

Original article

Spectrum and Surgical Management of Pediatric Neck Swellings: A Retrospective Study from Libya

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Keywords.

Neck Mass, Children,
Thyroglossal Duct Cyst, Neck
Abscess, Branchial Cleft
Anomaly, Libya

ABSTRACT

Neck swellings are a common reason for referral to pediatric surgical services, but the underlying diagnoses vary across populations, and published evidence from Libya is scarce. We conducted a retrospective descriptive study of children who underwent surgery for a neck swelling in the Department of Pediatric Surgery at Misurata Medical Center, Libya, between January 2022 and March 2026, using the departmental register, operation register, operative logbook and histopathology reports. Sixty-six children were included (35 female, 31 male; median age 3.0 years, IQR 1.2–7.0; range 6 days–13 years). Neck abscess was the most common diagnosis (23; 34.8%), followed by thyroglossal duct cyst/sinus (19; 28.8%), branchial cleft anomalies (7; 10.6%), and lymphadenopathy requiring surgery (5; 7.6%). Congenital lesions accounted for 50.0% and inflammatory lesions for 42.4%. One 12-year-old boy with a supraclavicular swelling had a sarcomatous lesion (1.5%). Children with inflammatory lesions were younger than those with congenital lesions (median 2.0 vs 5.0 years; $p = 0.002$), and abscesses presented earlier than thyroglossal duct cysts (median 1.6 vs 6.0 years; $p < 0.001$). Histopathology was available for 16 patients (24.2%), and the clinical diagnosis was confirmed in all 14 cases with a specific preoperative diagnosis. Most surgically managed pediatric neck swellings were benign. Abscesses predominated in infants and toddlers, whereas thyroglossal duct cysts predominated among school-age children. The single malignant case presented as a supraclavicular mass, reinforcing the importance of this warning sign. Incomplete paper-based records support the need for a structured departmental registry and more consistent histopathological submission

Introduction

Neck swelling is a common reason for children to be referred to pediatric surgery or ear, nose and throat services [1,2]. Unlike adults, in whom a persistent neck mass raises substantial concern for malignancy, most neck swellings in children are benign. They are generally classified as inflammatory or infective lesions, congenital abnormalities and, less commonly, neoplasms [1,3,4]. Reactive lymphadenopathy, suppurative lymph nodes and neck abscesses account for a substantial proportion of pediatric presentations, particularly in younger children [2,5]. Among congenital lesions, thyroglossal duct remnants are the most frequent, followed by branchial arch anomalies, dermoid cysts and vascular or lymphatic malformations [6,7]. The Sistrunk procedure remains the standard treatment for thyroglossal duct cysts because removal of the central portion of the hyoid together with the tract reduces the risk of recurrence compared with simple cyst excision [8,9]. Although malignancy is uncommon in childhood, it should remain part of the differential diagnosis, particularly in adolescents and in children with a persistent, firm or supraclavicular mass [2,10].

The distribution of pediatric neck swellings differs between populations and is influenced by factors such as age, geographic setting, socioeconomic conditions, and referral patterns [11]. Studies from Iraq and Saudi Arabia have reported inflammatory lesions in 34–57% of children and malignancy in 10–26% [11,12], while a Tanzanian series also identified inflammatory disease as the leading category [13]. To our knowledge, no indexed study has specifically described the spectrum of pediatric neck swellings in Libya. Local data may help clinicians counsel families, plan surgical and pathology resources, and identify children who require more extensive investigation.

This study aimed to describe the demographic profile, diagnostic spectrum, surgical treatment, and histopathological findings of children undergoing surgery for neck swellings in the Department of Pediatric Surgery at Misurata Medical Center and to place these findings in the context of regional and international reports.

Patients and Methods

Study design and setting

We performed a retrospective descriptive study in the Department of Pediatric Surgery at Misurata Medical Center, Misurata, Libya, a tertiary teaching hospital affiliated with Misurata University that receives referrals from the central region of Libya. The study period extended from January 2022 to March 2026.

