



胸腔外科困難個案討論會



Mediastinal growing teratoma syndrome

高雄醫學大學附設醫院胸腔外科

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Case presentation



- 17-year-old healthy male adolescent
- Worsening chest pain and dyspnea for 2 weeks
- A chest X-ray revealed a large anterior mediastinal mass

2015.08 vs 2018.05





Case presentation



- $13 \times 12 \times 7$ cm measured on chest CT
- Inhomogeneous components
- CT-guided biopsy: nonseminomatous germ cell tumor



Biopsy: Nonseminomatous GCT





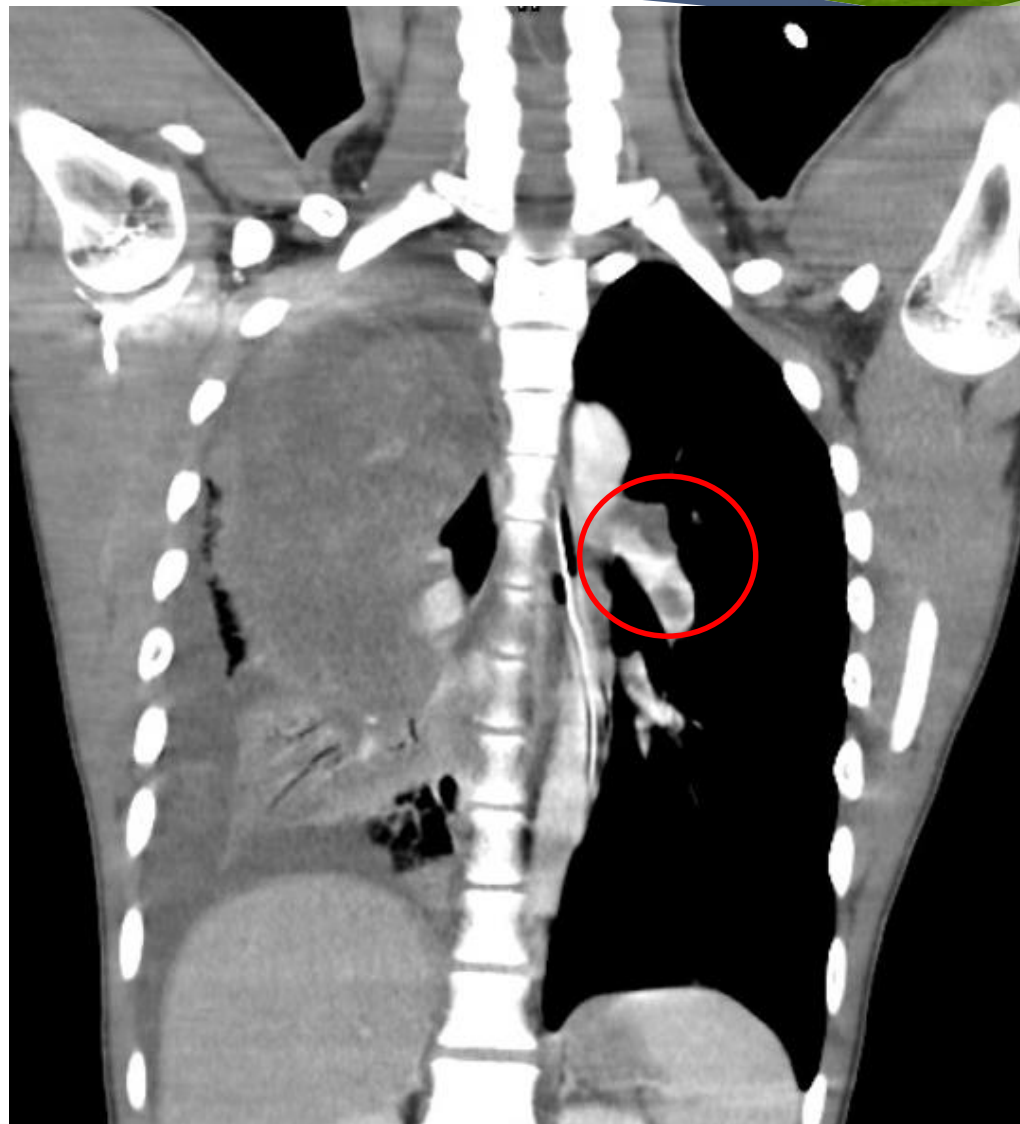
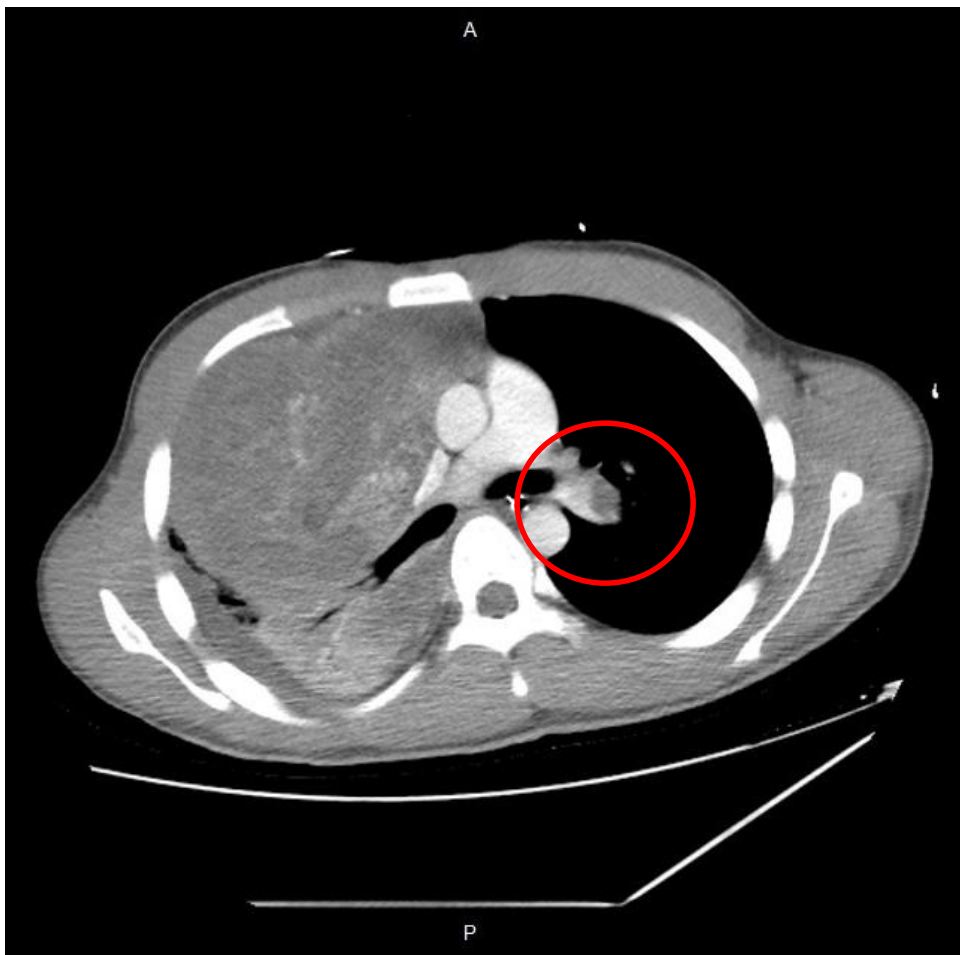
Case presentation



- Refer to pediatric oncologist
- Bone scan: no metastasis
- Abdominal CT: no intraabdominal lesion or testicular mass
- 1st course VIP induction chemotherapy initiated in 2018.05
 - Etoposide
 - Ifosfamide
 - cisplatin

