Anomalous Segmental branch of pulmonary vein: V^6 draining into the superior pulmonary vein

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Abstract

Literatures have described different anatomical variations of pulmonary venous drainage. Even a single anatomical anomaly can eventually lead to surgical catastrophe, thus making the anticipation of these abnormalities crucial to perform a successful thoracic surgery procedure. We report a case of anomalous venous drainage of superior segment of the right lower lobe (V^6) draining into the central venous branch of superior pulmonary vein. It wasn't identified preoperatively but recognized intraoperatively and ensured after the meticulous dissection while doing Video assisted thoracoscopic right lower lobectomy (VATS) for lung cancer. Diagnostic Imaging and careful surgical dissection are of paramount importance to avoid intraoperative bleeding and inaccurate division of vein which may lead to venous gangrene of corresponding segment.

Key words: Anomalous pulmonary vein; Segmental Venous drainage, thoracoscopic lobectomy; lung cancer.

Introduction

Anatomical Variations of pulmonary venous drainage system have been reported throughout the literatures. Anatomical variations are seen more when segmental and subsegmental anatomy of lung is explored.[1] Anticipation of these anomalies helps surgeon to reduce intraoperative complications like bleeding. These anomalous vessels may lead to torrential bleeding which might turn out to be very difficult to manage especially in case of minimal invasive thoracic surgery.[2] The role of three dimensional CT scan with reconstruction is very elaborated in recent times.[3,4]the involved lobes were excluded from the analyses.\nRESULTS: We confirmed variant drainage patterns in 15/189 (8.0% Here we present a case of right V^6 draining into central venous branch of superior pulmonary vein. It was not identified in CT prior to surgery but identified intraoperatively. Careful evaluation of pulmonary vasculature is therefore imminent to perform safe lung resection surgeries.

Case report

A 32 years old female patient presented with history of right sided chest pain for last 1 year and dry cough with 4-6 episodes of hemoptysis. She visited primary health center for her symptoms where chest X ray showed irregular opacified shadow in right lower zone. On further investigation, a mass 33*30*27 mm was seen in a right lower lobe on CT scan. After completing all preoperative laboratory assessment, a bronchoscopy was done which showed mass

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completely obstructing the basal trunk of right lower lobe. Histopathological examination of the lesion showed carcinoid tumor. The tumor was staged clinically as T2a N1 M0 according to the 9th edition of TNM classification for pulmonary malignancies. After thorough cardiovascular assessment and pre-anesthetic checkup, she underwent Video assisted thoracoscopic Right lower lobectomy (VATS) with systematic lymphadenectomy. The segmental vascular anatomy can't be traced and appreciated in the provided CT. Intraoperatively it was observed that V^6 was draining into the central venous branch of superior pulmonary vein. It was seen during dissection of inferior pulmonary vein, and due to our routine protocol of isolating each segmental veins before ligating it, it was easier to identify the anomalous drainage even without preoperative anticipation. Even though we saved ourselves from the complications that could have happened, it is always better to know the segmental vasculature preoperatively and these anomalies should always be kept in mind.

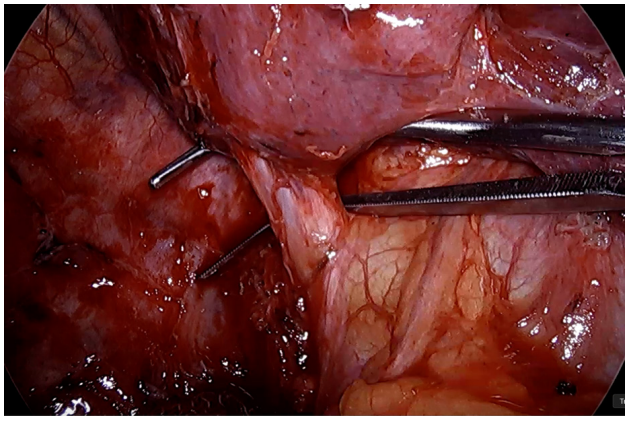

Fig 1. Intraoperative picture showing Inferior pulmonary vein of the right side

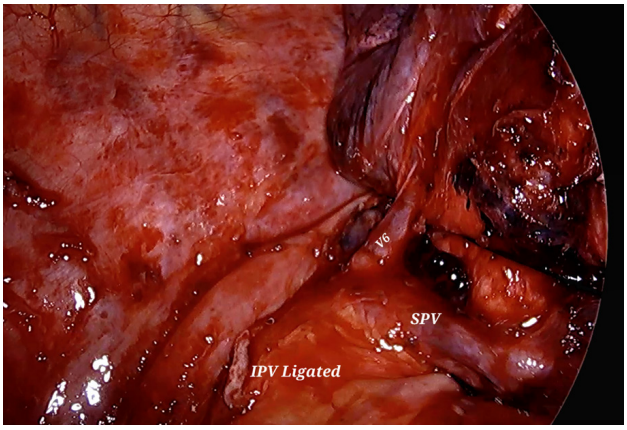

Fig 2. Illustrative intraoperative diagram showing V^6 draining to superior pulmonary vein.

