

# Injury of an Aberrant Subclavian Artery: A Rare Complication of Video Assisted Thoracoscopic Esophagectomy

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**An aberrant right subclavian artery is an uncommon anomaly. When associated with esophageal cancer, it can cause diagnostic confusion as the symptoms are similar. If unrecognized and injured during esophageal surgery, it can lead to disastrous complications. We report a patient in whom this aberrant artery was injured during a thoracoscopic mobilization of the esophagus. The embryological and radiologic aspects of this anomaly and its clinical significance are discussed. Pre-operative diagnosis will require a high index of suspicion, as the clinical and radiological features are not specific. If injury occurs, an immediate vascular reconstruction will prevent limb ischemia and hence knowledge of this entity is of utmost importance. (Ann Thorac Cardiovasc Surg 2005; 11: 35–7)**

**Key words:** aberrant subclavian artery, dysphagia lusoria

## Introduction

An anomalous right subclavian artery arising from the descending thoracic aorta is an unusual, though a well described entity. The incidence varies from less than 1% to 2% in literature.<sup>1-3)</sup> Damage to this artery during esophageal surgery may lead to disastrous complications. Pre-operative diagnosis may not be always possible because of the rarity of the anomaly. Further, dysphagia, if present, may well be because of the esophageal pathology and therefore may not help in diagnosis. We report a case of a Video Assisted Thoracoscopic (VAT) mobilization of the esophagus for a middle third esophageal malignancy, where the aberrant artery was transected, but successfully re-anastomosed.

## Case Report

A 55-year-old woman presented to us with dysphagia for the last 6 months. Upper gastrointestinal endoscopy re-

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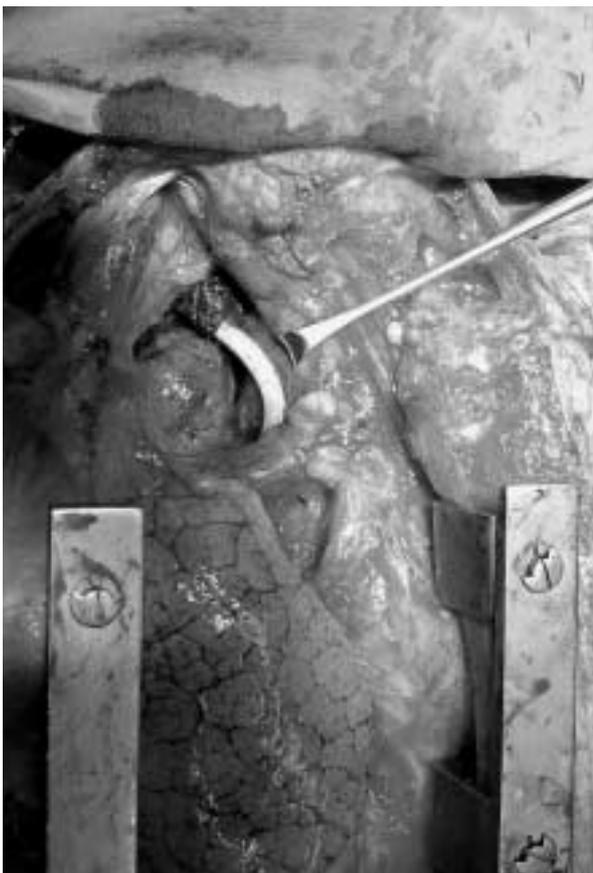
vealed a growth at 25 cm. The barium studies showed a filling defect corresponding to the primary tumor (Fig. 1). The computerized tomography (CT) scan showed a resectable middle third esophageal growth. A VAT mobilization of the entire thoracic esophagus was carried out. To aid in mediastinal nodal clearance the esophagus was transected and stapled using a linear endoscopic stapler. A complete mediastinal nodal dissection was carried out and the patient was shifted to the supine position. Gastric tube mobilization along with bilateral neck nodal dissection was done simultaneously by two teams. On delivering the cut esophageal stump in the left cervical incision, a cut and stapled retro-esophageal subclavian artery was identified. A polytetrafluoroethylene interposition graft was placed between the aortic arch and the subclavian artery via a median sternotomy (Fig. 2). The esophago-gastric anastomosis was then carried out. The patient recovered completely with no vascular deficit and was discharged on the 12th postoperative day.

