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Hodgkin's Lymphoma Extra-nodal Presentation as Chest Wall Abscess Involving Sternum

Huma Akhtar[1*], M. Jamal Uddin[1] and M. Tahir[1]

[1]Department of Surgery, Abbasi Shaheed Hospital, Karachi, Pakistan.

Authors' contributions

This work was carried out in collaboration among all authors. Author HA designed the study, performed the statistical analysis, wrote the protocol, managed the literature searches and wrote the first draft of the manuscript. Authors MJ and MT managed the analyses of the study. All authors read and approved the final manuscript.

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Case Study

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ABSTRACT

Hodgkin's lymphoma (HL) is a type of lymphoma which originates from lymphocytes. Most often, painless swollen lymph nodes may occur in the neck, under the arm, or in the groin. Symptoms can include pyrexia, night sweats and weight loss. Those affected may experience tiredness or itchiness. The osseous involution is unorthodox at the time of diagnosis. A case is described of Hodgkin's lymphoma extra-nodal involution presenting as an abscess in the chest wall involving sternum. A 22-year-old male presented with a painless swelling at anterior central chest wall. The clinical, radiological and histological characteristics of the disease can resemble other medical conditions, including Tuberculosis, making it difficult to diagnose as it is a very infrequent disease which often leads to delay in treatment.

Keywords: Hodgkin's lymphoma; extra-nodal involvement; chest wall abscess; tuberculosis.

**Corresponding author: E-mail: huma1345@hotmail.com;*

1. INTRODUCTION

Hodgkin Lymphoma (HL) is a category of malignant neoplasms characterized morpho-logically by the presence of neoplastic giant cells the Reed – Sternberg (RS) cells admixed with a variable inflammatory infiltrate. RS cells express CD30 in addition to CD15 antigens [1].

The HL classification comprises, a) Classical Hodgkin's lymphoma, which includes Nodular Sclerosis (NS), Lymphocyte Depletion, Lymphocyte Rich and Mixed Cellularity (MC) HL and b) Lymphocyte Predominance as a separate entity [2]. It has two peaks of the bimodal distribution. First peak in the third decade and second in age 50 or older [3]. There is a common presentation of progressive painless lymphadenopathy, particularly of the cervical, supraclavicular, mediastinal in addition to the inguinal areas [4]. Extra-nodal HL accounts for <1% of HL cases with osseous involvement in advanced stages 9-35% [5].

Usual sites of HL bone lesions include the vertebrae and the ribs, while currently there is an even rarer sternal involvement, with only nine cases reported. A study in Pakistan, involving 658 patients showed that HL has a bimodal distribution with a 5:1 ratio between male and female, and that the MC subtype is more common. Throughout the developing countries, the NS subtype was more prevalent; however, the distribution of bimodal age conforms to ours [6].

2. CASE REPORT

A 22-year-old male with a pruritic rash on his chest five months prior to presentation associated with two swellings in the right axilla for one month. The rash and the axillary swellings increased gradually in size, with intermittent purulent discharge. Accompanied with undocumented low-grade fever for a month and weight loss of nearly 6-7 kilograms since the eruption of the rash. There was a positive history of tuberculosis contact in early years.

On examination, the patient weighed 46 kilograms and was alert, awake and fully oriented. There were two ulcerating wounds over the sternal body measuring approximately 7 by 2.5 cm and 5 by 1.5 cm, respectively. The ulcers were irregular in shape and margins, with no discharge. Two non-tender axillary swellings measuring 2 cm each, firm in consistency with irregular margins and immobile (Fig. 1). There was cervical, axillary and inguinal lymphadenopathy, bilaterally and clinically anemia was present.

Investigation revealed an elevated erythrocyte sedimentation rate (ESR) of 110 mm/h and total leucocyte count (TLC) of 21.1×10^9/l, baseline hematological investigations were otherwise under normal limits. A sputum culture and sensitivity, together with gene X-pert were negative for M. tuberculosis. Viral screening for Hepatitis B, C and HIV were negative as well.

