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CLINICAL MEET

**VIDEO ASSISTED THORACOSCOPIC
SURGERY- THORACIC DUCT CLIPPING
IN POST CABG WITH CHYLOTHORAX**

Presenter: Dr. Vijay Sai Reddy (PG Resident)



INTRODUCTION

Incidence of chylothorax in CABG is very rare.

A thorough review of literature revealed less than 50 cases in 2023 of which 6 cases were treated with left sided VATS

The incidence of chylothorax was

- 1) 0.4–4% noted in esophageal procedures**
- 2) 2.5%–4.7% in congenital heart surgeries**

CASE REPORT

- **A 49-year-old lady, known hypertensive presented with chest discomfort, sweating and palpitations with features of angina.**
- **Coronary angiography revealed critical triple vessel (CAD) Disease.**
- **She underwent Off pump CABG procedure.**
- **During CABG, pedicled LIMA was anastomosed to left anterior descending (LAD) artery, radial to obtuse marginal(OM) and great saphenous vein to posterior descending artery (PDA) respectively.**
- **She had an uneventful perioperative course but on the second day a milky chylous discharge was noticed from her left pleural drain, about 1400 ml .**

CASE REPORT

- The pleural fluid was sent for routine analysis.

Pleural Fluid	Triglycerides (mg/dl)	Cholesterol (mg/dl)	Chylomicrons	LDH (IU/L)	Bacterial Growth
Case values	544	96	Present	664	No growth
Chylothorax	>110	>60 and <200	Present		
Pseudo chylothorax	<50	>200	Absent		

COURSE IN HOSPITAL

Diagnosis of chylothorax was made based on these findings.



NPO, TPN with a medium-chain fatty acid rich low-fat diet was started and later calorie intake restricted to 1500 Kcal/day and monitoring of the chest drain output was done daily.

