

PLEURAL EFFUSION

الانسكاب البلىورى

By

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❖ قبل ما نعرف ايه الأسباب بتاعت كل نوع من ال EFFUSION

لازم نعرف معلومه مهمه جداااا وهى أن ⬇⬇⬇

- Pleural effusions can develop as a result of over 50 different pleuropulmonary or systemic disorders.
- Following diagnostic thoracentesis, the cause of a pleural effusion is not evident in up to 25 percent of patients.
- However, no universally accepted definition exists for an "undiagnosed effusion."

يا ترى ايه اسباب كل نوع من أنواع ال effusion ?

❖ Causes of EXUDATIVE effusion

I. Infectious causes ⬇

- Parapneumonic (post- pneumonic)
Bacterial > viral
- Empyema (frank pus in pleural cavity)
- TB

II. Inflammation

- Collagen diseases
- SLE
- RA (not common)
- Pancreatitis
- FMF (not common to cause effusion)
- Sarcoidosis (rare)

III. Malignancy

- ☞ Solid
 - Lung (direct invasion)
- ☞ Metastatic
 - Breast
 - Liver
 - Kidney
 - Colon
- ☞ Lymphoma

IV. Miscellaneous

- Chylothorax (lymphatic obstruction)
- Pseudochylothorax
- Asbestosis
- Uremia
- Pulmonary embolism (causes both EXUDATIVE & TRANSUDATIVE)

ملحوظه

EXUDATIVE is mostly due to local pleuropulmonary pathology so often it is (unilateral)

❖ Causes of TRANSUDATIVE Effusion

- | | |
|--|----------------------|
| - Systemic disease | - Nephrotic syndrome |
| - Congestive heart failure | - Hypothyroidism |
| - Constrictive pericarditis | - Meig's syndrome |
| - Liver failure (hepatic hydrothorax) | |

☞ EXUDATIVE PLEURAL EFFUSION = protein in pleural fluid often ≥ 3 gm /dl

☞ TRANSUDATIVE EFFUSION = protein in pleural fluid often < 3 gm

? Pleural effusion هل هناك أعراض لل

A] Symptoms related to effusion itself

- Pleural effusion might be asymptomatic (discovered accidentally) if it is mild
- if it is moderate to severe or bilateral --> it is usually Symptomatic
- **Symptoms like what?** ↓↓↓
 - Cardinal symptom is DYS-PNEA
 - Chest pain may particularly if effusion occurs after pleurisy
 - Cough : it occurs as an additional features particularly if effusion is related to local lung pathology e.g Pneumonia , TB

B] Symptoms related to underlying cause [Extra-Pulmonary features]

oo

A) TRANSUDATIVE causes

- CHF:
Orthopnea, pitting LL edema
- LCF:
Jaundice, abdominal enlargement, pitting LL edema
- Nephrotic syndrome:
Peri-orbital edema, frothy urine \pm leg edema
- Myxedema:
Weight gain, puffy face, non pitting edema in legs and goitre

B) EXUDATIVE

- ☞ Parapneumonic /Empyema :
Fever, productive cough followed by dyspnea
- ☞ TB :
Fever & night sweats, weight loss, productive cough \pm HEMOPTYSIS + risk factors for TB (see TB)
- ☞ Malignancy
 - Bronchogenic carcinoma :
(Wt loss, productive coughs \pm HEMOPTYSIS) + Risk factors for Cancer like significant smoking history)
 - Lymphoma :
(Wt loss, night sweats, fever) \pm Lymphadenopathy
- ☞ Collagen disease
 - SLE:
Multisystem affection (inflammatory type of joint pain, facial rash on exposure to sun, etc (\geq 4/11 criteria)

ده كان على سبيل المثال للأسباب المشهوره بالنسبه الانسكاب البلورى وليس على سبيل الحصر

طب هل نقدر نشخص ال effusion بالفحص ؟

ايوه طبعا

❖ Signs of effusion

☞ Inspection:

You may find decreased chest movements on affected side

☞ Palpation:

Chest expansion is decreased on affected side

☞ Trachea:

Might be shifted to the opposite side of effusion if it is marked effusion only

☞ Percussion:

