Original Article on Thoracic Surgery

Management of pulmonary arterial bleeding in the post induction setting

Janet P. Edwards, Stafford S. Balderson, Thomas A. D'Amico

Department of Thoracic Surgery, Duke University Medical Center, Durham, NC, USA

Contributions: (I) Conception and design: SS Balderson, TA D'Amico; (II) Administrative support: JP Edwards, SS Balderson; (III) Provision of study materials or patients: SS Balderson, TA D'Amico; (IV) Collection and assembly of data: JP Edwards, SS Balderson; (V) Data analysis and interpretation: All authors; (VI) Manuscript writing: All authors; (VII) Final approval of manuscript: All authors.

Correspondence to: Thomas A. D'Amico, MD. Gary Hock Endowed Professor of Surgery, Chief, General Thoracic Surgery, Department of Surgery, Duke University Medical Center, Box 3496, Duke South, White Zone, Room 3589, Durham, NC 27710, USA. Email: Thomas.damico@duke.edu.

Background: A minimally invasive approach to lung cancer resection offers many benefits over traditional open surgery. Pulmonary arterial injury is a widely cited reason for conversion to open surgery.

Methods: We present a case of pulmonary arterial injury complicating dissection of the pulmonary artery during thoracoscopic left upper lobectomy. Ethical approval was obtained from the institutional ethics board and written consent was obtained from the patient.

Results: Thoracoscopic management of pulmonary arterial bleeding is demonstrated. We show maintenance of a thoracoscopic approach with establishment of proximal pulmonary arterial control, allowing suture repair of an injury to the ongoing pulmonary artery.

Conclusions: While pulmonary arterial injury may be a significant problem during thoracoscopic lobectomy, minimally invasive approaches to repair are safe and effective.

Keywords: Pulmonary artery; bleeding; post induction

Received: 16 February 2016; Accepted: 26 February 2016; Published: 16 March 2016
doi: 10.21037/jovs.2016.03.08
View this article at: http://dx.doi.org/10.21037/jovs.2016.03.08

Text

Thoracoscopic lobectomy is now considered the standard of care for surgical management of early stage pulmonary malignancy, offering many advantages over thoracotomy (1-5). Among the varied reasons for increased rates of complications, conversion to open surgery or planned conventional open surgery is the presence of difficult hilar or interlobar lymphadenopathy (6-8). This difficult to manage lymphadenopathy can be seen in the post induction setting, leading to a potentially increased risk of pulmonary arterial injury (7,9,10). While many thoracic surgeons advocate prompt conversion to thoracotomy in the setting of pulmonary arterial injury, with experience a minimally invasive approach to repair can be safe and effective. We present a case of pulmonary arterial injury during a thoracoscopic left upper lobectomy in the post induction setting, demonstrating tamponade of the injury, with subsequent proximal control and suture repair of the defect.

Figure 1 is a video presenting a two incision thoracoscopic left upper lobectomy complicated by a pulmonary arterial injury incurred while dissecting post induction adherent lymphadenopathy off of the ongoing pulmonary artery distal to the take off of the truncus anterior. At the outset of the video, a sponge ball has been placed overlying the injury to achieve tamponade. We then address the fissure, performing blunt dissection using a thoracoscopic suction and lymph node grasper to raise the pulmonary parenchyma off of the underlying pulmonary arterial branches. The lingular and ascending branches of the pulmonary artery are then divided using a curved tip vascular load of the endoscopic stapler. The truncus anterior branch of the pulmonary artery is dissected out with a thoracoscopic right angle and lymph node grasper and is divided using a curved tip vascular load of the endoscopic stapler as is

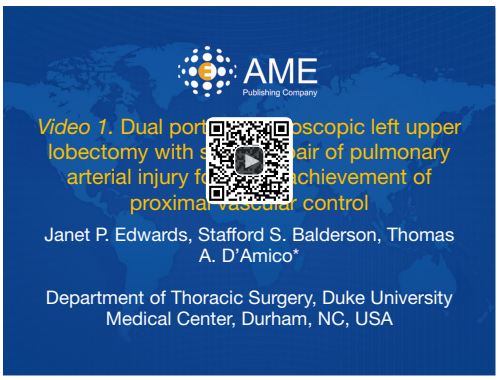

Figure 1 Dual portal thoracoscopic left upper lobectomy with suture repair of pulmonary arterial injury following achievement of proximal vascular control (11).
Available online: http://www.asvide.com/articles/863

another ascending branch of the pulmonary artery. The left upper lobe bronchus is then divided with a regular load of the endoscopic stapler. The left upper lobe is then placed in a retrieval bag and removed from the chest cavity. The sponge ball is then lifted to check for hemostasis and ongoing bleeding is encountered. It is easily controlled with repeated tamponade. We then employ the thoracoscopic suction and lymph node grasper to dissect proximally on the left pulmonary artery allowing placement of a thoracoscopic vascular clamp proximal to the pulmonary arterial injury. Hemostasis is then adequate to allow a suture repair of the defect.

