Case report - Coronary

Coronary bypass by complete sternotomy in a patient with a tracheostoma

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Abstract

Patients with a laryngectomy pose a challenge when they require cardiac surgery. Dissection of the manubrium and sternal notch from surrounding soft tissues can be hazardous, as it may result in troublesome bleeding and inadvertent tracheal injury, especially in those patients, in whom the trachea is displaced anteriorly, or lies close to the sternal notch, as a result of a ‘low’ tracheal stoma. Performing a median sternotomy in such patients is believed to substantially increase the risk of sternal wound complications, mediastinitis, stoma necrosis and tracheal injuries, leading to several modifications of conventional median sternotomy, including bilateral thoracotomy incisions and limited median sternotomy approaches. There is only one case reported in the literature wherein cardiac surgery was done in such a patient, through a full sternotomy. This report describes a successful coronary artery bypass grafting through a complete median sternotomy, with no complications. This approach permitted adequate operative exposure and separated the stoma from the operative field. We also review alternative modalities of access, in these patients.

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1. Case report

Coronary artery bypass grafting (CABG) was performed on a 71-year-old man with critical left main and triple vessel coronary artery disease. The patient underwent a total laryngectomy and radiotherapy, followed by an end tracheostomy in 1982. He had obstructive airways disease and bilateral bronchiectasis.

Following induction of anesthesia, the tracheostoma was cannulated for respiratory support, adequately secured and isolated from the surgical field with a sterile drape. A prophylactic dose of cefuroxime was given at induction. We minimized wound contamination by limiting the superior extent of the skin incision to the lower aspect of the manubriosternal junction, and lifted the skin and subcutaneous tissue of the manubrium to expose the sternal notch. Dissection in the sternal notch was kept flush with the top of the manubrium, and well away from the stoma. No bleeding was encountered. Full-length sternotomy was performed from top to bottom with minimal difficulty. The left great saphenous vein was harvested.

Cardiopulmonary bypass was instituted by ascending aortic – right atrial cannulation. Three-vessel coronary artery bypass was performed in the usual fashion. The patient was weaned off bypass, without inotropes.

The sternum was approximated with interrupted stainless steel wires. We obtained a clearance of 3 inches between the tracheostoma and the top of the skin incision. Cyanoacrylate glue was used to exclude the wound from the exterior.

Intense physiotherapy was used postoperatively to avoid respiratory complications. The patient was extubated 4 h after the operation. There was no evidence of wound infection when he was discharged 5 days later or at follow-up after 6 weeks.

2. Discussion

A pre-existing tracheostomy imposes a considerable risk for infection in cardiac surgical procedures. Myocardial revascularization using a sternal approach in these patients

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is believed to be difficult and risky, leading to different authors adopting alternative modalities of access.

2.1. Full sternotomy

Bowman et al. [1] performed an aortic valve replacement, in a patient with a tracheostomy through a full-length sternotomy. Subsequently the patient had a cardiac arrest, requiring closed chest massage. This totally disrupted the sternal wound resulting in sternal wound infection. Healing eventually occurred by secondary intention.

2.2. Manubrium sparing sternotomy

2.2.1. CABG

Kaiser and Salerno [2] described a technique that limited the sternotomy to the xiphoid and body, and dismantled the manubriosternal joint leaving the manubrium intact. This approach was used in two patients, in whom CABG was undertaken using saphenous vein conduits.

2.2.2. OPCAB

Ricci and Salerno [3] used a similar approach, to perform off pump surgery in a post laryngectomy patient. Off pump surgery eliminates the need of placing the aortic cannula and the aortic cross-clamp, whose positioning at the upper aspect of the sternal wound may be problematic with an intact manubrium. The mammary artery was not used in their patient. Great care should be taken in avoiding excessive elevation of the left hemisternum, as this may stretch and injure the mammary artery. The proximal mammary pedicle remains attached to the inner surface of the second condrosternal joint, whose mobility is limited as the manubrium is left undivided. This could make mammary harvest more difficult with this technique, as compared to harvest through a full sternotomy. Sternal wires need to be placed between the undivided manubrium and the body of the sternum, to reconstruct the joint.

2.3. Bilateral thoracotomy

Marshall and colleagues [4] suggested, bilateral thoracotomy, with transverse section of the sternum for optimal cardiac exposure, for coronary grafting, using a conventional extracorporeal circuit. This approach is, however, traumatic and mutilating, and divides the mammary arteries, which is a further disadvantage.

2.4. Thoracoscopy/thoracotomy

Nataf et al. [5] revascularized the left coronary using both mammary arteries, through a limited left thoracotomy in two patients. This entailed thoracoscopic harvesting of the mammary arteries, and required a double-lumen endotracheal tube. The right and left mammary arteries were grafted to the left anterior descending and the obtuse marginal arteries, respectively.

Median Sternotomy provides unrivalled exposure of all coronary targets. Exposure for aortic and atrial cannulation was adequate and we encountered no problems during the procedure. The mammary artery was not utilized due to previous radiotherapy and the presence of dense pleural adhesions. The patients also had bronchiectasis. The distance from the tracheostoma to the top of the incision was large enough to minimize the risk of mediastinal infection. Femoral cannulation might allow further space on the ascending aorta, an important option in such patients.

The technique of limiting the skin incision and the use of cyanoacrylate glue to exclude the wound from the exterior was adequate to limit wound contamination from the tracheostoma. The dissection is kept flush with the top of the manubrium to avoid injury to the tributaries of the jugular veins, and unnecessary opening up of tissue planes to avoid infection. This technique could have been more difficult in obese patients with a short neck, or a low tracheostoma, but the same would apply for alternative modalities of access as well. Had we left the manubrium intact, it would have been exceedingly difficult to cannulate and clamp, our patient’s aorta.

We propose that the following factors be taken into consideration in planning surgical access in such patients:

1. Co morbid respiratory disease.
2. Previous radiotherapy, and the presence muscle flaps.
3. The position of the stoma, the extent of its separation from the notch and the habitus of the patient.
4. The ability to use thoracoscopy, thoracotomy or a manubrium sparing sternotomy if required.
5. The necessity to harvest the mammary artery and perform extra thoracic cannulation if warranted.
6. The necessity to perform off pump surgery if required.

Fig. 1. Depicts the clearance between the tracheotomy and the top of the wound.
7. Adequate postoperative physiotherapy and expert stoma care.

3. Conclusions

A tracheostomy should not necessarily preclude, cardiac surgery through a median sternotomy. It might be possible to safely operate on postlaryngectomy patients through a full sternotomy, contingent upon obtaining a good clearance between the top of the incision and the tracheostomy (Fig. 1). Our experience is limited, but this approach is a good alternative and warrants further evaluation.

References