STONY DULLNESS over effusion in comparison to other lung regions

☞ Auscultation:

Decreased air entry often without any added sounds on the area of effusion

👉👉 In any case of effusion, you should examine for the following ➡

☞ LL edema & ascitis

➔ If present ➡

Search for stigmata of **CLD** including

- Jaundice -> if present --> decompensated liver cirrhosis complicated with Hepatic hydrothorax

☞ **JVP** : if high + orthopnea ± PND ± shifted apex ± gallop ± LL edema --> **CHF**

☞ **peri-orbital edema** ± pitting LL edema + urine abnormalities (frothy urine) --> suspect **Nephrotic Syndrome**

☞ **Puffy face, goitre, bradycardia** --> suspected **Hypothyroidism**

☞ Lymphadenopathy

DD: Lymphoma, TB and Bronchogenic carcinoma

بعد الفحص هتعمل ايه لمريض شاكك أنه عنده

Pleural effusion by examination

✚ Initial test is CXR to confirm your diagnosis initially

اثبات التشخيص مبدائيا عن طريق اشعة الصدر العاديه وبعدين هتعمل التحاليل

ال Pleural effusion

من ضمن pleural opaque lesion

وعشان نجزم بتشخيص ال pleural effusion فى الاشعه

لابد من توافر الشروط الاتيه

1) Obliterated costophrenic angle

(الاسهم الطويله).

2) Homogenous opacity

ابيض ناصع غالبا

3) Surface has rising border to axilla

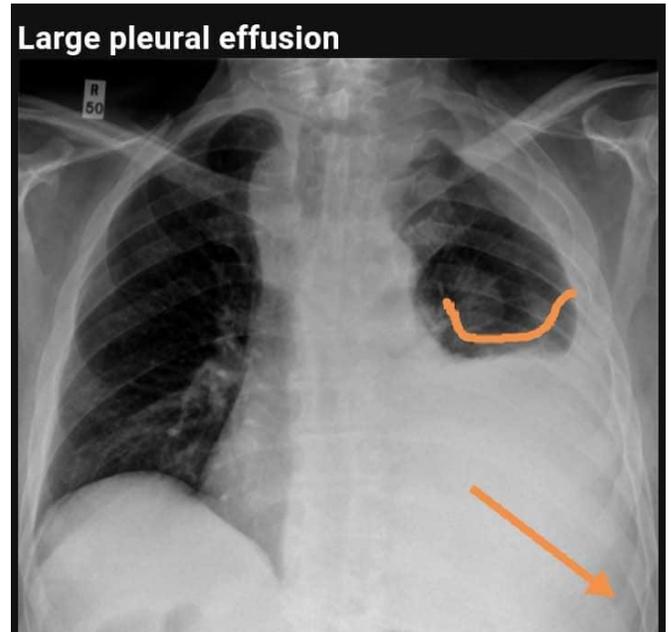
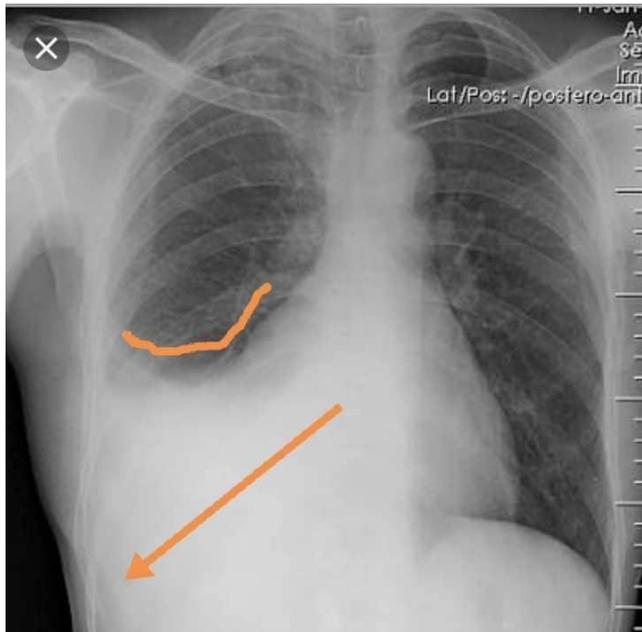
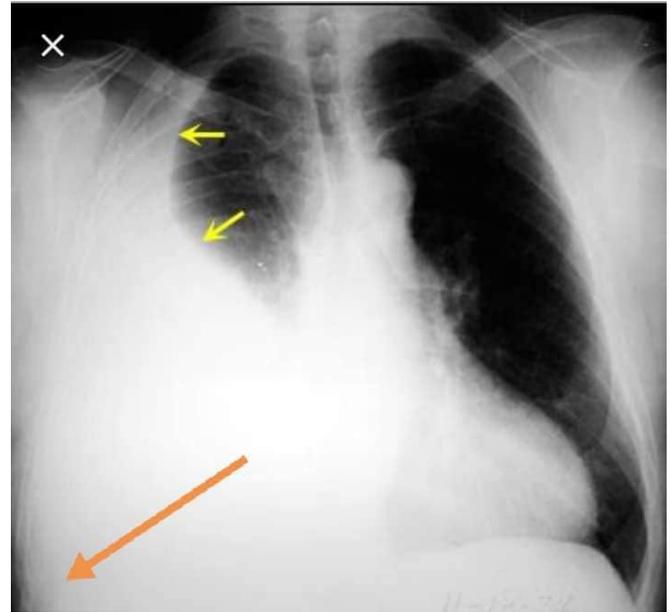
وكمان

