ORIGINAL ARTICLE

Role of Surgical Tissue Sampling in the Diagnosis of Cervical Tuberculous Lymphadenitis: A Retrospective Case Series

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ABSTRACT

BACKGROUND: ***Tuberculosis lymphadenitis is the most common form of extrapulmonary tuberculosis (EPTB) in Indonesia. Diagnosis often depends on surgical biopsy, and treatment typically lasts longer than for pulmonary tuberculosis. Surgical intervention, particularly histopathological examination of lymph nodes, is essential for accurate diagnosis. This study aims to describe the clinical presentation, diagnostic approaches, and surgical management of cervical lymph node tuberculosis (CLT).***
METHODS: ***This retrospective descriptive study analyzed 108 cases of cervical lymph node tuberculosis confirmed by histopathology, with some supported by bacteriological tests. Data were obtained from patients treated at the Pulmonary Clinic of Bhayangkara Brimob Hospital between January until December 2023, covering lymph node location and types of surgical procedures.***
RESULTS: ***Among 108 cases, 18 patients also had pulmonary tuberculosis. Cervical lymphadenitis predominantly affected the anterior or posterior sternocleidomastoid regions (70%) and the supraclavicular area (30%), often bilaterally with skin involvement. Surgical management included excisional biopsy (42.6%), simple adenectomy (46.3%), and lymphadenectomy (11.1%), with abscess drainage performed when indicated.***
CONCLUSION: ***This case series highlights the role of surgical intervention in the diagnostic evaluation of cervical tuberculous lymphadenitis by enabling tissue sampling for histopathological confirmation. Surgical biopsy allows definitive identification of tuberculosis, guiding appropriate initiation of antitubercular therapy and clinical management. These findings should be interpreted within the limitations of a descriptive study design without comparative analysis.***
KEYWORDS: ***Role of surgical intervention, management, cervical tuberculous lymphadenitis***

INTRODUCTION

According to the WHO Global Tuberculosis Report 2025, Indonesia ranks second globally in TB prevalence, accounting for approximately 10% of the global TB burden (1) . Globally, 8.3 million new TB cases were recorded in 2024 (1).

Extrapulmonary TB (EPTB) occurs in approximately 20–30% of TB cases (2), with cervical lymph node tuberculosis (CLT) being the most common form, accounting for 84.7% of EPTB cases in Indonesia (3). This condition is particularly prevalent in low and middle-income countries (LMICs), accounting for more than 95% of global TB cases and deaths (4). In these regions, the cases disproportionately affect children under 15 years old and women compared to men (5).

Furthermore, the clinical manifestation of TB is frequently heterogeneous, overlaps with other conditions, complicating accurate diagnosis. Many healthcare settings, particularly in LMICs, often fail to rapidly identify symptoms due to limitations in diagnostic tools. Thus, there is a need for reliable diagnostic approaches, particularly in extrapulmonary tuberculosis (4).

Cervical lymph node tuberculosis, representing 35–40% of all EPTB cases, typically manifests as one or more unilateral, painless lumps, with neck lymph nodes involved in 60–90% of patients (6,7). While not usually life-threatening, this condition often requires accurate diagnosis through clinical, microbiological, radiological, and histological examinations (8–10). Surgical procedures play a crucial role in diagnosing cervical lymphadenitis, but they carry risks such as adhesions, neurovascular complications, and aesthetic concerns. Beyond diagnosis, surgical interventions are also therapeutically important, particularly for managing cold abscesses or fistulas (11). We present a study by providing a clinical overview of cervical lymphadenitis based on a descriptive analysis of case data and a review of current literature, emphasizing the role of surgical procedures in its diagnosis and treatment.

