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Original Article

Head and neck carcinoma in children: A clinicopathological study of 42 cases

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KEYWORDS
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Children

Abstract *Background/purpose:* Cancer is an important part of the global burden of childhood diseases. Head and neck carcinoma in children is rare and related research is limited. This study aimed to investigate the clinicopathological features of childhood head and neck carcinoma.
Materials and methods: Forty-two cases of childhood head and neck carcinoma treated in our institution were reviewed and analyzed.
Results: Median age overall was 11 years. Twenty-three patients (54.8%) were male and 19 (45.2%) were female. Parotid gland location was most common (54.8%). Mucoepidermoid carcinoma and squamous cell carcinoma were the most common histological types (57.1% and 11.9%, respectively). Two patients had a history of bone marrow transplantation and two had a history of odontogenic keratocyst. The recurrence rate after treatment was 8.6%.

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Conclusion: Early diagnosis and treatment and close follow-up of childhood head and neck carcinoma are warranted to prevent recurrence and improve clinical outcome.

Introduction

Cancer is one of the main causes of death in children under 14 years of age.[1] Incidence rates and types of childhood cancer vary according to global region and country because of differences in environmental factors.[2,3] The distribution and survival rates of childhood cancers also vary. Survival rates are worse in low-income countries.[2,4] Overall childhood cancer survival in China is improving but remains lower than the rate in the United States and other developed countries.[1] Head and neck carcinoma in children is rare and related research is limited.[5] These carcinomas usually require surgery and radiation, which seriously affects a child's physical and psychological health and is burdensome on families.[6] More research on these rare cancers is needed to improve our understanding, enable early detection and treatment, and improve clinical outcomes. In this study, we reported a clinicopathological analysis of 42 cases of childhood head and neck carcinoma treated in a single center in China.

Materials and methods

Data collection

Cases of childhood head and neck carcinoma in children under age 14 years treated at Peking University Hospital of Stomatology from 2009 to 2022 were reviewed. All diagnoses were made by two experienced pathologists using World Health Organization criteria.[7–10] Those not initially diagnosed and treated in our institution were excluded. Forty-two cases were included for analysis. Institutional review board approval was obtained.

Statistical analyses

Patient age and sex; tumor site, histology, and treatment; and family history were recorded. Seven cases (16.7%) were lost to follow-up. Statistical analyses and visualizations were performed using Prism software version 8.3.0 (GraphPad Software, San Diego, CA, USA).

Results

Patient and tumor characteristics overall

Patient and tumor characteristics are shown in Table 1. Median age was 11 years (range, 5–14). Most tumors (23.8%) were diagnosed at age 14 years (Fig. 1A). Twenty-three (54.8%) patients were male and 19 (45.2%) were female. Tumor location was as follows (Fig. 1B): parotid gland, 23 (54.8%); palate, four (9.5%); gingiva, three (7.1%); tongue, two (4.8%); infratemporal fossa, two (4.8%), maxilla, two (4.8%); mandible, two (4.8%); buccal mucosa, one (2.4%); retromolar, one (2.4%); submandibular gland, one (2.4%); and neck, one (2.4%). Histological type is shown in Fig. 2A. Most were mucoepidermoid carcinoma (57.1%), followed by squamous cell carcinoma (11.9%), acinic cell carcinoma (9.5%), secretory carcinoma (7.1%), myoepithelial carcinoma (4.8%), lymphoepithelial carcinoma (4.8%), low-grade intraductal carcinoma (2.4%), and ameloblastic carcinoma (2.4%). Lymph node metastasis was present in two cases (4.8%). Five patients (12.0%) had a relevant medical disease history before carcinoma diagnosis: two (4.8%) had a bone marrow transplant, two (4.8%) had an odontogenic keratocyst, and one (2.4%) had a sebaceous cyst. Only one child had a family history of cancer. Half of the cases were treated with surgery alone and half were treated with surgery and radiotherapy.

Table 1 Patient and tumor characteristics.

