Massive Pericardial Effusion as The First Manifestation of Childhood Non-Hodgkin's Lymphoma: A Case Report

Behzad Alizadeh[1], Zahra Shaye[1], Zahra Badiea[1], and Paria Dehghanian[1]

[1]Mashhad University of Medical Sciences

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Abstract

Although one of the serious manifestations of advanced malignancies is pericardial involvement, pericardial involvement of lymphoma is extremely rare. We present a case of a 6-year-old girl arriving at the hospital with dyspnea and pleuritic chest pain, which is eventually diagnosed with massive pericardial effusion due to mediastinal non-Hodgkin lymphoma.

Corresponding author: Dr Zahra Shaye, Mashhad University of Medical Sciences, Mashhad, Razavi Khorasan 91778-99191, Iran

Tel: +98 51 38049

Fax: +98 51 38713638

Email: shayezahra@yahoo.com

Key Clinical Message

Because non-Hodgkin lymphomas with mediastinal disease at presentation have a natural tendency for rapid dissemination and worse prognosis when invading the pericardium, hence minimal delay in diagnosis is essential.

Abstract

Although one of the serious manifestations of advanced malignancies is pericardial involvement, pericardial involvement of lymphoma is extremely rare. We present a case of a 6-year-old girl arriving at the hospital with dyspnea and pleuritic chest pain, which is eventually diagnosed with massive pericardial effusion due to mediastinal non-Hodgkin lymphoma.

Keywords: mediastinal non-Hodgkin lymphoma, pediatric lymphoma, pericardial involvement, pericardial effusion, case report

INTRODUCTION:

One of the important causes of pericardial effusion are solid tumors (1). Pericardial involvement from non-Hodgkin lymphoma is uncommon and malignant pericardial effusion is even more scarce(2). Pericardial effusion, which is the accumulation of fluid in the pericardial sac, is commonly associated with significant decrease in patient survival, and may lead to grave consequences like tamponade, cardiovascular collapse, and death (3,4). Here we present a case of this complication as the first manifestation of mediastinal lymphoma.

CASE:

A 6 year old girl presented to the hospital with the main complaint of dyspnea and pleuritic chest pain starting from one week earlier. She was mildly agitated and could not lay down due to pain and ortopnea;

She was also febrile during this period. In her past medical history: she is the first sibling, was born term, with no previous hospitalization. Her parents reported intermittent fever for 3 months before admission. There was no close contact with a suspicious covid-19 patient.

Upon physical examination, general appearance was good and the child was mentally oriented. Lung auscultation was clear but a region of decreased sounds was detected on the lower right side, heart sounds were muffled, and the peripheral pulses were normal at the time. The blood pressure reading was 100/65, heart rate was 120, and respiratory rate was 30. Abdominal examination revealed hepatomegaly.

Initial paraclinical studies included chest radiograph which showed a mediastinal widening (figure 1) and 12-lead electrocardiogram revealed sinus tachycardia and low-voltage alternans QRS (figure 2). Complete blood test, blood biochemistry assessment and COVID-19 PCR test were all normal (table 1).

Further evaluations were performed based on the primary findings, which included echocardiography showing significant pericardial effusion, and thorax computed tomography (CT) scan revealing a mediastinal mass accompanied by pleural and pericardial effusion (figure 3 and 4).

The biopsy from the mass was in favor of non hodgkin lymphoma (malignant small round cell tumor), bone marrow aspiration was normal and bone marrow biopsy demonstrated cellular hematopoietic, non-neoplastic marrow (figure 5). Chemotherapy was initiated after referral to oncologist, immunohistochemistry tests, and complete staging. The chemotherapt regimen was consisted from Prednisone (oral administration), vincristine (intravenous administration on), daunorubicin (intravenous administration), asparaginase (intravenous administration), cyclophosphamide (intravenous administration), cytarabine (intravenous administration), mercaptopurine (oral adminestration), and mitothrexat (intrathecal administration). After one yeard of follwo up, the patient is disease free.