MATERIALS AND METHODS

This retrospective descriptive case series adhered to the STROCSS (Strengthening the Reporting of Cohort Studies in Surgery) guidelines (12). The study included patients diagnosed with cervical tuberculosis (TB) at the pulmonary clinic, Bhayangkara Brimob Hospital, between January until December 2023. The study aimed to evaluate the clinical presentation and surgical management of cervical TB, focusing on surgical techniques, disease processes, and the limitations of each procedure, with comparisons to existing literature.
A total of 108 patients with cervical TB underwent excisional biopsy, simple adenectomy, or lymphadenectomy for both diagnostic and therapeutic purposes. The primary objective of this study was to evaluate the clinical presentation and surgical approaches in patients with cervical TB. The study also provides a detailed description of various surgical techniques, the disease processes involved, and the limitations of each procedure, with a comparison of our findings to the existing literature. Patients included in this study were those with cervical TB confirmed through anatomical pathology examinations, which revealed granulomas, caseous necrosis, and bacteriological confirmation (either within the tissue or coexisting pulmonary TB). Patients were excluded from the study if they did not return for follow-up visits after the initial diagnosis or did not complete their treatment regimen.

All patients received anti-tuberculosis therapy following national TB treatment guidelines. The standard regimen consisted of a 2-month intensive phase with rifampicin, isoniazid, pyrazinamide, and ethambutol (2RHZE), followed by a continuation phase with rifampicin and isoniazid (RH). The intended total duration of therapy ranged from 9 to 12 months, depending on clinical response, disease severity, and the presence of complications.

The Ethics Committee of Bhayangkara Hospital approved the study. Participation in this study was voluntary, and all participants provided written informed consent. Informed consent was obtained from all participants before inclusion in the study.

