Management of Chylothorax After Coronary Artery Bypass Grafting: Two Case Reports and Review of Literature

Kaushik Mukherjee¹, Ushnish Chakrabarty¹, Kollol Dasbakshi¹, Sanchita Roymukherjee³, Enakshi Saha² and Plaban Mukherjee¹

Departments of CTVS¹ and Anaesthesia², Medical College, Kolkata and Department of Anatomy, N.R.S Medical College³, Kolkata, India

Abstract

Chylothorax following coronary artery bypass graft (CABG) surgery is a very rare complication and its management is debatable. Opinions vary from early aggressive management to prolonged conservative treatment. We describe two cases of post-operative chylothorax following CABG and its management with intravenous octreotide.

[Indian J Chest Dis Allied Sci 2016;58:131-134]

Key words: Chylothorax, Coronary artery bypass grafting, Octreotide, Somatostatin.

Introduction

Chylothorax, the presence of chyle in pleural cavity, was originally described in 1633 by Bartolet. It is a but serious complication rare following cardiothoracic surgery. Post-operative chylothorax occurs in less than 1% of thoracic procedures with a range of 0.5% to 2%.1 After cardiovascular surgery its incidence is 0.6% to 0.8%. Chylothorax following coronary artery bypass graft (CABG) is even rarer around 0.09% (1 in 1065 cases).² In another series³, the incidence was still less 0.06% (6 in 26563 cases). In our experience, out of the 1890 patients who underwent CABG in the last five years, only two patients developed chylothorax (0.15%). We present these cases with a review of its aetiopathogenesis and management of this rare complication.

Case Reports

Case-1

A 56-year-old male patient underwent off-pump CABG with left internal mammary artery (LIMA) pedicle graft to left anterior descending (LAD) artery and three vein grafts. On the third post-operative day, 450mL of milky pleural fluid drained through the chest tube. Pleural fluid analysis showed triglyceride value of 852mg/dL. A diagnosis of chylothorax was made.

Conservative management was initiated. Diet rich in medium-chain triglycerides (MCT) with low fat was started along with proteins and vitamin supplementation. Injection octreotide was started with dosage of $100\mu g$ thrice daily subcutaneously. After two days the draining output was still high. The patient was counseled about the available surgical options but he opted for conservative management. Octreotide dosage was increased on day three to 200mg thrice daily. Daily drainage somewhat decreased after that but it was still around 200mL per day. Necessary investigations were done regularly to monitor the nutritional and electrolyte status and aberrations were promptly corrected. After 30 days the chyle leak decreased to less than 100mL per day for three consecutive days. Talc pleurodesis of the left pleural cavity was done by insufflating slurry talc through the pleural catheter. The pleural catheter was removed the next day. Chest radiograph two days later showed expanded lung.

Case-2

A 50-year-old male patient underwent off-pump CABG with pedicled LIMA to LAD and two vein grafts. This patient was discharged on the 7th post-operative day after an uneventful recovery. After one week, he presented with respiratory distress. Chest radiograph (postero-anterior view) revealed left sided pleural effusion (Figure 1). Milky-white fluid was aspirated from the left pleural cavity. Tube thoracostomy drained 1500mL milky-white pleural fluid. Pleural fluid triglyceride level was 1169mg/dL, confirming the diagnosis of chylothorax.

The second case was similarly managed with subcutaneous octreotide injection [100mcg 8 hourly from 1st day and diet rich in MCT. Chyle drainage started to decline from the 7th day and reduced to less than 50mL per day on the 29th day. It was followed by slurry talc pleurodesis through the chest tube.

[Received: November 26, 2014; accepted after revision: June 22, 2015]

Correspondence and reprint requests: Dr Kaushik Mukherjee, Associate Professor, Medical College and Hospital, 88, College Street, Kolkata-700 073 (West Bengal); E-mail: drmukherjeekaushik@yahoo.com



Figure 1. Chest radiograph (postero-anterior view) showing left-sided pleural effusion in 2nd case.

Post-pleurodesis chest radiograph taken after two days showed expanded lung. Follow-up radiograph of both the patients at three months and at one year showed no recurrence.

