JRAAS
Special Issues in Medicine & Surgery
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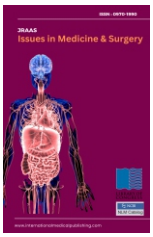

Case Report

Section: Radiodiagnosis

Role of Imaging in Diagnosis of Rare Case of Hodgkin's Lymphoma

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HIGHLIGHTS

- Imaging helps localize lymph node involvement.
- CT and PET scans assess disease spread.
- MRI evaluates mediastinal and abdominal masses.
- Guides biopsy for histopathological confirmation
- Crucial for staging and treatment planning

Key Words:
Pediatric lymphoma
Hodgkin's lymphoma
Mediastinal mass
Multimodal imaging
Lugano classification

ABSTRACT

Hodgkin's lymphoma (HL) is an uncommon but highly curable pediatric malignancy, rarely diagnosed in children below ten years of age due to its subtle, nonspecific clinical presentation. We report a rare case of classical HL in a 7-year-old male presenting with low-grade fever, dry cough, pallor, and cervical lymphadenopathy. The patient had been empirically started on anti-tubercular therapy without improvement. Clinical evaluation revealed hepatosplenomegaly and widespread lymphadenopathy. Chest X-ray and abdominal ultrasonography were suggestive of a mediastinal mass and multiple splenic lesions. Contrast-enhanced computed tomography (CECT) confirmed a large, homogeneously enhancing mediastinal mass with vascular encasement and extensive abdominal nodal involvement. Based on imaging and clinical features, the case was classified as stage IVB Hodgkin lymphoma per Lugano classification. Histopathological confirmation was achieved through lymph node biopsy revealing Reed-Sternberg cells. Multimodal imaging played a pivotal role not only in initial detection and staging but also in identifying biopsy sites and guiding therapeutic decisions. This case underscores the diagnostic value of integrated imaging-including ultrasound, CECT, and PET/CT-in accurately evaluating pediatric lymphomas, especially in atypical age groups. It also highlights the risk of misdiagnosis and treatment delays when empirical therapies like ATT are initiated without confirmatory histology. Prompt imaging and tissue diagnosis are vital to ensure timely intervention and optimal outcomes. A multidisciplinary approach, integrating radiologic, pathologic, and clinical expertise, is crucial for managing such rare pediatric malignancies and improving long-term prognosis.

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Article History: Received 15 July 2025; Received in Revised form 17 August 2025; Accepted 21 August 2025
How To Cite: Rachna Chaurasia & Rameshwar Pippal, Role of Imaging in Diagnosis of Rare Case of Hodgkin's Lymphoma Diagnosed in a Child 07 Years of Age with Histopathological Correlation. *JRAAS: Special Issues in Medicine & Surgery;*2025,40(1),1-6

INTRODUCTION

Hodgkin's lymphoma (HL) is a malignant lymphoid neoplasm defined by the presence of distinctive multinucleated Reed-Sternberg cells within an inflammatory cellular milieu. While it constitutes about 10–15% of all childhood lymphomas, its occurrence in children under the age of ten remains uncommon. In younger children, HL tends to manifest with nonspecific symptoms such as prolonged low-grade fever, weight loss, fatigue, and night sweats. These general symptoms can easily be misinterpreted as benign infections or other self-limiting conditions, leading to delays in appropriate diagnostic workup. This rarity and vagueness of clinical features in younger patients necessitate a high index of suspicion and a systematic approach to investigation to avoid missed or delayed diagnosis [1].

Timely identification of HL is crucial as it is considered one of the most curable pediatric malignancies when appropriately managed. Imaging plays an essential role throughout the diagnostic pathway-from initial suspicion and disease mapping to biopsy guidance and treatment planning. Ultrasonography is typically the first imaging modality used due to its safety profile and ability to provide real-time information regarding superficial lymphadenopathy or organomegaly. It also assists in guiding percutaneous biopsy of accessible lesions. Nevertheless, ultrasound has limitations in whole-body evaluation and in detecting deep-seated nodal or extranodal disease [2].

