

Video-Assisted Open Supraclavicular Sympathectomy Following Air Embolism

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ABSTRACT

Background: Air embolism is a relatively rare complication of thoracoscopic surgery.

Methods: Open supraclavicular sympathectomy was indicated to overcome the risk of re-embolization. A novel video-assisted technique was performed.

Conclusions: The previously prevalent open supraclavicular sympathectomy is a good choice for avoiding air embolism. Laparoscopic instrumentation and technology can be used to improve open procedures, especially when exposure and visibility are limited. Sometimes we should remember to use the experience of our teachers.

Key Words: Thoracoscopic surgery, Air embolism

INTRODUCTION

Air embolism is a relatively rare complication of thoracoscopic video-assisted surgery.¹ Nevertheless, intraoperative care and monitoring are of utmost importance and may save lives.² The evaluation of end-tidal CO₂ is known to serve as a possible indicator of increased dead space due to CO₂ embolism.^{3,4} The transition from an open to a thoracoscopic approach to upper dorsal sympathectomy, more than 20 years ago, brought this rare complication to awareness. Insufflation of hemithorax with CO₂ is required to obtain visualization and working space and can cause gas embolism.

PATIENTS AND METHODS

An 18-year-old male with idiopathic primary palmar hyperhidrosis (PPH), suffering from severe social and occupational handicaps, was admitted for an elective re-sympathectomy. Two years previously, an attempted bilateral thoracoscopic sympathectomy had failed. At the very beginning of the procedure with the patient under general anesthesia, after a left pneumothorax was obtained with 1 liter of CO₂ and before any dissection was commenced, a sudden drop in end-tidal CO₂ accompanied by bradycardia (55 beats/minute) was noted. An air embolism was suspected. Immediate deflation of the left hemithorax was done followed by intravenous infusion of 500cc of clear fluids with a 10-mg intravenous push of Ephedrine. The patient became hypotensive (blood pressure, 80/40) with severe bradycardia of 45 beats/minute. After 2 intravenous injections of 0.3-mg Adrenaline, the patient stabilized and the operative procedure was postponed. The patient insisted on undergoing the surgical procedure. We decided that it would be safer to perform the long neglected open approach of supraclavicular upper dorsal sympathectomy. A surgeon, very experienced in this surgical approach, was invited to participate. We upgraded the old procedure to a video-assisted procedure, with the use of a 5-mm scope through the supraclavicular incision. The identification of the sympathetic trunk was easier instead of counting on palpation alone, and we had excellent visual control of the entire procedure. The patient had an immediate excellent result, and there were no complications.

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Follow-up of 36 months revealed no morbidity and dry hands.

The Video-Assisted Supraclavicular Sympathectomy Procedure (Figure 1)

A skin incision, about 7cm in length, is made 1cm above the middle part of the clavicle. The platysma muscle and the clavicular head of the sternocleidomastoid muscle are incised. The prescaleneal pad of fat and lymph nodes, lateral to the internal jugular vein, is excised. If the omohyoid muscle is in the operating field, it should be transected. The phrenic nerve, positioned over the anterior scalenus muscle must be preserved and, if necessary, gently moved aside. The thyrocervical arterial trunk should often be transected. The anterior scalenus muscle is transected.

The plan of dissection, above and behind the subclavian artery and medial to the brachial plexus, reaches the dome of the pleura, which is dissected from the posterior part of the thorax. The first costo-vertebral

junction is palpated, and the stellate ganglion is exposed. At this stage of the procedure, an additional 5-mm skin incision is made 1cm lateral to the primary incision. A 5-mm trocar is inserted toward the index finger that lies deep in the cavity. A 30° 5-mm scope is introduced. All the previously mentioned structures that could only be palpated are now visible on the screen, and the Stellate ganglion (T1) and the sympathetic trunk can be easily identified. No gas insufflation is required. The pleura are dissected under vision from the posterior part of the thorax along the second, third, and fourth costovertebral junctions, anterior to which are the second and third sympathetic ganglia. These 2 ganglia are resected using metal clips on the remaining chain. Care is taken not to injure the subcostal vessels. If the pleura are injured, a small tube is inserted into the pleural cavity. The sternocleidomastoid and subcutaneous tissue are sutured. The skin is closed. If a tube was inserted into the pleural cavity, air is aspirated from it while the lungs are inflated, and the tube is removed.

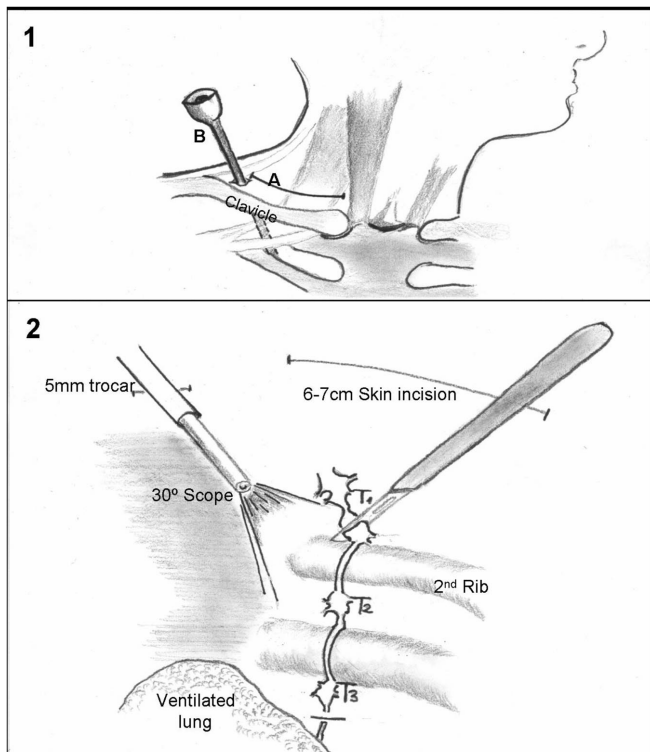


Figure 1. (1) Localization of skin incisions: A. 6-cm to 7-cm skin incision, 1cm above and parallel to the clavicle; B. A 5-mm trocar is introduced 1cm lateral to the primary incision. (2) Visual control enables identification of the sympathetic trunk and ganglia and safe resection of the T2-T3 segment.

DISCUSSION

The determination of our patient to undergo 3 anesthetics and 2 surgical procedures emphasizes the scope of the problem PPH presents, and underlines the perseverance of these patients in their search for a solution to their problem.

Air embolism during thoracoscopy should always be born in mind. When suspected, prompt diagnosis and immediate therapeutic measures are mandatory to prevent severe morbidity or mortality. The classical open approach was never indicated in our practice after the introduction of the thoracoscopic technique in the early 1990s. This case was an exception, because we were not prepared to attempt re-thoracoscopy due to the risk of air embolism. We chose, therefore, to offer to the patient the classical open supraclavicular sympathectomy approach. This procedure used to be our standard surgical approach for PPH more than 2 decades ago.⁵ The results were satisfying, yet the procedure required exceptional expertise. The vast experience in this technique of one of the authors (HM) facilitated surgery. We managed to improve the approach by the assistance of videoscscopy instead of manual palpation, which facilitated detection of the sympathetic chain and determining the level of ganglia.

CONCLUSION

Laparoscopic instrumentation and technology can be used to improve open procedures, especially when exposure and visibility are limited. Indeed, in the present case it proved to be very helpful and made the identification of the sympathetic structures very easy.

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