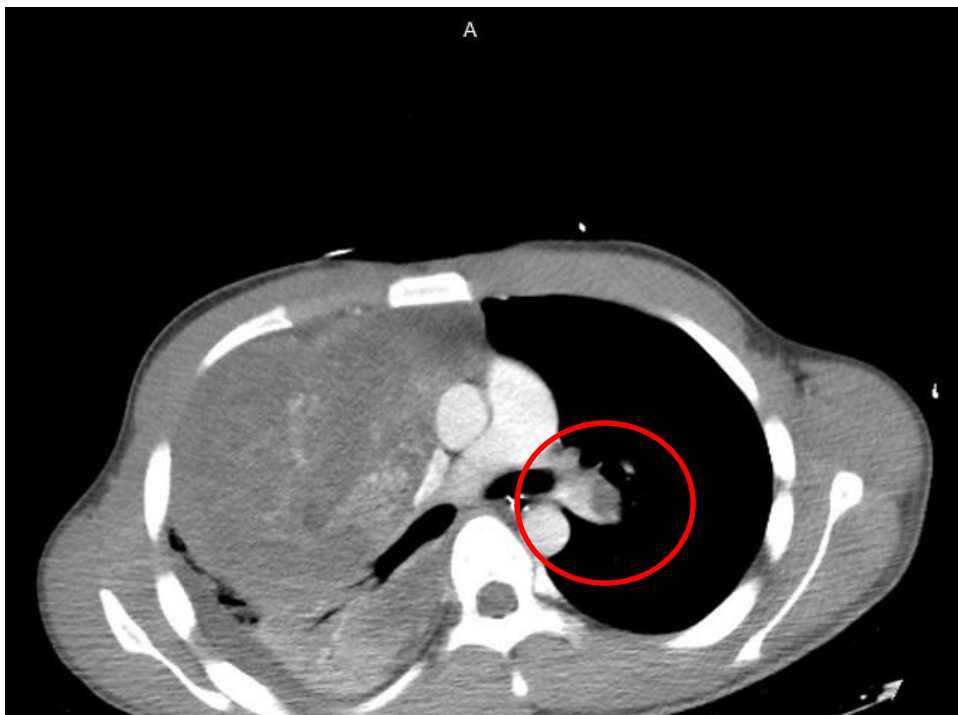


PE during 1st VIP chemotherapy

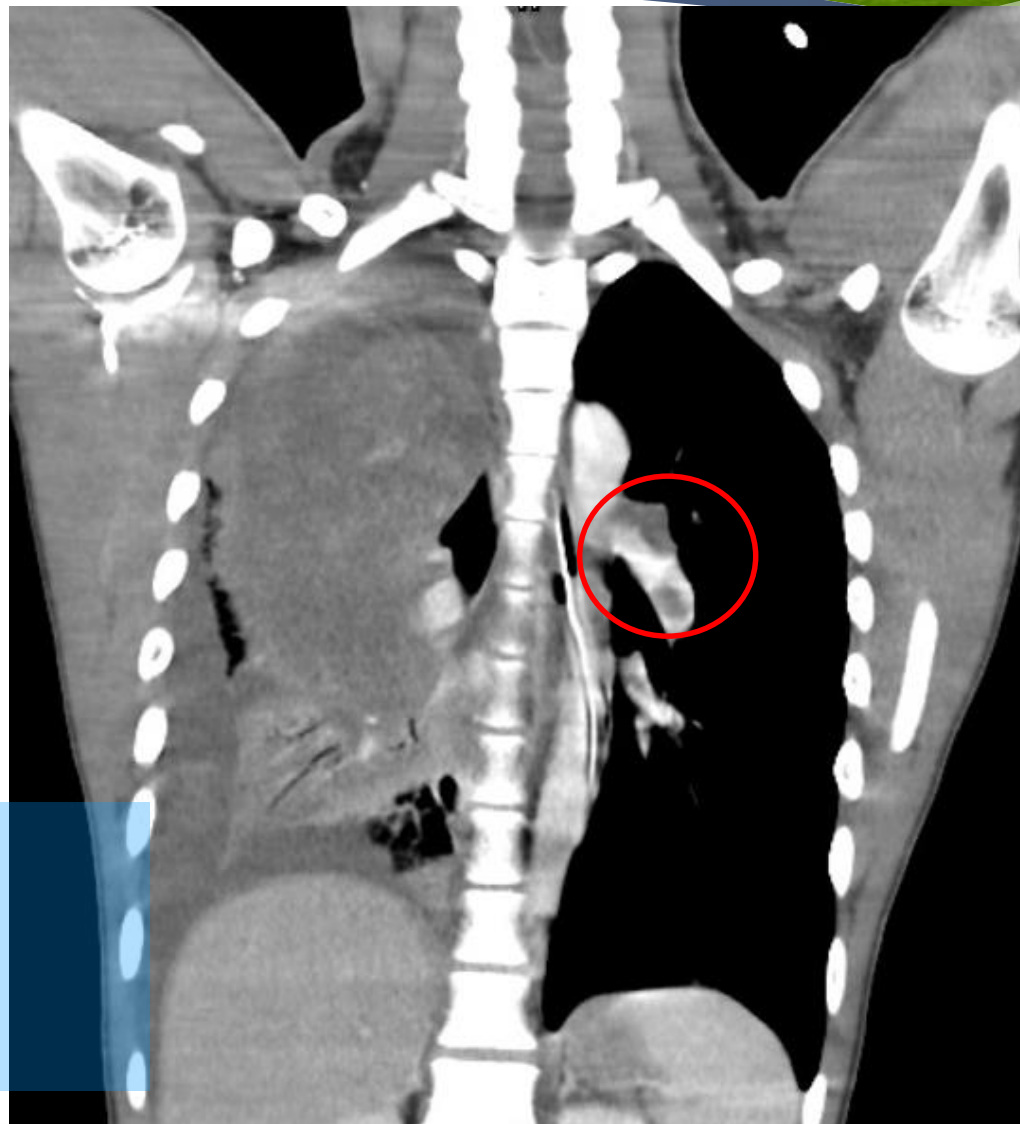




PE during 1st VIP chemotherapy

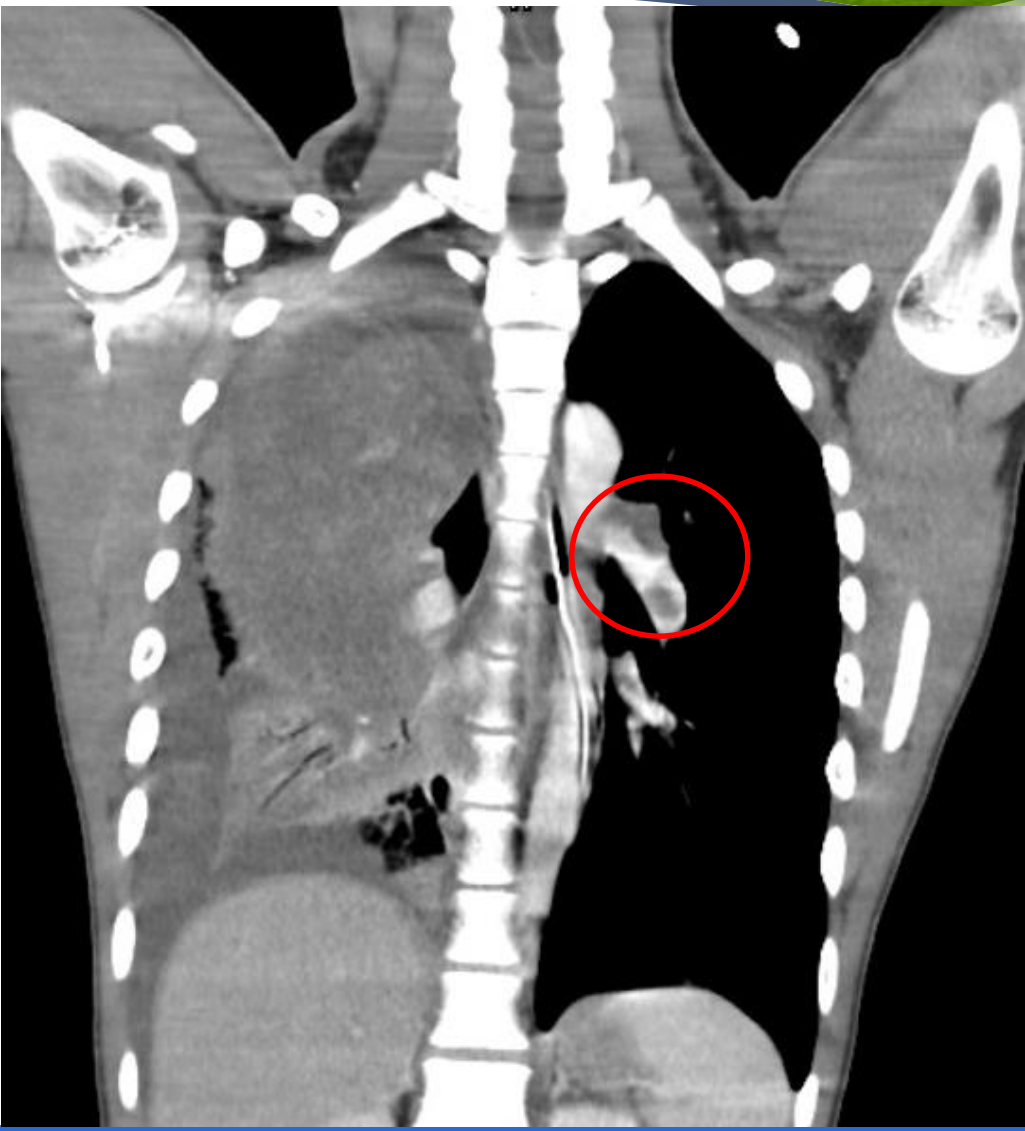
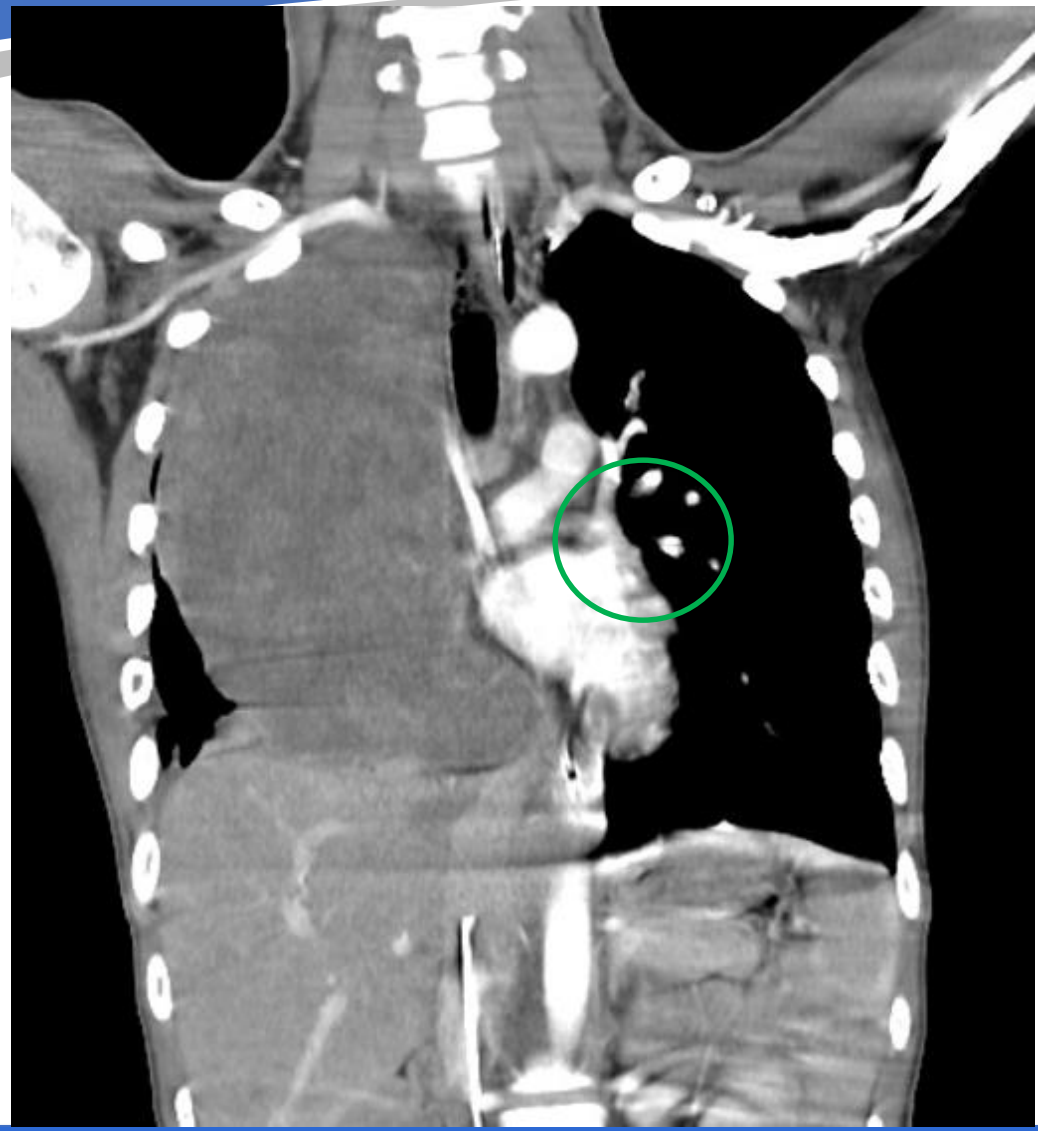