Clinicopathological parameters	Number/median (interquartile range)	Percentage
Age	11 (9–13)	
Sex		
Male	23	54.8%
Female	19	45.2%
Concomitant with lymph node metastasis		
No	40	95.2%
Yes	2	4.8%
Medical history before carcinoma		
No	37	88.1%
Bone marrow transplantation	2	4.8%
Odontogenic keratocyst	2	4.8%
Sebaceous cyst	1	2.4%
Family cancer history		
No	41	97.6%
Yes	1	2.4%
Treatment		
Surgery	21	50.0%
Surgery and radiotherapy	21	50.0%
Recurrence		
No	39	92.9%
Yes	3	7.1%

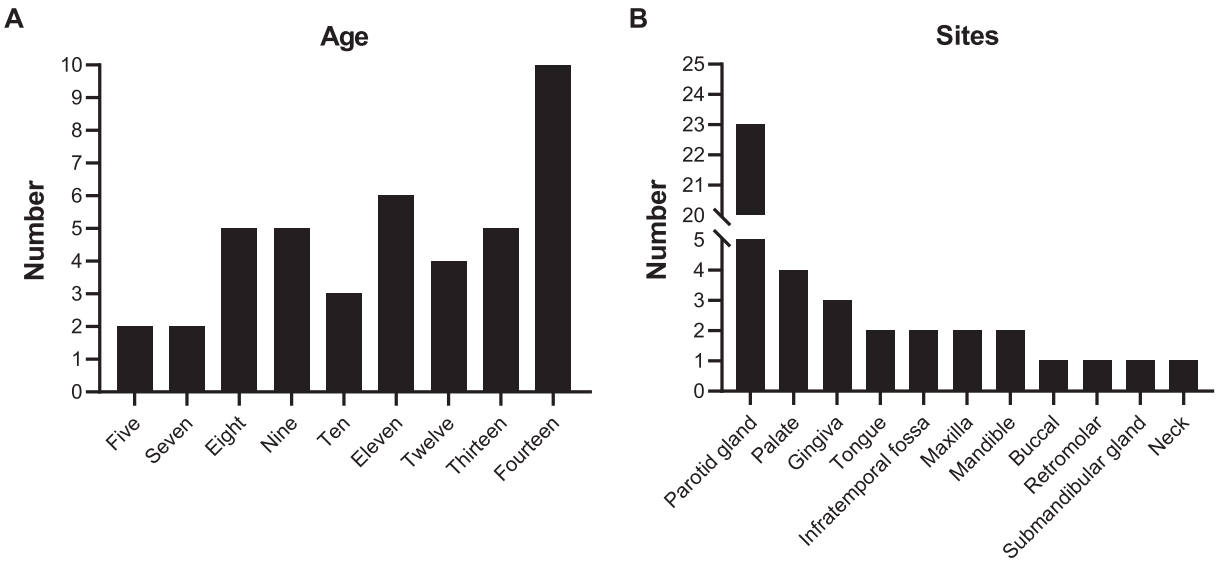

Figure 1 Age at diagnosis (A) and tumor location (B).

