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Original Research Article

A Clinical Study of Cervical Lymphadenopathy and Its Management

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Abstract:

Background: Cervical lymphadenopathy is a common clinical condition involving the enlargement of cervical lymph nodes due to various causes, including infections, malignancies, and systemic diseases. Its presentation often poses diagnostic challenges. This study explores the etiologies, clinical profiles, diagnostic approaches, and management strategies for cervical lymphadenopathy, aiming to improve patient outcomes through evidence-based interventions.

Methods: Patients presenting with cervical lymph node enlargement. Data collection involved a structured proforma, which included detailed patient history, thorough clinical examination, and relevant investigations to establish a provisional diagnosis. Routine investigations included fine-needle aspiration cytology (FNAC) and blood tests. In cases where FNAC yielded inconclusive results, lymph node biopsy specimens were collected and subjected to histopathological examination (HPE).

Results: The study included 40 cases, of which 24 were male (60%) and 16 were female (40%). A minority of cases (28.5%) had a history of tuberculosis contact. The most common site for reactive lymphadenitis was level I, while secondaries were most common at level II. All lymphoma cases were classified as Hodgkin's lymphoma, with no cases of non-Hodgkin's lymphoma. Squamous cell carcinoma (SCC) was the most frequent primary malignancy (13 cases), followed by papillary carcinoma of the thyroid (3 cases). FNAC demonstrated 100% sensitivity and specificity for diagnosing secondaries and lymphoma, with high sensitivity (85.7%) for tubercular cervical lymphadenitis and 100% specificity.

Conclusion: This study provides valuable insights into the epidemiology and management of cervical lymphadenopathies. The findings highlight the diversity of etiologies, ranging from infectious causes, such as tuberculosis, to malignant conditions, such as metastatic squamous cell carcinoma. FNAC remains a highly effective diagnostic tool, and the treatment outcomes depend significantly on the underlying pathology.

Keywords: Cervical lymphadenopathy, Squamous cell carcinoma (SCC), Hodgkin's lymphoma, Fine Needle Aspiration Cytology (FNAC).

Introduction

The human body contains approximately 800 lymph nodes, with over 300 located in the neck region, making it a significant area involved in various pathological conditions [1]. Lymph nodes play a pivotal role in immune defense, filtering lymph, producing antibodies, and responding to antigens, including microorganisms, particulate material, or soluble antigens [2]. Strategically positioned along the drainage pathways of tissues and fluids, lymph nodes are most abundant in regions that interface directly with external environments, such as the neck [3]. This anatomical distribution underscores their clinical significance, as lymphadenopathy in the cervical region often serves as an indicator of regional or systemic diseases. Lymphadenopathy refers to abnormalities in the size or consistency of lymph nodes and is usually caused by the invasion or proliferation of inflammatory or neoplastic cells. A subset of this condition, lymphadenitis, specifically pertains to lymphadenopathies resulting from inflammatory processes [4].

Cervical lymphadenopathy, defined as the enlargement of cervical lymph nodes exceeding 1 cm in diameter, is a common clinical manifestation that affects individuals across all age groups [5]. Its etiology varies with age and encompasses a broad spectrum of diseases, ranging from benign infections to malignancies [3]. The evaluation of cervical lymph node enlargement is clinically challenging due to the overlapping presentation of many underlying conditions. Accurate diagnosis is

crucial, as improper evaluation and treatment can lead to the progression of a potentially curable disease into an incurable one [4]. Fine Needle Aspiration Cytology (FNAC) is an essential diagnostic tool because of its cost-effectiveness, ease of use, and rapid results. Biopsy and histopathological examination further aid in confirming diagnoses, especially in complex or ambiguous cases [6]. This study aimed to investigate the etiological factors of cervical lymphadenopathy, establish correlations between pathological findings and clinical diagnoses, and assess the outcomes and clinical progression of affected lymph nodes during follow-up. Additionally, it seeks to determine the prevalence of cervical lymphadenopathy and analyze the factors contributing to its occurrence, thereby providing insights into its diagnosis and treatment.

