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Neck masses in children: a 10-year single-centre experience in Northwest China

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Abstract

Neck masses in children are a common clinical concern but there is a paucity of published information about them. We organised this retrospective study to analyse their prevalence and treatment in Northwest China. The records of 207 children who presented with neck masses between 2008 and 2017 were retrieved from the Department of Oral and Maxillofacial Surgery, Lanzhou University Second Hospital, and age, sex, clinical presentation, preoperative investigation, surgical procedure, histopathological diagnosis, and complications were recorded. Their mean (range) age was 10 years (6 months to 21 years), and the male:female ratio was 1.23:1. In total 128 patients (62%) had congenital lesions, 35 (17%) had inflammatory lesions, and 44 (21%) had neoplastic lesions. The most common mass was a thyroglossal cyst (31%), followed by plunging ranula (17%) and lymphangioma (16%). Temporary injury to the facial nerve and wound infection were the major complications of surgical treatment. The types of neck masses in Northwest China differ from those previously reported, which may be attributed to genetic alterations in people of this race. The present report adds to the knowledge of diagnosis and treatment of neck masses in children in Northwest China, and brings out the demographic differences between races.

Keywords: Neck masses in children; Inflammatory lesions; Thyroglossal cyst; Plunging ranula; Diagnosis and treatment

Introduction

Neck masses are a common problem and have been described and investigated in many studies. There are, however, only a few published studies about neck masses in children, and most of them are case reports or part of a wider range of studies.[1–3] The differential diagnoses of cervical masses are traditionally divided into congenital, inflammatory, and neoplastic lesions, and the most common neck masses are benign.[3] However, the occurrence of neck masses during childhood creates anxiety to relatives because of fear of possible underlying cancer, and often lead to aesthetic problems.[4] Neck masses are usually treated by maxillofacial surgeons, and knowledge of the characteristic clinical features of these lesions is necessary for accurate diagnosis and surgical treatment.

The aim of this study was to analyse the demographic data of a series of children operated on for neck masses over a period of 10 years and review any publications that will aid surgeons in the clinical evaluation of these masses.

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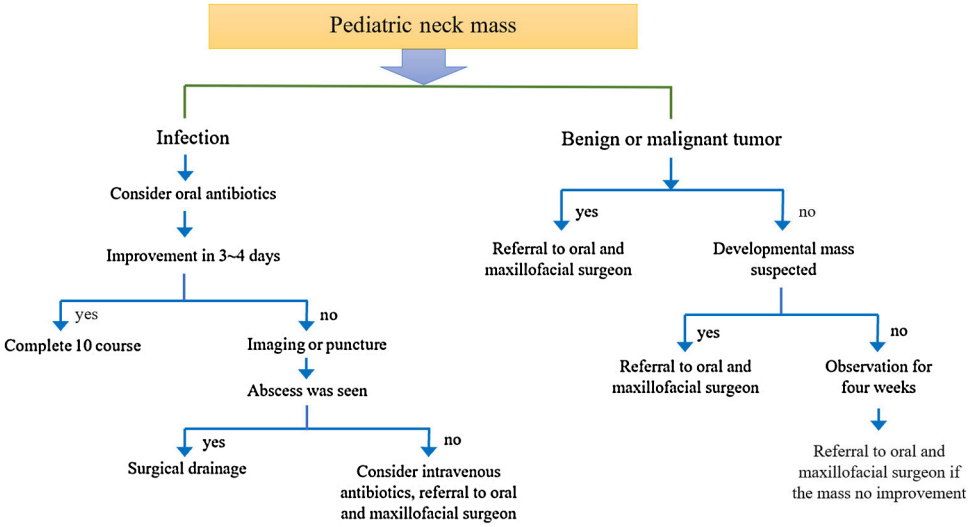

Fig. 1. Flow chart for the treatment of children with neck masses.

Patients and methods

Institutional review board approval was obtained from the Lanzhou University Second Hospital. The charts of patients aged 0-21 years who had surgical intervention for a neck mass at Lanzhou University Second Hospital, between January 2008 and December 2017, were reviewed retrospectively. The inclusion criteria were: a previous diagnosis of neck mass, a history of surgical intervention for that mass, and adequate preoperative and postoperative information. The exclusion criteria included patients who did not have adequate medical records or follow-up data, and those with acute inflammation of the neck. The age, sex, clinical presentation, preoperative investigation, surgical procedure, histopathological diagnosis, and complications were reviewed. Fig. 1 is a flow chart for the treatment of a child who presented with a neck mass.