DISCUSSION:

One of the frequent and serious manifestations of advanced malignancies is pericardial involvement, which includes various degrees such as pericarditis, pericardial effusion, pericardial tamponade, and constrictive pericarditis(4). Symptomatic effusion mostly presents with tachycardia, dyspnea (our patient's chief complaint), and echocardiographic characteristics of right heart failure, but it can also occur asymptomatically (5,6).

Pericardial effusion rises mainly from blockage of the lymphatic and venous drainage of the pericardium which is caused by adjacent compression, direct tumoral infiltration, or via hematogenous spread. Pericardial effusions in cancer patients can also be triggered by chemotherapy and radiotherapy. Other complications like infections and autoimmune diseases, can also cause pericardial effusion in these patients(4,7). The typical findings on electrocardiogram are sinus tachycardia and low voltage defined as maximum QRS amplitude $<$0.5 mV in the limb leads. New-onset atrial fibrillation can be present. Electrical alternans, characterized by beat-to-beat alternation in the QRS complex, represent the swinging of the heart in the pericardial fluid(3). Echocardiography is considered to be the primary imaging modality for pericardial effusion, and it is recommended to be done before, during and after treatment to monitor the patient(1,2).

Lymphoma is a haematological malignancy that emerges from the clonal proliferation of lymphocytes at different maturation stages. It presents with fatigue, night sweats, enlarged painless lymph nodes, and weight loss. Lymphoma is classified into 2 major subgroups: Hodgkin (10%) and non-Hodgkin lymphoma (90%) (2). Lymphomas involving the mediastinum have a wide age range, and occur in both pediatric and adult populations(11).

Chen et al compared pediatric and adult lymphomas involving the mediastinum, and reported that pediatric patients had a higher incidence of T-LBL/T-ALL, prevalence of dyspnea, stage IV tumors frequency, and relative tumor diameter, compared to adults. They were also more likely to be male(12).

Cardiac and pericardial involvement of lymphoma is extremely rare. It accounts for 0.5% of cardiac involvement and 1% of all extranodal non hodgkin lymphomas. It is more common in high-grade lymphomas,

particularly double-hit/triple-hit subtypes, and shows a poor prognosis, as in other malignancies(6). Bertog et al. studied 163 patients diagnosed with constrictive pericarditis, and lymphoma was the aetiology in only 2 of the patients (9). In another study, out of 8 patients undergoing pericardiectomy for malignant constrictive pericarditis, only one was diagnosed with lymphoma(10). This unlikeliness has sometimes led to incorrect approaches and treating patients with multiple pericardiocenteses or management according to other diagnoses like tuberculosis(13).

On the other hand, malignancy involving the pericardium is usually a late secondary feature(8). In a case study-based systematic review on lymphoma-associated cardiac tamponade, Shareef et al evaluated 52 cases aged 9 to 95 (median 52), out of which 49 patients had non-Hodgkin lymphoma, and observed that most of these patients were diagnosed with lymphoma prior to hospital presentation (80.8%) (4). They also reported that the median overall survival of patients with lymphoma and cardiac tamponade is 4 months, and there is no significant difference between lymphoma diagnosis before or after this complication.

A chest x-ray identifies an anterior mediastinal mass mostly when it is very large (bulky disease) and produces mediastinal widening. It demonstrates tumour bulk and pleural effusion. Chest computed tomography (CT) scans are examined for precise tumour location, presence of necrosis, pulmonary parenchymal involvement, chest wall invasion, and more assessment of pleuropericardial effusion(14,15). Definitive diagnosis is achieved via biopsy and histopathological examination, and treatment begins after complete staging according to Ann Arbor classification.

CONCLUSION:

Although pericardial effusion is rare as the first demonstration of pediatric mediastinal lymphoma, it is important to take this differential diagnosis into consideration. Because non-Hodgkin lymphomas with mediastinal disease at presentation have a natural tendency for rapid dissemination and worse prognosis when invading the pericardium, hence minimal delay in diagnosis is essential to avoid incorrect initial management and initiate the true approach as soon as possible.

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Conflict of interest

All authors declare that they have no conflicts of interest.

Ethical cosideration

The study protocol was approved by the Ethics Committee of Mashhad University of Medical Sciences, and was conducted according to the Declaration of Helsinki. Undersigned informed consent form was obtained from patient prior to the enrollment.

