Dyspnea in the oncology patient: a pulmonologist’s approach

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History – High yield

- Severity and Urgency
- Acute versus chronic complaint
- Associated complaints
  - Wheezing
  - Cough
  - Bleeding
  - jaundice
  - Swelling and weight gain
  - Palpitations
  - Aspiration
  - Ascites
  - Orthopnea (CHF, diaphragm failure, effusion)
  - Platypnea (AVMS, liver disease)
- Other medical history
  - Prior VTE
  - Port
  - Smoking
  - CTD
  - Cardiac history
  - Recent BMT
  - Recent procedures
- Medications
- Radiation
Medications

The Drug-Induced Respiratory Disease Website
Philippe Camus, M.D.
Dijon, France

Browse by:
DRUGS
PATTERNS

Search
Search by keyword
Advanced search

I - Interstitial/parenchymal lung disease
I.a Pneumonitis (ILD), acute and/or severe (may cause ARDS)
I.b Pneumonitis (ILD)
I.c Eosinophilic pneumonia (pulmonary infiltrates and eosinophilia)
I.d Organizing pneumonia pattern (an area or areas of consolidation on imaging)
I.m ILD with a granulomatous component
I.n Pulmonary alveolar proteinosis (PAP)
I.y Progression, acceleration or exacerbation of preexisting ILD/fibrosis

II - Pulmonary edema - Acute lung injury - ARDS
II.b ARDS - Acute lung injury
II.d Pulmonary edema, cardiogenic

SEE ALSO UNDER
Bosutinib
Dasatinib
Nilotinib
Physical exam

- Vitals
  - Fever or hypothermia
  - BP
    - Hypertension
      - Multi-kinase inhibitors
      - VEGF agents, Proteasome inhibitors
    - Hypotension
      - Sepsis
      - PE
      - Heart failure or tamponade
      - Dehydration from diarrhea, vomiting, FTT
      - Adrenal insufficiency
  - Hypertension
  - Hypotension
- Tachypnea
  - Compensation for metabolic acidosis
  - Hypermetabolic state
  - Diaphragm failure
- SpO2%
  - Up to 10% differences in saturation estimates in darker-skinned patients and worse at lower saturations (Feiner 2007)
- Methemoglobinemia
  - SpO2% usually in the mid 80s
  - Rasburicase (Alessa 2015)
  - Ifosfamide (Hadjiliadis 2000)
  - Cyclophosphamide (Sangera 2015)
Physical Exam
- high yield head to toe

- Icterus
  - PLS after BMT?
  - Biliary obstruction?
- JVD
  - CHF
  - Tamponade
  - Valvulopathy
- Accessory muscle use

- Murmurs
- Wheezing, crackles, percussion
- Abdominal distension

Extremities
- Clubbing
- Edema
- Temperature
- Capillary refill
Labs – Basic labs

- Polycythemia
- Anemia
- Sepsis
- Leukostasis
- Asthma
- Drug reaction

WBC > hgb

- GI bleed
- Renal failure
- FTT

BUN

CO2

Cr

- Met alkalosis
- Met acidosis
- CKD and AKI
Imaging – CT chest

- With contrast
  - Creates more ground glass
  - More difficult to assess lung parenchyma
- CTA timing
  - PA
    - AVM (shunting)
    - PE
    - Clues for RV overload (contrast reflux)
    - Clues for intracardiac shunt (contrast in LA)
  - Aortic/bronchial artery
    - Dissection
    - Hemoptysis (Mass, mycetoma, bronchiectasis)
Bronchial artery

- Bronchial circulation is the source of massive hemoptysis in 90% of cases
  - Goal is to guide IR for bronchial artery embolization
  - → CT angio/aortogram
What about the kidneys?

- Contrast nephropathy from CAT scans is of questionable existence as an independent risk factor for AKI.
- Concerns are based on very flawed and outdated data.
- If the test will be helpful, get the test.
- I routinely follow up abnormal VQ scans with CTAs that are negative.
- Make a dot phrase for justification and list references.
- McDonald et al 2015.
  - Retrospective propensity score-adjusted analysis.
  - A total of 6902 patients (4496 CKD stage III, matched: 1220 contrast and 1220 noncontrast; 2086 CKD stage IV-V, matched: 491 contrast and 491 noncontrast).
  - Rates of AKI, emergent dialysis, and mortality were not significantly higher in the contrast group than in the noncontrast group in either CKD subgroup (CKD stage III: OR, 0.65-1.00; P<.001-.99 and CKD stage IV-V: OR, 0.93-2.33; P=.22-.99).
Imaging – CT chest

- Without contrast
  - HRCT chest
    - Can miss or mischaracterize nodules
    - Prone images with inspiration and expiration
    - Best for interstitial lung disease
  - Non con CT chest
    - Best for nodules and masses
    - Prone to artifacts at the bases
Examples

h/o small cell, severe bolus disease and dynamic hyperinflation
Treated with liquid morphine

h/o radiation and now concomitant IPF
Treated with Esbriet and gabapentin
Examples - micronodules

Centrilobular nodules
- MAI, medication induced bronchiolitis, hypersensitivity pneumonitis
- Spare the periphery

Peri lymphatic
- lymphangitic spread, sarcoidosis
- bronchovascular and subpleural
Echo and POCUS

IVC gives clues for RV pressures
- volume status
- tamponade
- RV failure from PE or MI
RV failure

-PE?
-Tumor or medication induced pulmonary hypertension?
-Malignancy-induced PVOD? (McHugh 2021)
-CTEPH
Bubble study

$R \rightarrow L$ shunt
Specific Situations
Anemia and hemoglobin serum levels are associated with exercise capacity and quality of life in chronic obstructive pulmonary disease.