EKOS catheter-directed
thrombolysis





3 weeks after treatment of PE



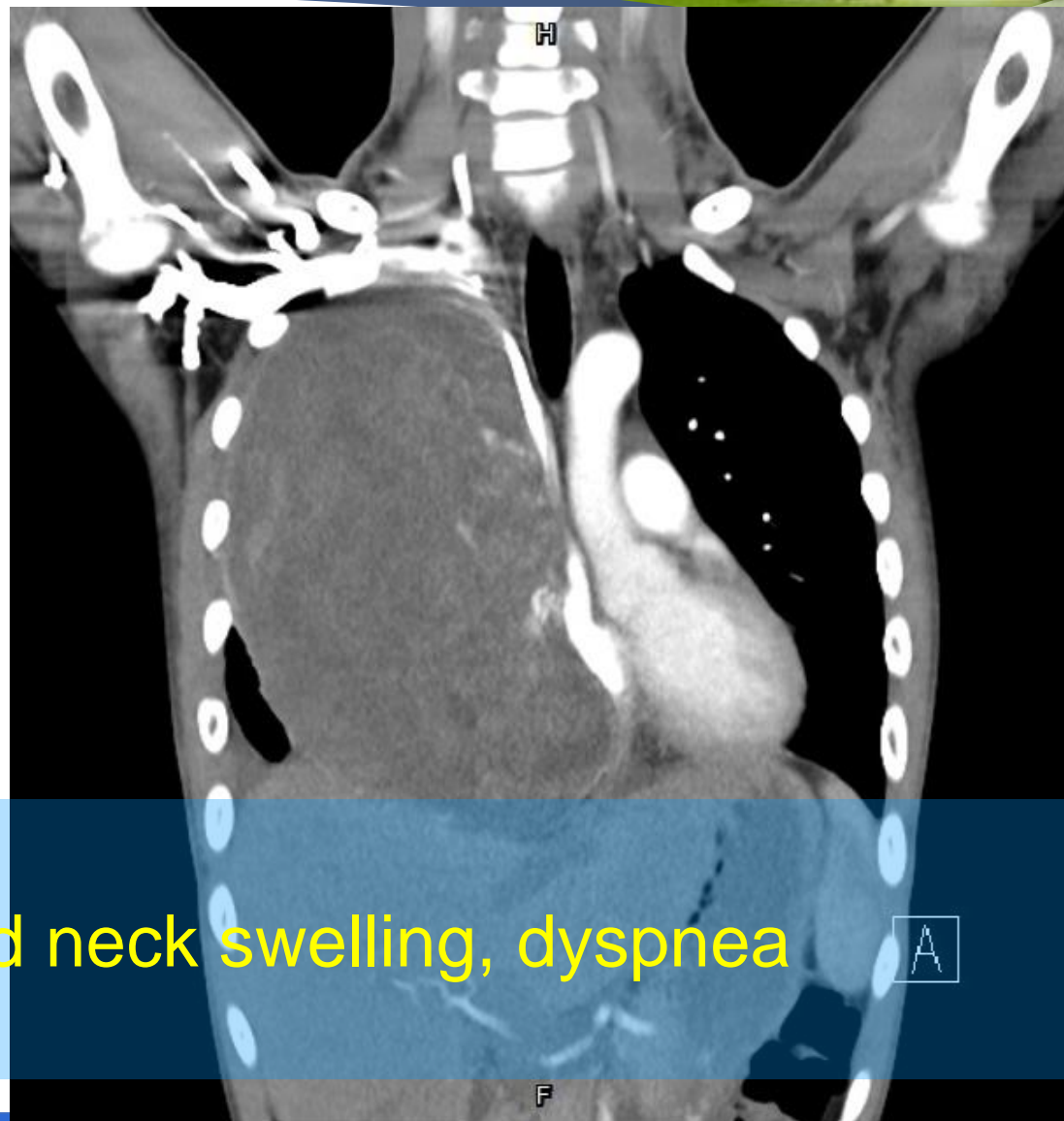


4 weeks after 2nd VIP chemotherapy





4 weeks after 2nd VIP chemotherapy



Clinical S/S: facial and neck swelling, dyspnea

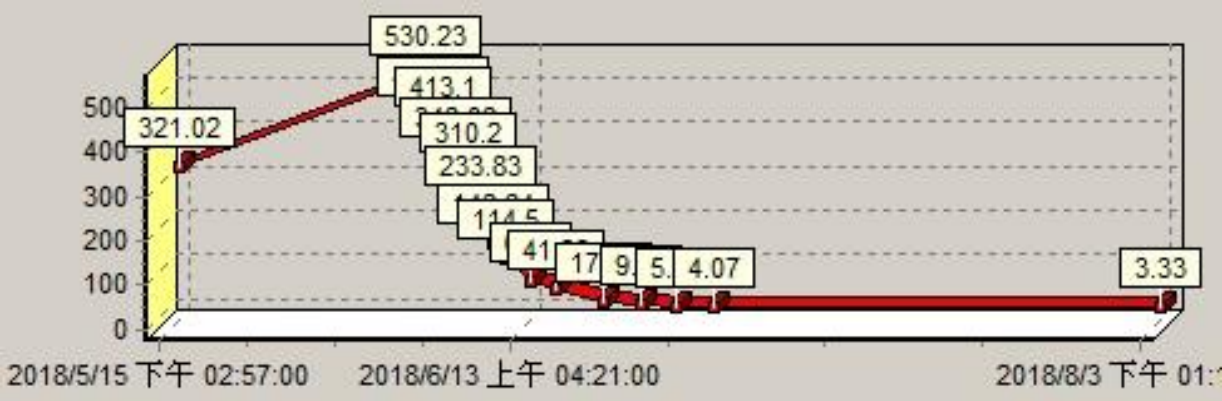




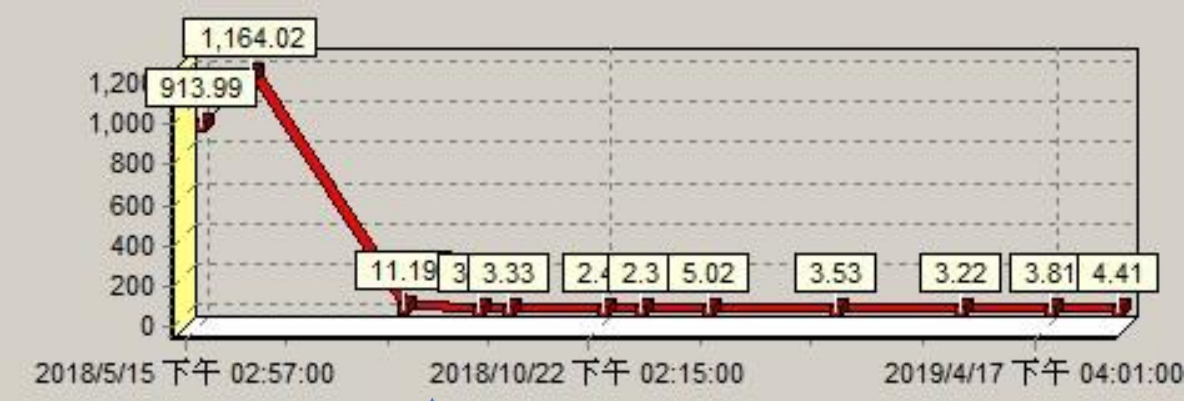
Trend of tumor marker



β -HCG



AFP



Operation day
in 2018.08



Growing teratoma syndrome



Growing teratoma syndrome



- Enlargement of a nonseminomatous GCT despite appropriate systemic chemotherapy
- Normalization of serum tumor markers
- Absence of pathologic component other than mature teratoma
- Requires salvage surgery

Logothetis, et al. *Cancer* 1982



Growing teratoma syndrome



- Enlargement of a nonseminomatous GCT despite appropriate systemic chemotherapy
- Normalization of serum marker levels
- Absence of pathologic component other than mature teratoma
- **Requires salvage surgery !**

Logothetis, et al. *Cancer* 1982

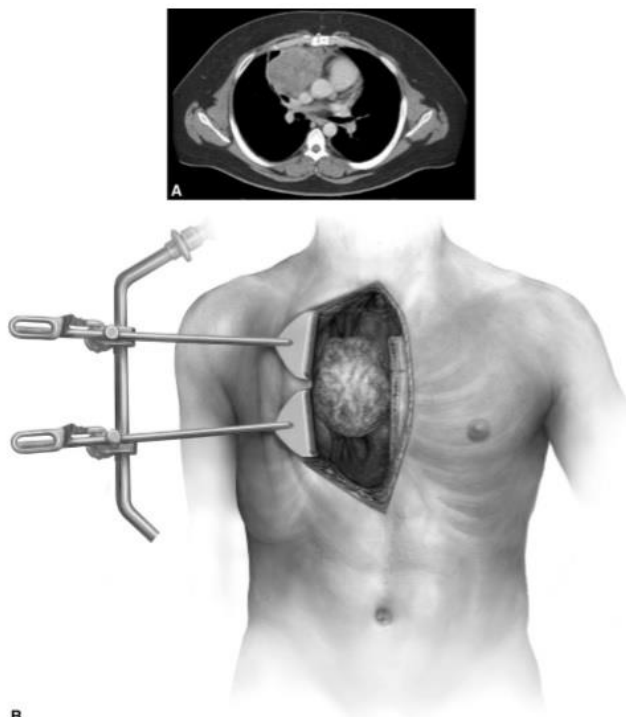


Operative approach

Technique for mediastinal GCT resection

56

K.A. Kesler



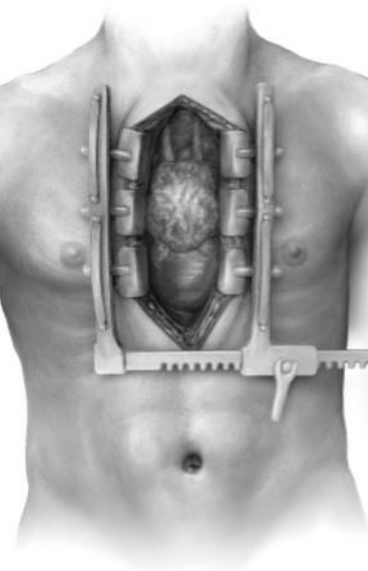
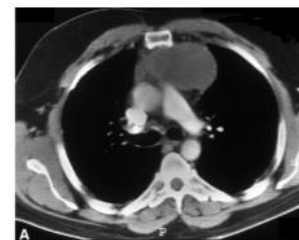
B

Figure 2 (A) CT of a patient who underwent a sternotomy approach to remove a moderate-sized RM after chemotherapy. Note extension into the right pulmonary hilum in addition to the substernal component. (B) With the use of sternal retractors used to mobilize internal thoracic arteries for coronary bypass procedures and instruments designed for minimally invasive pulmonary surgery, en-bloc pulmonary resection can be accomplished through this approach. In this case, extension into the pulmonary hilum precluded wedge resection. En-bloc