For a more comprehensive assessment, contrast-enhanced computed tomography (CECT) of the neck, chest, abdomen, and pelvis is frequently employed. CT imaging is particularly useful in identifying mediastinal masses, retroperitoneal lymphadenopathy, and involvement of the lungs and visceral organs. Although it provides excellent anatomical detail, it involves ionizing radiation and has limited utility in evaluating the central nervous system and bone marrow. This makes it insufficient as a standalone tool in the complete staging of HL [3].

To overcome these limitations, 18F-fluorodeoxyglucose positron emission tomography combined with computed tomography (FDG-PET/CT) has become the gold standard for staging and response evaluation in pediatric HL. This hybrid imaging technique offers the advantage of detecting both nodal and extranodal sites of active disease based on metabolic activity. PET/CT has demonstrated superior sensitivity in identifying disease within the liver, spleen, bones, and bone marrow, often correlating more accurately with marrow involvement than biopsy alone. Given its high diagnostic value, PET/CT is now routinely integrated into pediatric lymphoma protocols for staging and treatment response assessment [4].

Considering the long-term risks of radiation exposure in children, whole-body magnetic resonance imaging (MRI), particularly when enhanced with diffusion-weighted sequences, has emerged as a promising alternative. It offers excellent soft tissue contrast without radiation and has demonstrated comparable accuracy to PET/CT in detecting lymph node and extranodal disease. However, whole-body MRI is limited by its reduced sensitivity for small pulmonary lesions, longer imaging times, and the need for sedation in younger children. Additionally, its availability remains limited in many healthcare settings [5].

Imaging also plays a critical role in selecting optimal biopsy sites by identifying the most metabolically active or anatomically favorable lesion for tissue sampling. This ensures the retrieval of representative samples for histological confirmation, which is essential for identifying Reed-Sternberg cells and establishing a definitive diagnosis. Furthermore, imaging findings contribute significantly to staging using systems like the Ann Arbor classification, which informs risk stratification and therapeutic strategies. A multimodal imaging approach that combines functional and structural assessment thus remains indispensable for diagnosing and managing rare pediatric presentations of HL effectively and ensuring favorable outcomes [2, 6].

REVIEW OF LITERATURE

Venkatakrishna SS and colleagues (2024) conducted a retrospective study analyzing MRI signal characteristics in 11 pediatric patients with biopsy-confirmed nodular sclerosing Hodgkin lymphoma. While CT remains standard for initial imaging, MRI was favored for its superior soft tissue contrast and lack of ionizing radiation. Typically, lymphoid tissue shows high T2/STIR signals; however, this study noted low signal in five patients (45.5%) and intermediate signal in six, suggesting atypical imaging features. These findings indicated that such signal patterns might serve as potential imaging biomarkers for this histological subtype, possibly reducing the need for invasive biopsy if validated in larger cohorts [7].

Si J, et.al; (2024) conducted a study to develop a radiomics model using contrast-enhanced CT for non-invasive differentiation between diffuse large B-cell lymphoma (DLBCL) and Hodgkin's lymphoma (HL), which require different clinical approaches. The study analyzed data from 66 patients (16 with DLBCL and 50 with HL), extracting 2,264 radiomics features refined through advanced selection techniques. Logistic regression and quadratic discriminant analysis models achieved AUCs of 0.814 and 0.841, respectively. Incorporating lactate dehydrogenase (LDH), an independent clinical predictor, further enhanced model performance (AUC 0.845), supporting the utility of integrated radiomics-clinical approaches [8].

Kalra M, et.al; (2023) conducted the InPOG-HL-15-01 multicentric prospective study to evaluate a response-based, risk-adapted treatment strategy using the ABVD regimen in

pediatric Hodgkin lymphoma, aiming to reduce radiation therapy (RT). Early response assessment (ERA) after two chemotherapy cycles was done using PET-CT or contrast-enhanced CT (CECT), with RT limited to cases showing bulky disease or poor response. Among 382 patients, PET-CT showed higher satisfactory response rates (81.2%) compared to CECT (64.3%), enabling reduced RT use. However, 5-year event-free and overall survival were similar in both groups, supporting PET-CT's role in safely guiding treatment de-escalation [9].

