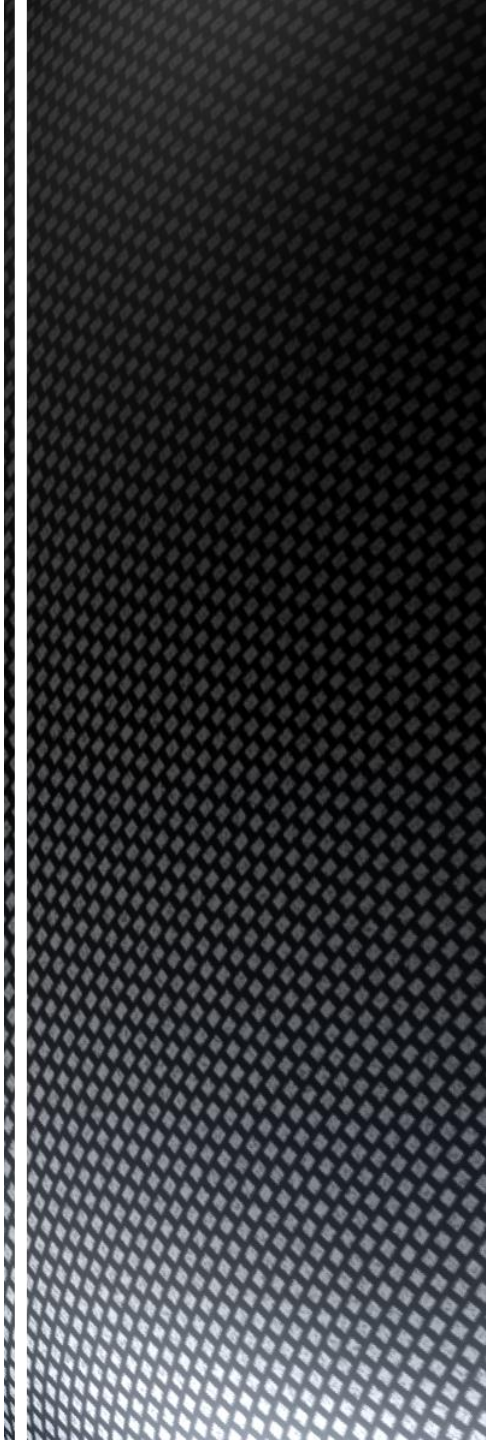
A case report of pneumothorax and acute kidney injury in the early phase of acute lymphoblastic leukemia (ALL) induction therapy due to Aspergillus Fumigatus and *Pneumocystis Jirovecii* Co-infection

Hossein Esfahani MD
Pediatric Hematologist/Oncologist
Avicenna (Hamadan) University of Medical Sciences

Parinaz Sedighi
Medical Student
Avicenna (Hamadan) University of Medical Sciences