Concave upwards...

واسمه العلمى

(Meniscus sign)

وده انا موضحه وعامل علامه عليه



✚ Routine Basic Labs

- CBC
- LFTs
- RFTs
- RBG
- PT, PTT , INR
- Electrolytes
- ESR & CRP

➔ Basic labs may diagnose the underlying cause of effusion ➔

★LCF (cirrhosis)

- ↓ Albumin
- Normal or ↑ total protein ↑ bilirubin, ↑ PT & INR

★Nephrotic syndrome

- ↓ Albumin & ↓ total protein
- ± elevated creatinine

--> You must confirm your diagnosis by quantification of protein in urine

(Albumin creatinine ratio, protein ≥ 3 gm)

★ESR ↑ --> Cancer & TB & SLE

★ CRP: high in infections (post-pneumonic effusion, Empyema and TB)

✚ Then the most crucial step is "DIAGNOSTIC PLEURAL FLUID ANALYSIS "

هندور على ايه فى ال Pleural fluid

الاجابه :

- I. The Lab doctor will analyse the pleural fluid **CHEMICALLY** initially namely the Protein in pleural fluid
 - 1) If value ≥ 3.5 gm/dl --> it is for sure {**EXUDATIVE** effusion} then GO for other lab Workup for EXUDATIVE effusion
 - 2) If value is **below 2.5 gm/dl**. It is for sure {**TRANSUDATIVE** effusion}, no need for further lab workup , assess only for the possible causes of TRANSUDATIVE systemic causes

3) If value is **between 2.5 - 3.5** , The BTS guidelines recommend the So called
"LIGHT'S CRITERIA"

You should obtain other labs in pleural fluid including Pleural fluid LDH, serum LDH, serum protein

➔ **EXUDATIVE** cause is more likely if there is at least one of the following criteria are met

- Pleural fluid protein \div serum protein > 0.5
- Pleural fluid LDH \div serum LDH > 0.6
- Pleural fluid LDH $> 2/3$ the upper limit of normal serum LDH

✚ If It is **EXUDATIVE** effusion, then the next step is to determine the definitive cause of such effusion because , every possibility has different treatment

➔ You should request the following ➔

Other chemical analysis

- **PH** : if < 7.2 --> para-pneumonic effusion
- **Glucose** : low in TB effusion , Empyema , Malignancy , RA related effusion
- **Frank pus** = EMPYEMA
- **blood staining** (hemorrhagic)
 --> DD: Malignancy, Mesothelioma, TB and Pulmonary embolism
- **Triglycerides** : done only if the color of pleural fluid is MILKY لون اللبني
 -->Indicates CHYLOUS EFFUSION or CHYLOTHORAX
 --> It would be diagnostic if > 110 mg/dl
- **Amylase** only if suspicious pancreatitis induced effusion
 -->Features of pancreatitis from the history: severe abdominal pain + risk factors
 --> Also in cases suspicious to be esophageal perforation
- **ADA** (Adenosine deaminase) : is vital in the diagnosis of TB pleural effusion
 -->Value ≥ 43 U/ml supports the diagnosis of TB pleural effusion

