**Novel Surgical Method of Proximal Anastomosis in Off-Pump Coronary Artery Bypass Grafting**

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**Background:** Cerebral embolization as a result of aortic manipulation has emerged as an important risk factor for the incidence of stroke after off-pump coronary artery bypass grafting (OPCAB).

**Methods and Results:** A new surgical technique for proximal anastomosis without using a side-biting clamp or any proximal anastomotic device in OPCAB has been developed and successfully used for proximal anastomosis between a great saphenous vein or radial artery graft and the aorta in OPCAB of 138 patients, with good short-term results.

**Conclusions:** This novel technique proximal anastomosis in OPCAB can be completed in a safe, easy and economical fashion. (Circ J 2009; 73: 1342–1343)

**Key Words:** Off-pump coronary artery bypass grafting; Proximal anastomosis

Although numerous pathophysiologic mechanisms for stroke after coronary artery bypass graft (CABG) surgery have been suggested, cerebral embolization of debris dislodged by aortic manipulation has emerged as an important risk factor. Off-pump coronary artery bypass grafting (OPCAB) is associated with fewer cerebral embolic events than on-pump CABG, but use of a side-biting clamp is still unavoidable. Several proximal anastomotic devices have been developed to reduce the incidence of stroke by eliminating the side-biting clamp, but its cost prohibits widespread clinical use in China. We developed a new and easy surgical technique for proximal anastomosis in OPCAB without using either the side-biting clamp or any proximal anastomotic device.

**Methods**

This new method of proximal anastomosis was approved by the hospital’s Institutional Review Board and informed consent was given by each patient.

The method of proximal anastomosis with a saphenous vein graft (SVG), for example, is as follows. The aorta is pulled out and steadied with a heavy pericardial stay suture placed close to the superior vena cava. (A couple of swabs behind the aorta also help to prevent and stabilize it.) A patch of aortic adventitia is cleared and a 15-mm superficial double purse string with a 5-0 prolene is placed in the ascending aorta. A 14F silastic urinary catheter has the balloon cut off at an angle and 2-0 silk is tied approximately 4 cm from the cut end to mark that length so as to prevent it being inserted more than 4 cm into the aorta. The other end of the catheter is occluded with a vascular forceps or tied off to prevent bleeding. With the systolic blood pressure at approximately 100 to 90mmHg, a stab in the centre of the purse string is made with a no. 11 blade and 4.0 mm punch is introduced through the stab hole. The hole is punched with care to ensure it is in the centre of the purse string. The catheter is introduced into the aorta through the hole to the depth marker and the purse string is lightly tightened with a tourniquet to prevent any bleeding. A continuous suture is made between the SVG and aorta for the anastomosis using an RB-1 swaged needle with 5-0 prolene (Ethicon, Somerville, NJ, USA). The needle point should be driven into the wall of urinary catheter while it is passed through all the layers of the aorta from the outside and then the urinary catheter is withdrawn to bring the tip of needle with it, which is then put into the graft (Figure). After every stitch the urinary catheter was inserted into the lumen again and suturing is continued in this manner. The tourniquet on the purse string is released after suturing is completed all the way round. Pull out the urinary catheter and tie down the graft with an assistant’s finger over it to stop the inevitable few leaks and de-air the graft at the same time.

**Results**

A total of 279 proximal anastomoses have been successfully performed between 211 SVG or radial artery grafts and the aorta in 138 patients. Mean time per anastomosis is 11±2.4 min. There has been no evidence of stroke after OPCAB. Only 1 hospital death from acute kidney failure and no cases of late death after a mean follow-up of 23±4.5 months.

**Discussion**

Stroke after CABG is associated with an increased postoperative morbidity and mortality, delayed hospital stay, and increased hospital expense, although the incidence is approximately 2% in the literature. Partial aortic clamping, however, remains a potential cause for embolic stroke during OPCAB.

*(Received January 21, 2009; revised manuscript received April 22, 2009; accepted April 26, 2009; released online May 29, 2009)*

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The main advantage of our new technique include: (1) ease of handling, ease of learning and a short operating time. Compared with the second-generation proximal anastomotic device, our new method has a simpler configuration and mechanism of action, which make it easy to finish the proximal anastomosis; (2) economical and practical for wide use. No special device is needed, other than a 14F urinary catheter and 5-0 prolene suture with RB-1 needle, to complete the proximal anastomosis, therefore it is also economical for the patient; (3) less injury to the aorta. Unlike Enclose II\(^5\) and other devices\(^6\) that involve introduction of the device through the aorta or opening of the membrane and a punch into the aortic, during which some degree of aortic trauma during insertion and manipulation can occur, our technique can be achieved with a purse string and punch in the aorta, suggesting that less injury to the aortic wall will occur, which lowers the risk of either releasing debris or dissection of the aorta.

However, the possibility of intimal injury does exist as a result of all suturing being performed from the outside of the aortic wall to the inside and repeated insertion and removal of the catheter through the punched hole. Therefore, this method can not used for a patient with a porcelain aorta.

Acknowledgment

We are grateful to Miss Juan Wang for drawing the illustrations.

References