right upper and middle lobectomies and pericardectomy with resection of the right phrenic nerve resection were required. Although a clamshell approach could have been utilized in this patient, the sternotomy approach facilitated recovery. The sternotomy approach also provided better exposure to the anterior compartment as compared with a thoracotomy approach.

Mediastinal germ cell tumor resection

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Operative Technique



B

Figure 1 (A) CT of patient who underwent a sternotomy approach to remove a moderate-sized RM after chemotherapy. Note the RM is substernal with no extension toward either pulmonary hilum, which makes sternotomy the approach of choice. (B) Standard sternotomy approach to this residual mass. Only en-bloc removal of the thymus and pericardium was required in this case.



Technique for mediastinal GCT resection

Mediastinal germ cell tumor resection

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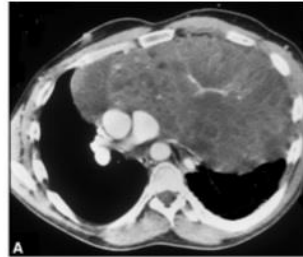


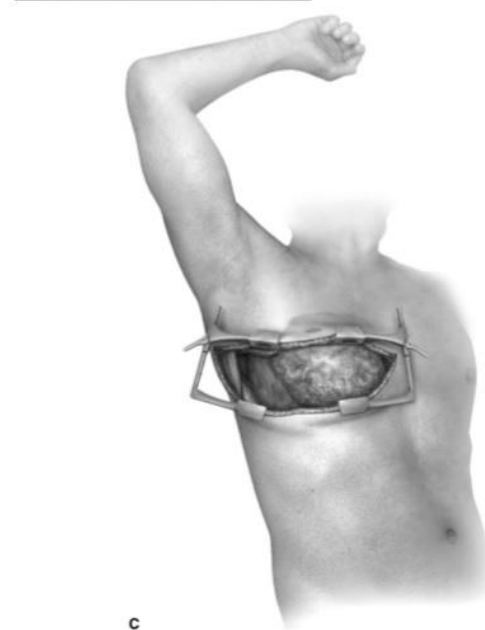
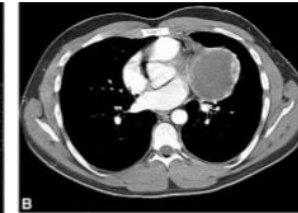
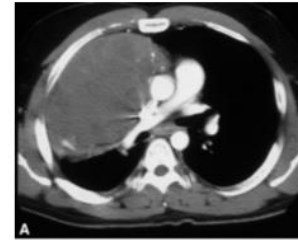
Figure 3 (A) CT of a patient who underwent a clamshell approach to remove a large RM after chemotherapy. Note a large substernal component with significant extension into the left pleural space with effacement of pulmonary hilum. (B) Patient positioning is supine with both arms crossed, padded, and then secured to an ether screen above the head. In this case, the incision extended from the right mid clavicular line to the leftward mid axillary line. En bloc left brachiocephalic vein, left upper lobectomy, and pericardectomy was required based on intraoperative findings.