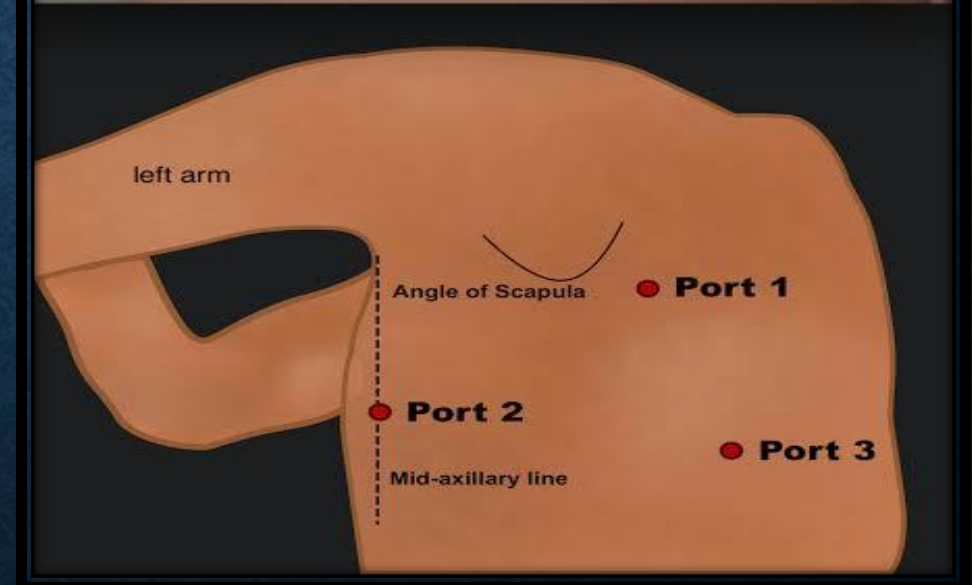
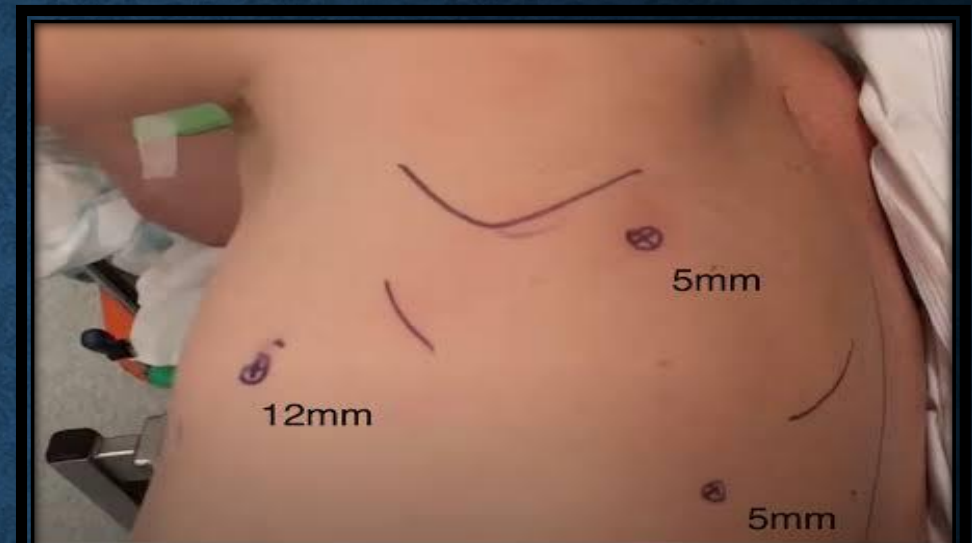
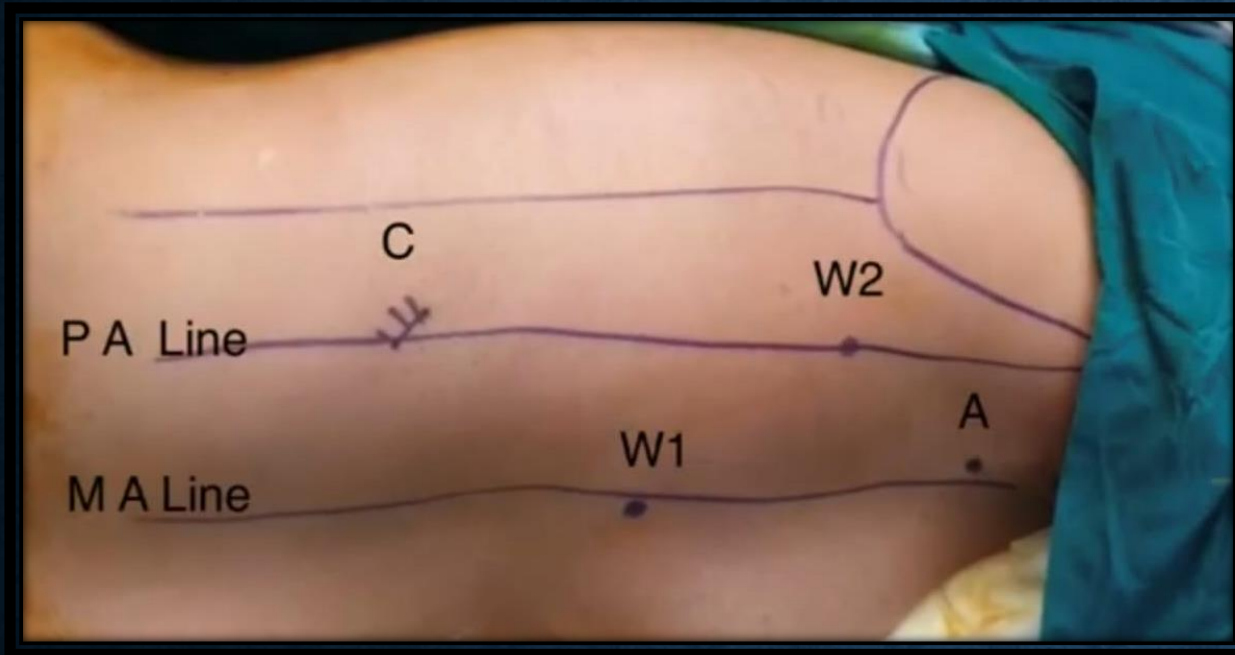
Because of continuous and extensive drainage, the decision was taken to administer 100 µg octreotide eighth hourly by subcutaneous route

COURSE IN HOSPITAL

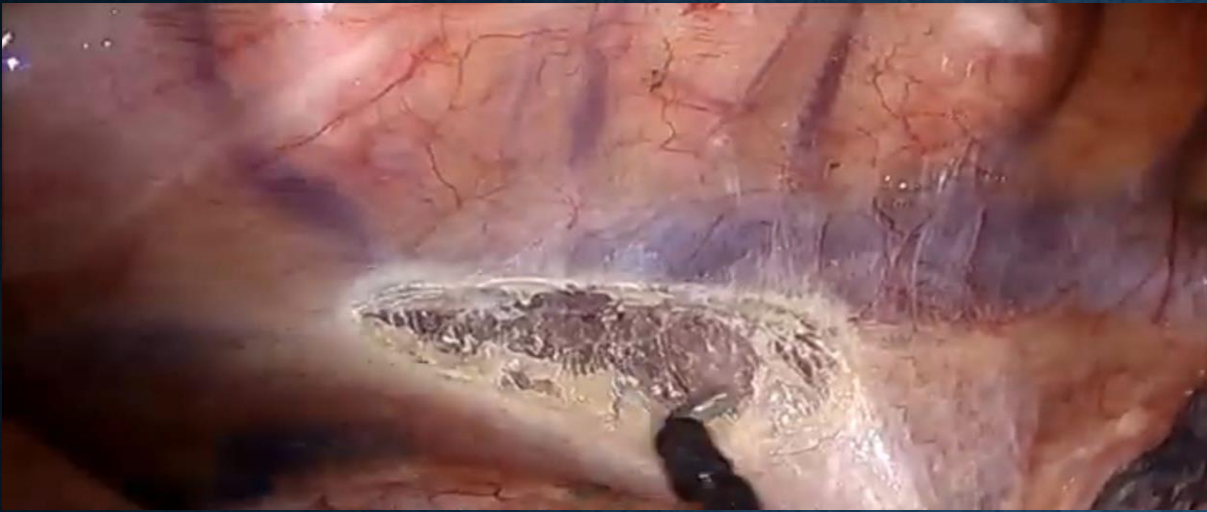
- **1600 mL/day chylous fluid drainage on the day of octreotide therapy, decreased to 1100 mL/day on the 8th day of octreotide therapy.**
- **Still there was about 1100 ml drainage form left ICD drain after conservative measures hence decision was taken for thoracoscopic inspection and clipping of thoracic duct.**