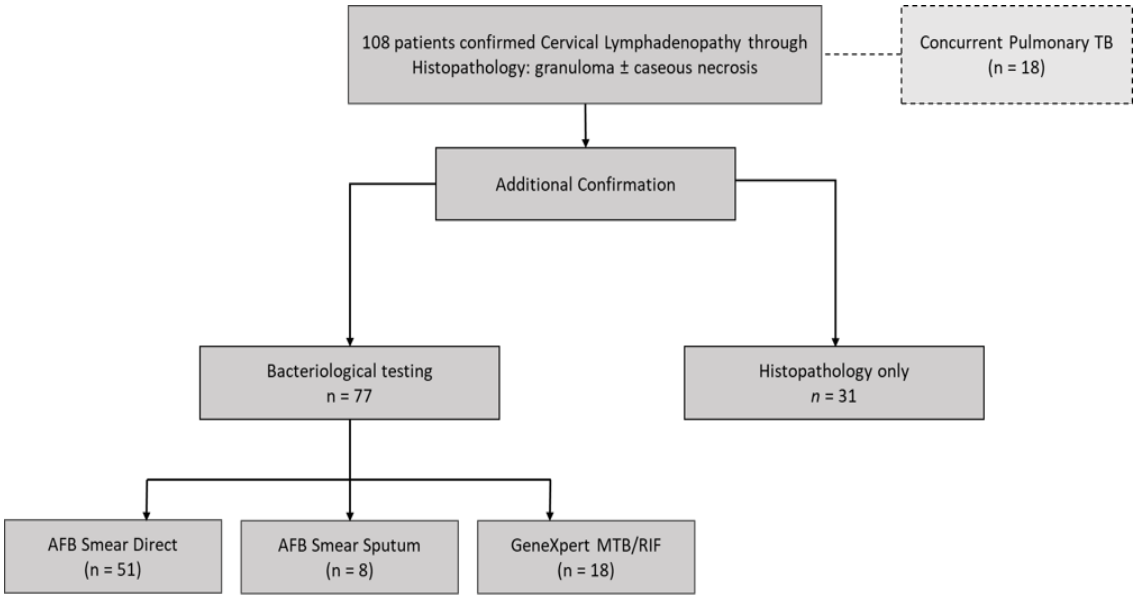

***Figure 1**: Diagnostic flow of cervical lymph node tuberculosis cases (N = 108).*

RESULTS

The study included 108 patients diagnosed with cervical glandular tuberculosis and treated at the pulmonary and surgical polyclinics between January and December 2023. Most patients were female (70, 64.8%), while males accounted for 38 (35.2%) cases. The average age of the patients was 30.37 years, ranging from 13 to 59 years. Age distribution showed that the largest group consisted of patients aged 20–29 years (46, 42.59%), followed by 10–19 years (20, 18.52%), 40–49 years (18, 16.66%), 30–39 years (14, 12.96%), and 50–59 years (10, 9.2%). Among the 108 patients, 23 (21.3%) reported a history of contact with tuberculosis (TB). Neck swelling was the primary complaint in all cases. Isolated neck swelling was observed in 78 patients (53.7%), while 30 patients (27%) presented with neck swelling accompanied by rupture, fistula formation, and pain, as shown in Table 1.

Table 1: Characteristic and Clinical Presentation (N = 108).

Variable	Category	Number of Patients (%)
Age (years)	10 – 19	20 (18.5)
	20 – 29	46 (42.6)
	30 – 39	14 (13.0)
	40 – 49	18 (16.7)
	50 – 59	10 (9.2%)
Complaint	Cervical swelling	78 (72.7)
	Cervical swelling, pain, rupture fistula	30 (27.8)

Ultrasound examinations of the neck revealed hypoechoic lesions in 83% of cases and hyperechoic lesions in 17%. The histopathological analysis of all patients showed granulomatous patterns with or without caseous necrosis. Bacteriological testing identified Acid-Fast Bacilli (AFB) in 51 patients (47.2% of 108) through direct smears, in eight patients through sputum examination, and in 18 patients via Polymerase Chain Reaction (PCR) GeneXpert MTB/RIF assay. Additionally, 18 patients (16.6%) had concurrent cervical and pulmonary TB (Table 2). Figure 1 visualizes the diagnostic flow of the 108 confirmed cervical lymph node tuberculosis cases.

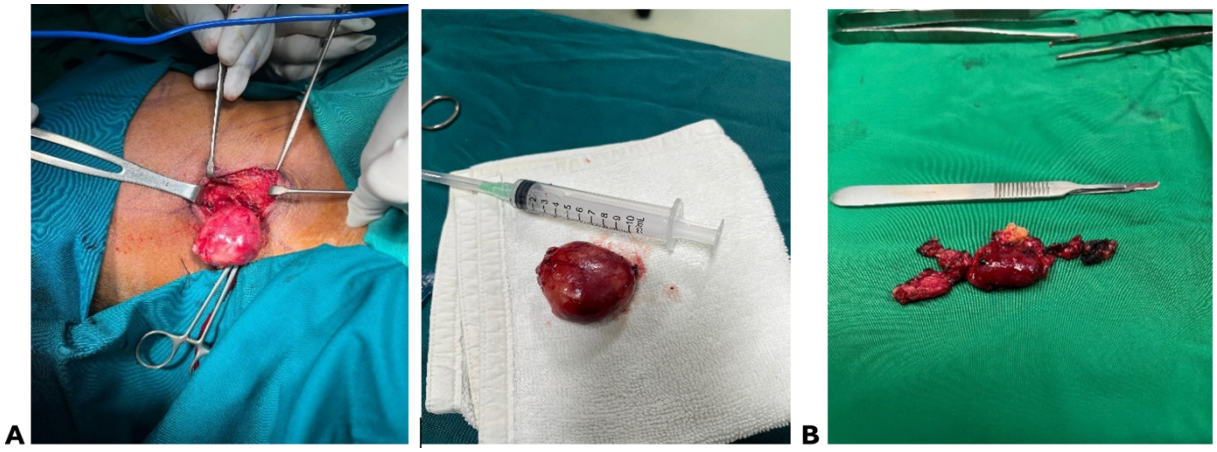

***Figure 2**: Surgical Specimens: A- Single large lymph node (adenopathy >30 mm), B Multiple lymph nodes (polyadenopathy).*

Table 2: Diagnostic Findings and Indications for Surgery.