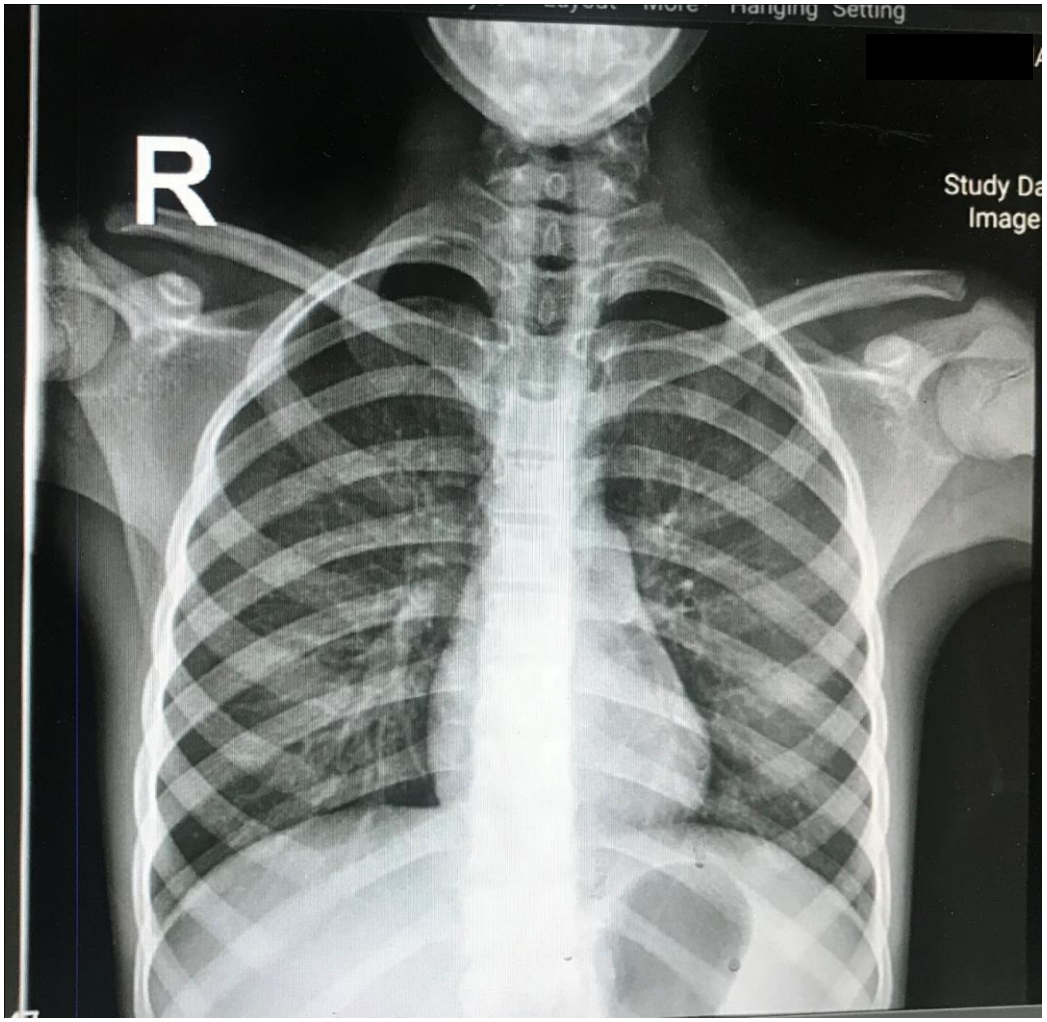
- 12 Y/O female
- Bone pain, fever (5 d)
- malaise, anorexia and weight loss (2 mo)
- P/E: fever, splenomegaly and significant pallor
- V/S : RR=25, PR=97, T=37.6, BP=90/60

LABORATORY TESTS	Result	Unit
White blood cell	7800	cells /micro liter
Hemoglobin	7	g/dL
Mean corpuscular volume (MCV)		Femtoliter (fL)
Platelets	63000	cells /micro liter
Blood urea nitrogen: (in order)	10, 61, 68, 72, 81,	mg/ dL
Creatinine: (in order)	0.6, 1/4, 1/6, 1/9, 2/1	mg/dl
Aspartate Aminotransfrase	25	unit/L
Alanine Aminotransfrase	36	unit/L
Erythrocyte sedimentation rate	110	ml/ hour
C-reactive protein	+	Qualitative

Initial and subsequent hematology and biochemistry findings

The first imagings

- In spite of her normal chest findings on examination, chest X-ray was done as the baseline of examination which was revealed mild right sided peribronchial cuffing .
- The first sonography of the abdomen revealed mild splenomegaly and normal shaped kidneys.



- BMA: pre B-cell acute lymphoblastic leukemia (ALL).