B

60

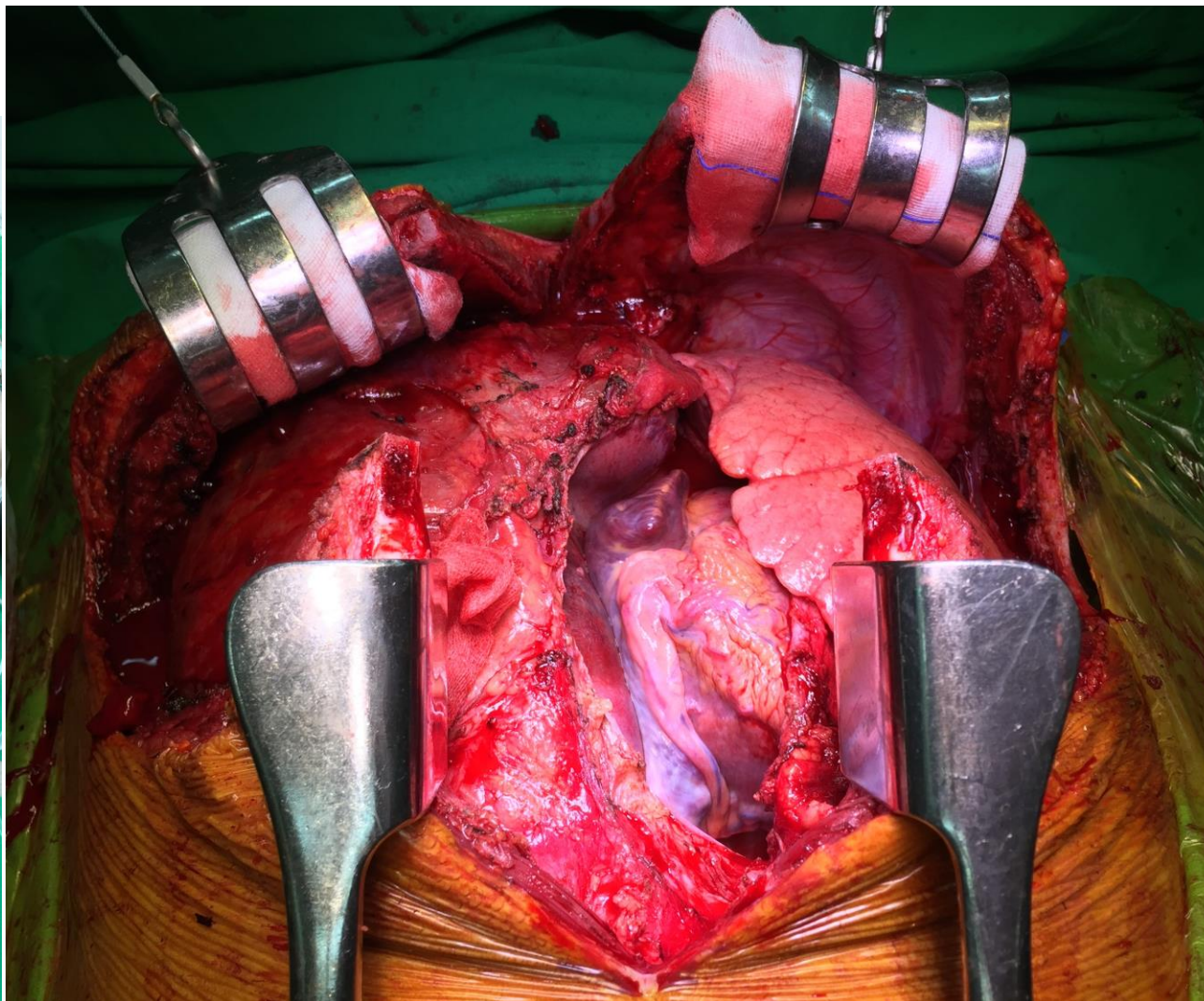
K.A. Kesler



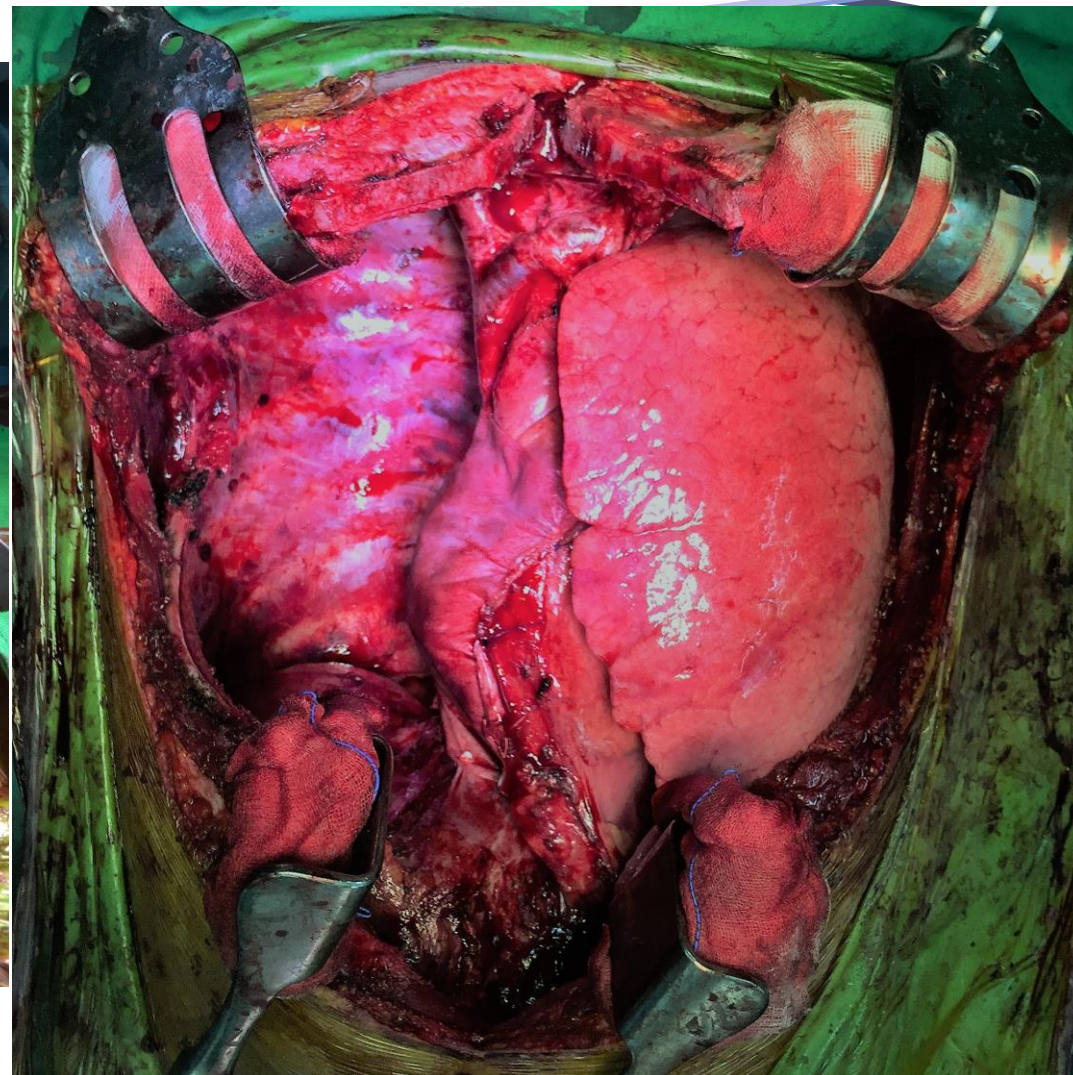
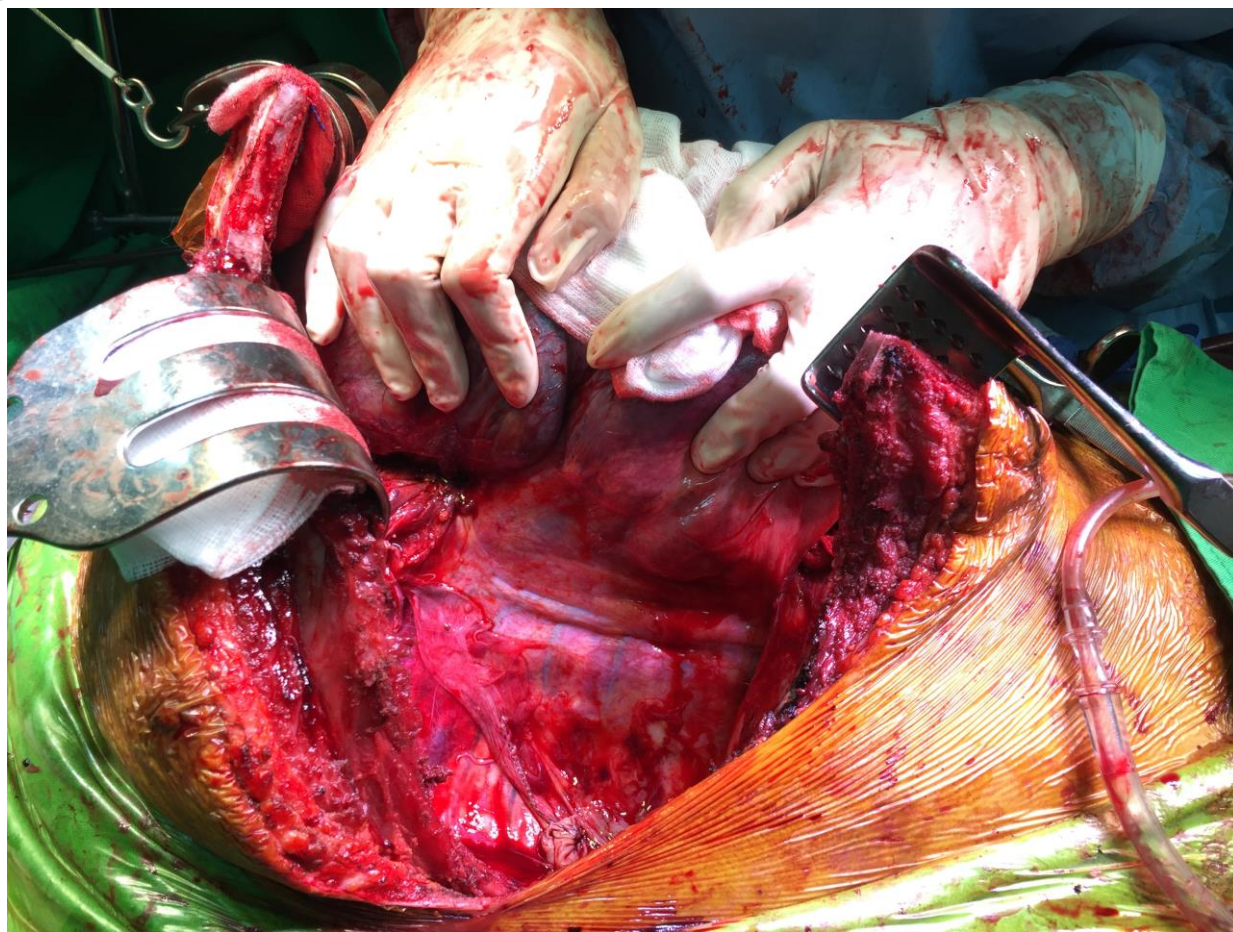
