Acute ischemic stroke after thoracoscopic lobectomy for the left upper lobe lung cancer: A case report

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Summary

Cerebral infarction is normally caused by thrombosis in chronic cardiogenic patients. However, it may be an acute appearance after surgery because of thrombus formation in dammaged vascular. The left upper lobectomy is the highest risk factor for cerebral infarction among anatomical lung resection. Here we report a 69-year-old patient who presented with left hemiparesis after left upper lung lobectomy on the fourth day. We strongly suspect that cerebral infarction is one of cardiopulmonary complications after anatomical lung resection in this case.

Keywords: Left upper lobectomy, cerebral infarction, pulmonary vein stump.

1. Background

Cerebral infarction is a rare post-operative complication in thoracic field. It was estimated that this symptom would develop 0.6% after thoracic convention including surgery and intervention, 0.8% - 1.1% after lobectomy [1], [2], [3]. One of the high risk factors for cerebral infarction after anatomical lung resection is the left upper lobectomy (LUL). Nowaday, thrombus caused by blood stasis in longer left pulmonary vein stump is the most commonly accepted hypothesis [4]. We admitted a LUL patient with lung cancer who treated by mechanical thrombectomy for acute ischemic stroke. Our team has succeed in detecting abnormal symptoms early and identifying opportunities in intravascular interventional methods.

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2. Case presentation

A 69-year-old patient with the left upper lobe adenocarcinoma lung cancer was admitted into our department. She was in clinical stage IA2 (T1bN0M0) and comforted with thoracoscopic left upper lobectomy. She is a non-smoker. Brain stroke signs were not appeared before surgery. Preoperative brain magnetic resonance image (MRI) and electrocardiography were normal. She had slightly elevated pulmonary artery pressure (35 millimeters of Mercury). There was no difficulties during the perioperative time. The operation lasted 120 minutes without bleeding. She was extubated on operating room; then she was transferred to observation ward in Thoracic Department. There were not any complications in the postoperative days. Chest tube was removed on the morning of the fourth day after lobectomy. In the same day, she had suddenly the left hemiparesis with severe strength of limb muscle, National Institutes of Health Stroke Scale was 8 points. Brain NCCT (Non-constrast Computed Tomography) and CTA (Computed Tomography Angiography) showed ASPECT 10 and right internal carotid artery (ICA) occlusion at the level of the cavernous sinuses. Atrial fibrillation and hypercoagulability were not recorded during surgery and post-operation days.

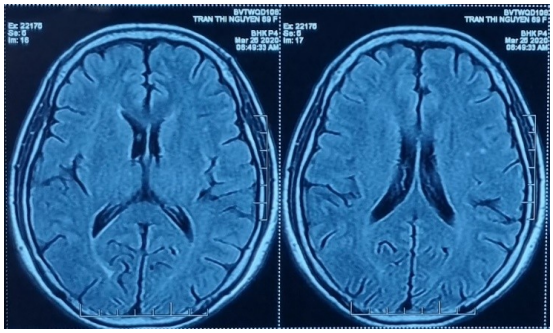


Figure 1. Preoperative brain MRI

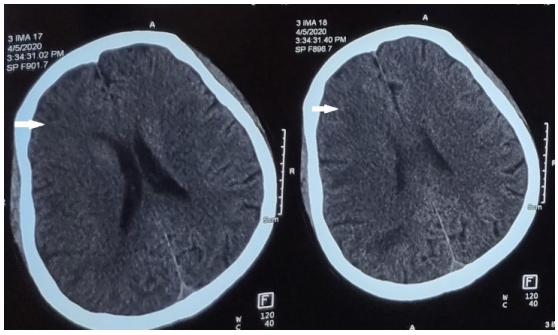


Figure 2. Postoperative brain CT (Arrow indicates infarction area)

The patient underwent mechanical thrombectomy for acute ischemic stroke within 2 hours after the onset. We successfully revascularization by aspiration with the Penumbra catheter system. After thrombectomy, the right ICA flow showed TICI 2b, a small of the distal middle cerebral artery was still occluded.