Patients

Children aged 14 years or younger were eligible if they underwent a surgical procedure for a neck swelling, including excision, Sistrunk operation, incision and drainage, debridement or lymph node biopsy. As departmental documentation was paper-based, cases were identified from four sources: the departmental neck-swelling list, operation register, operative logbook and hospital histopathology records. Records were cross-matched using the patient's name, hospital file number, age and date to avoid duplicate inclusion. Seven cases were excluded: one adult specimen mistakenly included in the pathology batch, one infant who underwent palliative tracheostomy, one ranula limited to the floor of the mouth, and four cystic lesions (three epidermoid/dermoid cysts and one suspected dermoid) whose anatomical location could not be confirmed as the neck.

Data collection and definitions

The variables collected were age, sex, nationality, side or site of the swelling, clinical diagnosis, surgical procedure, type of anesthesia, operation date and histopathological diagnosis. Histopathology, when available, was used as the final diagnosis; otherwise, the documented clinical diagnosis was retained. Lesions were classified as congenital (thyroglossal duct cyst/sinus, branchial cleft anomaly, epidermoid/dermoid/sebaceous cyst, lymphatic malformation and hemangioma), inflammatory (neck abscess and lymphadenopathy requiring surgery), malignant or miscellaneous. Age was categorized as <1 year, 1–4 years, 5–11 years and ≥12 years. Clinico-pathological concordance was assessed when both a specific clinical diagnosis and a histopathology report were available. Missing variables were left as missing and were not imputed.

Statistical analysis

Categorical variables are presented as counts and percentages. Because age was not normally distributed, it is summarized as median and interquartile range (IQR). The Mann–Whitney U test was used to compare age between two diagnostic groups, and the Kruskal–Wallis test was used for comparisons involving more than two groups. Exact binomial tests assessed whether sex or lesion side differed from an expected 1:1 distribution. All tests were two-sided, with $p < 0.05$ considered statistically significant. Where information was incomplete, percentages were calculated using only patients with documented data for that variable. Statistical analyses were performed with IBM SPSS Statistics version 27 (IBM Corp., Armonk, NY, USA).

Ethical considerations

Ethical approval for this study was obtained from the Research Ethics Committee of Misurata Medical Center. As only existing records were reviewed and identities were removed before analysis, individual consent was not required.

Results

Patient characteristics

The study included 66 children: 35 girls (53.0%) and 31 boys (47.0%), corresponding to a male-to-female ratio of 0.89:1. Ages ranged from 6 days to 13 years, with a median of 3.0 years (IQR 1.2–7.0). Children aged 1–4 years formed the largest group (42.4%), followed by those aged 5–11 years (31.8%), infants younger than 1 year (19.7%) and children aged 12 years or older (6.1%). Two patients were neonates, aged 6 and 12 days. Nationality was documented in 58 cases; 56 children were Libyan, one was Sudanese, and one was Syrian (Table 1). The year of surgery was available for 42 patients: 1 in 2022, 3 in 2023, 15 in 2024, 20 in 2025 and 3 in 2026.

Table 1. Demographic characteristics of the study population (n = 66)

Characteristic	n	%
Sex		
Female	35	53.0
Male	31	47.0
Age group		
< 1 year	13	19.7
1–4 years	28	42.4

Characteristic	n	%
5–11 years	21	31.8
≥ 12 years	4	6.1
Age, years, median (IQR)	3.0 (1.2–7.0)	
Age range	6 days – 13 years	
Nationality (documented, n = 58)		
Libyan	56	96.6
Other (Sudanese, Syrian)	2	3.4
Side / site (documented, n = 45)		
Midline	22	48.9
Right	11	24.4
Left	10	22.2
Bilateral	1	2.2
Posterior neck	1	2.2
Side / site not documented	21	31.8% of total

IQR, interquartile range.

Diagnostic spectrum

Congenital lesions were identified in 33 children (50.0%), inflammatory lesions in 28 (42.4%), a malignant lesion in 1 (1.5%), and miscellaneous lesions in 4 (6.1%). Neck abscess was the most frequent individual diagnosis (23; 34.8%), followed by thyroglossal duct cyst/sinus (19; 28.8%), branchial cleft anomalies (7; 10.6%), surgically treated lymphadenopathy (5; 7.6%) and epidermoid, dermoid or sebaceous cysts (4; 6.1%) (Table 2, Fig. 1). Lymphatic malformations (2 cases) and hemangioma (1 case) were uncommon. The miscellaneous category included an unspecified lateral cystic lesion, a submandibular cystic lesion in a 12-day-old neonate, a posterior neck naevus and a keloid scar following previous thyroglossal cyst surgery.