ملحوظه : فى حالات اشتباه الانسكاب البللورى المرتبط بالدرن ،

هناك تحليل حديث نوعا ما اسمه GeneXpert test

وده اختبار لوجود TB DNA in pleural fluid

مشكلته ↓

Low sensitivity & high specificity

ولكن بنستخدمه كتحليل اضافى يفيد فى التشخيص

II. BACTERIOLOGICAL LAB analysis for pleural fluid

☞ Routine Culture to exclude para-pneumonic effusion & empyema

☞ Test for TB by Ziehl Neelsen stain (ZN)

--> If acid fast bacilli are positive --> diagnostic for TB

--> If negative: doesn't exclude TB = still a possibility

ملحوظه هاهاهاهاه : اختبار ال ZN stain بتاع الدرن فى السائل البللورى بيكون ايجابى فى حالات قليله فقط ..

و سلبيته لا تعنى استبعاد الدرن

III. CYTOLOGICAL EXAM for pleural fluid

- Test for the presence for cells

- High neutrophils support the diagnosis of Parapneumonic effusion

- High Lymphocytic effusion (predominant Lymphocytic effusion:has DD

TB versus Malignancy

- Test for Malignant cells: it is mandatory for all cases of EXUDATIVE pleural effusion to exclude MALIGNANT pleural effusion particularly if Imaging excludes the mass lesion

ده بيحتاج عينه كبيره نوعا ما من السائل البللورى للبحث عنه

ملحوظه هاهاهاهاه

☞ Lymphocytic EXUDATIVE pleural effusion + high ADA in pleural fluid with negative malignant cells in pleural fluid ---> TB effusion untill proved otherwise

ملحوظه هاهاهاهاه

☞ Test for TB by PCR test is approved only in sputum not in pleural fluid (last update) so, it is not of great value if negative

Summary of pleural fluid analysis

I. Chemical كيميائي

- ★ Protein in addition serum protein
- ★ LDH in addition to serum LDH
- ★ PH
- ★ ADA
- ★ Glucose
- ★ in some cases (TG ± TC) suspicious CHYLOUS versus Pseudo-chylous effusion
- ★ In some cases: Amylase if suspicious pancreatitis

II. Bacteriological

- ★ routine culture
- ★ Culture for TB
- ★ ZN stain for TB

III. CYTOLOGICAL

- ★ For malignant cells
- ★ For neutrophils
- ★ For lymphocytes

ملحوظه هالامه :

هناك نوع من ال

Effusion is called Pseudo-chylous effusion which is similar to CHYLOUS effusion, to differentiate between them ⇨

----> Test for pleural fluid cholesterol in addition to Triglycerides (TG)

- Cholesterol (TC) \geq 200
- TG < 110

✚ Imaging In The Case Of Pleural Effusion

- Initially --> request CXR to confirm your initial diagnosis that made clinically
- Then if effusion is confirmed EXUDATIVE and symptomatic
 - > do therapeutic thoracentesis making the expanded to reveal local pathology

E.g Consolidation, or mass or cavity

↪ So the next optimal step ↪

CT chest with IV contrast

- In TRANSUDATIVE effusion,
 - CT chest may reveal the following ↪
 - Cardiomegaly in case of effusion due to CHF
 - Pericardial effusion in association to pleural effusion in case of NEPHROTIC SYNDROME