Category	Type of Testing	Number of Patients (% of N = 108)
Positive Bacteriological Examination (n = 77)	Direct smear for acid-fast bacilli (AFB)	51 (47.2)
	AFB smear (sputum)	8 (7.4)
	GeneXpert MTB/RIF assay	18 (16.7)
Histopathological only (n = 31)		31 (25.0)
Indications for Surgery		
Surgical Treatment (N =108)	Single large adenopathy (adenopathy >30 mm)	50 (46.3)
	matted lymphadenopathy	12 (11.1)
	Rosary pattern appearance	22 (20.4)
	Polyadenopathy	20 (18.5)
	Sinus tract formation (Fistualization)	4 (3.7)

Surgical procedures were performed for both diagnostic and therapeutic purposes. The types of surgeries included lymph node excision in 50 patients (46.3%), excisional biopsy in 46 patients (42.4%), and lymphadenectomy in 12 patients (11.1%) (Table 3, Figure 2). Additionally, drainage was conducted in 5 cases to manage abscesses identified during the procedures (Figure 3A-3C). Intraoperative findings strongly indicated tuberculosis in many cases. The caseous appearance was observed in 50 patients (46.3%), inflammation in 48 patients (44.4%), purulent exudate (pus) in 26 patients (24.1%), and adhesions surrounding the affected tissue in 23 patients (21.3%).

Table 3: Surgical Procedures and Intraoperative Findings.

Category	Type	Number of Patients (%)
Clinical presentation (N = 108)	Lymph node excision	50 (46.3)
	Lymphadenectomy	12 (11.1)
	Excisional biopsy	46 (42.6)
Intraoperative findings*	Caseous necrosis	50 (46.3)
	Inflammation	48 (44.4)
	Purulent exudate (Pus)	26 (24.1)
	Adhesions to surrounding tissues	23 (21.3)

*Notes: *Patients may present with more than one intraoperative finding.*

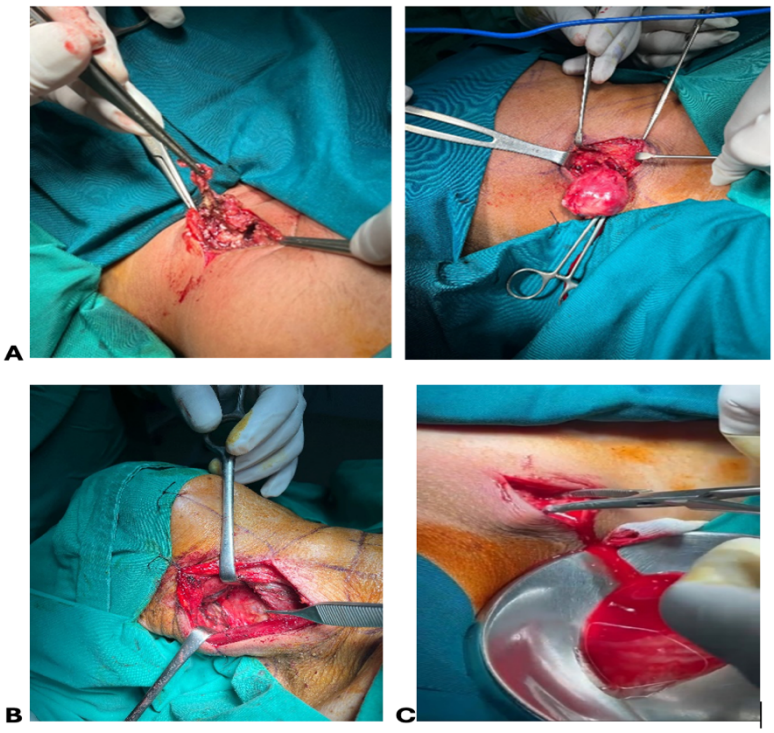

Figure 3*: Surgical procedures for cervical lymph node tuberculosis: A: Lymph node excision, B: Lymphadenectomy, C: Abscess drainage*

All patients in the study received anti-tuberculosis treatment using the 2RHZE/RH regimen. As shown in Table 4, the total treatment duration ranged from 9 to 12 months, with longer durations observed in patients presenting with extensive lymphadenopathy, abscess formation, or delayed clinical resolution. This duration represents common practice in EPTB, where treatment may exceed the standard 6-month pulmonary TB regimen.