POST OP DAY	DRAIN OUTPUT
1	450
2	1600
3	1500
4	1300
5	1300
6	1300
7	1250
8	1100
9	1100

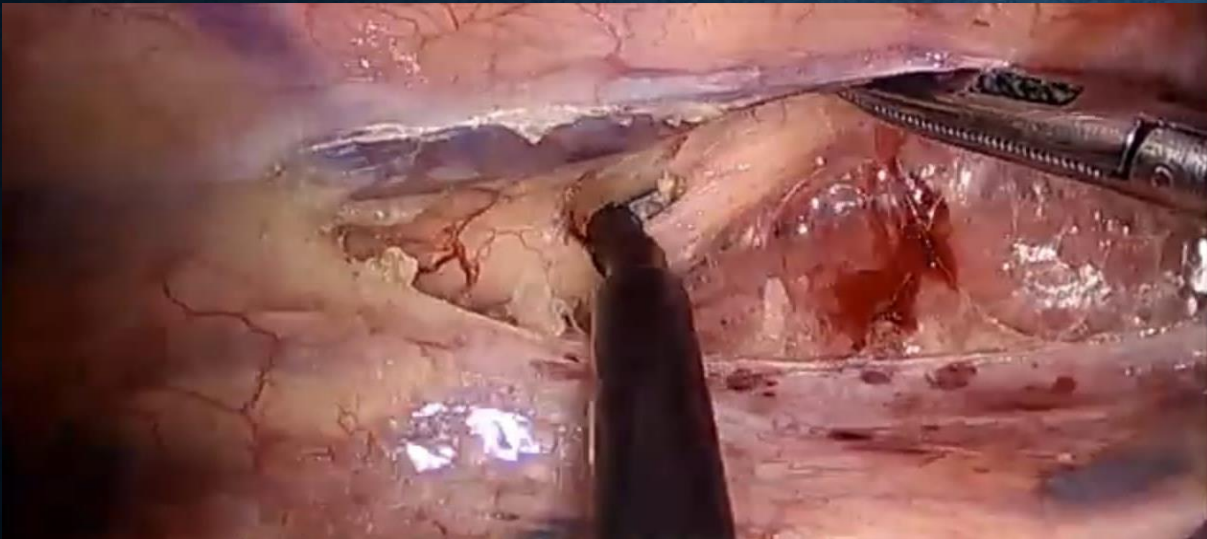
COURSE IN HOSPITAL – VATS PORT PLACEMENT



- 10 mm port in 7th ICS posterior axillary line and 6th ICS in mid axillary line.
- 5mm port in 7th ICS in anterior axillary line.