Conclusions

This video is illustrative of several tips for management of difficult pulmonary arterial injury encountered during thoracoscopic lobectomy. First, if a pulmonary arterial injury is encountered control can usually be obtained with gentle pressure. The surgeon can then assess the degree of injury, their degree of confidence with techniques of vascular control and repair, and thus the safety of proceeding in a minimally invasive fashion. The need for proximal control should be weighed. Here we demonstrate an injury in a difficult location with significant bleeding after an extended period of tamponade. Proximal control in this case significantly improves visualization and provides an added layer of safety. We also demonstrate that in the setting of pulmonary arterial injury, moving away from the area of difficulty to complete dissection elsewhere can lead to good exposure in an indirect manner. We then demonstrate the feasibility of performing a thoracoscopic sutured repair of the pulmonary arterial injury.

Acknowledgements

None.

Footnote

Conflicts of Interest: Dr. D'Amico is a consultant for Scanlan Instruments.

Ethical Statement: The study was approved by the University of Louisville IRB. Written informed consent was obtained from the patient. A copy of the written consent is available for review by the Editor-in-Chief of this journal.

References

1. Daniels LJ, Balderson SS, Onaitis MW, et al. Thoracoscopic lobectomy: a safe and effective strategy for patients with stage I lung cancer. Ann Thorac Surg 2002;74:860-4.
2. Yan TD, Black D, Bannon PG, et al. Systematic review and meta-analysis of randomized and nonrandomized trials on safety and efficacy of video-assisted thoracic surgery lobectomy for early-stage non-small-cell lung cancer. J Clin Oncol 2009;27:2553-62.
3. Kaseda S, Aoki T, Hangai N, Shimizu K. Better pulmonary function and prognosis with video-assisted thoracic surgery than with thoracotomy. Ann Thorac Surg 2000;70:1644-6.
4. Swanson SJ, Herndon JE 2nd, D'Amico TA, et al. Video-assisted thoracic surgery lobectomy: report of CALGB 39802--a prospective, multi-institution feasibility study. J Clin Oncol 2007;25:4993-7.
5. Roviaro G, Rebuffat C, Varoli F, et al. Videoendoscopic pulmonary lobectomy for cancer. Surg Laparosc Endosc 1992;2:244-7.
6. Hanna JM, Berry MF, D'Amico TA. Contraindications of video-assisted thoracoscopic surgical lobectomy and determinants of conversion to open. J Thorac Dis 2013;5 Suppl 3:S182-9.
7. Samson P, Guitron J, Reed MF, et al. Predictors of conversion to thoracotomy for video-assisted thoracoscopic lobectomy: a retrospective analysis and the influence of computed tomography-based calcification assessment. J Thorac Cardiovasc Surg 2013;145:1512-8.
8. Villamizar NR, Darrabie M, Hanna J, et al. Impact of

T status and N status on perioperative outcomes after thoracoscopic lobectomy for lung cancer. J Thorac Cardiovasc Surg 2013;145:514-20; discussion 520-1.
9. Mason AC, Krasna MJ, White CS. The role of radiologic imaging in diagnosing complications of video-assisted thoracoscopic surgery. Chest 1998;113:820-5.
10. Li Y, Wang J. Analysis of lymph node impact on conversion of complete thoracoscopic lobectomy to open thoracotomy. Thorac Cancer 2015;6:704-8.
11. Edwards JP, Balderson SS, D'Amico TA. Dual portal thoracoscopic left upper lobectomy with suture repair of pulmonary arterial injury following achievement of proximal vascular control. Asvide 2016;3:109. Available online: http://www.asvide.com/articles/863

doi: 10.21037/jovs.2016.03.08
Cite this article as: Edwards JP, Balderson SS, D'Amico TA. Management of pulmonary arterial bleeding in the post induction setting. J Vis Surg 2016;2:53.