The only malignant case involved a 12-year-old boy who underwent excision of a supraclavicular swelling. Departmental records described the lesion as sarcomatous, although the corresponding histopathology report was not available for review.

Table 2. Distribution of diagnoses by sex and age

Diagnosis	n (%)	Male	Female	Median age, y (IQR)
Congenital	33 (50.0)	14	19	
Thyroglossal duct cyst/sinus	19 (28.8)	6	13	6.0 (4.0–7.5)
Branchial cleft anomaly	7 (10.6)	4	3	1.0 (0.8–10.0)
Epidermoid/dermoid/sebaceous cyst	4 (6.1)	2	2	2.5 (2.4–2.9)
Lymphatic malformation	2 (3.0)	1	1	2.3–8.0†
Hemangioma	1 (1.5)	1	0	0.4
Inflammatory	28 (42.4)	14	14	
Neck abscess	23 (34.8)	10	13	1.6 (0.6–2.3)
Lymphadenopathy	5 (7.6)	4	1	3.0 (3.0–9.0)
Malignant (sarcomatous lesion)	1 (1.5)	1	0	12.0
Miscellaneous	4 (6.1)	2	2	3.6 (1.0–7.0)
Total	66 (100)	31	35	3.0 (1.2–7.0)

†Range.

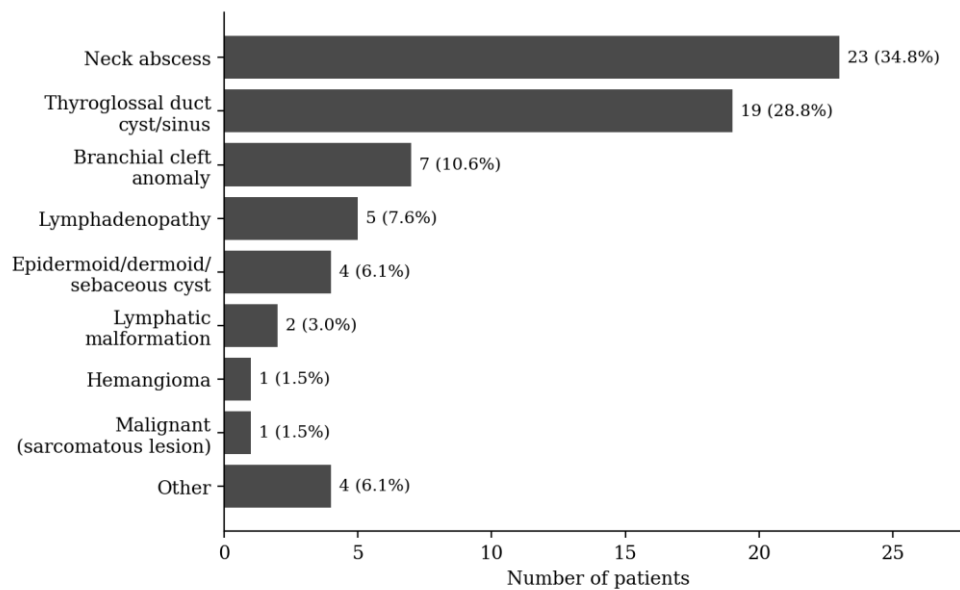


Figure 1. Distribution of final diagnoses among 66 children with neck swellings.

Age and diagnosis

Age varied significantly across the four largest diagnostic groups (Kruskal–Wallis, $p < 0.001$; Fig. 2). Children with inflammatory lesions were younger than those with congenital lesions (median 2.0 [IQR 0.8–3.0] vs 5.0 [IQR 2.5–8.0] years; Mann–Whitney U, $p = 0.002$). Neck abscesses occurred at a younger age than thyroglossal duct cysts (median 1.6 vs 6.0 years; $p < 0.001$). Twenty of 23 abscesses (87.0%) occurred in children younger than 5 years, whereas 13 of 19 thyroglossal duct cysts (68.4%) occurred in children aged 5 years or older. Abscess was the leading diagnosis during infancy, affecting 8 of 13 infants (61.5%). Branchial anomalies showed a bimodal age pattern: three presented during infancy, including a 40-day-old infant with an infected branchial cyst, while two presented after 12 years of age. A female predominance was noted among thyroglossal duct cysts (13 of 19; 68.4%), but this did not reach statistical significance (binomial test, $p = 0.17$). Among the 21 unilateral lesions with documented side, 11 were right-sided and 10 left-sided ($p = 1.0$).