Discussion

Chylothorax causes cardio-pulmonary compromise due to its mechanical effects and severe metabolic and immunologic derangements. Loss of proteins and vitamins, rather than fats appear to be primarily responsible.⁵ It appears 2-10 days after surgery due to the normal dietary restrictions in the immediate post-operative period. The usual presentation is with dyspnoea and fatigue (56%). Though the gold standard for diagnosis is the demonstration of chylomicrons in the pleural fluid by lipoprotein electrophoresis,6 the presence of triglycerides >110mg/ dL is 99% sensitive and is more easily available.7 A triglyceride level <50mg/dL virtually excludes the diagnosis.⁷ The physical character of the fluid may not be of much help, since it can be milky, serous, serosanguinous or even bloody.6

The left anterior mediastinal lymph node chain (LAMLNC) normally drains into the left jugulosubclavian venous confluence and unidirectional flow is maintained by the presence of a competent valve system. Rarely, instead of the jugulo-subclavian venous confluence LAMLNC drains directly into the



Figure 2. Proposed mechanism of chylothorax formation after LIMA dissection.

thoracic duct and very rarely chyle valve insufficiency may be associated with it. The very rare complication of chylothorax after CABG occurs due to injury to LAMNC by electrocautery where when it drains into the thoracic duct and is guarded by an incompetent valve. It is likely to occur during dissection of the proximal part of LIMA, where LAMLNC is in close association. Electrocautery is ineffective in coagulating lymphatic anyway because it contains less coagulable material compared to plasma, and hence, an effective sealing coagulum does not form. Chyle valve insufficiency allows back flow. The rarity of chylothorax following LIMA harvesting is explained by the usual lymph vessel valve competency of LAMLNC, which in addition, are not always connected with the thoracic duct itself.4

Other rare causes of post-operative chylothorax include: transection of the thoracic duct, injury of the large aberrant thymic lymphatic duct, thrombosis of the thoracic duct with subsequent backflow and extravasation from disrupted lymphatics and duct injury during central line placements.

The initial management is with a tube thoracostomy and maintenance of adequate nutrition and fluid-lectrolyte balance. Oral MCT with low fat, protein and vitamin supplements is very helpful. We used commercially available MCT in powdered form in both cases. However, some natural food products, like milk and dairy products, coconut and palm kernel oil are other rich sources. MCT passes directly into the portal vein, and thus, reduces chyle formation. If this fails, total parenteral nutrition (TPN) may be required. Octreotide, the long-acting somatostatin analog is a useful adjunct therapy as it acts directly on the vascular somatostatin receptors, lowers lymph formation and indirectly reduces lymphatic flow.² A review of literature showed significant variation in dosing regimens of octreotide. Subcutaneous, intravenous bolus/infusion have been used as routes of administration with a dosage of 7-240µg/kg per day. The duration of therapy has ranged in different studies from 3-27 days. Octreotide is usually welltolerated even in higher dosages. However, potential adverse effects include cholelithiasis, liver and renal impairment, transient glucose intolerance and hypothyroidism.8

Another drug that has been used is etilefrine. It decreases chyle output by its sympathomimetic effect on the smooth muscle fibers of the main lymphatic vessels. It was used to treat post-operative chylothorax in 10 patients with an 80% success rate.⁹ Once the chyle drainage decreases, pleurodesis can help to seal-off the leakage area.

If conservative treatment fails, other options available include coil or gelatin particle embolisation of the affected lymphatic channel¹¹ or surgery. Percutaneous embolisation, if possible, is preferred to surgical intervention.¹¹

The ideal management of post-operative chylothorax, whether surgical or conservative is debateable.¹² Some authors recommend surgery if drainage lasts for more than one to three weeks and daily drainage is 200mL to 500mL.¹³ Gabbieri D *et al*¹⁴ recommended surgery when (a) leakage persists for more than three weeks, (b) daily loss as >1.5L per day, (c) if loculations are present, and (d) for nutritional deficiencies in a debilitated patient. Surgery is also advised for adults if the daily drainage exceeds 1000mL per day for five days.²

Video-assisted thoracic surgery (VATS) is preferred to open surgery, since it entails lesser morbidity and mortality.