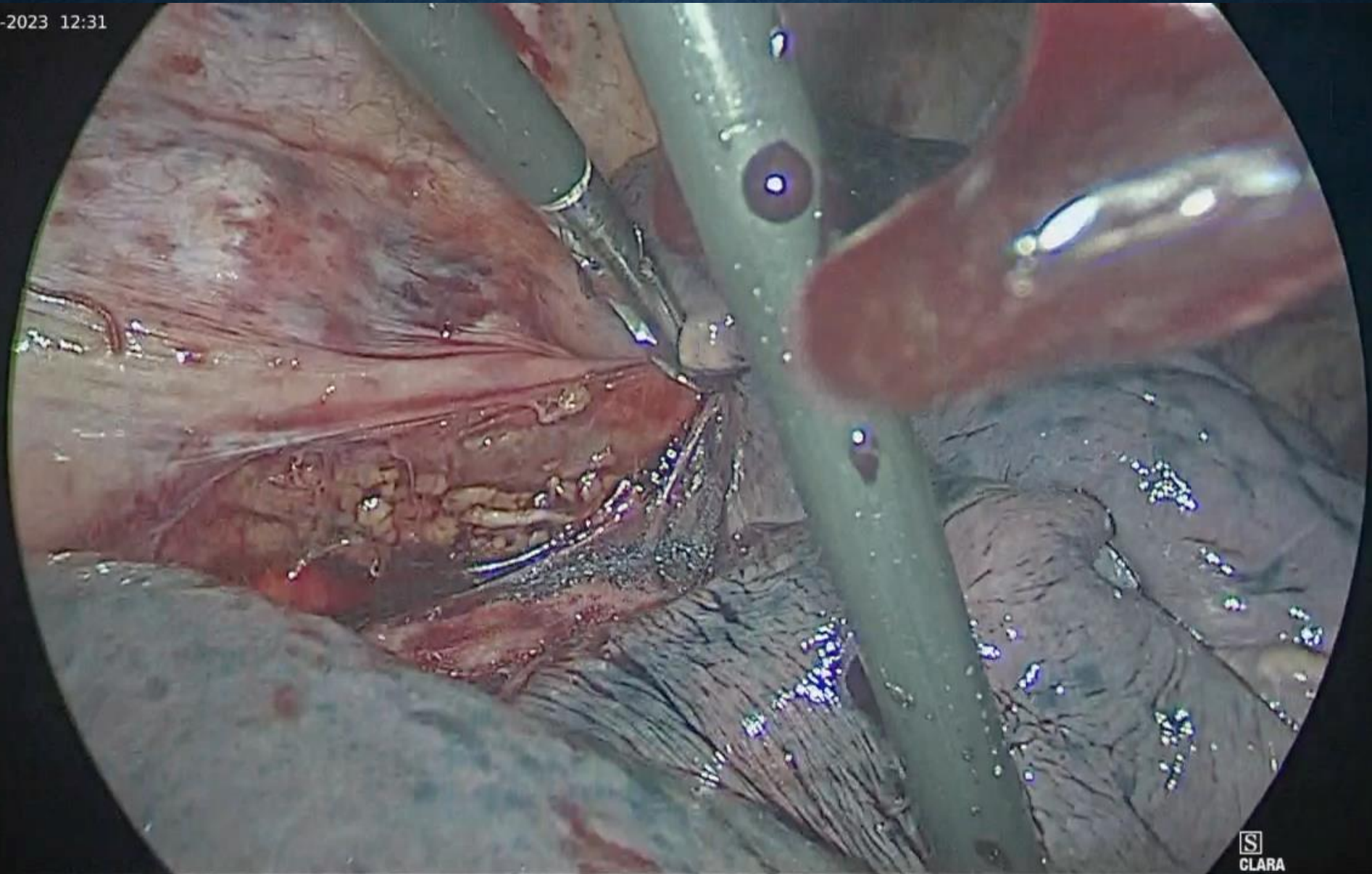
Intra-op image: Pleural cut being made over the azygous vein



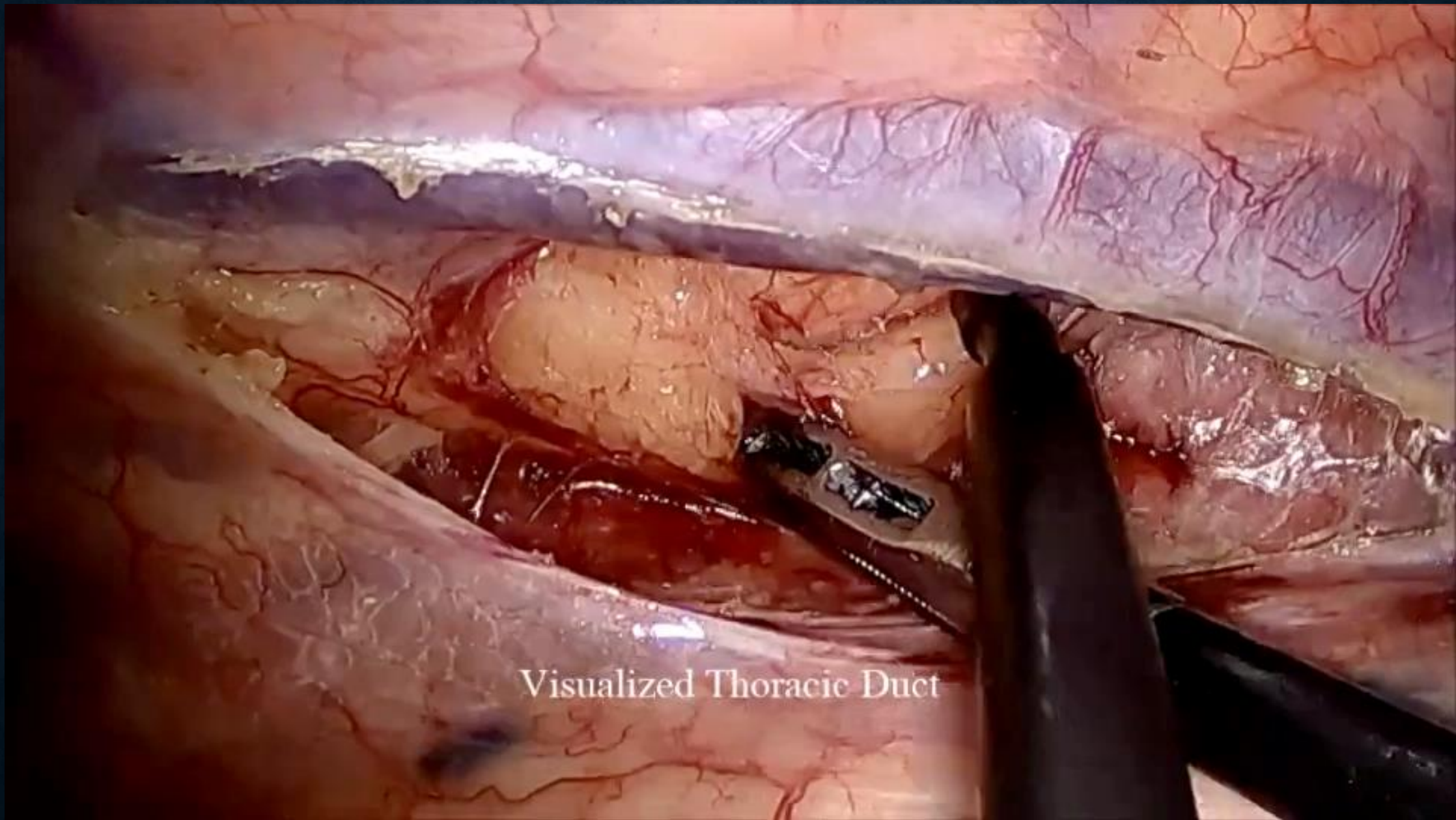
Intra-op image: Dissection of thoracic duct and azygous vein