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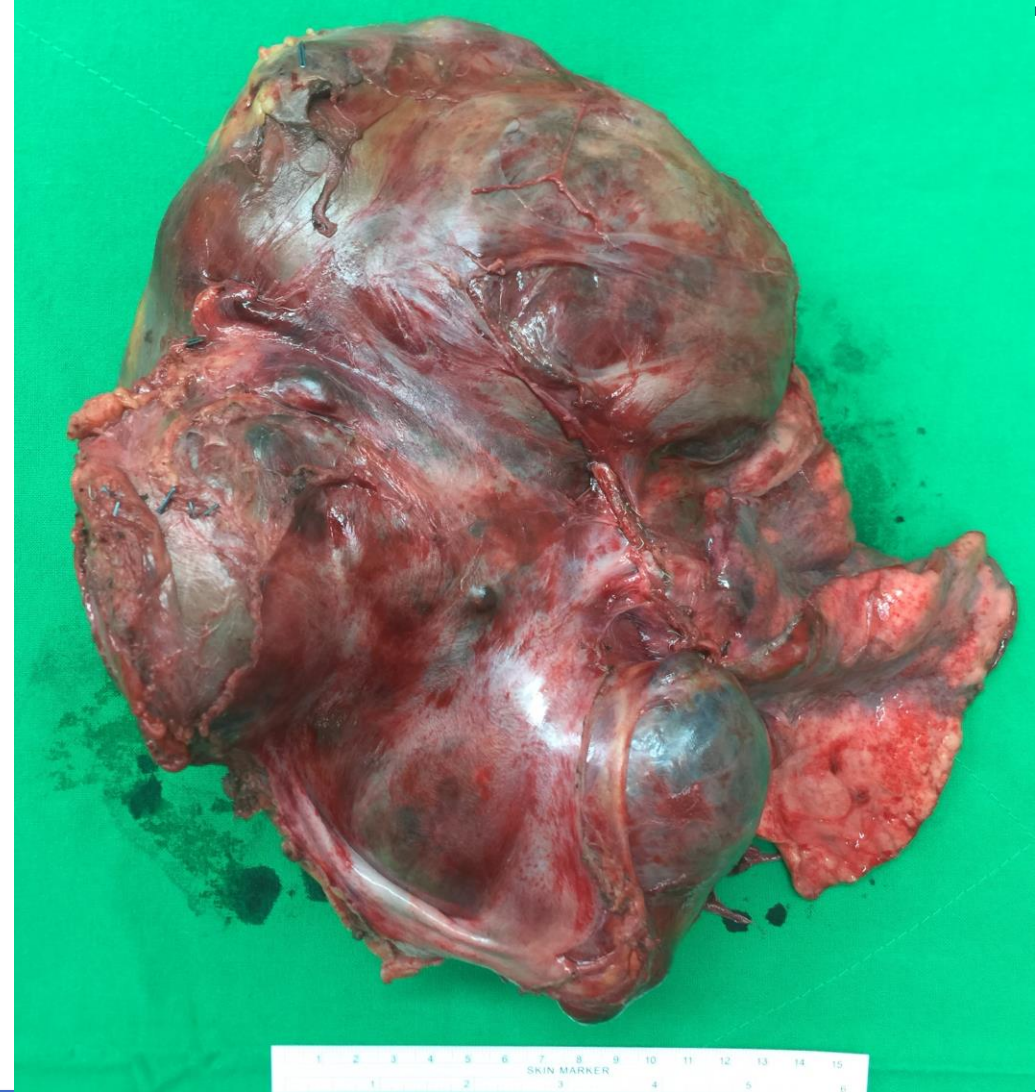
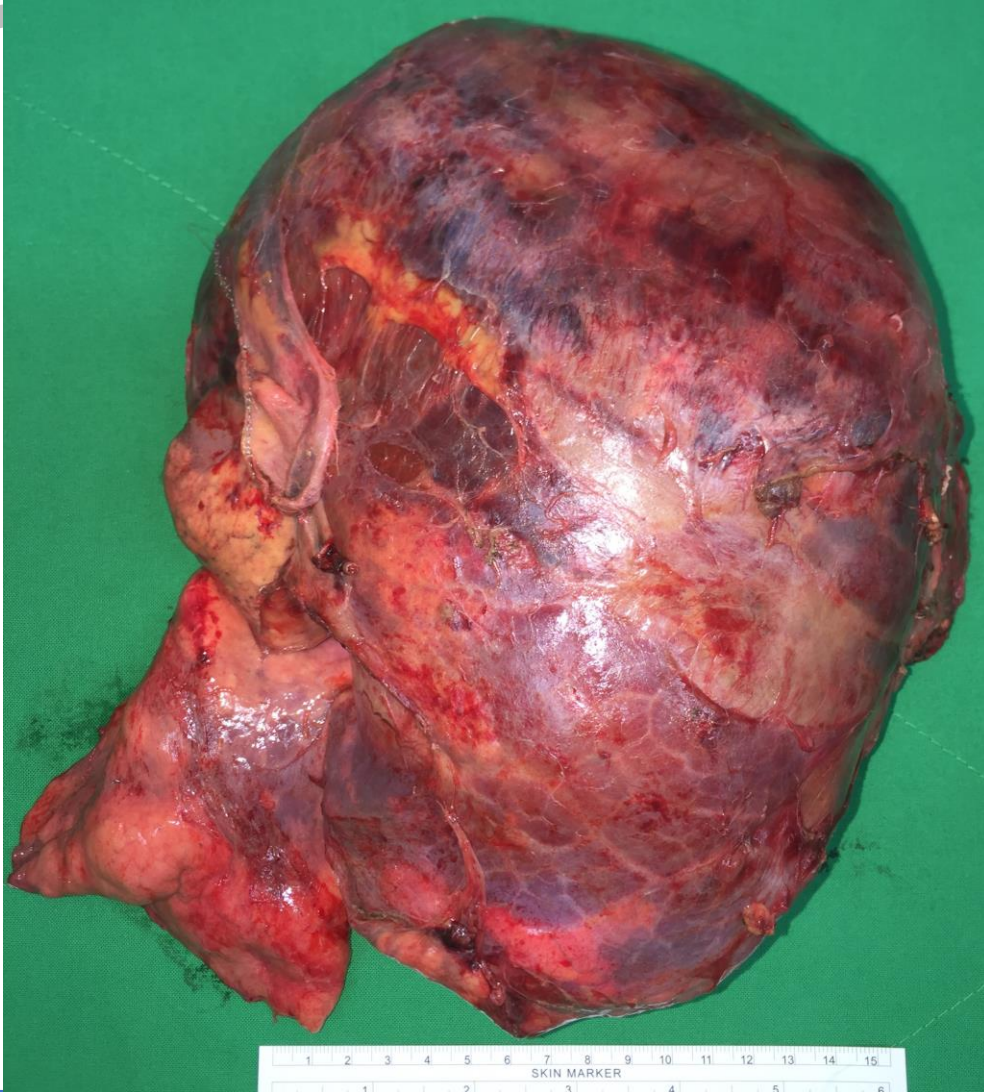
Clamshell + median sternotomy in 2018.08