Spijkers S and colleagues (2019) emphasized the importance of detecting extranodal disease in pediatric Hodgkin lymphoma for accurate staging, treatment planning, and prognostication. They reviewed various imaging modalities used to identify extranodal involvement, each offering specific advantages in visualizing disease spread beyond lymph nodes. Their pictorial essay provided a comprehensive overview of the imaging characteristics associated with extranodal manifestations, illustrating key radiologic patterns and organ-specific findings. These insights aimed to enhance diagnostic accuracy and improve clinical management by helping radiologists and clinicians recognize subtle signs of extranodal disease in pediatric Hodgkin lymphoma cases [10].

Keraliya AR and colleagues (2015) presented a comprehensive review on the role of imaging modalities other than PET/CT in managing Hodgkin lymphoma (HL). Although PET/CT remained the primary imaging method, the authors highlighted the complementary value of plain radiographs, ultrasound, CT, MRI, and nuclear imaging in various stages of care. CT and MRI were particularly useful in detecting recurrence, assessing treatment-related complications involving thoracic and abdominal organs, and identifying second malignancies. The study emphasized that awareness of expected post-treatment imaging changes was essential for improving diagnostic accuracy and guiding appropriate patient management throughout the course of HL [11].

Agrawal K, et.al; (2013) conducted a study to assess the effectiveness of F-18 FDG PET/CT in detecting bone marrow involvement (BMI) compared to bone marrow biopsy (BMB) during initial staging of pediatric Hodgkin's lymphoma (HL). The study included 38 children with a mean age of 9.8 years, of whom 31 underwent BMB. PET/CT identified BMI in 4 of 5 biopsy-positive cases and showed negative results in 23 of 26 biopsy-negative cases, yielding a sensitivity of 87.5% and a negative predictive value of 96%. These results indicated that F-18 FDG PET/CT offered high diagnostic accuracy and could potentially replace routine BMB in staging pediatric HL [12].

Dinesh K, et.al; (2011) conducted a study to evaluate CT features of pediatric Hodgkin lymphoma (HL) at diagnosis, during treatment, and at completion, aiming to identify predictors of early relapse. The study included 70 children aged 3-17 years, followed over four years. CT effectively visualized nodal and extranodal disease, and all patients initially achieved complete remission. However, 10 patients (7%) relapsed during a mean follow-up of 3.3 years. No CT features at any stage-initial, mid-treatment, or post-treatment-were predictive of relapse. Furthermore, relapse risk did not correlate with disease stage or histological subtype, highlighting CT's limitations in outcome prediction [13].

CASE DESCRIPTION

A 7-year-old male child presented to the Pediatrics Outpatient Department with complaints of neck swelling, persistent low-grade fever, generalized weakness, and dry cough. The patient had been empirically started on anti-tubercular treatment (ATT) for the past three months without clinical improvement. General examination revealed a febrile child with a body weight of 18.5 kg and significant pallor. Bilateral cervical lymphadenopathy was evident on palpation. Per abdominal examination revealed a distended abdomen with hepatosplenomegaly; both liver and spleen were palpable below the costal margin.

A chest X-ray (posteroanterior view) demonstrated a large mediastinal radiopacity. Cartridge-Based Nucleic Acid Amplification Test (CBNAAT) for tuberculosis returned negative. High-resolution ultrasonography (HRUSG) of the neck using the AeroScan and Vivid 8 USG machine identified multiple bilateral enlarged cervical lymph nodes. Ultrasonography of the abdomen revealed mild hepatosplenomegaly with multiple hypoechoic lesions scattered within the splenic parenchyma, along with enlarged lymph nodes in the peripancreatic and perisplenic regions.