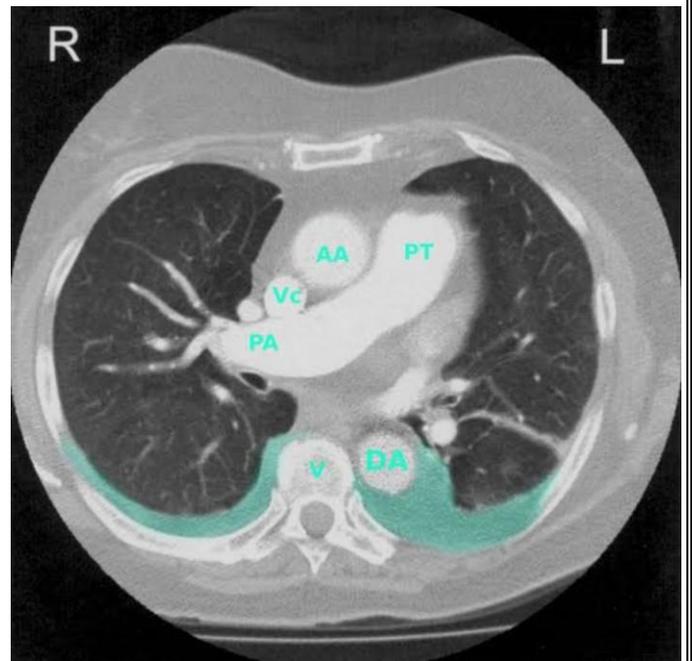
- In cases of EXUDATIVE pleural effusion in which the cause is not explained despite comprehensive lab + imaging studies as mentioned before

Next step is ↓↓↓

PLEURAL BIOPSY

Either by open surgery, abram's needles or VATS

- VATS (video-assisted thoraco-scopic surgery) is the modality of choice
- If TB is suspected, biopsy should be underwent Culture for TB



N.B1: VATS is essential in the case of pleural thickening particularly due to Mesothelioma

N.B 2: Pleural effusion and pleural thickening are similar in Radiological appearances

NB: Meig' s syndrome

- Characterised by the presence of a benign ovarian fibroma,
- Associated with ascites and a right-sided pleural effusion.
- The aetiology of the pleural effusion is thought to be related to the size of fibroma, Leading to accumulated peritoneal ascites that flows into the pleural cavity via the lymphatics or via abdominal-pleural communications (via the foramen of Bochdalek)
- Treatment

Removal of the ovarian mass is associated with resolution of the ascites and pleural effusion and patients have excellent prognosis.

علاج الانسكاب البللورى

❖ TREATMENT

➤ The main treatment is the treatment of the underlying cause either exudative or transudative

A) TRANSUDATIVE

- CHF --> anti-failure measures plus diuretics
- LCF: albumin + diuretics
- If refractory --> Consider TIPS as a bridge for transplantation
- If symptomatic --> therapeutic pleurocentesis (cautious as there is a risk of Superimposed Empyema after thoracocentesis)

B) EXUDATIVE

⇒ Tube insertion with drainage in the following cases ➤

Chest tube insertion in patients with an infected pleural effusion is indicated if there is one of the following

- Presence of organisms on a Gram stain of the Pleural fluid
- Frankly purulent pleural fluid
- Pleural pH < 7.2 in the setting of an infected pleural effusion
- Loculated pleural effusions
- Poor clinical progress despite antibiotic treatment

N.B:

There is emerging recent evidence in cases of hepatic hydrothorax (pleural effusion related to liver cirrhosis) that it is thought to be due to diaphragmatic defects between peritoneal cavity and pleural cavities

So, whilst the patient is waiting for liver transplantation, and the pleural effusion is refractory to both therapeutic thoracocentesis and TIPS as well... VATS should be done to evaluate for diaphragmatic defects ---> consider pleurodesis

➤ **Antibiotic regimens** in Empyema in addition to thoracostomy with tube insertion and drainage

Either

- Beta.lactam ABX + anaerobic coverage

Ex: Augmentin + dalacin

Or

- Piperacillin – Tazobactam

Ex: Tazocin 4.5 gm / 12 hrs

Or

- Imipinem - cilastin

Ex: Tienem 0.5 gm /8 hrs

Or

- Meropenem

Ex: Meronem 0.5 gm /8 hrs

For 10 - 15 days

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N.B1: Tube, VATS and Empyema --- ➡ عرض ومسؤولية جراح القلب والصدر

N.B2: Decision of pleurodesis → cardiothoracic surgeon دكتور القلب والصدر

N.B3: Decision of pleurocentesis (thoracocentesis) --> internist