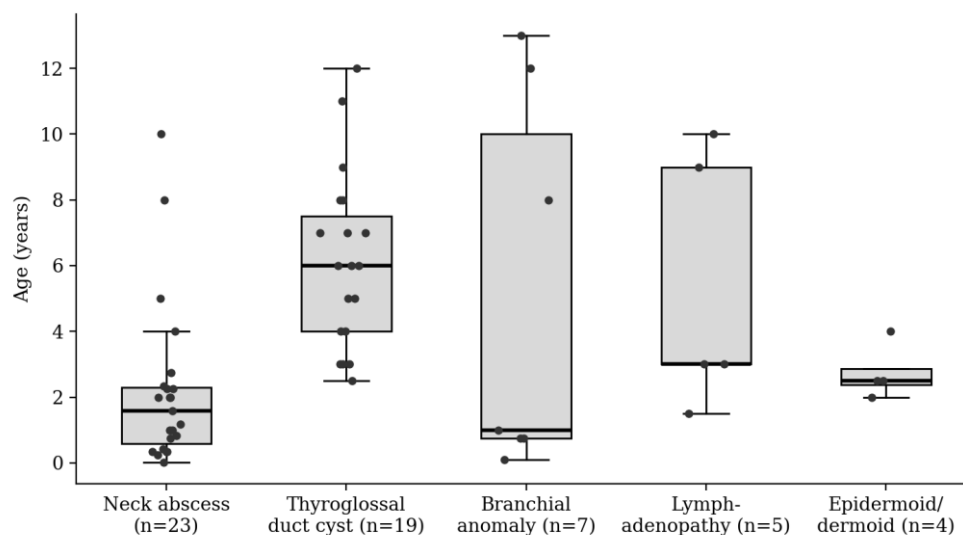


Figure 2. Age distribution of the five most common diagnoses. Boxes show median and interquartile range; whiskers show range excluding outliers; dots represent individual patients.

Surgical management

Excision was the most common procedure (23; 34.8%), followed by incision and drainage (21; 31.8%), Sistrunk operation (14; 21.2%), and excisional lymph node biopsy (4; 6.1%) (Table 3). Three children underwent other procedures: debridement of multiple matted lymph nodes with culture for suspected tuberculous lymphadenitis, wound debridement and closure following previous drainage of a neck abscess, and a cytology procedure for a neonatal submandibular cystic lesion. Among the 19 thyroglossal duct lesions, 14 were managed with a documented Sistrunk procedure and 5 were

recorded simply as excisions without further procedural detail. Anesthetic technique was documented in 24 cases: 18 (75.0%) received general anesthesia and 6 (25.0%) sedation, including four of the seven abscess drainages for which anesthesia was recorded.

Table 3. Procedures performed

Procedure	n	%	Main indications
Excision	23	34.8	Branchial, dermoid/epidermoid, lymphatic malformation, other
Incision and drainage	21	31.8	Neck abscess
Sistrunk operation	14	21.2	Thyroglossal duct cyst
Excisional lymph node biopsy	4	6.1	Persistent lymphadenopathy
Other	3	4.5	Node debridement (?TB), wound debridement, cytology
Not recorded	1	1.5	—
Anesthesia (documented, n = 24)			
General anesthesia	18	75.0	
Sedation	6	25.0	

Histopathological findings

Histopathology reports were available for 16 patients (24.2%) (Table 4). All nine specimens from clinically diagnosed thyroglossal duct lesions confirmed a thyroglossal duct cyst or remnant. Each showed acute or chronic inflammation or granulation of tissue. Bone or osteocartilaginous tissue compatible with hyoid resection was identified in five specimens; ectopic thyroid tissue in one, and two specimens had no epithelial lining, which the pathologist attributed to previous rupture or chronic inflammation. Both excised lymph nodes demonstrated reactive follicular hyperplasia. None of the available histopathology reports showed malignancy.

Clinical and histopathological diagnoses were concordant in all 14 patients for whom both a specific preoperative diagnosis and a pathology report were available (100%). One girl with a right-sided lymphatic malformation underwent re-excision 13 months after the initial operation because of recurrence. Another child required excision of a keloid scar after previous thyroglossal cyst surgery. A submental abscess in one patient developed after varicella infection.