Incision and drainage were performed, the cavity was cleared of slough and necrotic tissue without any bony particles (Fig. 2). The cavity was kept exposed for secondary healing. The wall biopsy obtained from the procedure was inconclusive.

Chest CT scan with contrast showed; destruction of sternum, adjacent ribs with soft tissue thickening and the muscles of chest wall bilaterally. Increased density of retrosternal fat indicative of infiltration and inflammation with no collection was seen in mediastinum suggestive of soft tissue infection with osteomyelitis most likely tuberculosis (Fig. 3).

Debridement of the wound was performed again and a biopsy sample was sent of the wound along with an inguinal lymph node which revealed complete effacement of lymph node architecture by a lymphoid neoplasm arranged in nodules. The lymphoid population comprised of scattered large atypical cells against the polymorphous background of mixed inflammatory cells including lymphocytes, histiocytes and plasma cells. The cells show a moderate amount of eosinophilic cytoplasm and vesicular nuclei with prominent eosinophilic nucleoli. Few cells were bilobed and few had multilobed nuclei. Sections from anterior chest wall revealed fibrocartilaginous tissue exhibiting lymphoid infiltrate comprising of scattered large atypical cells against the population of mature lymphocytes. Immunohistochemical staining displayed:

LCA: Negative
PAN B (CD20), PAN T (CD3): Negative
CD30 (Ki-1): Positive
CD15 (GAA): Positive
PAX5: Weakly Positive

Based on morphological and immune histochemical features, a diagnosis of Classic HL; Nodular Sclerosis type was made.

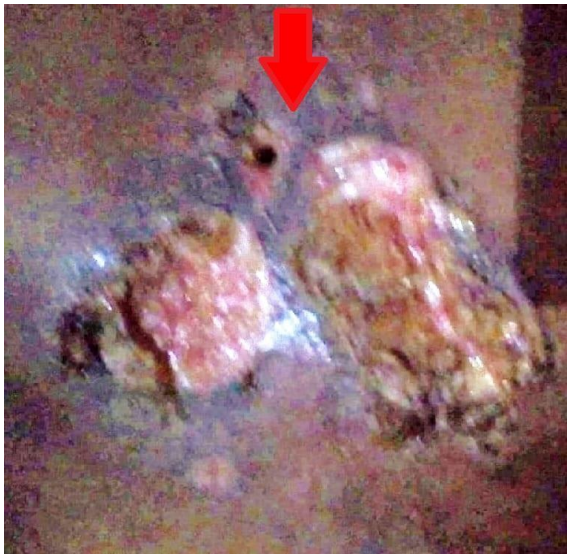

Fig. 1. Showing anterior chest wall abscesses

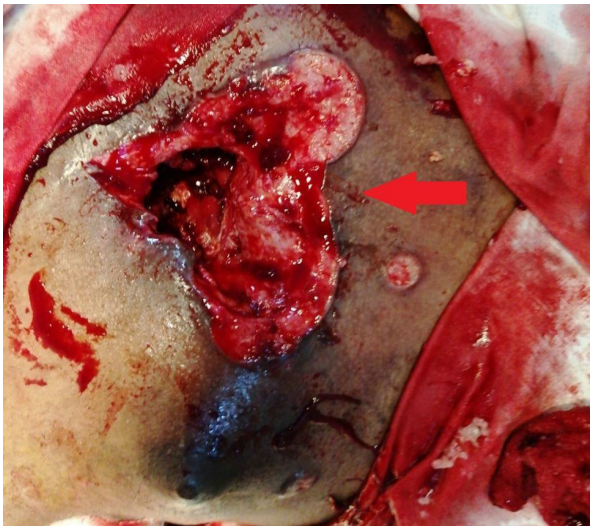

Fig. 2. Anterior chest wall wound per-operatively which was debrided containing slough and have a hollow space