Data availability statement

The data sets used and/or analyzed during the current study are available from the corresponding authors per request.

Author contributions

B.A., Z.B., Z.Sh., and P.D. contributed in conception, design and drafting of the manuscript. ., Z.Sh. contributed in data collection. B.A., Z.B., and Z.Sh., contributed in drafting of the manuscript. and P.D. supervised the study. All authors approved the final version for submission.

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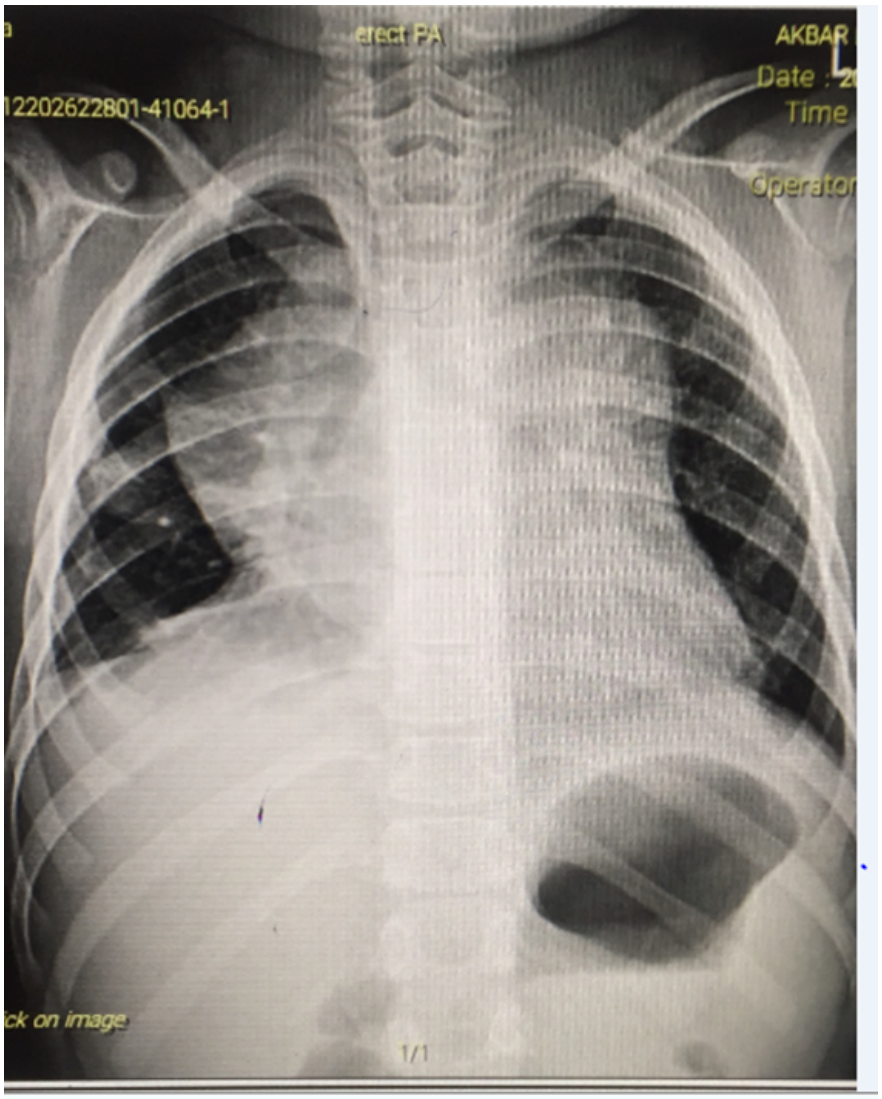

Figure 1: The patient's chest radiograph demonstrating a mediastinal widening, suggestive of mediastinal mass