Chylothorax following a LIMA harvest probably merits a less aggressive approach because in most cases smaller lymphatic channels are violated and only very rarely an aberrant thoracic duct is injured. A similar view has been expressed by Choong *et al.*¹⁵ He, however, suggested surgical intervention if chyle leak persisted for two to three weeks. Our report and those by *Weber et al in* 1981¹⁶ and *A. Karimi et al in* 2010¹⁷ somewhat contradicts Choong's second contention of surgery after two to three weeks.

References

- 1. Sieczka EM, Harvey JC. Early thoracic duct ligation for postoperative chylothorax. J Surg Oncol 1996;61:56–60.
- Kilic D, Sahin E, Gulcan O, Bolat B, Turkoz R, Hatipoglu A. Octreotide for treating chylothorax after cardiac surgery. *Tex Heart Inst J* 2005;32:437–9.
- Eldaif SM, Singh KA, Kane L, Miller JI. Postoperative chylothorax: 20 years of managing a rare complication of coronary artery bypass grafting. *Chest* 2009;136:35S-h-36S.
- Riquet M, Assouad J, D'Attellis N, Gandjbakhch I. Chylothorax and re-expansion pulmonary edema following myocardial re-vascularization: role of lymph vessel insufficiency. *Interact Cardiovasc Thorac Surg* 2004;3:423-5.
- Fahimi H, Casselman FP, Mariani MA, van Boven WJ, Knaepen PJ, van Swieten HA. Current management of postoperative chylothorax. *Ann Thorac Surg* 2001;71:448–50.
- Maldonado F, Hawkins FJ, Daniels CE, Doerr CH, Decker PA, Ryu JH. Pleural fluid characteristics of chylothorax. *Mayo Clin Proc* 2009;84:129–33.
- Staats BA, Ellefson RD, Budahn LL, Dines DE, Prakash UB, Offord K. The lipoprotein profile of chylous and nonchylous pleural effusions. *Mayo Clin Proc* 1980;55:700-04.
- Helin RD, Angeles STV, Bhat R. Octreotide therapy for chylothorax in infants and children: a brief review. *Pediatr Crit Care Med* 2006;7:1–5.
- 9. Guillem P, Papachristos I, Peillon C, Triboulet JP. Etilefrine use in the management of post-operative chyle leaks in thoracic surgery. *Interact Cardiovasc Thorac Surg*

2004;3:156-60.

- Nakano A, Kato M, Watanabe T, Kawai N, Ota H, Hattori T, et al. OK-432 chemical pleurodesis for the treatment of persistent chylothorax. *Hepatogastroenterology* 1994;41:568–70.
- 11. Cope C, Salem R, Kaiser LR. Management of chylothorax by percutaneous catheterization and embolization of the thoracic duct: prospective trial. *J Vasc Interv Radiol* 1999;10:1248–54.
- 12. Misthos P, Kanakis MA, Lioulias AG. Chylothorax complicating thoracic surgery: conservative or early surgical management? *Updates Surg* 2012;64:5–11.
- 13. Fahimi H, Casselman FP, Mariani MA, van Boven WJ, Knaepen PJ, van Swieten HA. Current management of postoperative

chylothorax. Ann Thorac Surg 2001;71:448-51.

- 14. Gabbieri D, Bavutti L, Zaca F, Turinetto B, Ghidoni I. Conservative treatment of postoperative chylothorax with octreotide. *Italian Heart J* 2004;5:479–82.
- 15. Choong CK, Martinez C, Barner HB. Chylothorax after internal thoracic artery harvest. *Ann Thorac Surg* 2006;81:1507–9.
- Weber DO, Mastro PD, Yarnoz MD. Chylothorax after myocardial revascularization with internal mammary graft. *Ann Thorac Surg* 1981;32:499–2.
- 17. Karimi A, Salehi OA, Yazdanifard P. Chylothorax after coronary artery bypass and internalmammary artery harvesting: a case report. *East Mediterr Health* J 2010;16:1103-4.