Results

The study included 207 subjects who had surgical interventions for neck masses. Ninety-three were female and 114 were male, and their ages ranged from 6 months - 21 years (mean 10 years). In total, 128 patients had congenital lesions, 35 had inflammatory lesions, and 44 had neoplastic lesions.

Congenital lesions were the most common cause of neck masses, accounting for 128 cases (62%). Five patients had recurrences and required re-excision. Details are shown in Table 1. Thirty-five patients had an inflammatory lesion (17%), and their details are given in Table 2. There were nine tumours, of which seven were benign and two were malignant. The two patients with malignant tumours were treated with chemotherapy, and no recurrence was found at follow-up. Of note is that 35 patients had plunging ranulas, the complications of which were recurrence, transient lingual nerve injury, and infection (Table 3).

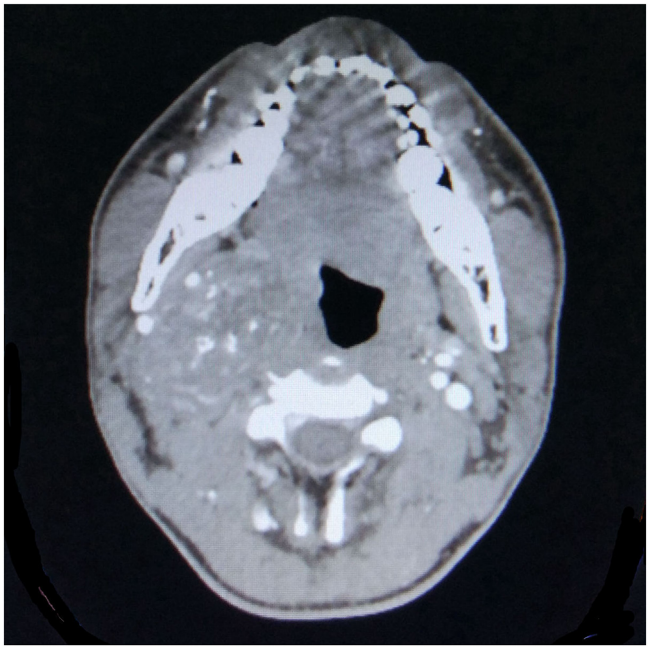

Fig. 2. Axial computed tomograph showing radiological features of the tumour compressing the internal and external carotid arteries.

A representative case is that of a 17-year-old patient who was admitted with a mass in the right side of the neck that he reported had been slowly enlarging for two years. Computed tomography (CT) showed a well-defined mass in the right parapharyngeal space (Fig. 2) which was excised. Histopathological examination showed a neurilemmoma in the right neck (Figs. 3–5). One year postoperatively there was no evidence of complications or recurrence.

Table 1
Diagnosis, age, sex distribution, and complications of congenital lesions.

Diagnosis	No.	Mean (range) age (years)	Sex		Complications
			Male	Female	
Thyroglossal cyst	64	5 (0.5–16)	37	27	Recurrence (n = 1) Permanent nerve sacrifice (n = 1) Infection (n = 2)
Branchial cyst (fistula)	26	13.7 (0.6–21)	10	16	Recurrence (n = 2) Permanent nerve sacrifice (n = 1) Transient nerve weakness (n = 2) Infection (n = 2)
Lymphangioma	34	10.9 (2–21)	21	13	Recurrence (n = 2)
Vascular malformation	1	7 (7)	0	1	None
Dermoid cyst	3	5.4 (1.5–8.3)	2	1	None

Table 2
Diagnosis, age, sex distribution, and complications of inflammatory lesions.

