

Off-pump coronary artery surgery with clamshell incision

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ABSTRACT

The clamshell incision is a type of incision which provides excellent exposure to the thoracic and cardiac structures. Herein, we report a case of laryngeal cancer with previous tracheostomy who underwent off-pump coronary artery bypass surgery using the saphenous vein graft via the clamshell incision. The postoperative course was uneventful and the patient was discharged on postoperative Day 10 with recovery.

Keywords: Clamshell, coronary artery bypass grafting, off-pump, tracheostomy.

Cardiac surgery procedures with a median sternotomy may cause severe complications such as wound infections, sternal osteomyelitis, and mediastinitis in patients with tracheostomy or cervical esophagostomy.^[1,2] In addition, severe bleeding and tracheal injury may develop due to dense adhesion behind the sternal notch during the median sternotomy.^[3] It seems possible avoiding all these complications during cardiac surgery by the clamshell incision.^[4] Both on-pump and off-pump cardiac surgeries can be safely performed using the clamshell incision with an acceptable complication rate.^[5]

Herein, we report a case of laryngeal cancer with previous tracheostomy and a tracheal stoma who underwent off-pump coronary artery bypass surgery (CABG) using the saphenous vein graft via the clamshell incision.

SURGICAL TECHNIQUE

An 81-year-old male patient who had total laryngectomy, radical neck dissection, and tracheostomy 15 years ago was admitted to our department with severe unstable angina symptoms. On electrocardiography, ST-elevation on V1-V6 and coronary T waves were observed. Two-vessel disease was detected on coronary angiography with 90% stenosis in the left anterior descending (LAD) artery at the first diagonal artery bifurcation and 99% stenosis in the right posterior descending artery. We planned CABG to alleviate unstable angina due to

unsuitable coronary anatomy for interventional cardiac procedures. A written informed consent was obtained from the patient.

We placed an 8F endotracheal tube into the tracheal stoma (Figure 1a). The incision was done from the right anterior axillary line to the left anterior axillary line (Figure 1b). Both thoracotomies were done in the fourth intercostal space. Both the internal thoracic artery and veins were ligated on both sides. Retractors were placed (Figure 1c) and the pericardium was opened. The saphenous vein was harvested and heparinization was done using 2 mg/kg. The first diagonal artery, followed by LAD artery bypass and posterior descending artery anastomosis were done using the Octopus® (Medtronic Inc., CA, USA) stabilizer. Proximal anastomosis of the diagonal artery and posterior descending artery grafts were, then, done to the ascending aorta. Proximal anastomosis of the LAD artery graft was carried out on the diagonal artery graft in an end-to-side fashion (Figure 1d, e). Protamine was given for bleeding control. Procaine solution was infiltrated to both intercostal spaces for the management of postoperative pain. Both

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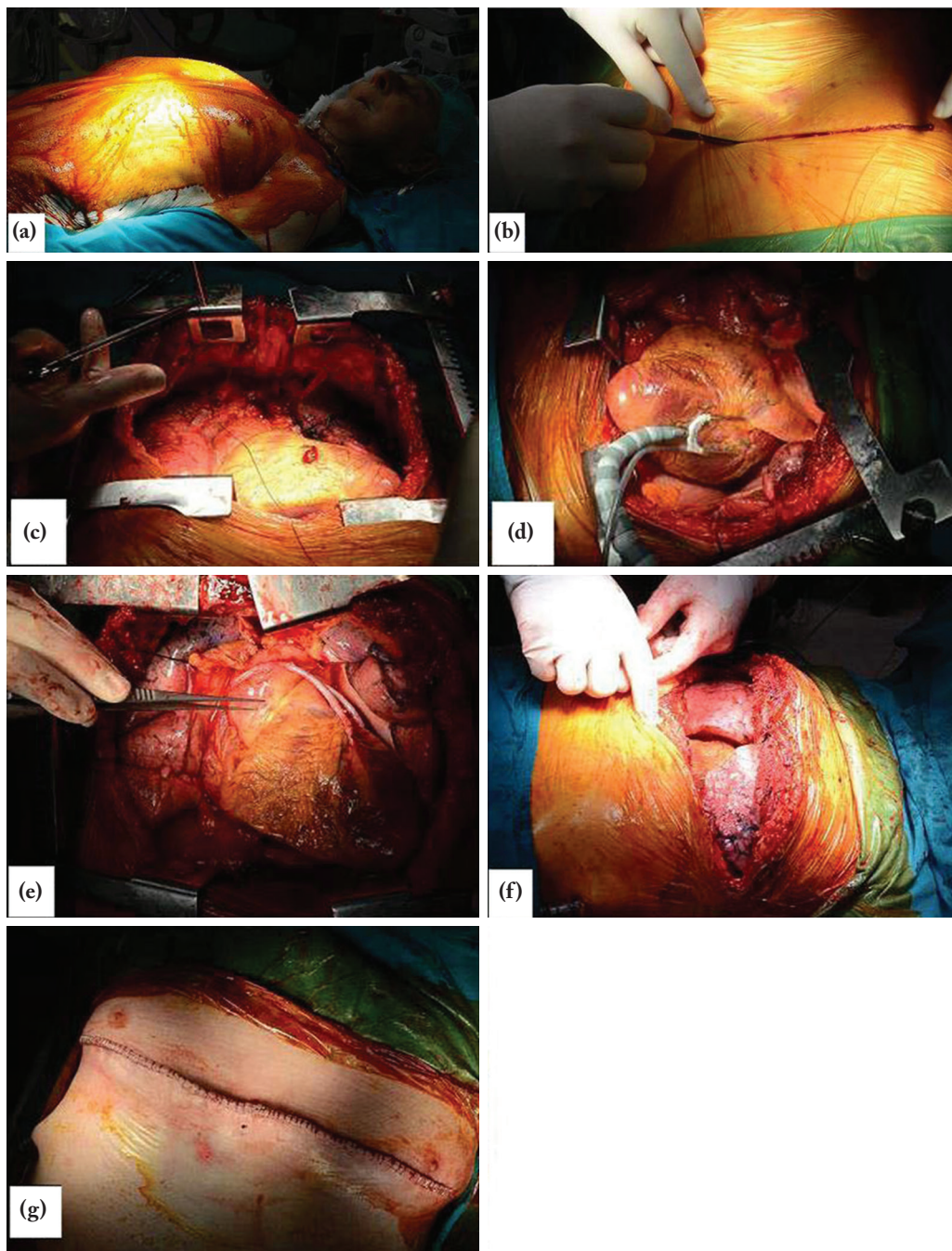