## Discussion

The right subclavian artery arises from the right brachiocephalic artery just above or below the right sternoclavicular joint. Embryologically, the proximal part of



**Fig. 1.** Barium swallow showing filling defect in the middle third esophagus.



**Fig. 2.** Polytetrafluoroethylene interposition graft between the arch aorta and right subclavian artery.

the right subclavian artery develops from the right fourth primitive aortic arch artery and the distal from the seventh intersegmental artery.<sup>4)</sup> The right subclavian artery normally arises from the brachiocephalic trunk. Abnormal involution of the fourth right aortic arch causes the persistence of the intersegmental artery which assumes a retroesophageal position.<sup>5,6)</sup> In a case with an anomalous right subclavian artery, the recurrent laryngeal nerve is generally 'non recurrent' and its absence during right recurrent laryngeal nodal dissection should help in preempting the diagnosis of an aberrant subclavian artery.<sup>7)</sup>

Successful identification and preservation of this artery during esophageal mobilization has been described in two cases where a transhiatal esophagectomy was performed.<sup>3,8)</sup> This is the first report where an aberrant subclavian has been encountered during a thoracoscopic mobilization. An inability to palpate pulsations due to the thoracoscopic procedure prevent its identification and preservation as opposed to a transhiatal/trans thoracic approach. Hence, the presence of this entity has to be kept in mind during thoracoscopic esophageal mobilization.

Normally, this anomaly causes no symptoms unless there is compression on the trachea or the esophagus. When present in isolation it may cause dysphagia (dysphagia lusoria). However, when associated with an esophageal carcinoma, the dysphagia is causally attributed to the growth and the aberrant artery may be missed on im-



**Fig. 3.** CT scan showing an abnormal vascular structure posterior to the esophagus.

aging studies. Pre-operative diagnosis will require a very high index of suspicion and a very keen scrutiny of the radiologic investigations. Characteristically barium studies show a diagonal impression at the level of the fourth thoracic vertebra.<sup>5)</sup> Hara et al. studied the radiographic findings in 25 cases with pre-diagnosed aberrant artery on CT scans. On lateral radiographs, a posterior tracheal imprint was seen in 95% of the patients.<sup>9)</sup> In a study by Fockens et al., endoscopic ultrasound was able to pick up an aberrant subclavian artery in 6/1,629 patients.<sup>10)</sup> However this study was directed towards picking up this particular vascular abnormality only and hence was very sensitive. In patients suspected to have symptoms of dysphagia lusoria in absence of other causes of dysphagia, endoscopic ultrasound may be a helpful tool. A CT scan may help, but in this aberrant location, it may get easily confused with the azygous vein. On retrospective review of the CT scan of our patient, an abnormal vascular structure arising from the descending thoracic aorta was indeed seen (Fig. 3)! Most studies evaluating radiologic investigations have been performed on proven cases of an aberrant right subclavian artery or with an intention of finding this anomaly and therefore may not actually translate into picking this rare anomaly pre-operatively. Previous reports document a 30% to 45% incidence of limb ischemia in patients undergoing ligation (without reconstruction) of an aberrant right subclavian artery.<sup>11,12)</sup> Hence, prompt reconstruction of the artery is necessary to prevent critical limb ischemia.

## Conclusion

Knowledge of this entity, a pre-operative identification if possible and careful dissection especially in a thoracoscopic mobilization, will help in preventing disastrous vascular complications in patients with an aberrant right subclavian artery. If inadvertently injured during surgery, prompt recognition and immediate establishment of vascular continuity with an interposition graft will prevent limb ischemia.

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