Diagnosis	No.	Mean (range) age (years)	Sex		Complications
			Male	Female	
Reactive lymphadenopathy	14	8 (1–21)	6	8	Recurrence (n = 1) Infection (n = 1)
Infective lymphadenitis	11	6.7 (4.3–14.6)	7	4	None
Granulomatous neck mass	5	7.3 (3.5–12.6)	2	3	None
Scrofula	3	11.2 (5.5–16)	2	1	None
Cat scratch disease	2	5.4 (4.5–6.2)	2	0	None

Table 3
Diagnosis, age, sex distribution, and complications of neoplastic lesions.

Diagnosis	No.	Mean (range) age (years)	Sex		Complications
			Male	Female	
Benign tumours:					
Neurilemmoma	3	13.8 (11–17.5)	1	2	Transient nerve weakness (n = 1)
Fibroma	3	14.3 (8.2–16.8)	2	1	None
Lipoma	1	16.9 (16.9)	1	0	None
Malignant tumours:					
Non- Hodgkin's lymphoma	2	18 (17–19)	2	0	None
Other lesions:					
Plunging ranula	35	10.6 (3.6–20.2)	19	16	Recurrence (n = 2) Transient nerve injury (n = 2) Infection (n = 3)

Discussion

Although many congenital lesions originate at birth, they are concealed until later in infancy or childhood. Neck masses are common presenting complaints, and attention should be paid to those in children because they contribute greatly to morbidity, and occasionally to mortality.[5] It is critical therefore for oral and maxillofacial surgeons to acknowledge the embryology and anatomy of relevant structures and to acquaint themselves with the management of these lesions.

Neck masses in children may arise from congenital, inflammatory, and neoplastic lesions, all of which may present as a rapidly enlarging mass.[6] In the present study, congenital lesions were the most common, which is in agreement with other studies.[4,7] However, some authors reported that inflammatory lesions were the most common.[1,5] We could not find any reason for this. However, infections of the oral and maxillofacial region and upper airway system are the predominant causes of inflammatory lesions.

The congenital lesions comprised 128/207 (62%) of all the neck masses in this study. Of these lesions, the most common neck was a thyroglossal cyst, which accounts for 50%. The rate of branchial cyst was 20%. The rates of lymphangioma and dermoid cyst were 27% and 2%, respectively. Dermoid cyst and vascular malformation were relatively rare. The published prevalence of thyroglossal cyst in neck masses in children varied from 8% to 15%.[1,8,9] We found that the prevalence of thyroglossal cysts was 31%. Further studies are needed to explore the incidence of thyroglossal cyst in Northwest China.

Benign and malignant tumours accounted for 3% and 1%, respectively, which is lower than in other studies. The

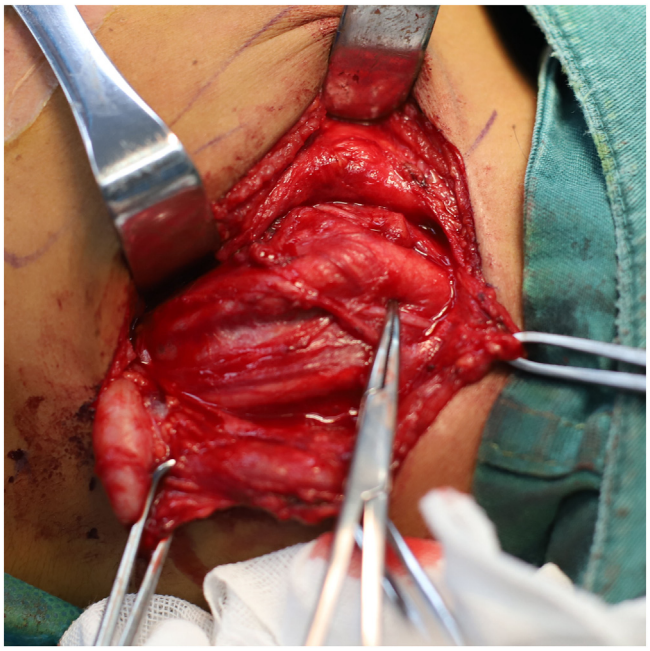

Fig. 3. Blunt dissection easily facilitates exposure of the mass.

Fig. 4. Entire neurilemmoma specimen.

reported discrepancies in incidence may be related to the regional differences, and should be further investigated to find a reasonable explanation. The neck region is also a site for concealed metastatic malignant tumours; however, we did not encounter any.