Figure 1. Operative steps of coronary artery bypass grafting via clamshell incision. **(a)** An 81-year-old male patient intubated through a tracheostomy stoma. **(b)** A transverse submammary incision was performed from right anterior axillary line to left anterior axillary line. We entered to both pleurae from fourth intercostal space. **(c)** Two retractors were placed in both sides of chest and pericardium was opened. **(d)** The first diagonal artery and posterior descending arteries were bypassed with saphenous veins. **(e)** A side clamp was placed to ascending aorta, and proximal anastomosis of diagonal artery and posterior descending artery grafts were performed. Proximal anastomosis of saphenous vein of left anterior descending artery graft was performed to diagonal artery graft. **(f)** Both lungs were forcefully expanded and sternum was, then, approached with sternal wire. Both sides of thoracotomy were closed. **(g)** Skin closure was done by stapler suture and the patient was transferred to intensive care unit.

thoracotomies were, then, closed (Figure 1f, g). The patient was extubated at 18th postoperative hours. Atrial fibrillation on the first postoperative day was controlled by amiodarone infusion. The patient was discharged on postoperative Day 10 uneventfully.

DISCUSSION

Classical median sternotomy may be dangerous in patients with previous tracheostomy or cervical esophagostomy. Postoperative mediastinitis and sternal osteomyelitis may develop, leading to death eventually.^[4] Uncontrollable bleeding from the retrosternal area beneath the sternal notch may be troublesome. Bains et al.^[6] used the clamshell incision in oncologic surgery. Lung transplantations and comprehensive thymoma surgeries were safely performed using the clamshell incision.

The clamshell incision for cardiac surgery has been used for the last three decades. This approach was routinely used in CABG with additional aortic arch surgery patients.^[5] In particular, aortic arch and descendent aorta surgery can be performed with the clamshell incision in a single-stage operation. Ascending aorta cannulation and cross-clamping can be easily done with this incision and it can be used for cosmetic reasons, as well. The left internal thoracic artery can be harvested by the clamshell incision to ensure a safe CABG for the patients. Postoperative bleeding problems were reported in several studies.^[1-5] Total sternotomy with a low skin incision may be used in many cases due to cosmetic reason. Dissection of the upper part of sternum may cause bleeding in chronic tracheostomy patients. Lower partial sternotomy can be also used in on-pump CABG. Off-pump CABG with multivessel disease may cause some troublesome complications due to the limited exposure of the

ascending aorta with lower partial sternotomy. Left thoracotomy is also another option for tracheostomy patients, while the right coronary system cannot be safely exposed with this approach.

In conclusion, we believe that off-pump CABG with the clamshell incision may additionally reduce bleeding problems. The clamshell incision may be in the surgeons' armamentarium for selected patients to perform a safe cardiac surgery.

Declaration of conflicting interests

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