Discussion

The anomalous segmental pulmonary vein can have unexpected course and it may lead to torrential bleeding. Inaccurate division of vein may lead to venous congestion of the particular segment and post operative hemoptysis.[5] Various anomalies can be expected in segmental vasculature, it can be bilateral in some cases or unilateral mostly, right sided segmental vasculature can vary both in number and pattern Noboyaki et. al. reported different anatomical variation from preoperative 3D-CT an incidence of V^6 draining into Superior pulmonary vein (spv) was found 1.3%.[3]the involved lobes were excluded from the analyses.\nRESULTS: We confirmed variant drainage patterns in 15/189 (8.0% An accessory right V^6 behind the bronchus intermedius was also found intraoperatively during VATS right upper lobectomy, as reported by Amore et. al. emphasizing on the careful evaluation of segmental anomalies.[8] The anomalous vasculature are also a common cause of conversion to open thoracotomy from minimally invasive surgeries apart from the calcified interlobar fissure and calcified hilar adenopathy.[9,10]reports have also documented that significant complications can occur during thoracoscopic lobectomy and sometimes require

planned or emergent conversion to open surgery. Several authors have identified and reported causes and implications of intraoperative conversion to thoracotomy using different types of classification. The aim of this single centre retrospective review is to evaluate how the reasons for conversion change with increased experience, dividing patients who were converted to thoracotomy during video-assisted thoracic surgery (VATS) To, the best of our knowledge, this is the first case report of anomalous V^6 draining into superior pulmonary vein from Nepal

Conclusion

Preoperative evaluation of vasculature variations in the pulmonary venous system is the wise option to prevent any complications that may befall during surgery. Many times, these anomalies may be recognized retrospectively. Therefore, it is always recommended to do careful dissection intraoperatively, with high degree of anticipation of anomalies, for prompt identification.

References:

1. Maciejewski R. The venous drainage of the apical segment of the right lower pulmonary lobe. Acta Anat (Basel). 1994;150(3):217–21.

2. Igai H, Kamiyoshihara M, Yoshikawa R, Ohsawa F, Yazawa T, Matsuura N. Algorithm-based troubleshooting to manage bleeding during thoracoscopic anatomic pulmonary resection. J Thorac Dis. 2019 Nov;11(11):4544–50.

3. Shiina N, Kaga K, Hida Y, Sasaki T, Hirano S, Matsui Y. Variations of pulmonary vein drainage critical for lung resection assessed by three-dimensional computed tomography angiography. Thorac Cancer. 2018 May;9(5):584–8.

4. Fourdrain A, De Dominicis F, Bensussan M, Iquille J, Lafitte S, Michel D, et al. Three-dimensional computed tomography angiography of the pulmonary veins and their anatomical variations: involvement in video-assisted thoracoscopic surgery-lobectomy for lung cancer. Folia Morphol. 2017 Sep 7;76(3):388–93.

5. Iida T, Shimada Y, Sato M. Management and mindset for air leak and intraoperative bleeding in thoracic surgery. J Thorac Dis. 2023 Aug;15(8):4137–40.

6. Wannasopha Y, Oilmungmool N, Euathrongchit J. Anatomical variations of pulmonary venous drainage in Thai people: multidetector CT study. Biomed Imaging Interv J. 2012 Jan;8(1):e4.

7. Jardin M, Remy J. Segmental bronchovascular anatomy of the lower lobes: CT analysis. AJR Am J Roentgenol. 1986 Sep;147(3):457–68.

8. Amore D, Molino A, Caterino U, Bergaminelli C, Casazza D, Palma A, et al. Accessory right V6 behind the bronchus intermedius during VATS right upper lobectomy. Int J Surg Case Rep. 2019;56:17–9.

9. Amore D, Di Natale D, Scaramuzzi R, Curcio C. Reasons for conversion during VATS lobectomy: what happens with increased experience. J Vis Surg. 2018;4:53.

10. Park JS, Kim HK, Choi YS, Kim J, Shim YM, Kim K. Unplanned conversion to thoracotomy during video-assisted thoracic surgery lobectomy does not compromise the surgical outcome. World J Surg. 2011 Mar;35(3):590–5.