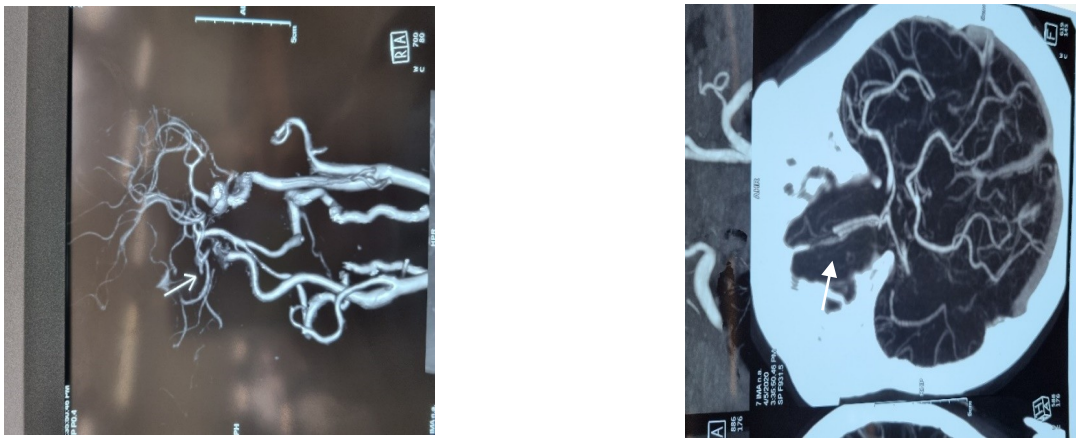
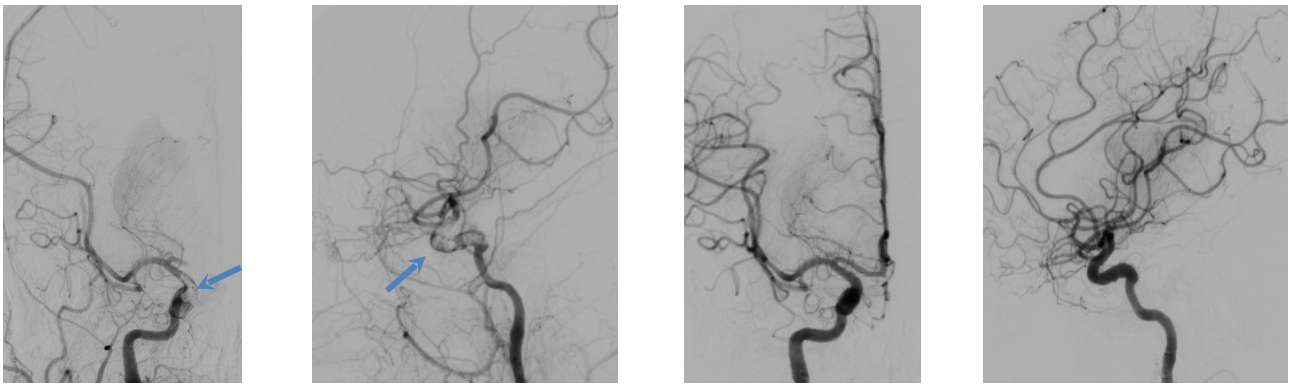


Figure 3. Computed tomography angiography (Arrow indicated occlusion position)



A B C D

Figure 4. Result of thrombectomy

A, B: Frontal and lateral view of ICA before thrombectomy,

C, D: Frontal and lateral view of ICA after thrombectomy (Arrow indicated thrombus position)

Rehabilitation therapy was prescribed for her first day after revascularization. She made a good recovery and was discharged on the ninth day after surgery.

Aspirin 81mg per day was indicated up to 3 months. She was followed up at 1 - 3 - 6 months then anually. No recurence was reported.