- “BFM 2009 ALL” protocol: Vincristine, Daunarubicin,

  L-Asparaginase and Dexamethasone

The second imaging

- Two week later: acute chest pain.
- Examination of the chest:

tachypnea (RR=60)

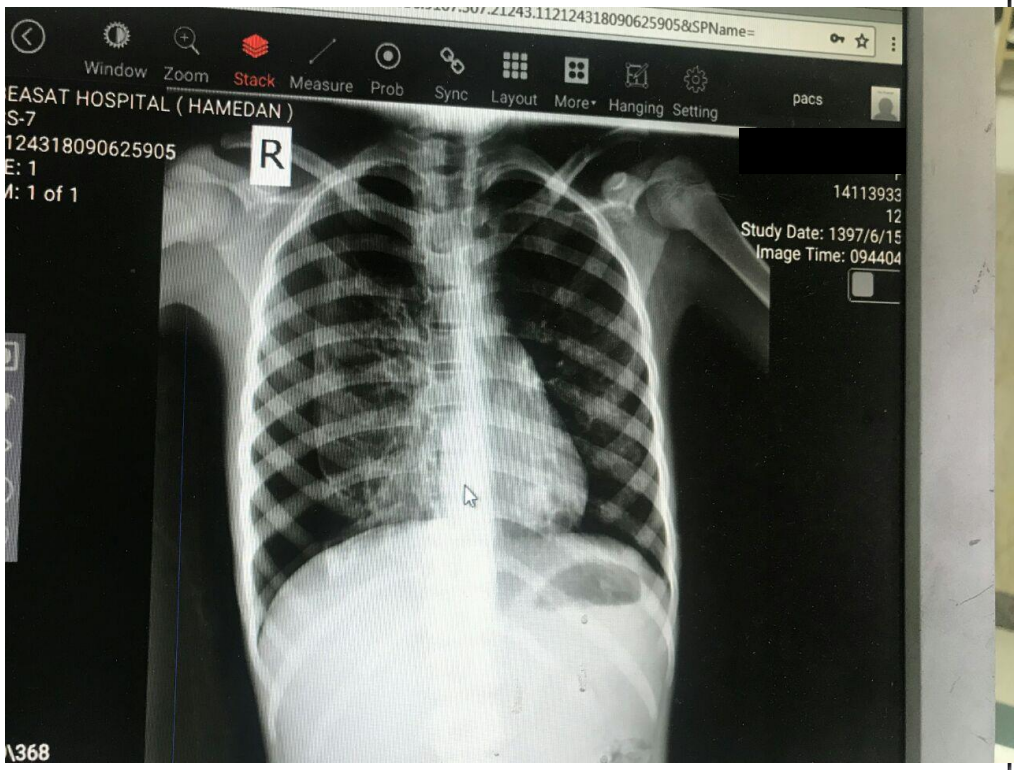
decreased right sided breathing sounds

normal heart sounds

CXR: right side Pneumothorax

- surgical consultation: right sided chest tube was inserted,

and improved respiratory symptoms



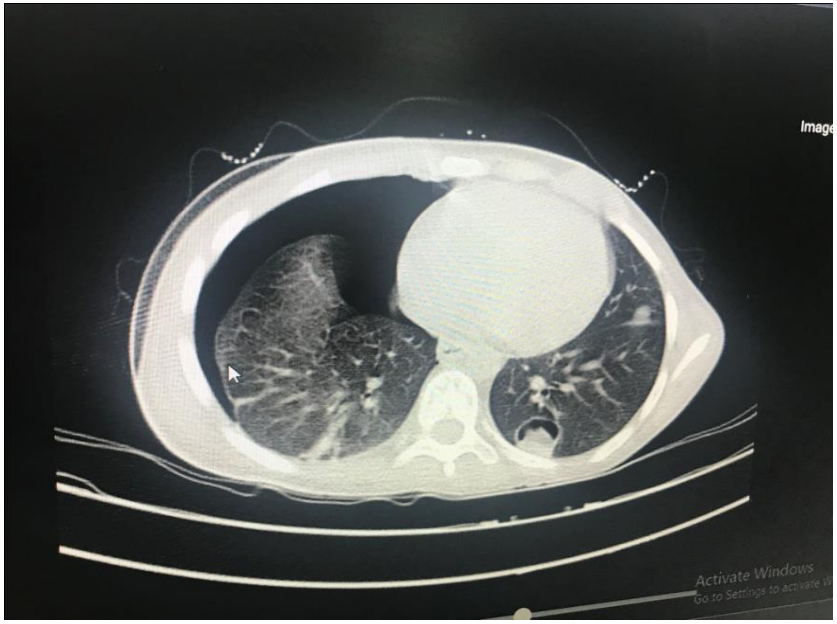
CXR after chest tube insertion

- Medical Therapy:
- antibiotic therapy