The oncological department was taken onboard. Directed hematological investigations showed high LDH levels of 369 IU/L. A chest CT scan exhibited complete destruction of the body of sternum and partial destruction of manubrium sterni, associated with adjacent soft tissue thickening and mild residual collection, bulging into the left hemithorax and mediastinum. Post intervention changes with soft tissue defect were seen anterior to the body of sternum. There was destruction of medial end of right 3rd and 2nd left rib. Multiple enlarged lymph nodes were seen in pre-vascular region. Mild left sided pleural effusion was observed. Multiple enlarged bilateral axillary lymph nodes were seen. Multiple sub-cutaneous deposits seen in upper anterior abdominal wall on right side anterior to liver. Multiple enlarged nodal masses seen along bilateral external iliac vessels. Bilateral enlarged multiple inguinal lymph nodes seen. Hepatosplenomegaly noted. There was no evidence of ascites. Rest of viscera were normal. PET-CT scan showed hypermetabolic lymphadenopathy both above and below the diaphragm with large lymphomatous mass in the anterior chest wall destructing sternum and

costochondral junctions. Left sided moderate pleural effusion with hypermetabolic pleural deposits. Few hypermetabolic deposits in the peritoneum representing peritoneal deposits. Evidence of mild hepatosplenomegaly. Multiple hypermetabolic soft tissue deposits are seen in the subcutaneous tissues of the chest, abdomen and pelvic regions. Homogenously increased metabolic activity in the skeleton without any discrete focal uptake, likely due to marrow hyperplasia. According to the modified Ann Arbor staging findings suggestive of stage IV disease.

The multidisciplinary team, opted for chemotherapy. Followed by 4 cycles of ABVD chemotherapy follow-up PET CT showed significant interval regression of cervical, supraclavicular, mediastinal, axillary, retroperitoneal and inguinal lymphadenopathy along with interval resolution of left sided pleural effusion as well as hypermetabolic pleural deposits with complete resolution of hypermetabolic peritoneal deposits with hepatosplenomegaly. Significant improvement of anterior chest wall lesion. As compared to the previous PET CT there is significant improvement suggesting excellent response to chemotherapy. However, solitary hypermetabolic node is seen in the aortopulmonary region showing SUVmax 7.2. According to Deauville 5PS findings represent partial metabolic response.

3. DISCUSSION

Hodgkin lymphoma is an unusual malignancy of B-cell origin mainly involving the lymph nodes and the lymphatic system. Higher incidence rates have been shown in the developed countries, with males affected more than females and lower in Asia. Globally, 15% accounts for Hodgkin's lymphoma amongst all cancers in young adults affecting quality of life [7]. HL accounts for 10–15% of all lymphomas. Extra-nodal lymphomas