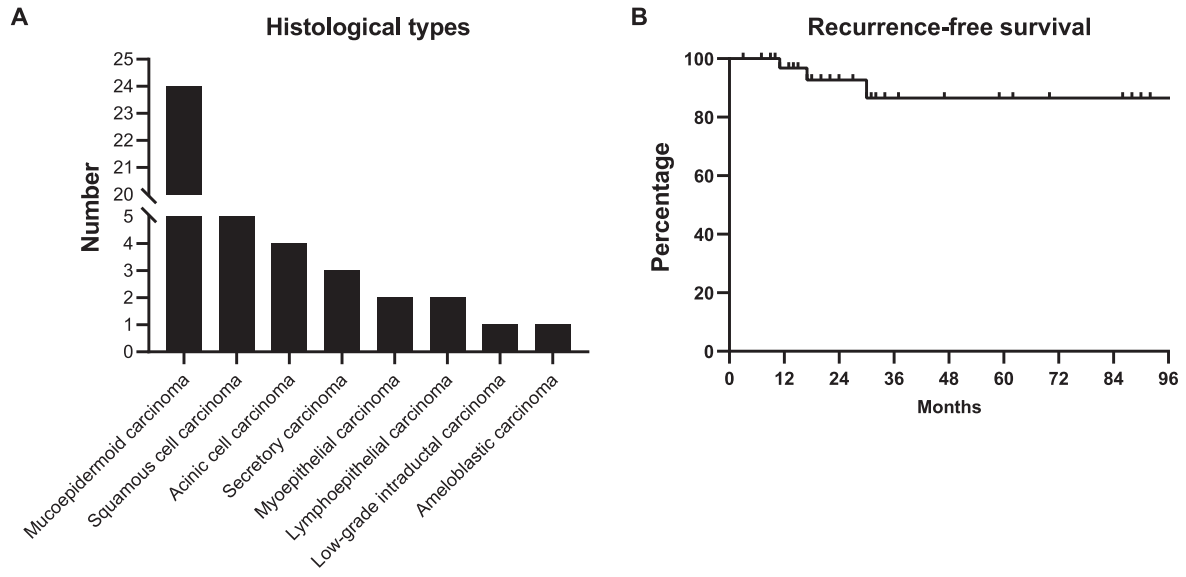

Figure 2 Histological type (A) and recurrence-free survival (B).

Among the 35 cases with follow-up, median follow-up was 25 months (maximum follow-up was 107 months). At last follow-up, all were alive but three (8.6%) had experienced recurrence (Fig. 2B).

Childhood mucoepidermoid carcinoma

Patient and tumor characteristics of 24 cases of mucoepidermoid carcinoma are shown in Table 2. Median age was 11 years (range, 5—14). Most (25.0%) occurred at age 14 years (Fig. 3A). Twelve patients (50.0%) were male and 12 (50.0%) were female. Tumor location was as follows: parotid gland, 14 (58.3%); palate, four (16.7%); submandibular gland, one (4.2%); gingiva, one (4.2%); tongue, one (4.2%); buccal mucosa, one (4.2%); retromolar, one (4.2%); and maxilla, one (4.2%). Histologically, nine (37.5%) were well-differentiated, 10 (41.7%) were well- to moderately-differentiated, and five (20.8%) were moderately-differentiated. No mucoepidermoid carcinoma patient had lymph node metastasis or a relevant previous medical history; however, one had a family history of cancer. Ten cases (41.7%) were treated with surgery alone and 14 (58.3%) with surgery and radiotherapy. Among the 20 cases with follow-up, median follow-up was 24.5 months (maximum follow-up was 107 months). At last follow-up, all were alive but one (5.0%) had experienced recurrence (Fig. 3B).

Childhood squamous cell carcinoma

Among the five cases of squamous cell carcinoma, three occurred at age 14 years; the others occurred at ages 5 and 8 years, respectively. Three patients were male and two

Table 2 Patient and tumor characteristics of 24 childhood mucoepidermoid carcinomas.

Clinicopathological parameters	Number/median (interquartile range)	Percentage
Age	11 (9–13)	
Sex		
Male	12	50.0%
Female	12	50.0%
Sites		
Parotid gland	14	58.3%
Palate	4	16.7%
Submandibular gland	1	4.2%
Gingiva	1	4.2%
Tongue	1	4.2%
Buccal	1	4.2%
Retromolar	1	4.2%
Maxillary bone	1	4.2%
Grade		
Well-differentiated	9	37.5%
Well- to moderately-differentiated	10	41.7%
Moderately-differentiated	5	20.8%
Family cancer history		
No	23	95.8%
Yes	1	4.2%
Treatment		
Surgery	10	41.7%
Surgery and radiotherapy	14	58.3%
Recurrence		
No	23	95.8%
Yes	1	4.2%

were female. Two cases occurred in the gingiva, one in the tongue, one in the maxilla, and another case in the mandible. Histologically, four were well-differentiated and one was moderately- to poorly-differentiated and associated with lymph node metastasis. One of the well-differentiated squamous cell carcinomas developed after bone marrow transplantation and two developed after an odontogenic keratocyst. The four well-differentiated carcinomas were treated with surgery alone and the moderately to poorly-differentiated one was treated with surgery and radiotherapy. Among the four cases with follow-up, median follow-up was 29.5 months (maximum follow-up was 62 months). At last follow-up, all were alive and none had experienced recurrence.