Patient was given a high fat content meal in order to increase the chyle output, thereby making it easy to identify the leak

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Visualized Thoracic Duct

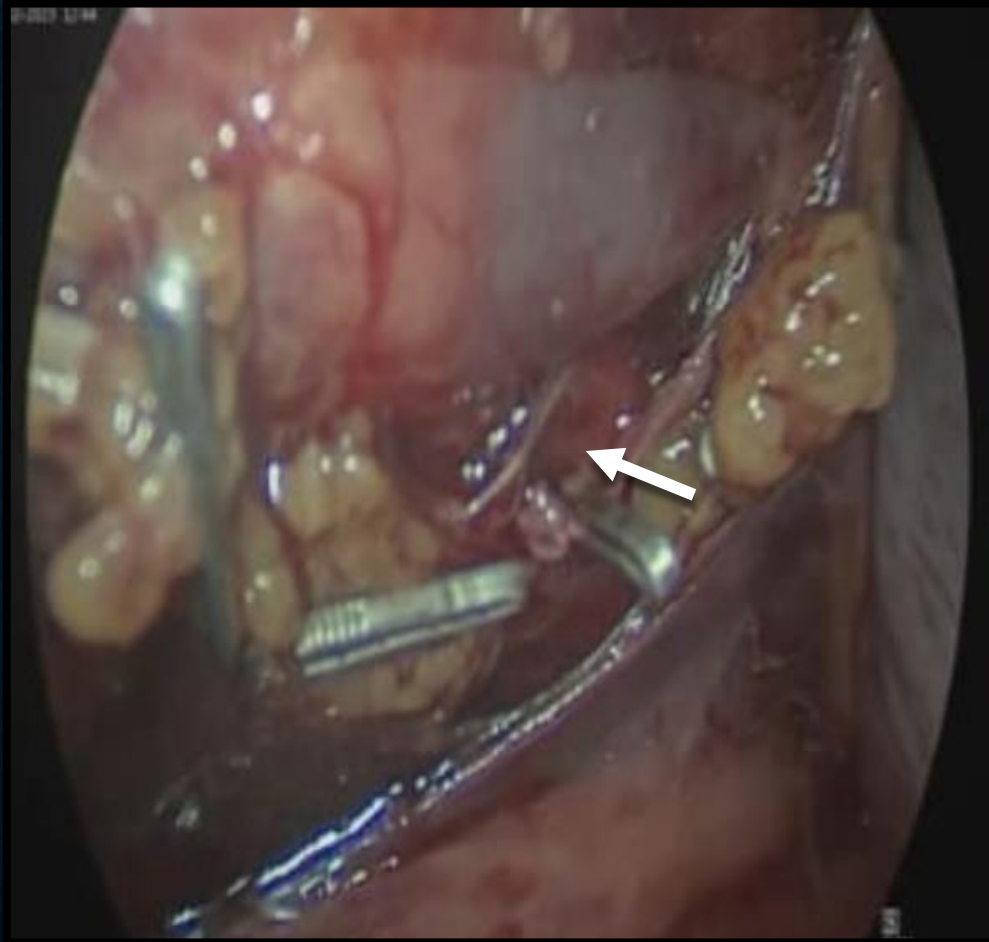
COURSE IN HOSPITAL – VATS FINDINGS

- **Intra-operative details (RIGHT HEMITHORAX)**
 - Patient was intubated with double lumen endotracheal tube. Port placement was performed.
 - The chest was inspected and undrained chylothorax evacuated.
 - For exposure anterior and cephalad retraction of the deflated lung was done and the pulmonary ligament divided.
 - Lateral to the azygous vein, parietal pleura was incised to clear a 2cm area.
 - After esophagus retraction anteriorly, aorta was identified, with careful dissection thoracic duct was identified adjacent to the azygous vein in the right lower hemithorax.
 - Thoracic duct clipped and divided and sent for HPE.
 - Hemostasis achieved and ICS was placed in 5th Intercostal space.

