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Research Article

CLINICAL ANALYSIS AND SURGICAL MANAGEMENT OF CONGENITAL MIDLINE NECK MASSES IN PEDIATRIC PATIENTS: A 10-YEAR RETROSPECTIVE STUDY

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ABSTRACT

Congenital midline neck masses are relatively rare but clinically significant conditions in pediatric patients. These masses include thyroglossal duct cysts, dermoid cysts, hemangiomas, lymphangiomas, and other rare lesions, each posing unique diagnostic and surgical challenges. This retrospective study, conducted over a 10-year period, analyzed 67 cases of midline congenital neck masses, evaluating their prevalence, age and gender distribution, clinical presentation, and surgical outcomes. Thyroglossal duct anomalies (55.2%) were the most common, followed by dermoid cysts (23.9%), with a male predominance (M:F ratio 1.68:1). The Sistrunk procedure was the preferred surgical approach for thyroglossal anomalies, while simple excision was performed for other lesions. The recurrence rate was low (4.5%), emphasizing the importance of early diagnosis and appropriate surgical intervention. Our findings highlight the need for early detection and standardized surgical management to ensure optimal patient outcomes and minimize complications.

Keywords: - Congenital midline neck masses, Thyroglossal duct cyst, Pediatric neck tumors, Surgical management, Neck mass recurrence.

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INTRODUCTION

Neck masses are a frequently encountered condition in children presenting to pediatric surgical centers [1]. These masses can be classified based on their origin into congenital/developmental, inflammatory/reactive, or neoplastic types [2]. Congenital neck masses constitute a significant proportion of cases and commonly include thyroglossal duct cysts, branchial cleft anomalies, dermoid cysts, and vascular malformations [3]. Additionally, rarer lesions such as cervical teratomas, ectopic thyroid, and midline cervical clefts may also be observed.Among congenital neck masses, thyroglossal duct cysts are the most prevalent, accounting for approximately 70% of all congenital neck anomalies [4-5]. Accurate diagnosis and appropriate surgical intervention, including complete excision, are crucial to achieving optimal outcomes and reducing the likelihood of recurrence [6]. A comprehensive understanding of the clinical and pathological characteristics of these lesions is essential for effective management.This study aims to assess the prevalence, age and gender distribution, and surgical outcomes of different types of congenital midline neck masses in children, with a specific focus on recurrence rates.

By deepening the understanding of these conditions, the findings of this study aim to enhance diagnostic accuracy and improve management strategies in pediatric surgical practice.

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MATERIAL AND METHODS

A retrospective study was carried out to assess midline congenital neck masses in the pediatric age group. Patient records were retrieved from the Department of Pediatrics for a detailed review of medical history and clinical examination. The collected data were subsequently analyzed, and statistical evaluation was performed to assess the prevalence, characteristics, and outcomes of these congenital neck masses.

RESULTS

Over a 10-year period, a total of 67 cases of midline neck masses were identified. Among these, thyroglossal duct anomalies were the most frequently observed, accounting for 37 cases (55.2%), followed by dermoid cysts (16 cases, 23.9%), hemangiomas (4 cases, 5.9%), and lymphangiomas (7 cases, 10.45%). Other rare lesions included cervical teratoma, ectopic thyroid, and giant congenital hamartoma, with one case each (Fig. 1).The age at presentation ranged from 4 days to 15 years, with the majority of cases occurring in the 4 to 6-year age group, followed closely by the 0 to 2-year age group. A male predominance was noted, with 42 males and 25 females, resulting in a male-to-female ratio of 1.68:1 (Fig. 2).Among the 37 cases of thyroglossal duct anomalies, 19 cases (51.35%) were diagnosed as thyroglossal fistula (Fig. 4a), while 18 cases (48.65%) were identified as thyroglossal cysts (Fig. 4b). All thyroglossal fistula cases were iatrogenic, caused by unintentional incision and drainage of an infected thyroglossal cyst abscess. These anomalies were more common in males (25 cases, 67.6%) compared to females (12 cases, 32.4%), with a sex ratio of 2.1:1. The most common location was infrahyoid (59.4%) in 22 cases, followed by suprahyoid (29.7%) in 11 cases, juxtahyoid (8.1%) in 3 cases, and suprasternal (2.7%) in 1 case. The mean age of patients with thyroglossal duct anomalies was 7.15 years (Table 1).In this study, 16 cases of dermoid cysts were reported (Fig. 4c). The majority were found in the 4 to 6-year age group, with an equal distribution between males and females (8 cases each) (Table 2). Congenital midline vascular swellings were not uncommon in our study. Four cases of hemangioma (Fig. 3d) were reported, occurring equally in the 0–2 year and 2–4 year age groups, with no gender preference. The primary presenting symptoms were ulceration and bleeding in 75% of cases. Seven cases of lymphangioma were identified, two of which showed cervico-mediastinal extension. The cystswere infected in 3 cases (Fig. 4a) and non-infected in 4 cases (Fig. 4b). The male-to-female ratio was 2.5:1, and all cases presented in the 0–2 year age group.Additionally, one case each of ectopic thyroid (8-year-old male), cervical teratoma (4-day-old female) (Fig. 4c), and giant congenital hamartoma (Fig. 4d) were recorded.

Diagnosis and Surgical Management

Diagnosis was primarily clinical, with ultrasonography and Fine Needle Aspiration Cytology (FNAC) used for confirmation. FNAC was particularly crucial in differentiating ectopic thyroid, as misdiagnosed excision could result in permanent hypothyroidism. CT scans provided detailed information on the extent and internal composition of the mass, while chest X-rays were essential in cases of cystic hygroma to assess mediastinal extension.All patients diagnosed with thyroglossal cysts or fistulae underwent the Sistrunk procedure under general anesthesia. This technique involved removing the cyst along with the central portion of the hyoid bone and meticulously excising the persistent thyroglossal duct up to the foramen cecum. For patients with dermoid cysts, hemangiomas, lymphangiomas, and other lesions, simple surgical excision was performed.