Other childhood head and neck carcinomas

There were four cases of acinic cell carcinoma. Age range was 8–13 years. All occurred in the parotid gland and one developed after a sebaceous cyst. Three cases of secretory carcinoma occurred (Fig. 4A and B), all in the parotid gland; age range was 9–11 years and one developed after bone marrow transplantation. Myoepithelial carcinoma (Fig. 4C and D) occurred in the infratemporal fossa in two males at ages 10 and 11 years, respectively. One experienced recurrence 30 months after surgery; the other was lost to follow-up. Two cases of lymphoepithelial carcinoma (Fig. 5A and B) occurred, one in the parotid gland and the other in the neck at age 13 and 14 years, respectively. The parotid gland carcinoma was associated with lymph node metastasis. Both patients were alive at last follow-up without recurrence. Low-grade intraductal carcinoma (Fig. 6A and B) of the parotid gland occurred in a 13-year-old boy. Ameloblastic carcinoma (Fig. 6C and D) of the mandible occurred in an 11-year-old girl and recurred after 11 months.

Discussion

This study analyzed 42 cases of childhood head and neck carcinoma. The male-to-female ratio was 1.2: 1. Approximately a quarter of patients developed carcinoma at the age of 14 years. Mucoepidermoid carcinoma was the most common histological type. Similar to previous studies, salivary gland carcinoma was most common and the parotid gland was the most frequently affected location.[5,11–13]

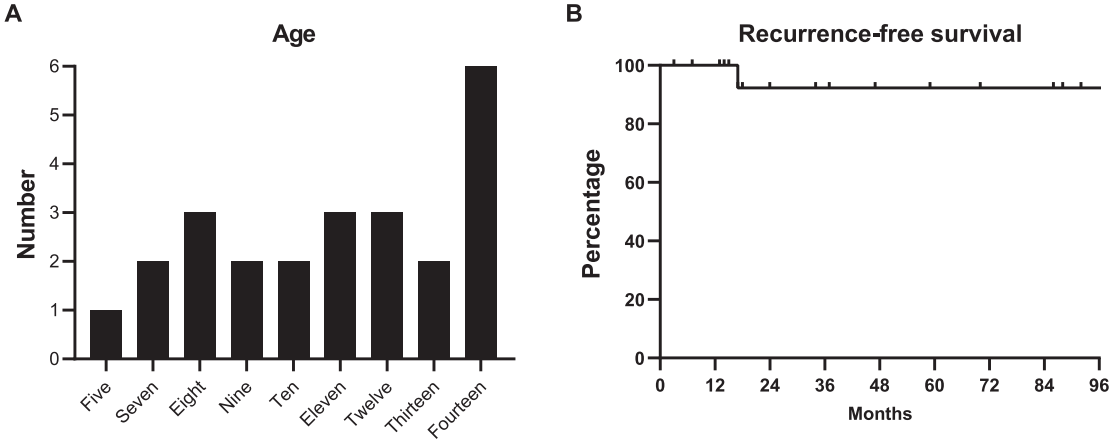

Figure 3 Age at diagnosis (A) and recurrence-free survival (B) in 24 patients with childhood mucoepidermoid carcinoma.