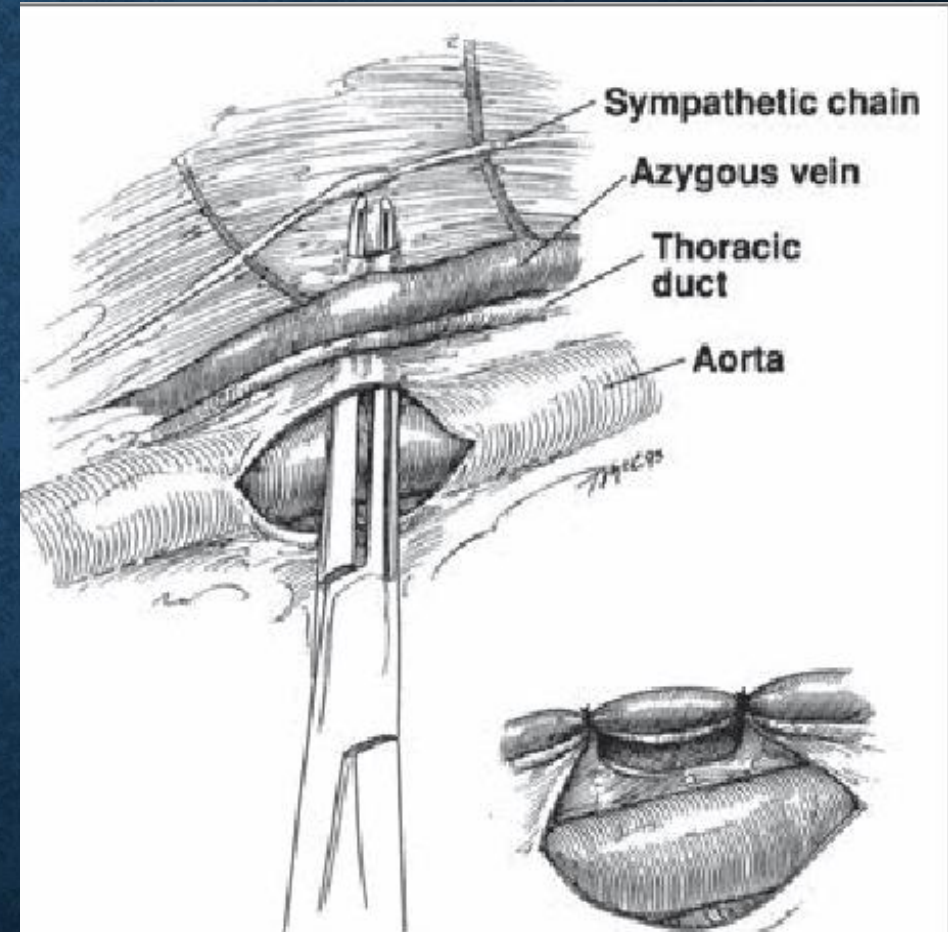
COURSE IN HOSPITAL – VATS FINDINGS

- **Intra-operative details (LEFT HEMITHORAX)**
 - **Similar port placement was done on the left side .**
 - **The chest was inspected and undrained chylothorax evacuated.**
 - **At the area of previous surgery near the LIMA harvest area there was a leak from the tributaries of the duct and draining lymphatics which were clipped.**
 - **Leak was checked after evacuating the collected chyle, no leak was identified after successful clipping of thoracic duct and tributaries of thoracic duct.**
 - **ICD was placed in 5th left ICS, patient was extubated and shifted to ward in stable condition.**

COURSE IN HOSPITAL – VATS FINDINGS



Leak identified and clipped using metallic clips. No leak noted post clipping



Anatomical relation of thoracic duct with aorta and azygous vein

COURSE IN HOSPITAL – POSTOPERATIVE COURSE

- **Patient was started on Incentive spirometry, ambulated out of bed the next day, no ongoing chyle leak was noted.**
- **Chest tubes were removed after 4 days when output was <50ml.**
- **Patient was discharged on pod 7.**