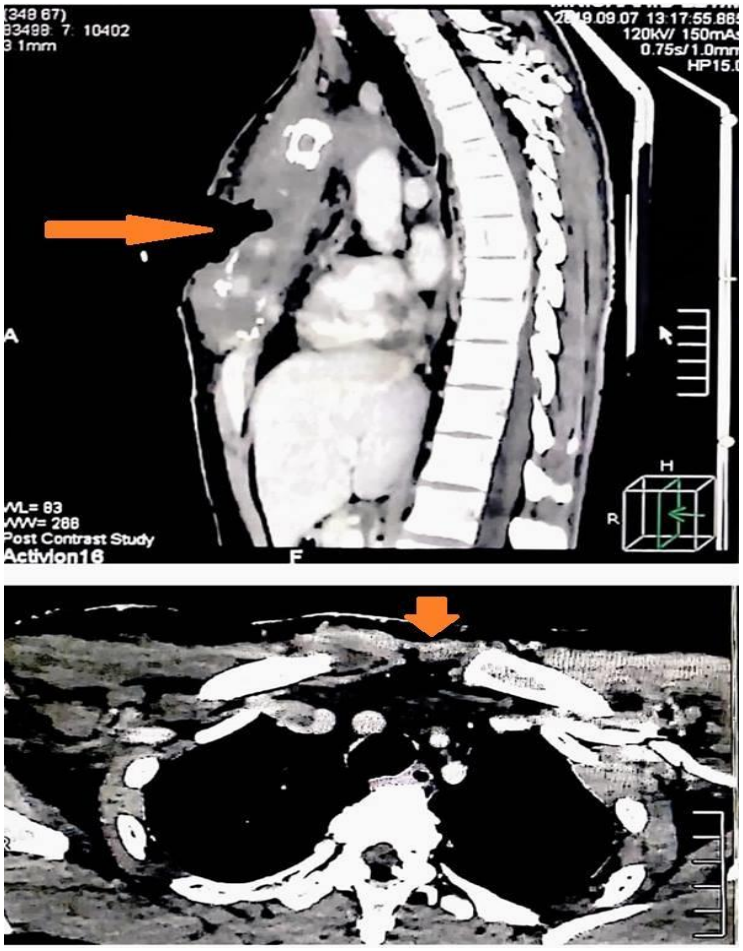

Fig. 3. Chest CT scan sagittal and axial views showing anterior chest wall defect in both views

account for 2–16% of all HL [8]. An extra-nodal presentation is an uncommon representation of HL and the most common sites of presentation for extra-nodal osseous extension mostly located in the vertebrae and ribs, while an extra-nodal presentation in the sternum is rarer [9]. Primary lymphoma of bone or secondary to hematogenous, direct contiguous spread from the lymph nodes or soft-tissue mass are the possible ways of osseous involvement [10]. Primary osseous HL is the diagnosis labelled to the patients who have osseous involvement with no associated extra osseous sites. Involvement of more than one osseous site termed as primary multifocal osseous HL [11]. Ann Arbor staging is being used for the selection of treatment based on accurate clinical stage showed in Fig. 4.

Osseous involvement perplexes the disease progression and denotes widespread disease which is labelled as stage IV [5]. Literature review has been done from Pubmed using key words Hodgkin's lymphoma, sternal Invovement and osseous from year 1966-2020 includes 21 cases in total of HL involving sternum which is summarized in Table 1.

After literature review of the osseous involution of HL denotes that the majority of cases have been associated with local or distant lymph node involution. Osseous involvement of HL presenting as a sternal lesion is quite eccentric. Frequently involved bones were the sternum, vertebrae, femur and ribs. Through chemotherapy and radiation, most patients could accomplish absolute remission. Usually, the patients showed a good prognosis as the outcome of timely treatment.

It is worth noting that, whole-body PET-CT is gaining growing interest in the period of imaging. The benefit of PET-CT as opposed to other approaches is the early identification of the disease [30]. For initial staging, restaging and follow-up of patients with lymphoma PET-CT has been used widely [31]. In an earlier meta-evaluation, when used to stage and restage patients with lymphoma PET-CT demonstrated

Stage I	Involvement of one lymph node or a group of adjacent nodes.
Stage II	Involvement of two or more lymph node regions on the same side of the diaphragm (a thin muscle below the lungs)
Stage III	Involvement of lymph node groups on both sides of the diaphragm (for example, neck, chest and abdomen)
Stage IV	Involvement of lymph nodes on both sides of the diaphragm and/or involvement of organs such as the lungs, spleen, liver, bones or bone marrow

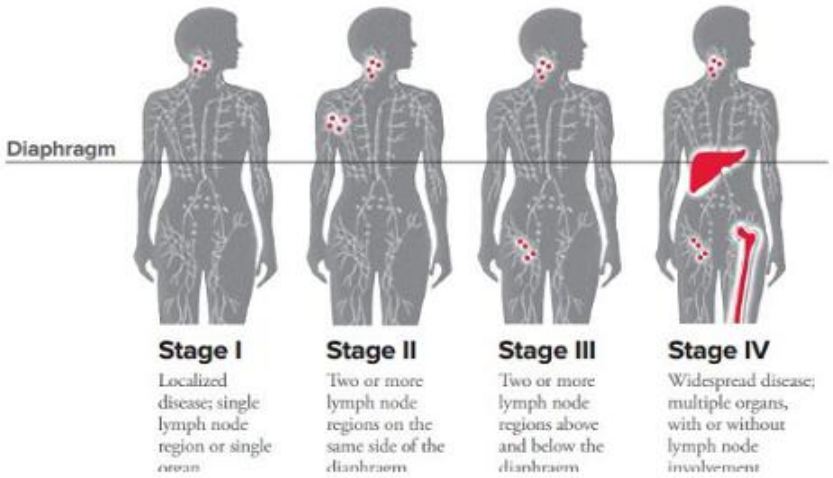

Fig. 4. Ann arbor staging for Hodgkin's lymphoma

Table 1. Showing details of all the cases of Hodgkin's lypmhoma involving sternum reported from 1966-2020