Laboratory investigations showed reduced hemoglobin levels indicating anemia, leukocytosis, neutrophilia, and decreased MCV, MCH, MCHC, and PCV values. Biochemical tests revealed hypoalbuminemia and elevated alkaline phosphatase levels, suggestive of systemic inflammatory or malignant process.

Contrast-enhanced computed tomography (CECT) of the chest performed using a Philips MX 16-slice CT scanner demonstrated a large, homogeneously enhancing soft tissue mass measuring approximately 95 × 65 × 40 mm centered in the superior mediastinum. The mass extended into the middle and posterior mediastinum, reaching the right apical chest wall and causing encasement and displacement of major vascular structures, including the pulmonary trunk, aorta, trachea, and superior vena cava (SVC).

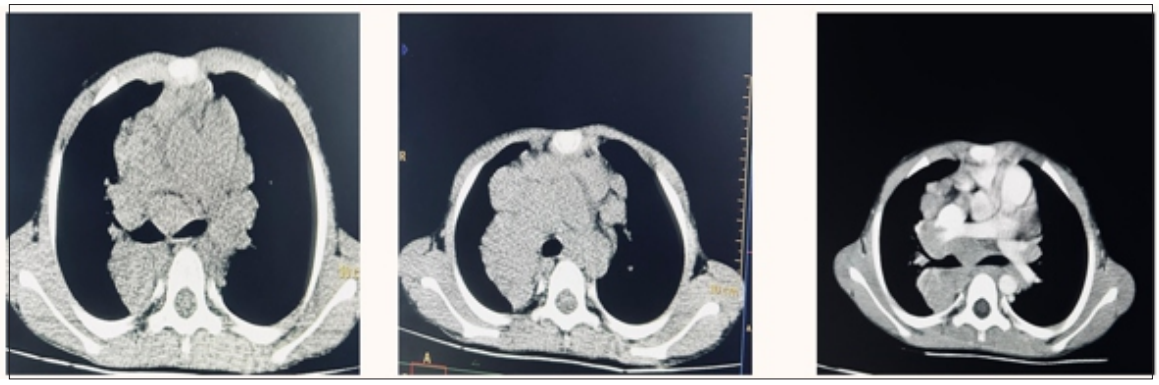

Figure 1: Axial CECT Chest Images Demonstratinga Large Homogenous Soft Tissue Mass in the Mediastinum with Encasement of Vascular Structures and Mass Effect

Additional findings included hepatosplenomegaly and multiple hypodense conglomerate lesions within the spleen, as well as enlarged lymph nodes in the peripancreatic, periportal, and para-aortic regions. These imaging findings were consistent with an advanced lymphoproliferative disorder, with a probable diagnosis of mediastinal lymphoma. Based on the Lugano classification, the case was staged as IVB.