Table 4. Histopathological diagnoses (n = 16)

Histopathological diagnosis	n	Notes
Thyroglossal duct cyst/remnant	9	Inflammation in 9; bone in 5; thyroid tissue in 1; no lining in 2
Reactive lymph node	2	Follicular ± parafollicular hyperplasia
Epidermal cyst	1	Clinical diagnosis: neck mass
Branchial cleft cyst	1	Respiratory lining with lymphoid follicles
Lymphangioma (lymphatic malformation)	1	Recurrent swelling, with reactive lymph node
Granulation tissue (infected mass)	1	Acute and chronic inflammation
Keloid scar	1	After thyroglossal cyst surgery
Malignancy	0	Sarcomatous lesion recorded clinically; report unavailable

Discussion

To our knowledge, this is the first study to describe the spectrum of pediatric neck swellings requiring surgical treatment in a Libyan pediatric surgery department. Most lesions were benign, and congenital and inflammatory conditions together accounted for more than 90% of cases. Age was also closely related to the pattern of diagnosis, in keeping with previous pediatric series [1–4].

Neck abscess was the most common individual diagnosis and was concentrated mainly among infants and toddlers. This is consistent with previous reports showing that suppurative lymph node infections and deep neck collections occur predominantly in children younger than five years [5]. The occurrence of a neck abscess in a 6-day-old neonate and an infected branchial cyst in a 40-day-old infant also illustrates the need to consider an infected congenital lesion when a very young infant presents with an apparent neck abscess [7,14]. One submental abscess developed after varicella infection, a recognized setting for secondary bacterial skin and soft-tissue infection. Because only one abscess specimen underwent histological examination and culture results were unavailable, no reliable conclusions can be drawn regarding causative organisms or occult underlying lesions.

Thyroglossal duct cyst was the most frequent congenital lesion, consistent with previous pediatric series [6–8]. The median age at operation was 6 years, which is compatible with its typical presentation around school age. All available thyroglossal specimens showed inflammation, and two lacked an epithelial lining, suggesting previous infection or rupture. Recurrent infection can distort tissue planes and complicate subsequent surgery, supporting definitive treatment after diagnosis when clinically appropriate [7,8]. Hyoid tissue was identified histologically in only five of nine specimens, while five thyroglossal lesions were documented simply as 'excision'. Since removal of the central portion of the hyoid is fundamental to the Sistrunk procedure [9], more precise operative documentation and consistent submission of relevant tissue would improve surgical audit. The keloid requiring later excision also highlights the value of postoperative wound assessment and follow-up.

Branchial cleft anomalies represented about one-tenth of the cohort and appeared at both ends of the pediatric age range. This pattern is clinically plausible because branchial remnants may present early as a sinus or discharging opening, or later as a cyst that becomes apparent after infection [7,14]. Lymphatic malformations were infrequent, although one child required repeat excision 13 months after the first procedure, illustrating the potential for recurrence when complete removal is difficult [15].

Five children underwent surgery for lymphadenopathy. The two available histopathology reports showed reactive hyperplasia, while one child with multiple matted nodes was treated as a suspected case of tuberculous lymphadenitis. Although lymph node biopsy has a relatively low diagnostic yield for malignancy in children without warning features [10], tuberculosis remains an important regional differential diagnosis [16]. Suspicious lymph nodes should therefore be submitted for histopathological assessment and, where tuberculosis is considered, appropriate mycobacterial testing. Clinical and histopathological diagnoses agreed in all evaluable cases. This finding supports the value of careful clinical assessment, supplemented by neck ultrasonography, in establishing a working diagnosis for many pediatric neck lesions [2,6]. Nevertheless, histopathology was available for only about one-quarter of the cohort, so the apparent 100% concordance should be interpreted cautiously. More consistent submission of excised tissue—and of abscess wall when an underlying lesion is suspected—would improve diagnostic confirmation and quality assurance.