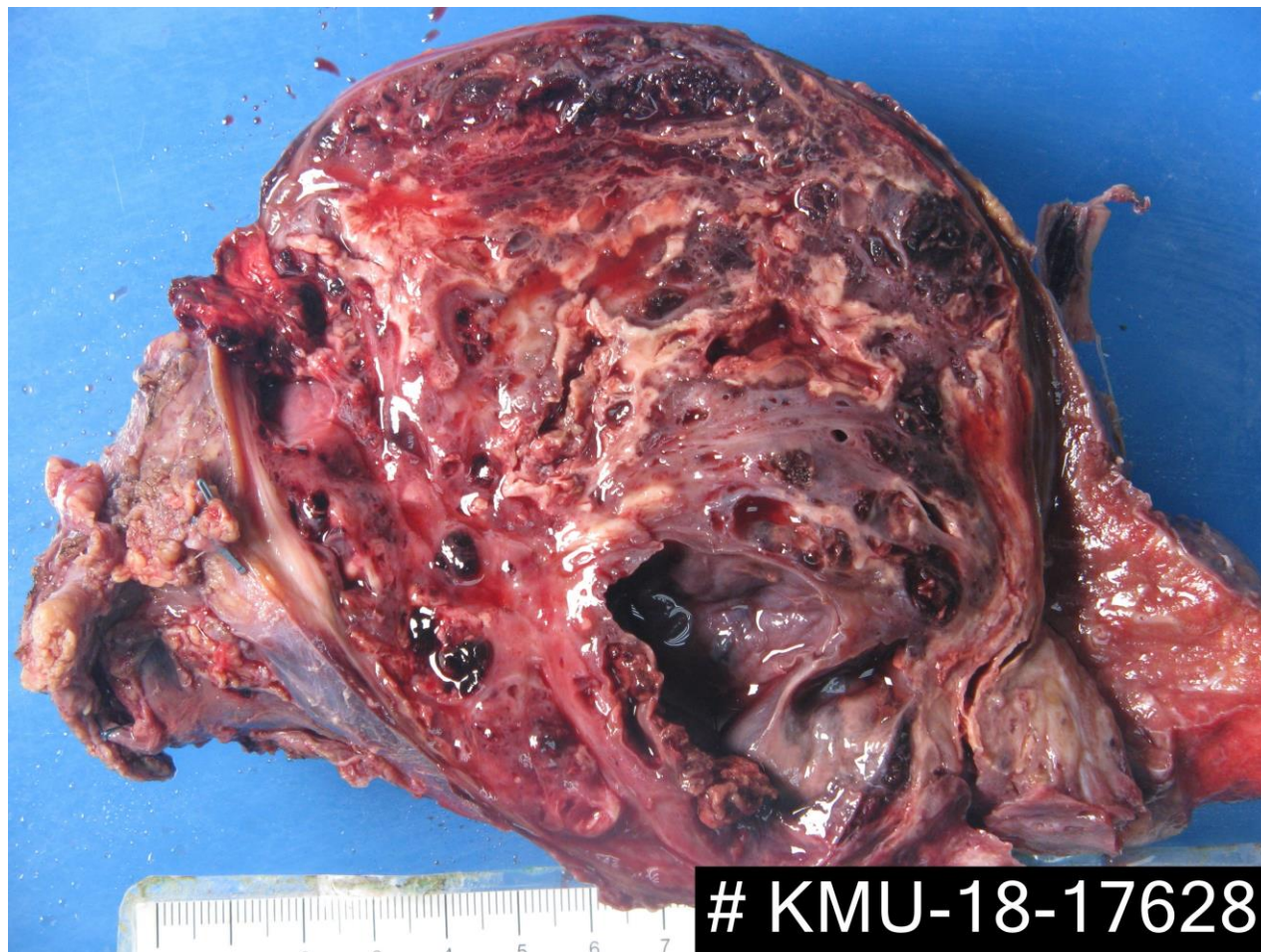
Under cardiopulmonary bypass



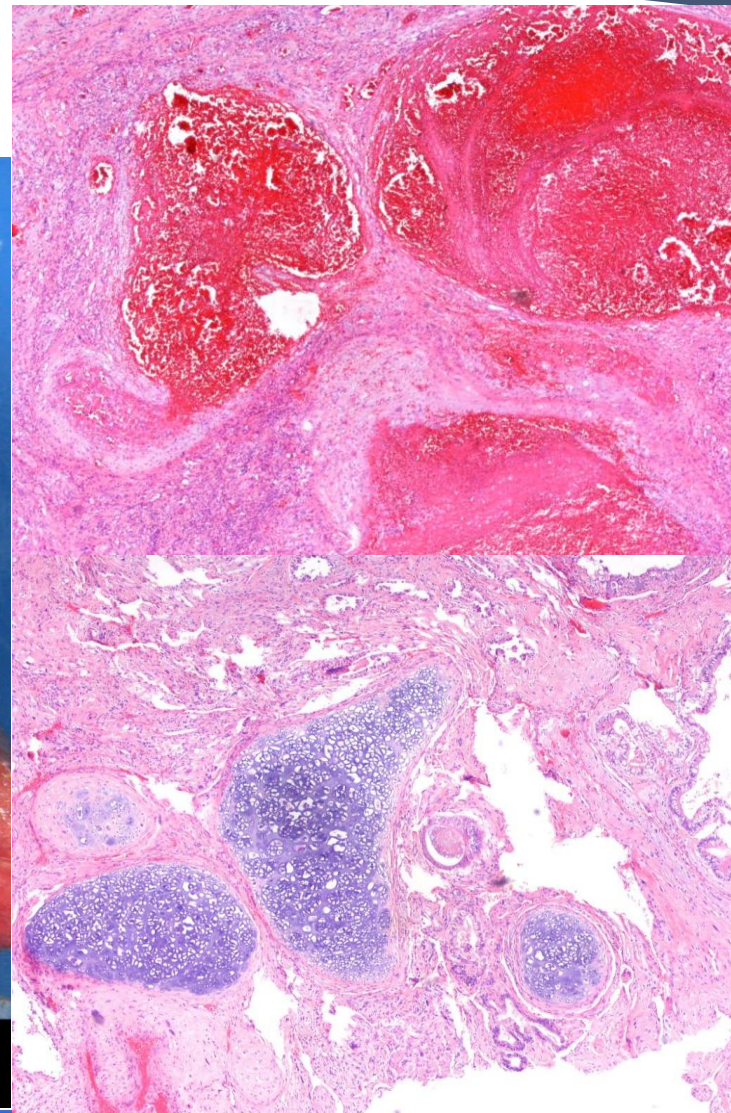
Specimen: 28x19x9 cm, 2200 gm



Microscopic feature of pathology



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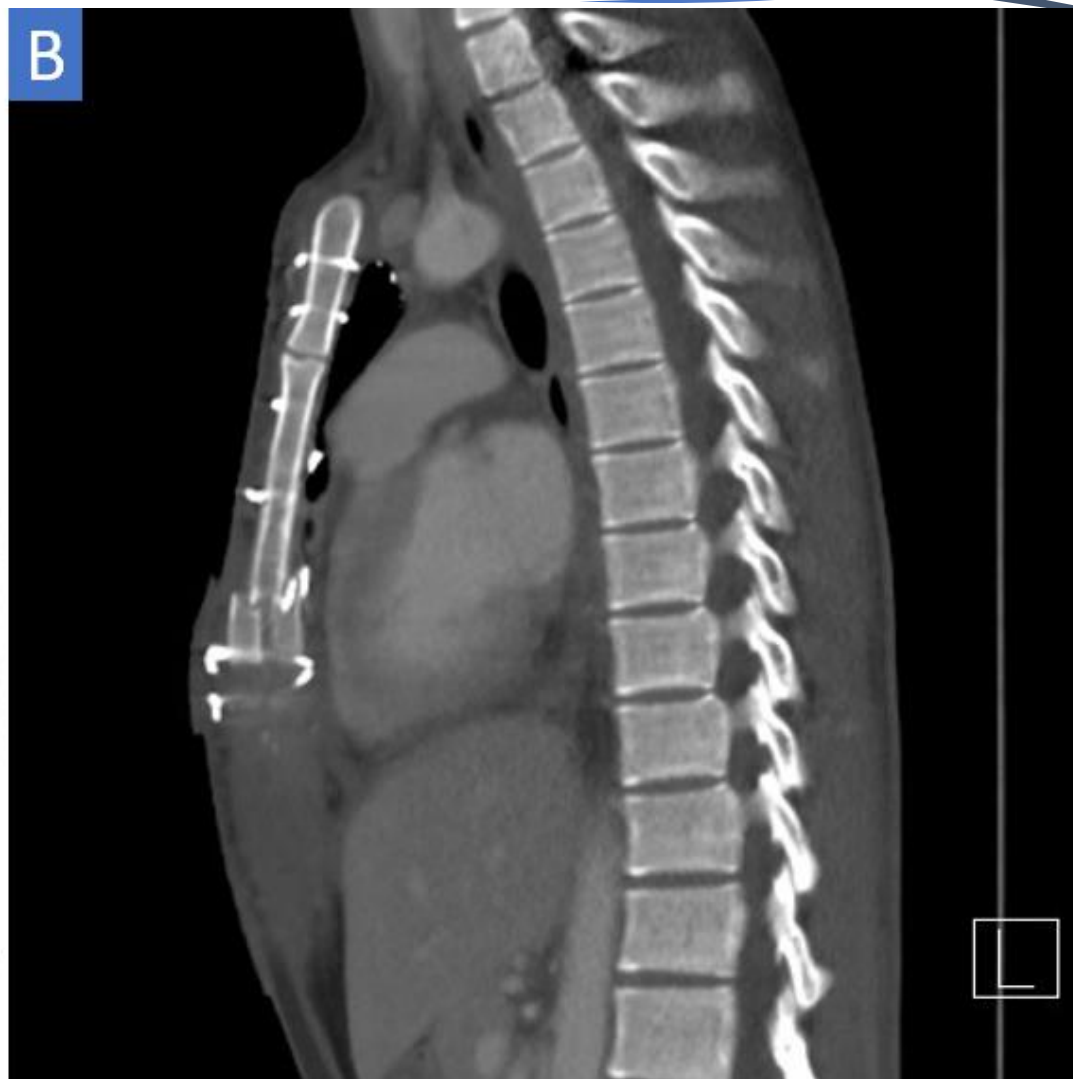
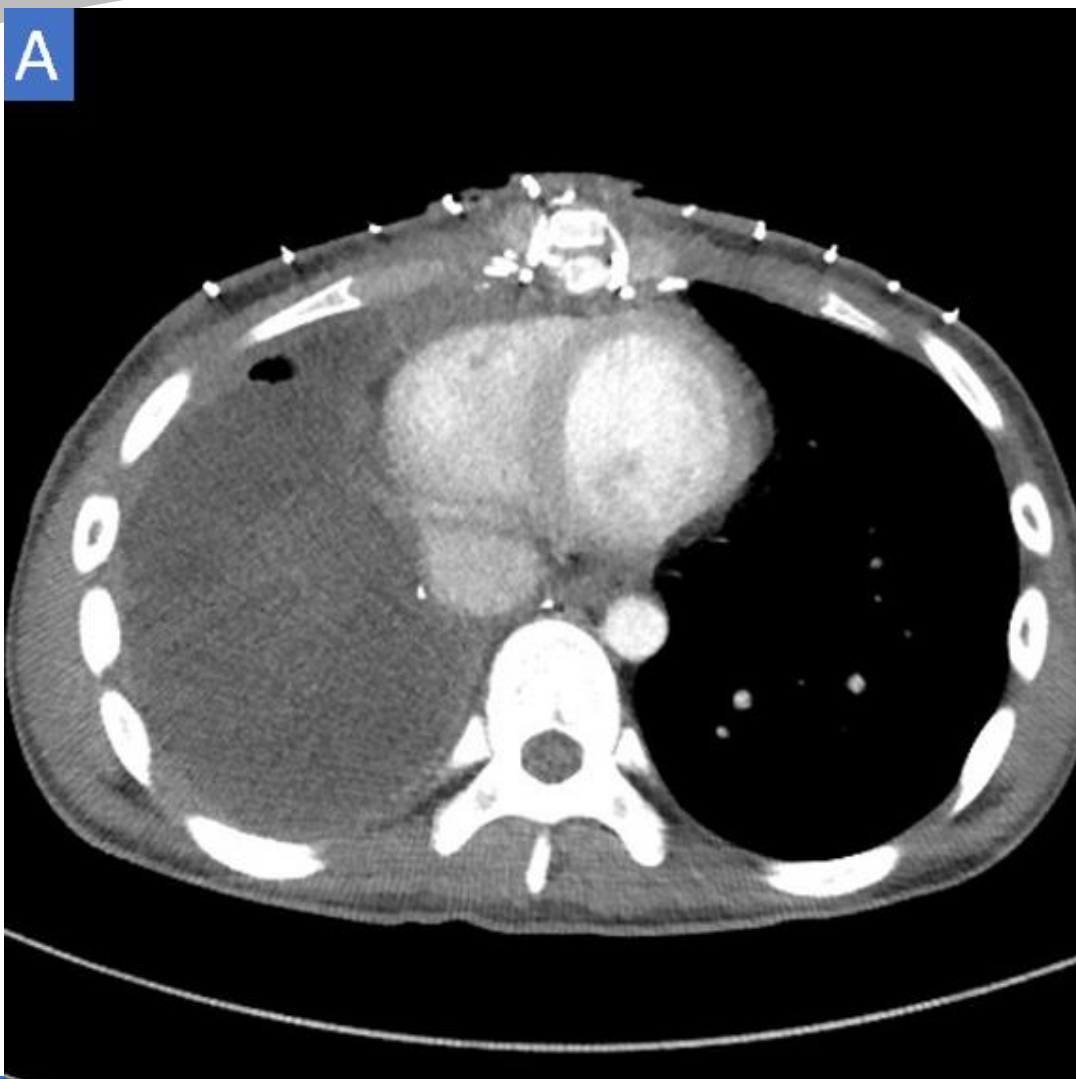


H&E 40X

H&E 100X



Postoperative sternal separation



POD 15 vs POD 60 vs POD 90





Review of GTS



- Most cases of GTS are found in the retroperitoneum
- Mediastinum is one of many alternative sites of metastasis
- A total of 18 cases of mediastinal GTS have been documented since 1990

Zheng. *Surg Endosc* 2019



Review of the literature

Table 1 Literature review of mediastinal GTS cases

Author/year	Age/ sex	Presenting symptoms	Surgical approach
Chen 1990	21M	Shoulder pain, SVC syndrome	Left thoracotomy
Afifi 1997	28 M	Chest PAIN	Clamshell thoracotomy ^a
	20 M	Dyspnea, severe compressive symptoms during chemotherapy	Clamshell thoracotomy
Yoshioka 2000	27 M	Incidental discovery on surveillance CT	Laparotomy, left thoracotomy
D'Aiuto 2005	30 M	Development of SVC syndrome between chemotherapy	Clamshell thoracotomy with upper hemisternotomy and en bloc resection of thymus, phrenic nerve, innominate vein, and right lung
Aide 2007	18 M	Enlarging lesion on surveillance CT	Unknown
Agatsuma 2011	43 M	Dyspnea during chemotherapy	Tracheal stent, median sternotomy
Hirai 2011	39 M	Tumor growth on imaging despite systemic chemotherapy	Midline sternotomy with en bloc resection of pericardium, innominate vein, the thymus, and right upper pulmonary lobe
Kesler 2012	20 M	Cardiopulmonary deterioration during chemotherapy	Clamshell thoracotomy with pericardiectomy
	22 M	Cardiopulmonary deterioration during chemotherapy	Clamshell thoracotomy with pericardiectomy