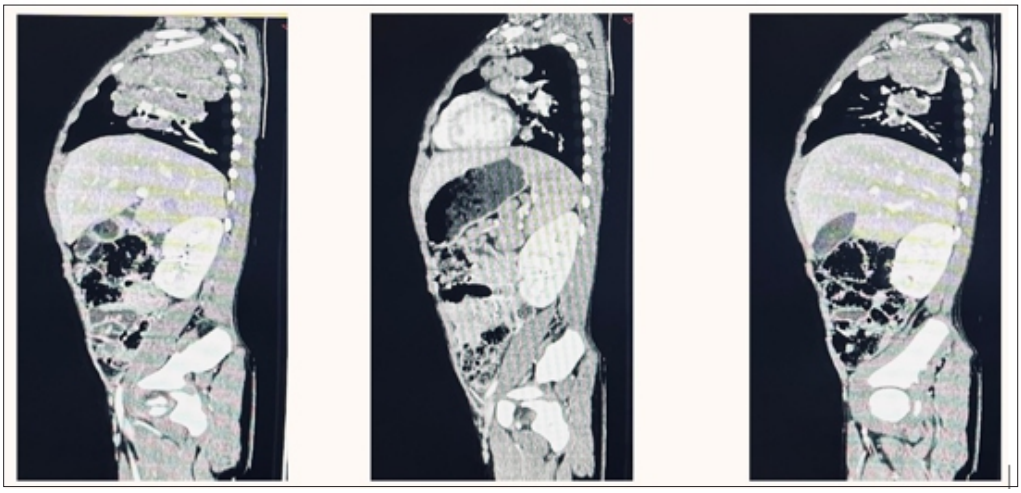

Figure 2: Sagittal CECT Images Showing Hepatosplenomegaly and Multiple Abdominal Lymph Nodes in the Peripancreatic and Para-Aortic Regions, Suggestive of Widespread Lymphomatous Involvement

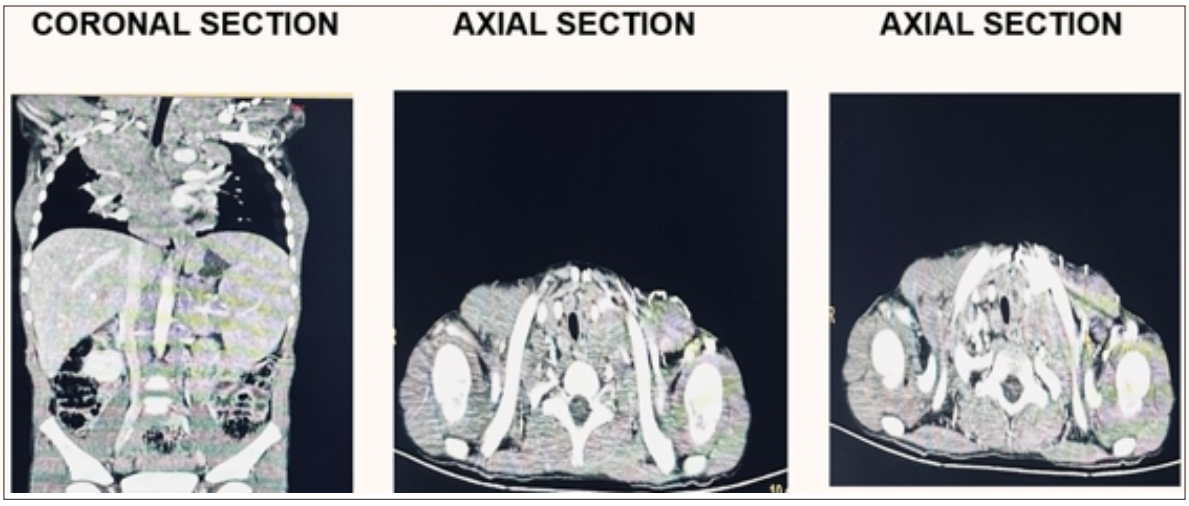

Figure 3: Coronal and Axial CECT Sections Showing Hepatosplenomegaly and Multiple Enlarged Abdominal Lymph Nodes (Including Pelvic and Periaortic Regions), Indicating Widespread Extranodal Involvement in Advanced Hodgkin's Lymphoma

Histopathological examination of the excised lymph node revealed large atypical mononuclear cells and occasional classic binucleated Reed-Sternberg cells with prominent nucleoli and high nuclear-to-cytoplasmic ratio. These findings were diagnostic of classical Hodgkin's lymphoma.

The final diagnosis was classical Hodgkin's lymphoma, stage IVB, with extensive mediastinal involvement and abdominal dissemination. This case highlights the pivotal role of multimodal imaging in early diagnosis, staging, and guiding biopsy in a rare pediatric presentation of Hodgkin's lymphoma.