Table 4: Duration of Treatments Based on the Type of Surgical Intervention.

Type of Procedure	**Treatment 9 – <12 Months (Number of Patients)**	**Treatment 12 Months (Number of Patients)**
Simple adenectomy	37	13
Lymphadenectomy	8	4
Biopsy excision	34	12

DISCUSSION

Our study reveals the role of surgery in diagnosing cervical lymph node tuberculosis. We found surgery's significant role in diagnosing and managing cervical lymph node tuberculosis. Consistent with previous studies, we observed a higher prevalence among female patients (64.8%) compared to males (35.2%), with an average age of 30.37 years (range 13–59 years). The 20–29 age group represented the most affected demographic. Similar trends were reported by Liu et al., who noted a prevalence of 70.56% among females with an average age of 38 years (13). Sellami et al. found a 58.8% prevalence in females with an average age of 35 (14). Likewise, Rai et al. reported that 76 out of 130 cervical TB patients were female, with an average age of 28.01 years (15).

In our study, 21.3% of patients reported a history of TB contact. Neck swelling was the predominant complaint in all cases, with 53.7%

presenting with isolated swelling and 27% showing additional symptoms such as rupture, fistula, and pain. Similar findings have been reported in prior studies. Atnafu et al. found that 79% of cases presented with single, mobile, tender neck lumps, predominantly unilateral on the left side (16). Lekhbal's 2020 study of 104 patients reported single lymph node swelling in 51.9%, multiple lymph nodes in 48.1%, and abscesses or fistulas in 19 patients (17). Gautam's 2018 study noted solid lymph nodes in 87.85% of cases, with 87.14% occurring on the right unilateral side (18).

Ultrasound examination in our patients predominantly revealed hypoechoic lesions (83%), consistent with previous studies reporting hypoechoic lymph nodes with characteristic internal echo patterns in cervical tuberculosis (19–21). While these findings support the role of conventional ultrasound in the initial evaluation of cervical lymphadenopathy (22), its diagnostic specificity remains limited.

Building on this, contrast-enhanced ultrasound (CEUS) has been shown to improve both lesion characterization and sampling accuracy (23). A retrospective study evaluated the diagnostic value of contrast-enhanced ultrasound (CEUS)-assisted core needle biopsy (CNB) in cervical lymph node tuberculosis (LN TB). This study demonstrated that CEUS-assisted core needle biopsy significantly enhanced specimen integrity and sampling quality compared to conventional ultrasound guidance, resulting in improved diagnostic performance in histopathological evaluation as well as higher sensitivity of the Xpert MTB/RIF assay (23).

Another cohort study with cervical lymphadenopathy showed that specific CEUS imaging patterns, particularly heterogeneous internal enhancement and peripheral rim-like enhancement — were significantly associated with cervical tuberculous lymphadenitis, with improved specificity when used in combination (21). Nevertheless, imaging findings alone remain insufficient for definitive diagnosis, reinforcing the necessity of tissue sampling and histopathological confirmation, as demonstrated in the present study.