Comparison with regional and international studies

Our findings show both similarities and differences when compared with published regional and international series (Table 5). Inflammatory lesions accounted for 42.4% of cases, a proportion close to reports from Saudi Arabia (33.9%) and Tanzania (43.9%) but lower than the 57% reported in Baghdad [11–13]. Differences in socioeconomic conditions and patterns of healthcare access may partly explain this variation [11]. Congenital lesions represented 50.0% of our cohort, exceeding the proportions reported in Iraq (25%) and Saudi Arabia (40.3%) and approaching the 55% reported in the large Philadelphia series [3,11,12]. Across these studies, thyroglossal duct cyst remained the most common congenital lesion [11,12]. The low proportion of malignancy in our cohort (1.5%) contrasts with rates of approximately 10% in Iraq, 11% in the United States and 25.8% in Saudi Arabia [3,11,12]. This difference should not be taken to mean that malignant pediatric neck masses are genuinely uncommon in Libya. The Saudi study was pathology based and therefore In contrast to the male predominance reported in Iraq (65.6% male), Saudi Arabia (53.2%) and Tanzania (male-to-female ratio 2.5:1) [11–13], our cohort showed a small female predominance (male-to-female ratio 0.89:1), largely because more girls had thyroglossal duct cysts. The cohort was also relatively young: only 6.1% of patients were aged 12 years or older, compared with 38.7% aged 11–14 years in the Saudi series [12]. This difference is consistent with the large number of abscesses seen in infants and toddlers in our study.

Clinico-pathological agreement was 100% among evaluable patients in our study, compared with 61% in the Philadelphia series [3]. The apparently higher concordance in our cohort probably reflects both the small number of patients with available pathology and the predominance of clinically characteristic lesions, particularly midline thyroglossal duct cysts. Tuberculosis should also remain in the differential diagnosis of cervical lymphadenopathy in the region; in a Turkish series of 630 neck masses, tuberculous lymphadenitis was the most common inflammatory diagnosis [16].

Table 5. Comparison with regional and international series

Study	Country	n	Age	M:F	Cong. %	Inflam. %	Malig. %
Present study	Libya	66	0–13 y	0.89:1	50.0	42.4	1.5
Al-Mayoof, 2015 [11]	Iraq	64	≤14 y	1.9:1	25	57	~10
Hudise et al., 2017 [12]	Saudi Arabia	62	1–14 y	1.1:1	40.3	33.9	25.8
Lucumay et al., 2014 [13]	Tanzania	148	≤10 y	2.5:1	NR	43.9	NR
Torsiglieri et al., 1988 [3]	USA	445	Children	NR	55	27	11

Cong., congenital; Inflam., inflammatory; Malig., malignant; NR, not reported in the abstract. M:F for Iraq and Saudi Arabia calculated from the reported percentage of males. The Saudi series was based on pathology records and excluded thyroid, parathyroid and salivary gland masses.

Documentation and recommendations

An important finding beyond the diagnostic spectrum was the extent of missing information in the paper records. Data had to be reconstructed from four separate sources. Lesion side was undocumented in 32% of cases, anesthetic technique in 64%, year of surgery in 36%, and histopathology in 76%. A structured departmental registry, ideally electronic, would substantially improve future audit and research. At a minimum, it should record lesion site and side, duration of symptoms, imaging findings, operative details (including hyoid resection where relevant), anesthesia, specimen submission, histopathology and microbiology results, postoperative complications and follow-up.

Limitations

Several limitations should be considered when interpreting these findings. The study was retrospective, conducted at a single center, and based on a relatively small cohort reconstructed from paper records of variable completeness. The year of surgery was unavailable for 24 patients, and lesion side, anesthetic technique, and histopathology were frequently missing. The only malignant case was identified from departmental documentation without an available pathology report, so its histological subtype could not be verified. Imaging findings, symptom duration, microbiological results, length of hospital stay, postoperative complications, and long-term recurrence could not be assessed systematically. Four cystic lesions were excluded because their anatomical location could not be confirmed, potentially leading to under-representation of dermoid and epidermoid cysts. Finally, the cohort included only children who underwent surgery in the pediatric surgery department; it therefore does not represent all children presenting with neck swellings, including those managed conservatively or by other specialties.

Conclusion

In this first Libyan surgical series of pediatric neck swellings, most lesions were benign. Neck abscesses were particularly common in infants and younger children, while thyroglossal duct cysts were the leading diagnosis among school-age children. The only malignant lesion occurred in an adolescent with a supraclavicular swelling, emphasizing the importance of this warning feature. Clinical and histopathological diagnoses were concordant in the limited number of cases with available pathology. More complete, structured documentation together with routine histopathological and appropriate microbiological assessment would strengthen clinical audit and enable more robust prospective studies in the future.

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