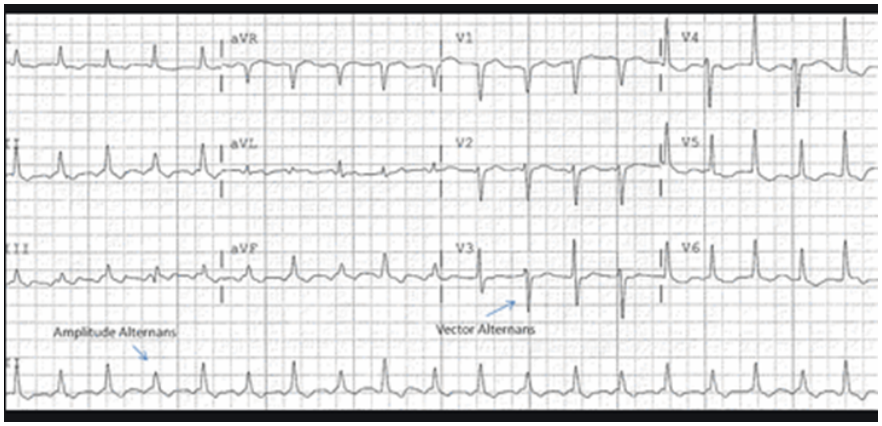

Figure 2: Changing QRS complex amplitude on a 12-lead electrocardiogram: Electrical alternans

Table 1: Complete blood count and biochemical tests

WBC	11.4 (PMN69, LYMPH21)	**BS**	150
HB	12.6	**UREA**	25
HCT	36.1	**Cr**	0.6
MCV	71.9	**LDH**	1061
MCH	25	**Na**	139
MCHC	34.9	**K**	4.7
PLT	565	**TPI**	negative
		Uric Acid	4.5
Covid19 pcr	negative	**Ca**	10
CRP	66	**P**	4
ESR	57	**ALT**	27
		AST	34

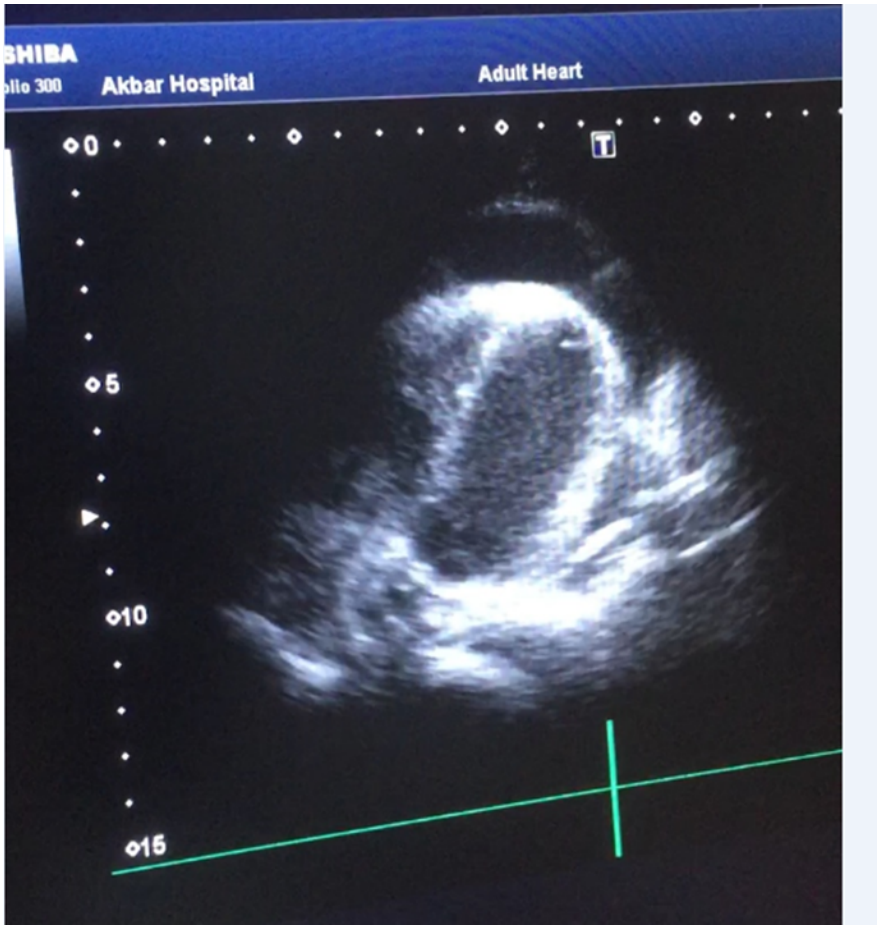

Figure 3: Transthoracic echocardiogram. The heart is seen surrounded by a very large pericardial effusion, without any sign of tamponade sign (15 mm left side & 18 mm right side)