DISCUSSION - CHYLOTHORAX

- **Chylothorax is the collection of an excessive amount of chyle in the pleural space.**
- **The continued loss of chyle, which can add upto 2 to 3 liters a day after a thoracic duct injury, leads to significant depletion of fats (up to 70% of dietary intake), proteins, and T lymphocytes.**
- **As a consequence, marked disturbances in the immunologic and nutritional profile are the rule in these patients along with a mass effect created by dislocation of intrathoracic structures by the enlarging fluid collection.**
- **Indeed, the flow rate of chyle within the thoracic duct can be as high as 110 mL/hr.**
- **If left untreated, chylothorax may yield an overall 50% mortality rate.**

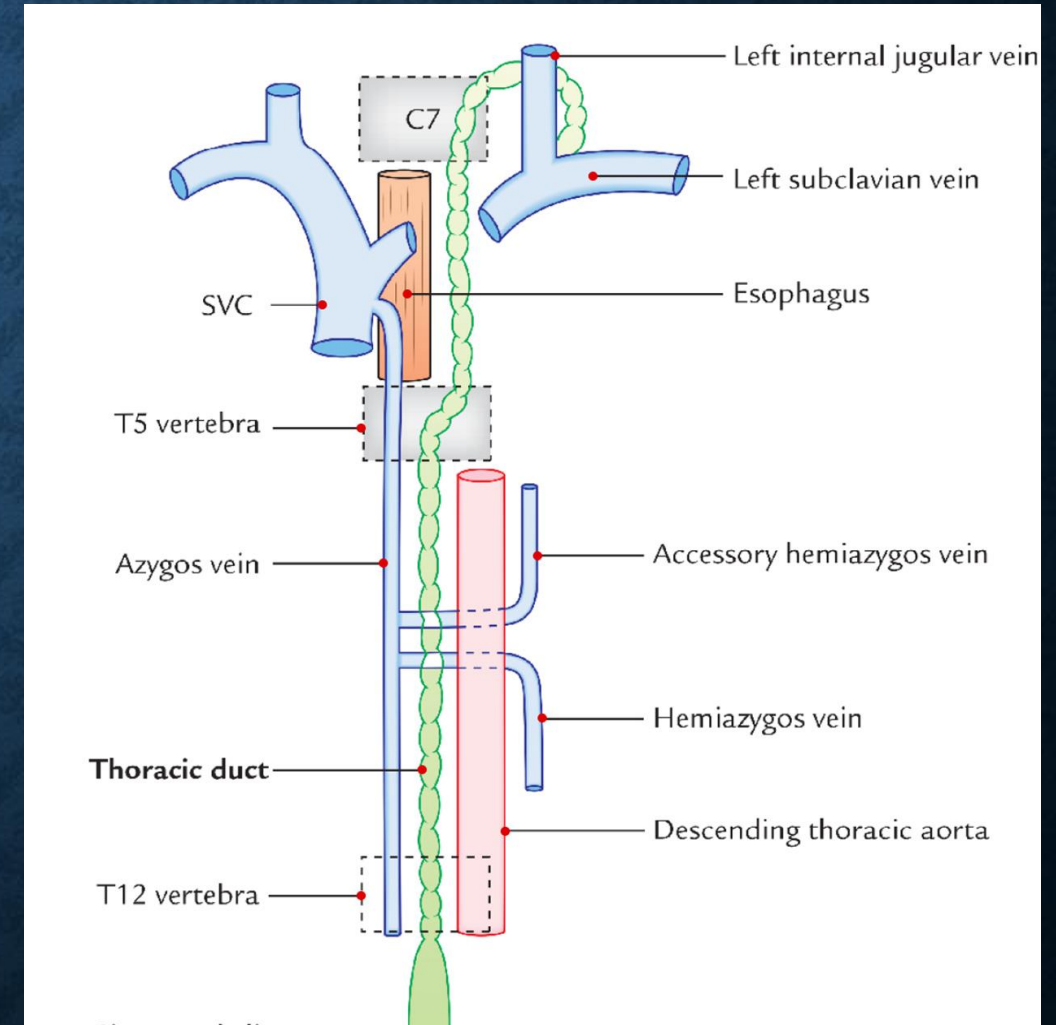
DISCUSSION - CHYLOTHORAX

Etiology:

- **Traumatic**
 - **Iatrogenic/Surgical (25%-50%)**
 - **Non-Iatrogenic (Penetrating injury > Blunt injury)**
- **Non-traumatic**
 - **Obstruction of lymphatic outflow**
 - **Increased production**
 - **Diseases of lymphatic pathways (eg: Lymphangiomatosis)**
 - **Chest irradiation**
- **Idiopathic (<6%)**

DISCUSSION – ANATOMICAL BASIS FOR BILATERAL VATS EXPLORATION

- Thoracic duct injury is one of the causes of chylothorax. It usually results from trauma or tumor and occasionally from idiopathic causes.
- Due to the anatomical course of the thoracic duct it can cause right sided effusion if damage is below T5 vertebrae level left sided pleural effusion if damage is above the T5 vertebrae level.
- Traumatic causes are usually iatrogenic with chylothorax seen after very few cardiothoracic interventions and this being the common indication for surgical TDL (Thoracic duct ligation).