	33 M	Cardiopulmonary deterioration during chemotherapy	Clamshell with resection of the right phrenic nerve, left innominate vein, and right upper/middle lobectomies
	23 M	Cardiopulmonary deterioration during chemotherapy	En bloc extrapleural pneumonectomy
	20 M	Cardiopulmonary deterioration during chemotherapy	En bloc left upper lobectomy, resection of the left phrenic nerve, and subtotal pericardiectomy via combined sternotomy and left thoracotomy
Iwata 2015	20 M	Incidental discovery on CXR followed by rapid growth	Sternotomy with thymectomy
Matsuoka 2019	26 M	Tumor growth on imaging despite systemic chemotherapy	Median sternotomy, resection
Sachdeva 2019	24 M	Worsening dyspnea during chemotherapy	Median sternotomy, resection
	21 M	Chest pain, dyspnea during chemotherapy	Median sternotomy, resection
	22 M	Chronic cough, weight loss	Right middle lobectomy via posterolateral thoracotomy



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Incidence: 2.6% (5/188) from 1981 to 2009

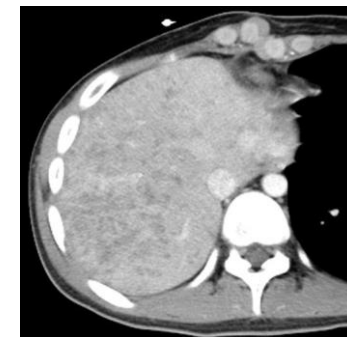
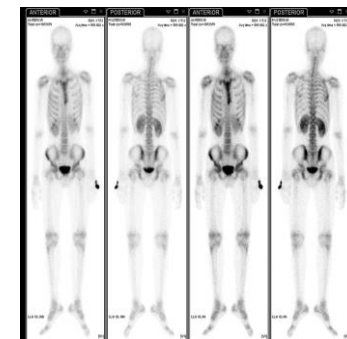
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Prognosis of the patient



- Development of spleen angiosarcoma in 2018.09
 - malignant transformation of teratoma?
- Bone and liver metastases in 2018.09 & 11
 - tumor dissemination from cardiopulmonary bypass?
- Adjuvant chemotherapy during 2018.10~2019.05
- Still alive in 2019.11





Summary



- Diagnosis and surgery are challenging for mediastinal growing teratoma syndrome
- With proper operative planning, favorable outcomes can be attained with complete resection despite the characteristic rapid growth and massive size of these neoplasms



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Kaohsiung Medical University Chung-Ho Memorial Hospital

THANK YOU

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