Trimethoprim-Sulfamethoxasole

Ceftazidime

One week after removing the tube, the patient suffered from chest pain again. At the new chest radiography, and then CT scan, breakthrough pneumothorax and cavity shaped lesion were identified in the right lung



- chest tube replaced again
- samples were taken from open lung biopsy for:

bacteriologic culture,

pathologic examination and

PCR for tuberculosis

other cause of respiratory infection in cancer patients.

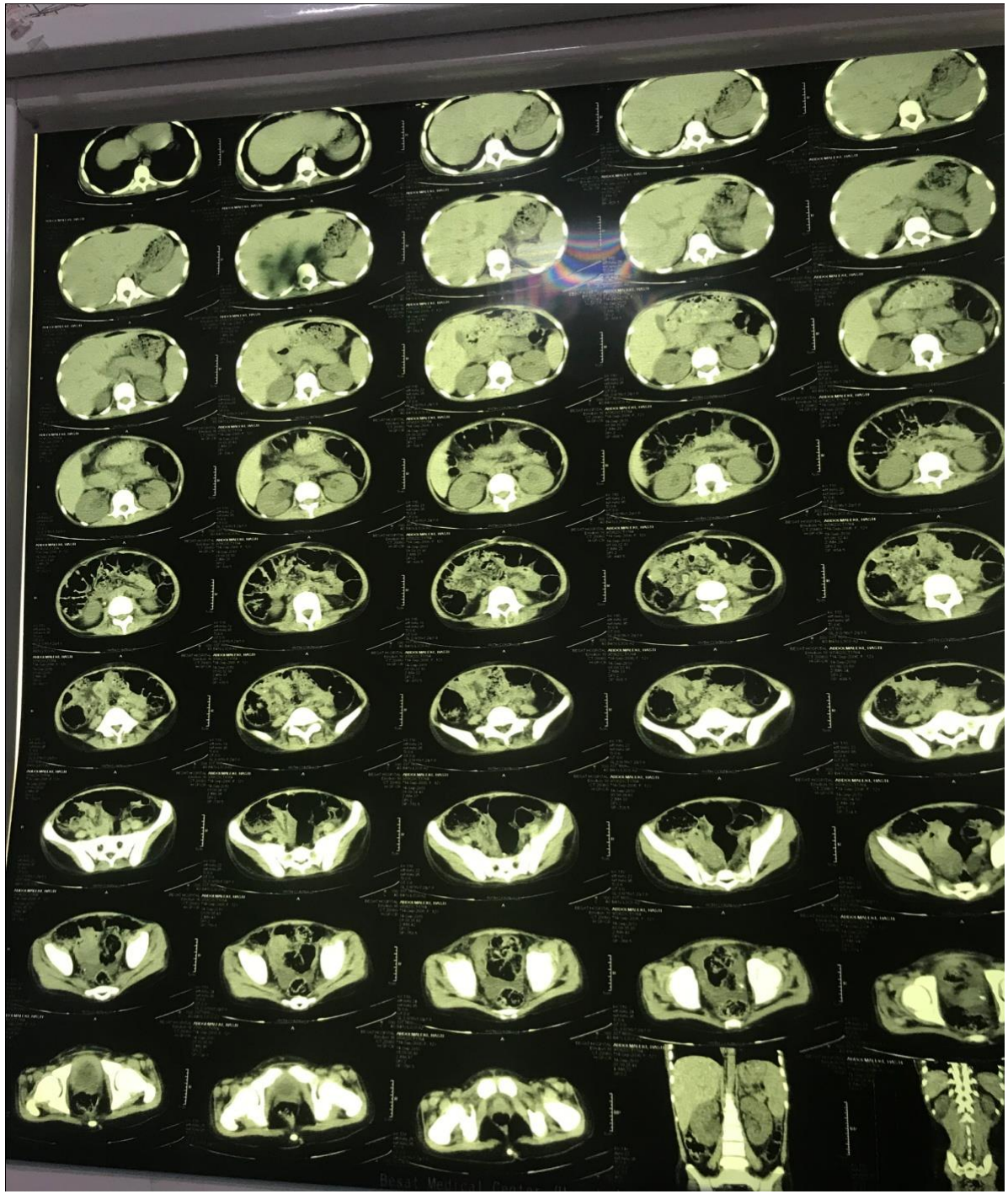
- results :