3. Discussion

In general, the incidence rate of cerebral infarction after surgery was approximately 0.2% [5]. It seem to be high proportion in thoracic surgery, especially according to the reported left upper lobectomy of 4.5% [2]. The mechanism of cerebral infarction after lobectomy is unclear; however, currently, acceptable hypothesis includes: (a) Cerebral infarction can be correlated with hypertension, hyperlipidemia, diabetes mellitus, arrhythmia, operative time, adjuvant chemotherapy [2], [4]; (b) Others suppose that left upper lobectomy is the major risk of cerebral infarction because the pulmonary vein stump length is longer, which causes the thrombosis due to blood stasis [1], [4]. Ohtaka et al demonstrated that the left superior pulmonary vein stump was significantly longer than the right inferior pulmonary vein stump, the right superior pulmonary vein stump and left inferior pulmonary vein stump (median 1.71cm vs median 0.50cm, p=0.0003; median 0.56cm, p=0.0002; median 0.54cm, p=0.0018, respectively) [4].

Cerebral infarction can occur in acute "phase" (< 1 month) or chronic phase (> 6 months) after surgery. Kobayashi, Kitajima reported this complication occurs on the second postoperative day [6], [7]. Others declared in 6 months or later after surgery [8], [9]. In this present report, we detected cerebral infarction on the second day after surgery. All patients were diagnosed by chest Contrast – enhanced computed tomography (CECT), brain MRI or CTA. Therefore, well timed postoperative scan would be indicated for high-risk patient.

In this case, the patient had a contraindication with IV-rtPA (intravenous - recombinant tissue plasminogen activator) because she was in early post-operative time. We, immediately, transferred her to emergency intervention room for mechanical thrombectomy. Anticoagulation could be used for small and limited thrombosis [8], [10]. However, intravascular therapy may be a better choice for complete obstruction, large thrombosis or high bleeding risk cases [9].

4. Conclusion

Cerebral infarction can be occurred in patients who underwent the left upper lobectomy. Early detection of brain abnormalities, chest CECT, CTA and intensive therapeutic intervention are important methods to diagnose and treat this complication.

References

1. Hattori A et al (2019) *Risk factor analysis of cerebral infarction and clinicopathological characteristics of left upper pulmonary vein stump thrombus after lobectomy*. Gen Thorac Cardiovasc Surg 67(2): 247-253.
2. Yamamoto T et al (2016) *Is left upper lobectomy for lung cancer a risk factor for cerebral infarction?* Surg Today 46(7): 780-784.
3. Matsumoto K et al (2018) *Frequency of cerebral infarction after pulmonary resection: A multicenter, retrospective study in Japan*. Surg Today 48(5): 571-572.
4. Ohtaka K et al (2013) *Thrombosis in the pulmonary vein stump after left upper lobectomy as a possible cause of cerebral infarction*. Ann Thorac Surg 95(6): 1924-1928.
5. Kam PC, Calcroft RM (1997) *Calcroft, Peri-operative stroke in general surgical patients.* Anaesthesia 52(9): 879-883.
6. Kobayashi Y et al (2017) *Left upper lung lobectomy is an embolic risk factor for cerebral infarction*. Journal of Stroke and Cerebrovascular Diseases 26(9): 177-179.
7. Kitajima A et al (2019) *Acute cerebral infarction in a patient with an epidural catheter after left upper lobectomy: A case report*. BMC Anesthesiol 19(1): 27.
8. Nagaoka E et al (2008) *Thrombus in the left superior pulmonary vein after left upper pulmonary lobectomy.* J Thorac Cardiovasc Surg 135(3): 709-710.
9. Ohira S et al (2013) *Surgical removal of extensive left pulmonary vein stump thrombus after pulmonary lobectomy: A rare cause of acute cerebral embolism*. Ann Thorac Surg 96(6): 135-136.
10. Asai K et al (2014) *Pulmonary vein stump thrombus: An early complication following upper division segmentectomy of the left lung*. Gen Thorac Cardiovasc Surg 62(4): 244-247.