Follow-up and Recurrence

Patients were monitored monthly for one year to detect any recurrence or fistula formation. Three cases of recurrent thyroglossal fistula were recorded, and these patients underwent reoperation after one year.

Table 1: Age distribution of Thyroglossal duct anomalies:

Age group (in years)	No of cases
0-2	2
2-4	6
4-6	6
6-8	5
8-10	7
10-12	6
12-14	4
14-16	1

Table 2: Age distribution of Dermoid cysts.

Age group (in years)	No of cases
0-2	0
2-4	3
4-6	7
6-8	2
8-10	2
10-12	2
12-14	0

DISCUSSION

Congenital neck masses are the most frequently encountered non-inflammatory swellings in children. However, there is limited literature specifically addressing midline congenital neck swellings. Consequently, our findings were compared with existing studies on congenital neck masses as a whole. Siddique et al. examined 36 cases, reporting thyroglossal cysts (58.33%) as the most common midline swelling, followed by branchial cysts (19.44%), hemangiomas (8.33%), lymphangiomas (8.33%), and dermoid cysts (5.55%) [7]. Similarly, Al Khateeb et al. conducted a study on 252 cases, with thyroglossal cysts (53%) being the most frequent, followed by branchial cysts (22%), dermoid cysts (11%), hemangiomas (7%), and lymphangiomas (6%) [8]. Our findings were consistent with previous studies regarding thyroglossal cysts; however, in contrast to earlier reports where branchial cysts were the second most common swelling, dermoid cysts ranked second in our study [7-9].

The age of presentation in our study ranged from 4 days to 15 years, with the highest number of cases observed in the 4 to 6-year age group. This differs from the findings of Siddique et al., who reported the peak incidence between 6 to 8 years, whereas Ayugi et al. found the 0 to 2-year age group to be the most commonly affected [10]. Our study also revealed a male predominance, with a male-to-female ratio of 1.58:1, aligning with Siddique et al., who reported a ratio of 1.11:1. However, Al Khateeb et al. found a female predominance (1:1.2), while Ayugi et al. noted an equal distribution (1:1) [8,10].

Thyroglossal Duct Anomalies

Thyroglossal cysts are the most common midline congenital neck masses, originating from persistent thyroglossal ducts. On the other hand, thyroglossal fistulas typically develop secondary to rupture or surgical drainage of an infected thyroglossal cyst. In our study, thyroglossal duct anomalies were more prevalent in males (67.6%) compared to females (32.4%), with a male-to-female ratio of 2.1:1. This contrasts with other studies that reported sex ratios of 1.1:1 [7] and 1:1 [11,12].The mean age of patients with thyroglossal duct anomalies in our study was 7.15 years, whereas Ayugi et al. reported a mean age of 7.8 years, Tarcoveanu E et al. documented 37.6 years, and Al Salem et al. found 15.4 years [10,13,14]. The most common anatomical location was infrahyoid (59.4%), followed by suprahyoid (29.7%), juxtahyoid (8.1%), and suprasternal (2.7%). These findings were similar to the reports by Siddique et al. [7] and Shih-Tsang L et al. [12]. Since thyroglossal cysts frequently become infected, leading to iatrogenic fistula formation, we recommend early excision to prevent complications.

Dermoid Cysts

Dermoid cysts are slow-growing, benign tumors that can develop in the midline of the neck. They typically present as firm, well-defined lumps attached to the overlying skin. In our study, 16 cases of dermoid cysts were recorded, with the majority occurring in children aged 4 to 6 years. This differs from the findings of Shih-Tsang et al., who reported that dermoid cysts most commonly present in the second and third decades of life [12]. Unlike some other congenital neck masses, dermoid cysts showed no gender predilection in our study.

Congenital Midline Vascular Swellings

Midline vascular swellings were also observed in our study, with hemangiomas being the most common benign tumors of infancy. These lesions are known to affect the head and neck region in approximately 14-20% of cases. Lymphangiomas, which are degenerative lesions originating from abnormal lymphatic development, can be categorized into simple lymphangiomas, cavernous lymphangiomas, and cystic hygromas. Cystic hygroma is the most frequently encountered form of lymphangioma, accounting for 5% of all benign tumors in infants and children, and is believed to result from the sequestration of embryonic lymphatic channels [11, 13].

In our study, all cases of lymphangiomas were observed in children aged 0 to 4 years, with equal distribution between genders. This contrasts with Siddique et al., who found that 66.67% of cases were

diagnosed at birth, while the remainder presented during the second decade of life, with a male-to-female ratio of 2:1 [7, 14]. Krol et al. noted that infantile hemangiomas typically appear within the first few weeks of life and can continue to proliferate for weeks to months [15]. Based on our observations, we strongly recommend early surgical excision of neck hemangiomas, as they frequently present with ulceration and bleeding, which can lead to complications if left untreated.

CONCLUSION

Congenital midline neck masses, though less frequently discussed, represent a clinically significant condition. These masses present diagnostic, therapeutic, and surgical challenges for many healthcare providers. Therefore, a comprehensive understanding, timely intervention, and proficient surgical techniques are essential to ensure effective management. Proper treatment not only enhances patient outcomes and prognosis but also significantly improves quality of life and long-term well-being in affected individuals.

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