Materials and Methods

This prospective study was conducted at the Department of General Surgery, Raja Rajeswari Medical College, Bangalore, Karnataka. This study included patients who were evaluated for cervical lymphadenopathy between December 2020 and May 2022. Ethical approval was obtained from the institutional ethics committee. Written consent was obtained from all participants after explaining the nature of the study in vernacular language.

Inclusion Criteria

1. Patients were aged 18 years and older.
2. Patients presenting with cervical lymph node enlargement.

Exclusion Criteria

1. Patients below 18 years of age.
2. Outpatient cases.

Study Methodology: Data collection involved a structured proforma, which included detailed patient history, thorough clinical examination, and relevant investigations to establish a provisional diagnosis. Routine investigations included fine-needle aspiration cytology (FNAC) and blood tests. In cases where FNAC yielded inconclusive results, lymph node biopsy specimens were collected and subjected to histopathological examination (HPE). Radiological evaluations, such as chest radiography, were conducted to identify potential primary lesions in the lungs. For specific cases, additional diagnostic tools, including contrast imaging, endoscopy, and ENT consultations, were used to ensure comprehensive assessment and accurate diagnosis.

Statistical Analysis: The data collected were entered into MS Excel 2010. The data were analyzed using SPSS. The diagnostic accuracy of fine-needle aspiration cytology (FNAC) was assessed by calculating sensitivity and specificity for different types of lymphadenopathies.

Results

The study included 40 cases, of which 24 were male (60%) and 16 were female (40%). Among the age groups, 13 participants were aged 18–30 years, comprising 7 males (17.5%) and 6 females (15%). In the 31–40-year age group, there were 10 participants, with 6 males (15%) and 4 females (10%). The 41–50-year age group included 8 participants, equally distributed between males and females, each contributing 10%. For the 51–60-year age group, there were 3 participants, with 2 males (5%) and 1 female (2.5%). Among participants older than 60 years, 6 cases were recorded, comprising 5 males (12.5%) and 1 female (2.5%). Out of the total cases, 45% were non-neoplastic lesions, while 55% were neoplastic. The majority of diagnoses were secondaries (47.5%), followed by reactive lymphadenopathy (27.5%) and granulomatous (17.5%). Hodgkin's lymphoma constituted 7.5%, and no cases of non-Hodgkin's lymphoma were observed (Figure 1).

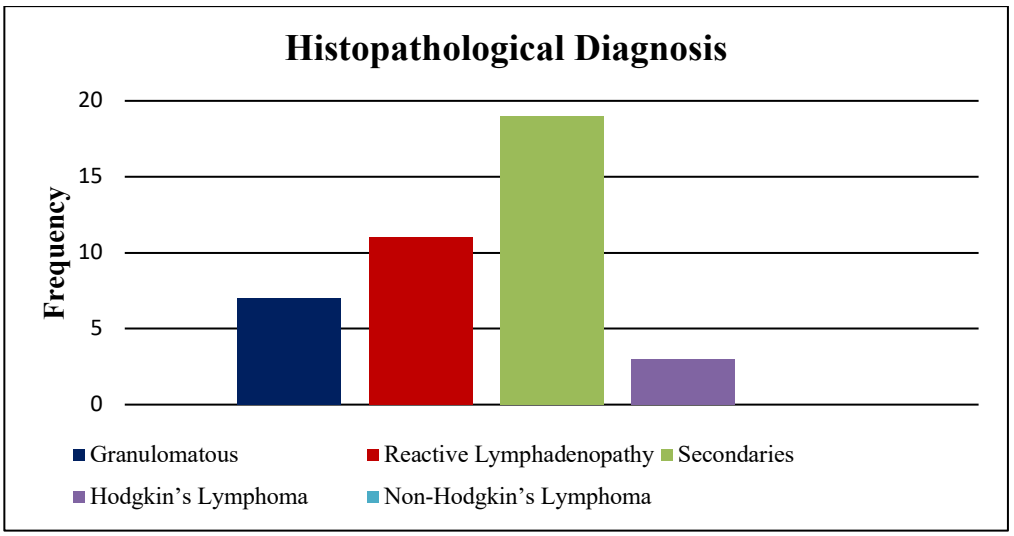

Figure 1: Distribution of Histopathological Diagnosis among the cases of the study

Neck swelling was the most common symptom (100%), followed by pain (22.5%) and cough (15%). Other symptoms included loss of appetite (10%) and fever (10%) (Table 1).

