Coronary artery bypass in the ambulatory patient

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In past decades, multiple organ dysfunctions¹ provoked by cardiopulmonary bypass (CPB) have been studied. The short- and long-term results and higher cost of CPB changed the scientific focus, causing less harm to the patient and giving more emphasis to off-pump and minimally invasive surgery. Many articles appeared. Benetti² and Karagoz and associates³ contributed to the progress of minimally invasive direct coronary artery bypass (MIDCAB).

With further investigation, we believe in the possibility of performing a MIDCAB in the ambulatory patient. We therefore operated on a series of selected patients who were totally awake and without orotracheal intubation. They were discharged from the hospital within 24 hours after the operation.

Methods

Between January 2000 and May 2001, 20 patients were subjected to coronary artery bypass while fully awake, without the use of CPB or an orotracheal tube. All patients had a lesion in the left anterior descending artery, and none had important chronic pulmonary disease. Ages varied between 41 and 75 years, and the predominant sex was male. All patients were subjected to preoperative psychologic preparation.

Operative Technique

An epidural thoracic anesthetic was used. The 10-mL solution was composed of 8 mL of 0.5% bupivacaine plus 2 mg of morphine, injected by a needle at the T4 level, with posterior positioning of

an 18-gauge catheter, and 1 mL of 0.5% bupivacaine that was injected for blocking in the second, third, fourth, and fifth left intercostal spaces. During the operation the patients were monitored through the arterial saturation with pulse oximetry, arterial gasometry before opening the thorax, and each 30 minutes after thoracotomy.

The access used was a thoracotomy in the fourth left intercostal space with the patients in the dorsal decubitus position, slightly turned to the right. The incision varied between 14 and 16 cm. The left internal thoracic artery was dissected through the incision until its exit through the subclavian artery. The pericardium was opened longitudinally on the anterior face, having its edges well fixed to the edges of the wound. The anastomosis between the left internal thoracic artery and left anterior descending artery was performed with continuous sutures with the use of an intracoronary shunt and stabilizer. The left lung remained partially collapsed throughout the operation. After the pleural cavity was drained and the thoracic wall closed, to end the pneumothorax, we asked the patients to breathe deeply and cough until the lung was totally expanded.

Results

The 20 patients withstood the operation well. The pneumothorax time varied between 60 and 190 minutes. During the procedure there was no hemodynamic instability or arrhythmia. No important modifications occurred in the PO_2 and PCO_2 (Table 1). There were no electrocardiographic, echocardiographic, or enzymatic alterations that characterized postoperative necrosis or clinical pulmonary or radiologic alterations.

All but one patient were released within 24 hours.

Discussion

The techniques used in this group of patients are different because of the thoracic epidural block and the psychologic preparation, which permit the patients to be kept awake and able to talk the whole time. During the operation, when the patient breathes deeply the heart tends to dislocate to below the sternum. This will happen with less intensity when the pericardium is well fixed at the edges, principally on the sternal side, which does not permit dislocation. At the time of anastomosis, the anesthetist asks the patient to cooperate by avoiding deep breathing and moving.

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TABLE 1. Age (years), time of pneumothorax (minutes), blood saturation of oxygen (percent), and Pco₂ (millimeters of mercury) before the opening of the thorax and every 30 minutes thereafter

Patients	Age	Time of pneumo.	Before		30 min		60 min		90 min		120 min		150 min		190 min	
			Sat	Pco ₂	Sat	Pco ₂	Sat	Pco ₂	Sat	Pco ₂	Sat	Pco ₂	Sat	Pco ₂	Sat	Pco ₂
1	51	92	99	37	98	40	97	41	97	41						
2	75	95	98	40	97	41	98	48	96	55						
3	69	85	98	40	97	40	98	44	97	46						
4	54	90	100	37	99	38	98	39	98	40						
5	56	80	99	37	97	40	97	42								
6	66	190	97	39	98	41	98	41	97	44	98	45	97	48	96	48
7	64	70	98	38	98	43	98	43								
8	66	72	98	39	98	42	97	42								
9	73	75	97	40	96	42	96	46								
10	60	81	98	39	96	40	98	49	97	40						
11	72	95	98	40	98	42	99	46	98	46						
12	45	84	98	37	98	38	98	39	97	39						
13	68	100	97	38	97	43	97	42	98	43						
14	43	68	100	40	99	39	98	44								
15	41	60	100	40	99	39	98	42								
16	52	68	99	40	98	40	98	43								
17	52	77	99	39	97	43	97	44								
18	71	71	100	40	96	44	97	46								
19	65	68	98	37	97	42	96	47								
20	52	65	100	39	96	43	95	45								

Respiratory exercise is done as soon as the patient arrives in the intensive care unit. This is made easier by the type of anesthesia that permits the exercises to be pain free, avoiding complications. The epidural anesthesia can also reduce the incidence of postoperative arrhythmias⁴ and graft thrombosis.⁵ We believe that we can expand the revascularization to more vessels and use this technique for the surgical treatment of other conditions, such as lung and mediastinal diseases. A hospital discharge within 24 hours after the operation and sending the patient to a home care regimen for some days, which is ideal, avoids the inconveniences of atrial fibrillation that could eventually occur.

Conclusion

Pneumothorax did not cause postoperative morbidity and permitted good anastomosis. This technique can be done in a large number of patients. We believe that in the future, with more experience, it can be performed routinely in ambulatory patients.

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