Aspergillus fumigatus

+ pneumocystis jirovecii

- antifungal treatment with Amphotrecin B was added to trimethoprim-sulfamethoxasole

- At the end of induction therapy:
- red urine and decreased urine output.
- Her blood pressure was normal,
- U/A: hematuria (WBC= 4-6, RBC= many),
- Blood Urea Nitrogen (BUN) and serum creatinine (Cr) level began to rise: (BUN=61, 68, 72, 81, Cr=1/4, 1/6, 1/9, 2/1).



Abdominal CT scan

- Renal sonography: mild left hydronephrosis, without any renal stone.
- renal output: decreased to less than 1 ml/kg/hour during next 24 hours,
- color Doppler sonography of both kidneys : normal flow in both kidneys.
- CT scan of the abdomen: double-sided kidney stone in left Uretero-Vesical Junction and distal urethra and right proximal urethra.

Urology and nephrology consultation: emergency peritoneal dialysis,

double J

renal stones were removed.

urination improved and her BUN and creatinine level decreased to normal level, during the next week. At the follow up, double J was removed after about 45 days.

- By improvement of symptoms, patient discharged with oral trimethoprim-sulfamethoxasole and Itraconazole for full course of antibiotic therapy, and her anti-cancer chemotherapy continued as scheduled protocol.

Discussion

- ALL patients, are susceptible to opportunistic infections such as PCP due to immunosuppressive agents and high dose corticosteroid therapy, especially during longer course of treatment.
- In non-HIV patients, PCP progress more abruptly to respiratory failure but, in these patients, there are lower fungus burdens

- At the present case, such as some other similar case reports, concomitant pneumocysitis infection with aspergillosis, progressed to severe respiratory distress and life threatening pneumothorax
- In addition, invasive aspergillosis, may progress to aspergilloma which may rupture and may lead to tension pneumothorax, even in immune-competent hosts

- ECIL-5 (Fifth European Conference on Infections in Leukaemia):

Immunofluorescense assay is defined as the most sensitive paraclinical diagnostic method.

- RT-PCR is advised for fluid specimens, however, negative results not able to rule out PCP

- Bilateral renal stone developed during the end of antibiotic and induction phase of chemotherapy.
- This complication may occur due to the crystalline nephropathy, most commonly sulfa drugs (Trimethoprim-Sulfamethoxasole)

- Aspergillosis and PCP are more more progressive in AIDS & Cancer patients

These may occur concomitantly

- Pneumothorax was happened in the first stages of the induction of chemotherapy.
- Physicians should be aware of : ANY kind of infections, or two or more concommitant infections
- In immunocompetent host or early stage of immunosuppressive or corticosteroid therapy.

Conclusion

- Finally:
- during the course of high dose antibiotic therapy, especially drugs with potential nephrotoxicity or crystalline formation, it is highly recommend to use:
- Urinalysis and/or Renal sonogram to detect early phase of renal stone formation.

Thanks for your attention