Table 1: Incidence of Presenting Symptoms

Symptom	Number of Cases	Percentage
Neck Swelling	40	100%
Pain	9	22.5%
Cough	6	15%
Loss of Appetite	4	10%
Fever	4	10%
Loss of Weight	5	12.5%
Difficulty Swallowing	2	5%
Change in Voice	1	2.5%

A minority of cases (28.5%) had a history of tuberculosis contact. The most common site for reactive lymphadenitis was level I, while secondaries were most common at level II (Table 2). Among tubercular cervical lymphadenitis cases, 58% presented with discrete nodes and 42% with matted nodes. Only 16.6% of tubercular cervical lymphadenitis cases showed a positive chest X-ray (Figure 2).

Table 2: Site Distribution of Tubercular Cervical Lymphadenitis, Reactive Lymphadenitis, Lymphomas, Secondaries

Site	Tubercular Cervical Lymphadenitis	Reactive Lymphadenitis	Lymphomas	Secondaries	Total
Level I (submental and submandibular)	1	6	0	0	6
Level II (upper jugular)	3	1	1	7	13
Level III (middle jugular)	0	1	0	5	6
Level IV (lower jugular)	0	1	0	2	3
Level V (posterior triangle)	3	2	2	5	12
Level VI (anterior compartment)	0	0	0	0	0

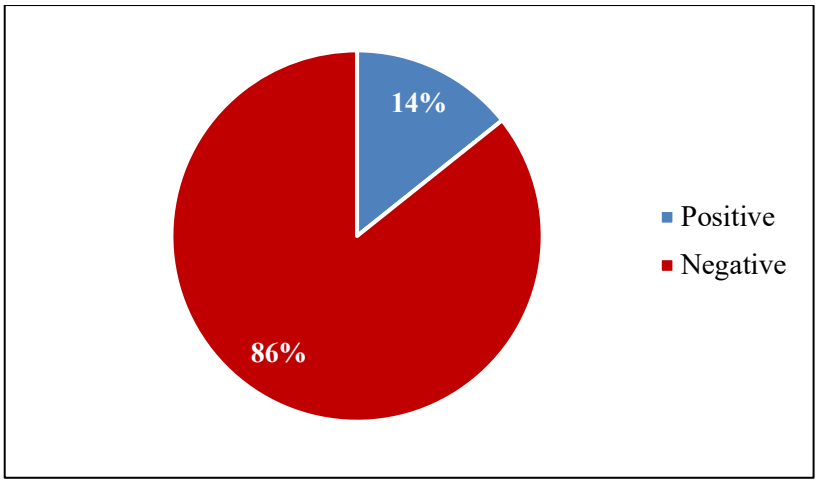

Figure 2: Chest X-ray Positivity in Tubercular Cervical Lymphadenitis

Involvement of lymph nodes beyond the cervical region was minimal, with only 2.5% of cases involving inguinal or axillary lymph nodes (Table 3).

Table 3: Involvement of Other Lymph Nodes in Cervical Lymphadenopathy

Lymph Node Group	Tubercular Cervical Lymphadenitis (No. & %)	Reactive Lymph Node (No. & %)	Lymphomas & Secondaries (No. & %)
Cervical + Inguinal	0 (0%)	1 (2.5%)	1 (2.5%)
Cervical + Axillary	0 (0%)	1 (2.5%)	0 (0%)
Cervical + Axillary + Inguinal	0 (0%)	0 (0%)	1 (2.5%)

All lymphoma cases were classified as Hodgkin's lymphoma, with no cases of non-Hodgkin's lymphoma. Squamous cell carcinoma (SCC) was the most frequent primary malignancy (13 cases), followed by papillary carcinoma of the thyroid (3 cases) (Table 4).