Moreover, histopathological examinations in all patients demonstrated granulomatous changes, with or without caseous necrosis, further supporting the diagnosis. Bacteriological examinations showed Acid-Fast Bacilli (AFB) on direct smear in 47.2%, AFB in sputum in 7.4%, and positive results via PCR GeneXpert in 16.6%. Additionally, 16.6% of patients had concurrent pulmonary TB. These findings align with Jha et al., who reported AFB positivity by direct smear microscopy in 24%, Lowenstein-Jensen culture in 34%, BACTEC culture in 45%, and PCR in 48% (24). Similarly, another study of 140 patients with cervical lymph node TB demonstrated Mycobacterium tuberculosis detection rates of 25.71% via Xpert MTB/RIF, 20.71% via conventional PCR, and 17.85% via MGIT 960 (18).

Another study further demonstrates that diagnostic yield in cervical lymph node tuberculosis is strongly influenced not only by the use of biopsy but also by pathological characteristics and sampling strategies (25). A retrospective study in 198 patients reported a high overall etiological positivity rate of 90.4%, with the GeneXpert assay showing the highest sensitivity (~90%), markedly outperforming conventional methods such as culture and acid-fast staining. Moreover, specimens exhibiting liquefactive necrosis yielded significantly higher detection rates across diagnostic techniques, and combining sampling approaches (e.g., surgical resection, needle biopsy, and drainage) further improved diagnostic sensitivity.

In our study, all patients received standard anti-tuberculosis therapy, with treatment duration extending beyond the conventional 6-month regimen in selected cases. Similarly, Lekhbal et al. reported that 76.9% of patients completed treatment within 6 months, while 23.1% required ≥9 months, with paradoxical reactions occurring in 23.1% of cases (17). Although a 6-month treatment duration is sufficient for many patients (75%), defining the end of EPTB treatment can sometimes be challenging (18). Jha et al. also observed successful treatment in most patients within six months, though surgical intervention was occasionally necessary (26). Another study found the average treatment duration for patients undergoing surgery was 205 days, compared to 372 days for those without surgery (13). Residual lymph nodes larger than one centimeter were noted in 44.61% of cases after six months of treatment.

Furthermore, only 9 out of 54 patients showed a significant reduction in lymph node size after nine months of treatment (15).

Surgical procedures in our study were performed for various indications, including single large adenopathy (>30 mm) in 48.1%, rosary pattern appearance in 20.4%, matted lymphadenopathy in 9.2%, polyadenopathy in 18.5%, and sinus tract formation (fistulization)in 3.7%. Cold abscesses were identified in 4.6% of cases and required drainage as part of the initial surgical procedure. These findings align with Lekhbal et al.'s study of 104 patients, where 80.8% required surgical intervention and only 19.2% healed with medical treatment alone (17). Similarly, Patel et al.'s prospective study reported that 84% of 130 cases were treated successfully using a combination of adenectomy and six months of short-term anti-tuberculosis therapy (27). Kanjanopas et al. performed surgery on 97 patients with indications including solitary lymph nodes ≥3 cm, multiple lymph nodes at a single site ≥3 cm, lymph nodes at multiple sites ≥3 cm, as well as abscesses and fistulas (28). In our study, patients underwent surgery for diagnostic purposes. The surgical procedures included simple adenectomy (46.3%), biopsy excision (42.4%), and lymphadenectomy (11.1%). Additionally, drainage was performed in five cases to address abscesses identified during surgery.

The effectiveness of surgical interventions has been well-documented in the literature. Kanjanopas et al. reported a 100% healing rate following complete surgical excision of lymph nodes ≥3 cm, combined with anti-tuberculosis treatment (28). Similarly, Siu et al. observed a 100% healing rate after excision of all lymph nodes ≥3 cm (29). Several other studies have emphasized the benefits of surgery, noting that it facilitates rapid tissue diagnosis, improves healing rates, provides excellent cosmetic outcomes, and carries a low risk of complications (30–33). In addition to surgery, fine needle aspiration (FNA) of cervical lymph nodes is widely recognized as a reliable method for diagnosing lymphadenopathy, further supporting its utility in clinical settings (34).

