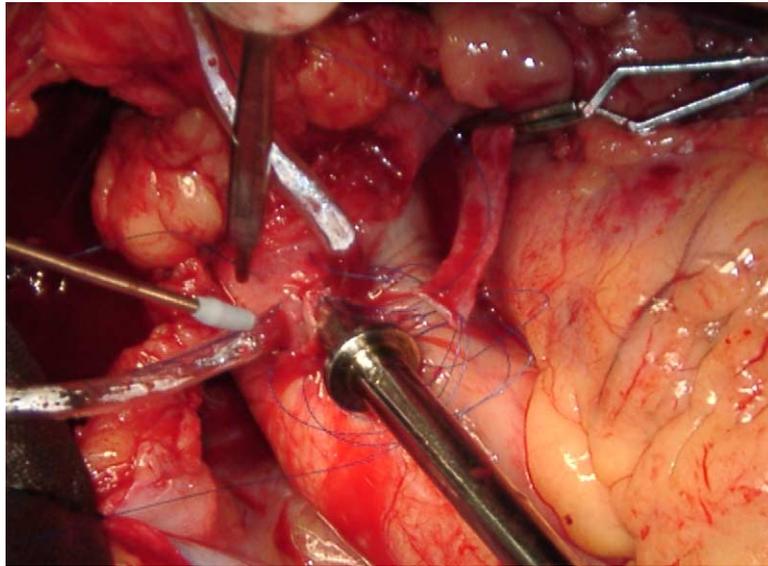


Figure 3. Proximal anastomosis.

## Discussion

With the present-day degree of myocardial protection and the refinement in surgical technique, the mortality and morbidity of coronary artery surgery is related more to the co-morbidities of the patients than to the heart function and the complexity of the surgical procedure.<sup>2</sup>

Avoiding cardiopulmonary bypass<sup>3</sup> has further contributed to the reduction of mortality and morbidity in high-risk patients, such as those with post infarction angina and a low ejection fraction.

With the VAO, the proximal end of the vein graft can be sutured as usual, taking the full thickness of the aortic wall. The vein graft is sutured with a continuous suturing technique.

Off-pump coronary artery bypass grafting (CABG) avoids extra corporeal circulation and has been shown to reduce the clinically relevant morbidity, especially with regard to neurologic sequelae. However, having to manipulate the ascending aorta by side-clamping it and performing the proximal anastomosis has definitely added to the neurologic risk during the performance of these anastomoses.

This VAO we are using still needs the surgeon's skill to perform the suturing of the proximal vein graft to the aorta. The advantage is that we can perform either the proximal or the distal anastomosis first, an option that is not pos-

sible with the recently described sutureless anastomotic device.<sup>1</sup> This Obturator is made of steel, is reusable, and costs only US\$ 10 to fabricate it. Side clamping of the aorta can be avoided, and hence there is no need to bring down the systolic pressure below 100 mmHg. There is no injury to the vein intima, because nothing is introduced into the vein. The suturing procedure takes not more than 10 min, and the learning curve is very short or negligible. This VAO can also be used in calcified aortas if a small island of normal aorta is available anteriorly. As our clinical results are excellent, we are now awaiting 1 year angiographic studies of the anastomoses we have performed, to confirm their long-term patency.

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