DISCUSSION - SYMPTOMATOLOGY

- **Low-volume or early chylothorax is clinically silent and no different from other pleural effusions.**
- **High- volume or, especially, rapidly occurring chylothorax can lead, not just to space-occupying effects, but also to dyspnea, cough, chest pain, and hypovolemic problems.**
- **Chyle does not itself cause inflammatory irritation.**
- **Thoracocentesis obtains a milky fluid, but this is seen in only about half of all cases .**
- **A milky appearance may also be seen in pleural empyema or so-called pseudo- chylothorax, but these conditions can usually be distinguished on the basis of clinical features and history.**

DISCUSSION - INVESTIGATIONS

Most cases of chylothorax are exudative (high protein, low lactate dehydrogenase [LDH], but in about 25% of cases it can be transudative. Transudative effusions indicate a hepatic (portal hypertension/cirrhosis) or cardiac etiology

A characteristic finding is the presence of chylomicrons on lipoprotein analysis – particles about 0.5 to 1.0 μm in size, made up of proteins and lipids (long-chain triglycerides), that are absorbed and transported directly via the lymphatic pathways

If lipoprotein analysis to demonstrate chylomicrons is not available, determining triglycerides and cholesterol will be helpful, as chylothorax is present in 99% of patients with an aspirate triglyceride content of >110 mg/dL and a cholesterol content <200 mg/dL .

DISCUSSION - MANAGEMENT

Confirm diagnosis by pleural fluid analysis

Triglyceride level >1.1 mmol per litre, absolute cell count > 1000 cells per ml,
Lymphocyte fraction >80% (Buttiker et al 1999)

*Is enteral feeding contraindicated – gastrointestinal problems, or malabsorption?
severe fluid restriction, poor nutritional status with high protein loss*

No

Yes

**Monogen and/or minimal LCT diet
5 day trial**

Monitor pleural drainage in mL/kg/day - Replace to maintain
serum albumin >30g/L ^{12, 13, 14}

*Drain not decreasing or
>20mL/kg/day on Day 5*

*Drain decreasing
and <20mL/kg/day on Day 5*

**Exclude residual lesion
with echo ± catheter study**

**Continue Monogen or
minimal LCT diet**

Is pleural drain <10 mL/kg/day

**Discussion with surgeon, cardiologist,
intensivist
- consider surgery**

No

Yes

Review nutritional status with Dietitian
If poor oral intake, pleural drain >20mL/kg/day or
weight loss
Consider 7 days parenteral nutrition

**Surgery for
residual lesion**

Parenteral nutrition

If pleural drain volume <5 mL/kg/day (3)

**Surgery
thoracic duct ligation**
especially if draining
>100mL/kg/day
or longer than 3 weeks (3)

Monogen or minimal LCT fat diet
Continue diet for 4 weeks from day last drain removed

INDICATION OF OPERATIVE INTERVENTION:

- More than (1000–1500 mL chyle is being drained every day .
- For 5 treatment days drain output is up to 1000 ml/d.
- A leak persists for more than 2 weeks (100 mL/day >2 weeks)
- The drain output remains unchanged over 1–2 weeks
- Clinical deterioration occurs, e.g., malnutrition or metabolic problems

DISCUSSION – INTERVENTIONAL MODALITIES

Treatment	Remarks
Transjugular intrahepatic stent shunt (TIPS)	In patients with hepatic chylothorax (cirrhosis, portal hypertension)
Lymphography	After lymphography, in some cases occlusion of a chyle fistula has been reported
Percutaneous closure of the thoracic duct	<ul style="list-style-type: none">– Catheterization of the thoracic duct, usually as a percutaneous transabdominal procedure after lymphography, followed by embolization– Technically demanding, not available in all centers– Usually successful if the thoracic duct can be intubated
Percutaneous needle disruption of lymphatic pathways	Performed when percutaneous embolization is impossible on anatomic grounds (anatomic variants); success rate lower than for embolization

- **For refractory chylothorax surgery remains the cornerstone in management of chylothorax.**
- **Surgical thoracic duct ligation though it is the most invasive method but it is the most effective treatment available for chylothorax.**

CONCLUSION

- **Chylothorax is a rare complication after coronary artery bypass grafting.**
- **Complication are more common in patients with a pedicled harvesting of left internal mammary artery.**
- **Conservative treatment should be initiated without further delay and surgical intervention must be implemented as early as possible in high output chylothorax if conservative management fails.**

CONCLUSION

- **Our experience in this case also highlights the importance of doing bilateral VATS and ligating smaller tributaries, as management of thoracic duct leak does not confine to ligation of thoracic duct alone.**
- **Thoracic duct ligation by VATS technique is a better option for cases which are not managed conservatively and ideal intervention for postoperative patients of chylothorax with an iatrogenic thoracic duct injury is surgical thoracic duct ligation.**

THANK YOU