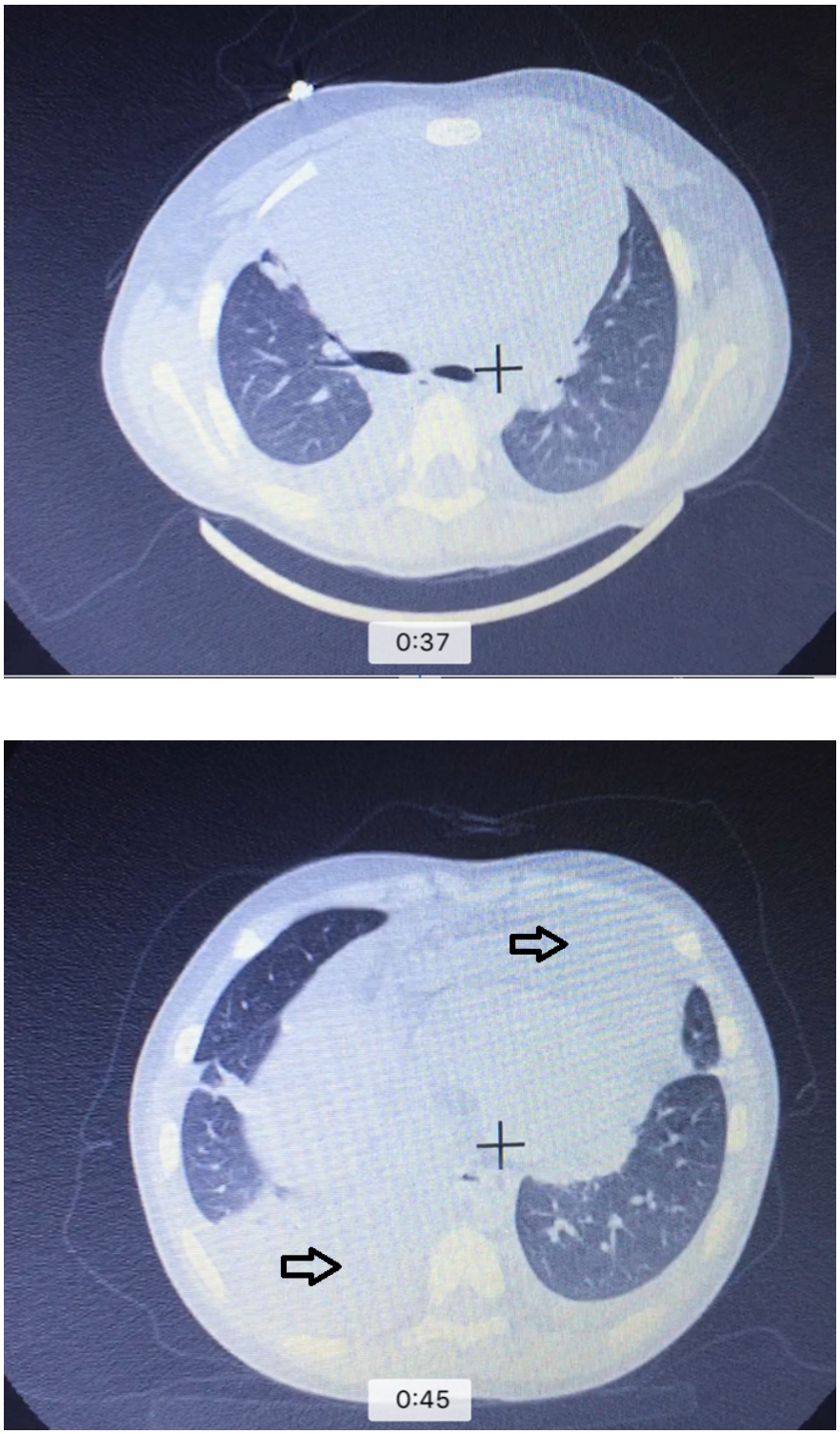

Figure 4: The thorax computed tomography (CT) scan revealed a mediastinal mass accompanied by pleural and pericardial effusion (arrows).