DISCUSSION

Our finding shows that a 7-year-old male child presented with persistent low-grade fever, dry cough, pallor, cervical lymphadenopathy, and hepatosplenomegaly, unresponsive to empirical anti-tubercular therapy-mirroring the case reported by Rai N et al. (2024), where a boy under 10 presented with similar features, ultimately diagnosed with discordant lymphoma involving classical Hodgkin lymphoma in cervical nodes and high-grade B-cell NHL in bone marrow. This underscores the diagnostic pitfalls of presumptive treatments like ATT without histopathological confirmation and highlights the necessity for thorough tissue and marrow evaluation in pediatric lymphadenopathy. Our case also resonates with Mauz-Körholz C et al. (2023), who demonstrated that early PET/CT-based response evaluation after two chemotherapy cycles in early-stage classical Hodgkin lymphoma permits safe omission of radiotherapy while maintaining high event-free survival. Delayed diagnosis, as seen in our case, risks disease progression and may necessitate more intensive treatment, reinforcing the importance of early and accurate staging to optimize therapeutic decisions in pediatric HL [14, 15].

In alignment with Spijkers et al. (2019), the combination of multiple hypoechoic splenic lesions on ultrasonography and bulky mediastinal soft-tissue mass >9 cm on CECT strongly suggests stage III-IV pediatric Hodgkin lymphoma with nodal and splenic involvement. Furthermore, the 2023 COG imaging consensus supports our stepwise imaging algorithm, starting with chest X-ray and proceeding to contrast-enhanced CT of the chest/abdomen/pelvis, followed by FDG-PET/CT to confirm staging and assess metabolic burden. These guidelines emphasize that bulky mediastinal disease and multilocular splenic involvement warrant definitive histopathology and PET-based staging prior to therapy initiation(10, 16].

Our finding shows hepatosplenomegaly with multiple hypodense splenic lesions and enlarged lymph nodes in the peripancreatic, periportal, and para-aortic regions, indicating an advanced lymphoproliferative disorder, likely mediastinal lymphoma. This case aligns with Saboo SS et al. (2012), who described that multiple hypodense, conglomerate lesions in the spleen are a common imaging pattern in hematologic malignancies, including Hodgkin's lymphoma, and typically represent nodal or extranodal disease spread. The presence of such lesions in our case supports the interpretation of extensive extranodal involvement, reflecting disease advancement. Additionally, Cheson BD et al. (2014) clarified in the Lugano classification that Stage IV Hodgkin lymphoma includes non-contiguous extranodal organ involvement, such as splenic lesions beyond nodal chains, and the “B” classification denotes systemic symptoms like fever or weight loss. The authors emphasized the importance of comprehensive imaging-CT chest, abdomen, and pelvis with contrast-for accurate staging. Our imaging findings of a mediastinal mass, widespread abdominal lymphadenopathy, splenic lesions, and hepatosplenomegaly fully satisfy these criteria, supporting the classification of Stage IVB disease as per Lugano guidelines [1, 17].

CONCLUSION

This case highlights the crucial role of multimodal imaging-X-ray, ultrasound, and contrast-enhanced CT-in the early detection, staging, and diagnostic workup of Hodgkin's lymphoma in a rare pediatric presentation. The presence of mediastinal mass, hepatosplenomegaly, and widespread lymphadenopathy raised suspicion for lymphoma, confirmed histopathologically by Reed-Sternberg cells. Imaging not only guided the biopsy site but also helped classify the disease as stage IVB per Lugano criteria. A multidisciplinary approach involving radiologists, pathologists, and oncologists was essential for accurate diagnosis and timely management. Early diagnosis in such rare pediatric cases significantly improves treatment planning and long-term outcomes.