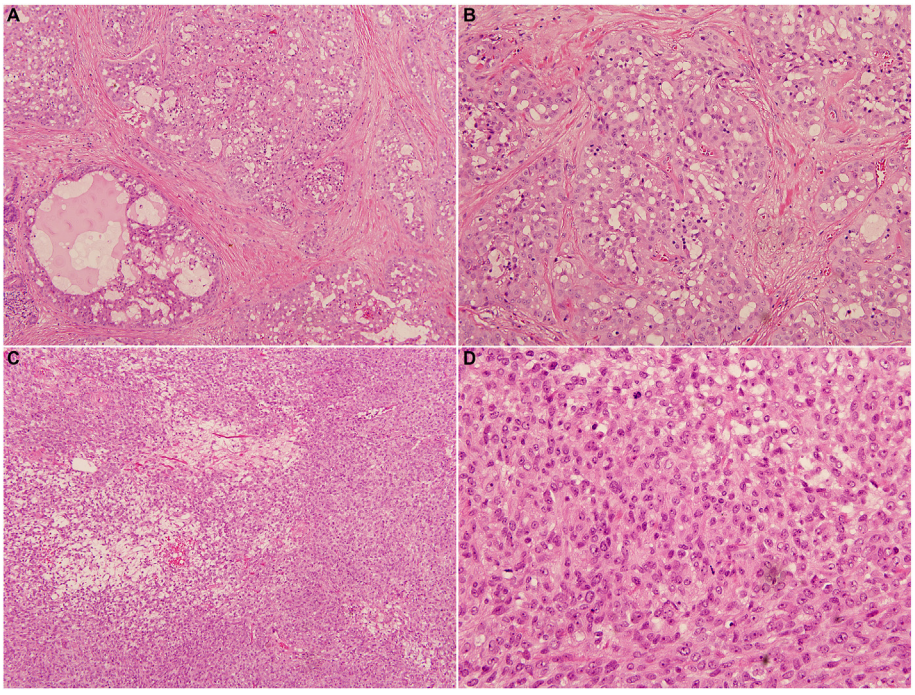

Figure 4 Hematoxylin-eosin staining of secretory carcinoma (A: 100×, B: 200×), and myoepithelial carcinoma (C: 100×, D:400×).

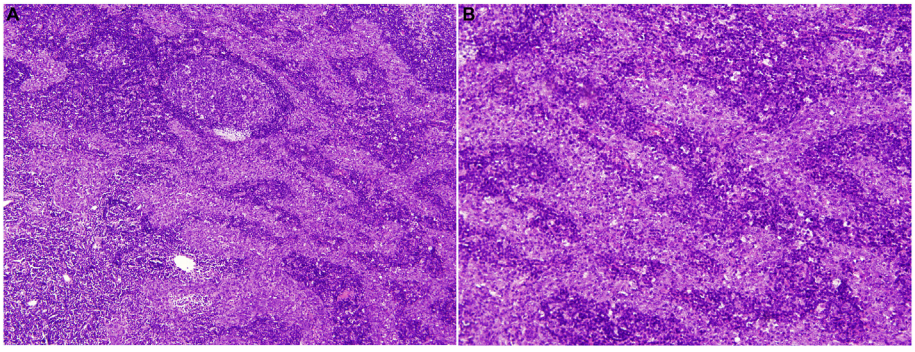

Figure 5 Hematoxylin-eosin staining of lymphoepithelial carcinoma (A: 100×, B: 200×).

Although several previous studies have reported a female predominance in childhood mucoepidermoid carcinoma,[5,12] we found no sex difference. In addition, all mucoepidermoid carcinomas were well- or moderately-differentiated. Moreover, only one child had a family history of cancer, indicating that family history might not be a risk factor for childhood head and neck carcinoma. After treatment with surgery alone or combined with radiotherapy, all children were alive at last follow-up; however, one case recurred. Previously reported 5- and 10-year overall survival rates for pediatric salivary gland carcinoma are 93.1% and 90.7%, respectively.[12] Although this prognosis is good, children with a high risk of recurrence should be identified and followed particularly closely.

Although squamous cell carcinoma is the most common histological type of head and neck cancer in adults,[14] it is rare in childhood. Lee et al. summarized 25 cases of head and neck squamous cell carcinoma in children. Median age was 10 years, 64% were male, and most developed in the maxilla or palate.[15] There were five cases of squamous cell carcinoma in our study and most occurred at age 14 years. A history of bone marrow transplantation or odontogenic keratocyst might be risk factors for childhood head and neck squamous cell carcinoma. Graft versus host disease after marrow transplantation is a potentially malignant disorder which increases the risk of squamous cell carcinoma.[16] Odontogenic keratocyst represents approximately 15% of childhood odontogenic tumors and can transform into primary intraosseous squamous cell carcinoma.[17,18] Therefore, children with a history of bone marrow transplantation or odontogenic keratocyst should be closely monitored for development of squamous cell carcinoma. Although head and neck squamous cell carcinoma in children has a good prognosis, patients with lymph node metastasis may experience a poor clinical outcome.[15]

Secretory carcinoma is rare and occurs mainly in the parotid gland.[12,19] Our study included three cases and one was preceded by bone marrow transplantation, suggesting