#	Author and year	Age and sex	Sternum involved initially	Primary diagnosis	Type	Stage	Extra-sternal involvement	Treatment
1.	Arnold et al. [12]	21; F	Yes	Chondro-sarcoma	N/A	N/A	Yes	Resection followed by RT
2.	Manoli et al. [13]	14; M	Yes	EG	N/A	N/A	Yes	RT
3.	Manoli et al. [13]	19; F	Yes	HL	NS	IIAE	Yes	RT
4.	Sullivan et al. [14]	22; F	Yes	HL	NS	N/A	Yes	RT
5.	Miano et al. [15]	9; M	Yes	HL	NS	IIIAE	Yes	RT+CT
6.	Borg et al. [16]	23; M	N/A	HL	NS	IIA	Yes	RT+CT
7.	Ostrowski et al. [17]	50; M	Yes	HL	N/A	N/A	Yes	RT
8.	Ostrowski et al. [17]	58; M	Yes	HL	N/A	N/A	Yes	RT
9.	Ostrowski et al. [17]	20; M	No	HL	N/A	N/A	Yes	RT
10.	Petkov et al. [18]	33; M	No	HL	NS	IIB	Yes	CT followed by auto-SCT
11.	Priola et al. [19]	20; M	Yes	EG, IHC revealed HL	NS	N/A	Yes	RT+CT
12.	Daizyrena et al. [20]	18; M	Yes	HL	N/A	N/A	Yes	CT
13.	Karimi et al. [21]	82; F	Yes	HL	N/A	N/A	Yes	No treatment
14.	Langley et al. [22]	7; M	Yes	TB	N/A	IV	Yes	CT
15.	Biswas et al. [23]	21; M	Yes	TB	NS	IVB	Yes	CT followed by RT
16.	Oshikawa et al. [24]	28; M	Yes	HL	MC	IV	Yes	CT followed by RT
17.	Goyal et al. [25]	25, F	Yes	LCH	NS	IIIB	Yes	Initially RT followed by CT
18.	Singh et al.[26]	30; F	Yes	TB	MC	N/A	Yes	CT
19.	Jain et al. [27]	30; F	Yes	HL	NS	IEB	N/A	CT+RT
20.	Li et al. [28]	25; F	Yes	HL	NS	N/A	Yes	CT
21.	Yi-Yu et al. [29]	47; F	Yes	MM	MC	N/A	Yes	CT

Abbreviations: F: Female, M: Male, EG: Eosinophilic Granuloma, HL: Hodgkin's Lymphoma, IHC: Immuno-histochemistry, TB: Tuberculosis, LCH: Langerhans Cell Histiocytosis, MM: Mediastinal Mass, NS: Nodular Sclerosis, MC: Mixed Cellularity, CT: Chemotherapy, RT: Radiotherapy, SCT: Stem Cell Transplantation.

high positivity and specificity [32]. PET-CT is commonly for response assessment during and after therapy [33]. Early intermediate PET-CT scans have also been shown to be a sensitive prognostic predictor in patients with advanced stage and extra-nodal disease after 2–4 cycles of standard-dose chemotherapy [34]. In this study, HL's sternal infiltration was diagnosed as nodular sclerosing type stage IV disease; the most benign and shows promising prognosis. Chemotherapy was the preferred approach based on all of the pacing and imaging techniques.

4. CONCLUSION

In conclusion, the case presented was stage IV and responded well to 4 cycles of ABVD chemotherapy which resulted in disease regression along with complete wound healing. For current polychemotherapy, the long-term prognosis is promising for affected patients.

CONSENT

Informed consent was obtained from the patient to publish the data concerning this case.

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the authors.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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