Table 4: Distribution of Primary Malignant Secondaries in Neck

Primary Site of Malignancy	Histopathological Pattern	Number of Cases
Esophagus	SCC	3
Tongue	SCC	1
Buccal mucosa	SCC	8
Larynx	SCC	3
Thyroid	Papillary carcinoma	3
Unknown primary	Adenocarcinoma	1

FNAC demonstrated 100% sensitivity and specificity for diagnosing secondaries and lymphoma, with high sensitivity (85.7%) for tubercular cervical lymphadenitis and 100% specificity (Table 5).

Table 5: Sensitivity and Specificity of FNAC in Diagnosing Lymphadenopathy

	True Positive	False Positive	False Negative	True Negative	Sensitivity	Specificity
Tuberculous Cervical Lymphadenitis	6	0	1	33	85.7%	100%
Reactive Lymphadenitis	11	1	0	28	100%	96.5%
Secondaries	19	0	0	21	100%	100%
Lymphoma	3	0	0	37	100%	100%

Treatment outcomes varied, with 100% recovery in reactive lymphadenitis cases treated with antibiotics. For tubercular cervical lymphadenitis, 85.7% recovered after ATT. Among secondary cases, most were referred or operated but showed no recovery. Hodgkin's lymphoma cases showed partial recovery with chemotherapy (Table 6).

Table 6: Treatment and Outcome in the cases of the study

Diagnosis	No. of Cases	Treatment	Outcome	Recovered	Not Followed	Expired
Reactive Lymphadenitis	11	Swelling antibiotics	11	11	0	0
Tubercular Cervical Lymphadenitis	7	Swelling (ATT)	6	6	2	0
		Swelling with cold abscess or sinus (ATT + I&D)	1	1	0	0
Secondaries	19	Chemotherapy/Radiotherapy	0	0	0	0
		Operated	3	3	0	0
		Referred	15	-	15	1
Hodgkin's Lymphoma	3	Chemotherapy	1	1	0	0
		Referred	2	2	0	0

Discussion

This study aimed to systematically investigate the various pathological conditions associated with enlarged cervical lymph nodes, along with their clinical presentation and behavior. This study included 40 patients with cervical lymphadenopathies. Previous studies have reported varying incidences of nonneoplastic and neoplastic lesions. Shafullah and Syed Humayun Shah et al. identified 90.6% of lesions as non-neoplastic and 9.4% as neoplastic, while Kulal et al. observed rates of 80% and 20%, respectively [7, 8]. In contrast, the present study found non-neoplastic lesions in 45% of cases and neoplastic lesions in 55% of cases. Among the cases in this study, malignant secondary tumors were the most common diagnosis (47.5 %), followed by reactive lymphadenitis (27.5 %), tuberculosis (17.5 %), and Hodgkin's lymphoma (7.5 %). In the study by Shafullah et al. [7] tuberculosis comprised 69% of cases, reactive lymphadenitis 17.8%, secondaries 2.9%, non-Hodgkin's lymphoma 3.4%, and Hodgkin's lymphoma 3.1%. Similarly, Jha BC et al. [9] reported tuberculosis in 63.8% of their 94 cases. On the other hand, Pradeep

Kulal R et al. [8] found tuberculosis in 53% of cases, followed by reactive lymphadenitis (27%), secondaries (14%), and lymphomas (6%). It is noteworthy that this study exclusively included inpatient cases, while outpatient cases were excluded. Given that tubercular lymphadenitis is often managed on an outpatient basis, this study observed fewer cases of tubercular lymphadenitis and a higher proportion of neoplastic cases.