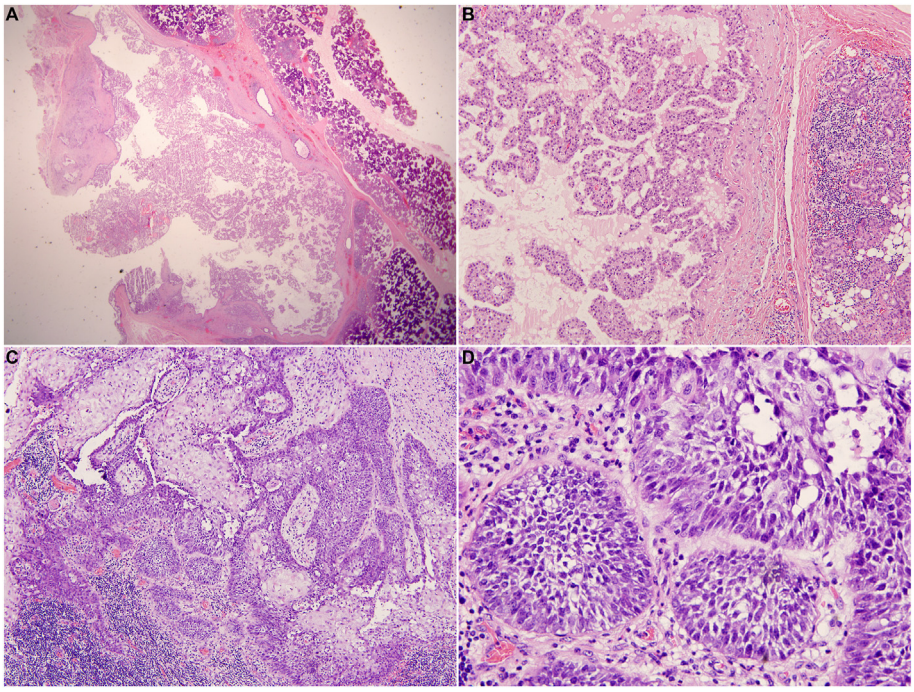

Figure 6 Hematoxylin-eosin staining of low-grade intraductal carcinoma (A: 12.5×, B: 100×), and ameloblastic carcinoma (C: 100×, D: 400×).

that bone marrow transplantation might be a risk factor. Myoepithelial carcinoma may be found in the salivary glands and has also been reported in the soft tissues of the trunk and extremities.[20,21] In one study of myoepithelial soft tissue carcinoma in children, 52% of patients developed metastasis and 39% experienced recurrence; recurrence was associated with surgical margin status. The authors concluded that wide excision might reduce the risk of recurrence.[21] In another study of myoepithelial carcinoma of the salivary gland, recurrence and metastasis rates were 63% and 31%, respectively.[22] Recurrence occurred in half of our cases. These findings suggest that myoepithelial carcinoma in children has high risks of recurrence and metastasis and should be completely resected with negative margins; close follow-up after surgery is indicated. Lymphoepithelial carcinoma is another rare entity and is commonly found in the nasopharynx, parotid gland, larynx, and hypopharynx.[23,24] The reported 5-year survival for parotid gland lymphoepithelial carcinoma is 97.0% while that for laryngeal and hypopharynx carcinoma is 68.9%.[23,24] The reported prevalence of lymph node metastasis at the time of parotid gland lymphoepithelial carcinoma diagnosis is 31.5%.[23] We also found lymph node metastasis at the time of presentation in children with parotid gland lymphoepithelial carcinoma. Ameloblastic carcinoma is rare and usually occurs in the mandible of elderly men; the recurrence rate is 21%.[25] Childhood ameloblastic carcinoma is also rare and has a significantly lower mean survival than the adult disease (43.95 months vs. 127.23 months).[25] Therefore, early diagnosis and treatment of ameloblastic carcinoma in children is particularly important.

Head and neck carcinoma in children is rare. Mucoepidermoid carcinoma and squamous cell carcinoma are the most common types. There is a slight male predominance and most cases develop after age 5 years. Although prognosis is generally good, early diagnosis and treatment and close follow-up are warranted to prevent recurrence and improve clinical outcome.

Declaration of competing interest

The authors have no conflicts of interest relevant to this article.

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