REFERENCES

1. Cheson BD, Fisher RI, Barrington SF, Cavalli F, Schwartz LH, Zucca E, et al. Recommendations for initial evaluation, staging, and response assessment of Hodgkin and non-Hodgkin lymphoma: the Lugano classification. 2014;32(27):3059-67.
2. McCarten KM, Nadel HR, Shulkin BL, Cho SYJPr. Imaging for diagnosis, staging and response assessment of Hodgkin lymphoma and non-Hodgkin lymphoma. 2019;49(11):1545-64.
3. Zytoon AA, Mohamed HH, Mostafa BAAE, Houseni MMJEJoR, Medicine N. PET/CT and contrast-enhanced CT: making a difference in assessment and staging of patients with lymphoma. 2020;51(1):213.
4. Juweid ME, Mueller M, Alhouri A, A-Risheq MZ, Mottaghy FMJC. Positron emission tomography/computed tomography in the management of Hodgkin and B-cell non-Hodgkin lymphoma: An update. 2021;127(20):3727-41.
5. Albano D, Micci G, Patti C, Midiri F, Albano S, Lo Re G, et

al. Whole-body magnetic resonance imaging: current role in patients with lymphoma. 2021;11(6):1007.

6. Velasco-Suelto J, Gálvez-Carvajal L, Comino-Méndez I, Rueda-Domínguez AJJoE, Research CC. Hodgkin lymphoma and liquid biopsy: a story to be told. 2024;43(1):184.
7. Venkatakrishna SSB, Rigsby DC, Amiruddin R, Elsingergy MM, Nel JH, Serai SD, et al., editors. Unusual Signal of Lymphadenopathy in Children with Nodular Sclerosing Hodgkin Lymphoma. Healthcare; 2024: MDPI.
8. Si J, Wang H, Xie M, Yang Y, Wang F, Chen X, et al. Distinguishing diffuse large B-cell lymphoma from Hodgkin's lymphoma in children using an enhanced computed tomography radiomics approach. 2024;13(5):716.
9. Kalra M, Bakhshi S, Singh M, Seth R, Verma N, Jain S, et al. Response assessment by positron emission tomography-computed tomography as compared with contrast-enhanced computed tomography in childhood Hodgkin lymphoma can reduce the need for radiotherapy in low-and middle-income countries. 2023;70(2):e30091.
10. Spijkers S, Littooij AS, Humphries PD, Lam MG, Nievelstein RAJPR. Imaging features of extranodal involvement in paediatric Hodgkin lymphoma. 2019;49(2):266-76.
11. Keraliya AR, Tirumani SH, Shinagare AB, Ramaiya NHJIiI. Beyond PET/CT in Hodgkin lymphoma: a comprehensive review of the role of imaging at initial presentation, during follow-up and for assessment of treatment-related complications. 2015;6(3):381-92.
12. Agrawal K, Mittal BR, Bansal D, Varma N, Srinivasan R, Trehan A, et al. Role of F-18 FDG PET/CT in assessing bone marrow involvement in pediatric Hodgkin's lymphoma. 2013;27(2):146-51.
13. Dinesh K, Thulkar S, Bakhshi S, Madhusudan K, Upadhyay ADJTIJoP. Pediatric hodgkin lymphoma: CT features at presentation, on treatment and its prognostic significance. 2011;78(5):549-54.
14. Rai N, Azhar ZA, Kheli NT, Lateef F, Javed O, Raza MRJe. Pediatric discordant lymphoma with classic Hodgkin lymphoma in cervical lymph nodes and high-grade B-cell non-Hodgkin lymphoma in bone marrow: a case report from Pakistan. 2024;18:1702.
15. Mauz-Körholz C, Landman-Parker J, Fernández-Teijeiro A, Attarbaschi A, Balwierz W, Bartelt JM, et al. Response-adapted omission of radiotherapy in children and adolescents with early-stage classical Hodgkin lymphoma and an adequate response to vincristine, etoposide, prednisone, and doxorubicin (EuroNet-PHL-C1): a titration study. 2023;24(3):252-61.
16. Mhlanga J, Lai H, Alazraki A, Cho SY, Nadel H, Pandit-Taskar N, et al. Imaging recommendations in pediatric lymphoma: a COG Diagnostic Imaging Committee/SPR Oncology Committee white paper. 2023;70:e29968.
17. Saboo S, Krajewski K, O'regan K, Giardino A, Brown J, Ramaiya N, et al. Spleen in haematological malignancies: spectrum of imaging findings. 2012;85(1009):81-92.