Another study revealed that extrapulmonary tuberculosis (EPTB) of the head and neck is a rare condition that is difficult to diagnose due to non-specific symptoms and its resemblance to malignancy or chronic inflammatory diseases. A retrospective review of nine cases showed that most patients presented with involvement of the pharynx, larynx, or cervical lymph nodes, often without pulmonary signs, leading to diagnostic delays (35). Surgical biopsy played a crucial role in all cases by confirming the diagnosis and excluding other conditions. When followed by appropriate anti-tubercular therapy, patients experienced favorable outcomes. Overall, early consideration of surgical biopsy is essential to improve diagnostic accuracy, reduce delays, and enhance treatment success.

In the present study, treatment duration frequently extended beyond the standard 6-month regimen, reflecting the complexity of cervical lymph node tuberculosis and the need for individualized management. This observation is consistent with previous reports indicating that extrapulmonary tuberculosis may require prolonged therapy, particularly in cases with extensive disease or delayed clinical resolution.

Surgical findings strongly suggested tuberculosis, with caseous necrosis observed in 46.3% of cases, inflammation in 44.4%, purulent exudate in 24.1%, and tissue adhesions surrounding the affected area in 21.3%. These findings align with Polesky et al.'s findings, who reported that necrosis and/or neutrophilic inflammation in tissue samples correlated with positive tuberculosis culture results. Their study of 106 patients found granulomas in 62% of fine needle aspiration samples and 88% of surgical biopsies, with Mycobacterium tuberculosis cultures positive in 62% of fine needle aspirates and 71% of excisional biopsies (36).

Meanwhile, Omura et al.'s research on 38 cases of cervical tuberculosis highlighted that 26.3% of patients had a prior history of tuberculosis treatment, all of whom responded well to medical therapy alone (37). Similarly, Weiler et al.'s study of 16 patients who underwent cervical lymph node excision surgery demonstrated

complete recovery in all cases following combined anti-tuberculosis therapy and surgical intervention. This suggests the effectiveness of anti-tuberculosis treatment, whether or not surgery is performed (34).

Furthermore, Byrd et al. analyzed 15 cases of cervical tuberculosis and found that combining anti-tuberculosis therapy with en bloc lymph node excision accelerated recovery (38). Furthermore, Lekhbal et al. reported that 80.8% of patients treated with anti-tuberculosis therapy and surgical intervention achieved superior outcomes compared to those who received medical treatment alone (17).

Diagnosing cervical lymph node tuberculosis (CLT) remains a significant challenge due to the variable sensitivity and specificity of available diagnostic tools (39). Our study demonstrates that combining clinical, radiological, and microbiological modalities substantially enhances diagnostic accuracy and facilitates early intervention. When faced with suspected CLT, an excisional biopsy should be performed to confirm the diagnosis of granulomatous disease, with subsequent monitoring of the lymph node for resolution. In cases with negative cultures and documented adherence to initial therapy, retreatment is not necessary.

In conclusion, this study demonstrated that surgical intervention is essential in enhancing diagnostic accuracy in cervical tuberculous lymphadenitis, because it provides adequate tissue for histopathological confirmation through anatomical pathology examination. Surgical intervention, combined with a 9–12-month course of anti-tuberculosis therapy, formed the standard management approach in this case series. In settings where clinical and imaging findings are non-specific, surgical biopsy approach allows for a definitive diagnosis and accurate differentiation from other etiologies of lymphadenopathy. These findings support the integration of clinical, radiological, and microbiological assessments to reduce diagnostic delay. Accordingly, antitubercular therapy can be initiated promptly, leading to more appropriate management and improved clinical outcomes. Nevertheless, this study has several limitations. As a retrospective descriptive case series, it lacks a control group and is subject to potential selection bias. Treatment duration was not standardized but determined by clinical judgment, which may limit generalizability. Moreover, the absence of comparative outcome analysis restricts the ability to draw conclusions regarding treatment effectiveness. Future studies incorporating larger cohorts and comparative designs are needed to further evaluate diagnostic strategies and optimize management approaches in cervical lymph node tuberculosis.

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