Marcello Ferrari, Lorenzo Manea, Kamel Anton, Paola Bruzzone, Mara Meneghello, Francesco Zamboni, Luigi Purgato, Lucia Cazzoletti, Pietro Ferrari, and Renato Testi
Pulmonary Emboli
PEERLESS Trial

- FlowTriever system versus catheter-directed thrombolysis (CDT)
- Enrolling in multicenter RCT
- Patients with intermediate-high risk pulmonary embolism (PE)
- Potential for immediate relief without the risk of lytics
- May be able to offer interventions to higher risk patients in lower risk PEs
- https://clinicaltrials.gov/ct2/show/NCT05111613
IVC filters

- 8,255 IVC filter lawsuits as of May 2022 (Miller 2023)
- Jury awards as high as $34 million
- Lack of evidence to support the use of IVC filters in any situation other than an absolute contraindication to anticoagulation
- In 2014, the FDA updated recommendations:
  - Risks > benefits between 29 and 54 days
  - Rarely retrieved that soon in real life
- American College of Chest Physicians in 2021 – strong recommendation against the use of IVC filters in addition to anticoagulants
- Society of interventional radiology clinical practice guidelines from 2020 – moderate recommendation stating “In patients with acute VTE who are being treated with therapeutic anticoagulation, we recommend against routine placement of an IVC filter”
- PREPIC2 trial, Randomized, open-label, blinded end point trial: “Among hospitalized patients with severe acute PE, the use of a retrievable inferior vena cava filter plus anticoagulation compared to anticoagulation alone did not reduce the risk of symptomatic recurrent PE at 3 months. Theses findings do not support the use of this type of filter in patients who can be treated with anticoagulation”
Apixaban and VTE in oncology patients

Apixaban for the Treatment of Venous Thromboembolism Associated with Cancer. April 23, 2020
N Engl J Med 2020; 382:1599-1607

- multinational, randomized, investigator-initiated, open-label, noninferiority trial with blinded central outcome adjudication
- Patients with cancer and VTE to receive apixaban or dalteparin for 6 months
- Oral apixaban was noninferior to subcutaneous dalteparin for the treatment of cancer-associated venous thromboembolism without an increased risk of major bleeding
Advanced Emphysema
Advanced emphysema

- More hyperinflation = less PIFR
  - Correlates with age (older = worse PIFR)
  - Lower IC = worse PIFR
  - Being female has been associated with reduced PIFR
  - Hyperinflation (worsened during exacerbation) reduced PIFR

→ bad obstruction and hyperinflation = may not benefit from an inhaler
Advanced emphysema

Pharmacology literature indicates patients must generate 60 L/min to receive optimal dose.

More resistance = more difficult to generate flow

→ DPIs require hard and fast inhalation

**Internal Resistances of Bronchodilator DPI**

<table>
<thead>
<tr>
<th>Bronchodilator DPI</th>
<th>Resistance (kPa0.5 [L/min])</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aerolizer</td>
<td>0.019</td>
</tr>
<tr>
<td>Diskhaler</td>
<td>0.021</td>
</tr>
<tr>
<td>Breezhaler/Neohaler</td>
<td>0.022</td>
</tr>
<tr>
<td>Accuhaler/Diskus</td>
<td>0.027</td>
</tr>
<tr>
<td>Ellipta</td>
<td>0.029</td>
</tr>
<tr>
<td>Genuair/PressAir</td>
<td>0.031</td>
</tr>
<tr>
<td>Turbuhaler</td>
<td>0.036</td>
</tr>
<tr>
<td>HandiHaler</td>
<td>0.051</td>
</tr>
</tbody>
</table>
Advanced emphysema
My go-to regimen

- All nebulizer meds
  - Revafenacin
  - Formoterol
  - Budesonide
- Prevent exacerbations
  - Azithromycin TIW
  - Mepolizumab or Tezepelumab
- Hypercapnic → Home non-invasive ventilator
- Severe dynamic hyperinflation → Liquid morphine
Endobronchial tumor
FVLs
Checkpoint inhibitor pneumonitis

- Patient risk factors
  - Lung cancer
  - Renal cell cancer
  - h/o ILD
  - Prior chest radiation
  - Smoking
  - Age > 70

- Usually around 6 months of therapy but range is broad 1.5 to 127 weeks
- Almost always with elevated CRP and ESR
CPI pneumonitis

Table 2: National Cancer Institute CTCAE Pneumonitis Grading System

<table>
<thead>
<tr>
<th>Grade</th>
<th>Symptom</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Asymptomatic; clinical or diagnostic observations only; intervention not indicated</td>
</tr>
<tr>
<td>2</td>
<td>Symptomatic; medical intervention indicated; limiting instrumental ADL</td>
</tr>
<tr>
<td>3</td>
<td>Severe symptoms; limiting self-care ADL; oxygen indicated</td>
</tr>
<tr>
<td>4</td>
<td>Life-threatening respiratory compromise; urgent intervention indicated (i.e., tracheostomy or intubation)</td>
</tr>
<tr>
<td>5</td>
<td>Death</td>
</tr>
</tbody>
</table>

Source.—Reference 26.
Note.—ADL = activities of daily living.

-Sarcoid like reaction