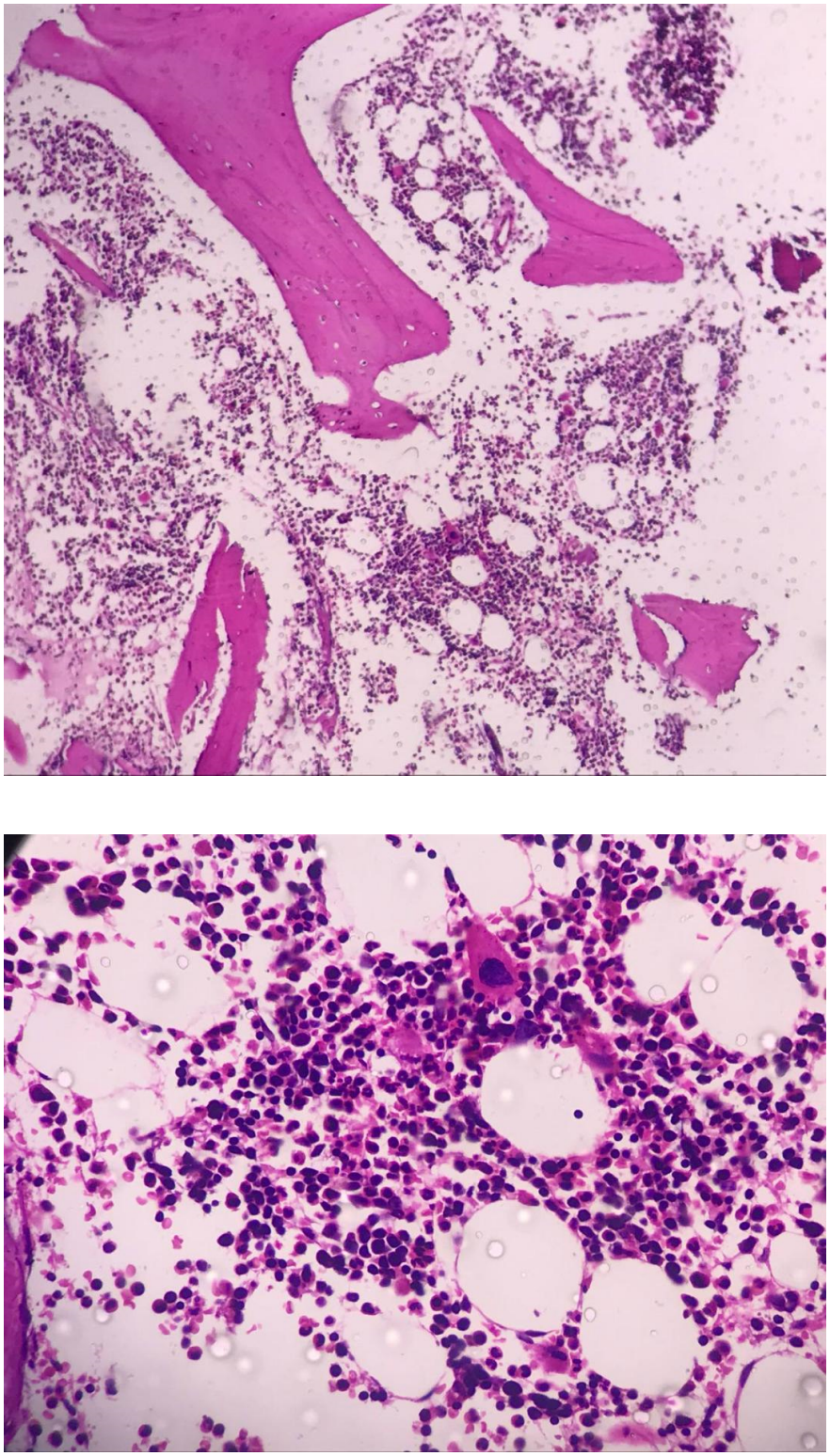

Figure 5: Cellular hematopoietic marrow, non-neoplastic (H&E staining): Low power field (left), high power field (right).