Of the 40 patients in the present study, 24 were male and 16 were female, resulting in a male-to-female ratio of 3:2. This finding indicates a male predominance, which contrasts with the female predilection observed in other studies. For instance, Bedi et al. [10] Ammari et al. [11] and Dworski reported male-to-female ratios of 1:1.7, 1:2, and 1:1.38, respectively, while Dandapat et al. [13] observed a ratio of 1:1.2.10-13 The male predominance in the present study could be attributed to differences in the population studied, healthcare-seeking behavior, or occupational exposures, as males may be more likely to present with certain conditions such as malignancies or infections requiring hospitalization. This study utilized the Memorial Kettering Hospital Classification, which categorizes neck lymph nodes into levels I–VII, to assess the site distribution in cervical lymphadenopathy cases. For tuberculosis-related lymphadenopathy, the findings of the present study demonstrated a distribution predominantly at both Level II and Level V, in contrast with previous studies. The series by Jha et al. [14] primarily reported tuberculosis cases localized to Level II, whereas Baskota et al. [15] documented cases mainly at Level V.9,14 A comparative analysis of multiple matted lymph nodes in tuberculous lymphadenopathy revealed varying patterns across studies. In the present study, 42% of cases exhibited multiple matted lymph nodes, which is slightly higher than the 38% reported in the series by Jha et al., 37.74% in the study by Pradeep et al. [6] and 30% in the study by Madhuri et al. [8] and Reddy et al. [9] Regarding chest X-ray positivity in tuberculosis-associated cervical lymphadenopathy, the present study recorded a positivity rate of 16.6%, aligning closely with the 16% observed in the series by Jha BC et al. [9] In contrast, Madhuri et al. [8] and Reddy et al. [9] as well as Pradeep et al. [6] documented lower positivity rates of 9.43% each. These variations may reflect differences in diagnostic approaches, disease severity, or study populations. A comparative analysis of the non-Hodgkin's to Hodgkin's lesion ratio across various studies demonstrates considerable variation. In the present study, Hodgkin's lymphoma cases were observed exclusively, with a non-Hodgkin's to Hodgkin's ratio of 0:3, in sharp contrast with other studies. Similarly, studies by Pradeep et al. [6] Madhuri et al. [8], and Reddy et al. [9] both documented a consistent ratio of 5:1. The role of Fine Needle Aspiration Cytology (FNAC) in the evaluation of cervical lymphadenopathy was assessed in the present study, highlighting its sensitivity and specificity across different pathologies. FNAC demonstrated excellent diagnostic performance with 85.7% sensitivity and 91.6% specificity for tubercular lymphadenitis, 100% sensitivity and 85.7% specificity for reactive lymphadenitis, and 100% sensitivity and specificity for both malignant secondary and lymphoma. A comparative analysis revealed consistency with findings from previous studies. For tubercular lymphadenitis, Chao et al. [16] reported a sensitivity and specificity of 88% and 96%, respectively, while Prasad et al. [17] observed 84% sensitivity and 95% specificity. In the current study, FNAC's sensitivity (85.7%) and specificity (91.6%) were closely aligned with these results. For secondary deposits, FNAC achieved 100% sensitivity and specificity in the present study, exceeding the sensitivity (97%) and specificity (99%) reported by Prasad et al. [17] Similarly, for Hodgkin's lymphoma, the current study recorded 100% sensitivity and specificity, surpassing Prasad et al.'s sensitivity of 80% and specificity of 98%.[16] These findings underscore FNAC's critical role of FNAC as a minimally invasive and highly accurate diagnostic tool for cervical lymphadenopathy. In the management of tubercular lymphadenitis, the present study's findings align with those of Jha et al. [9] who also reported successful outcomes with short-course chemotherapy, showing no recurrence. Reactive lymphadenitis cases were effectively managed with antibiotics and local treatments. For malignant secondary and lymphoma, staging and treatment were performed according to established protocols, with patients referred to specialized oncologic centers for further care. Once the diagnoses were confirmed, appropriate treatments were initiated. Medical treatment was administered for reactive and tubercular lymphadenitis, and patients with secondary malignancies and lymphoma requiring radiotherapy, chemotherapy, and specialized oncologic surgeries were referred to the Kidwai Memorial Institute of Oncology, Bangalore. All patients were provided with the necessary advice and were instructed to follow up at the surgical outpatient department.

Conclusion

In conclusion, this study provides valuable insights into the epidemiology and management of cervical lymphadenopathies. The findings highlight the diversity of etiologies, ranging from infectious causes, such as tuberculosis, to malignant conditions, such as metastatic squamous cell carcinoma. FNAC remains a highly effective diagnostic tool, and the treatment outcomes depend significantly on the underlying pathology. The results of this study contribute to a better

understanding of cervical lymphadenopathy in a local context, offering important implications for clinical practice. Further studies with larger sample sizes and longer follow-up periods are needed to confirm these findings and explore potential therapeutic advancements.

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Ethical Permission: Obtained

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