Plunging ranula is a non-epithelial-lined cyst that arises from the sublingual gland and dives through the mylohyoid muscle into the neck.[10,11] Recognising a plunging ranula is not always easy, because it may be confused with other

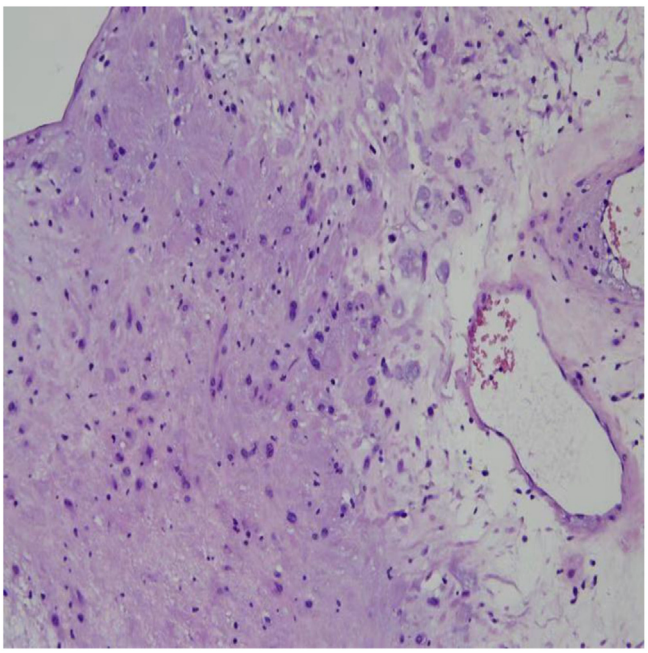

Fig. 5. Histological description of the neurilemmoma. Hypercellular areas contain compact spindle cells with elongated nuclear palisading, and hypocellular areas with loose myxoid stroma (haematoxylin and eosin, original magnification×400).

neck lesions such as thyroglossal cysts, branchial cysts, and lymphatic malformations.[11,12] Published studies on plunging ranula in neck masses are rare, however we found 35 cases,[1] which could be attributed to the predisposition of Asian ethnic groups, particularly the Chinese, for this condition. This ethnic variation may be the result of genetic alterations in people of this race.[13,14] Differences between the sexes have been reported in some studies, with a slightly higher prevalence in male patients. However, we found no difference in our study.[15,16] Excision of the sublingual gland through an intraoral approach was our first choice of treatment, except for two recurrences where excision through a transcervical approach was used.

Various imaging techniques are used in the preoperative evaluation of a neck mass and are expected to expedite an accurate diagnosis of the mass. Ultrasound is usually the initial one used in children to differentiate cystic from non-cystic masses. Colour Doppler ultrasound can also show vascularisation.[17,18] CT is a non-invasive imaging technique for evaluating neck masses and allows the visualisation of adjacent soft tissues and bony structures, but the radiation is an important risk for children.[8] Magnetic resonance imaging has superior contrast resolution and no ionising radiation compared with CT; however, it requires more time for imaging, and younger children need to be sedated. Fine-needle aspiration biopsy is also a safe, well-tolerated, and accurate technique for diagnosing neck masses in children.[19] When the lesions are suspected of being infective, antibiotic and anti-inflammatory treatment should be given. When these do not work well, histopathological examination is necessary.

The choice of imaging technique depends on the clinical evaluation of every child with a mass in the neck.

Excision was our primary therapeutic approach, and this perspective is consistent with those of other studies. For complicated cases, such as when patients have had an infection, the use of magnification and delicate microsurgical instruments can help preserve relevant anatomical structures, which decreases the risk of postoperative complications.

In conclusion, the demographic data of children with neck masses and their clinical evaluation have been discussed. The types of neck masses in Northwest China differ from those in previously reported studies, and these differences may be attributed to a genetic difference in people of this race. This report contributes to the knowledge of diagnosis and treatment of neck masses in Northwest China and illustrates the demographic differences among races.

Conflict of interest

We have no conflicts of interest.

Ethics statement/confirmation of patients' permission

Institutional review board approval was obtained from the Lanzhou University Second Hospital, and the patients gave their consent to publication.

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