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# Parotid Lesions in Children Undergoing Parotidectomy. The Children's Memorial Hospital Experience

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## Abstract

**Objective:** Evaluate the demographics, presentation, workup, surgical outcomes and pathology of pediatric parotid masses.

**Study design:** Consecutive retrospective review.

**Setting:** Urban pediatric tertiary care hospital.

**Subjects and methods:** Retrospective review of medical charts was performed on all patients undergoing a parotidectomy at Children's Memorial Hospital; Chicago, Illinois from March 1998 to March 2011.

**Results:** N=54. All but 2 patients presented with a facial/neck mass or swelling. Mean age was 9.7 years. 28 (52%) were male, 26 (48%) were female. Twelve (22%) patients had a pre-operative fine needle aspiration, 3 (6%) had an open biopsy; 2 by outside surgeons. All but one patient had a fully functioning facial nerve pre-operatively. Thirty-eight (70%) had a superficial parotidectomy, 12 (22%) had a total parotidectomy, 4 (7%) had a near total parotidectomy. Benign pathology was most common: n=45 (83%). The most common of which were pleomorphic adenoma (n=8) and lymphatic malformation (n=9). The most common malignant pathology was acinic cell carcinoma; n=3. Short term complications included generalized facial nerve paresis (n=7, 13%), marginal mandibular paresis (n=11, 20%), seroma (n=4, 7%) and wound dehiscence, hematoma and infection, all occurring in 1 patient.

**Conclusion:** Parotid masses are an uncommon finding in children. A wide spectrum of pathology was seen in our cohort with the majority being benign pathology; however malignancy was not uncommonly seen. The most common complication was temporary facial nerve paresis. Children with parotid masses can be treated successfully with little long term morbidity with appropriate pre-operative workup and surgical excision in the hands of experienced pediatric head and neck surgeons.

**Keywords:** Pediatric; Parotidectomy; Parotid lesions; Children

## Introduction

Pediatric salivary gland disease represents a very small portion of the pathology that we see among children and as such, it represents a very small part of what head and neck surgeons treat. The majority of salivary gland masses occur within the parotid gland [1-4]. Parotid gland lesions are infrequent in children. Less than 5% of all salivary gland neoplasms occur in this population and less than 10% of pediatric head and neck tumors originate from the salivary glands [5,6]. Many different pathologies can originate within the parotid gland. Benign causes include, among others, lymphatic malformations, hemangiomas and branchial cleft cysts. Due to the close proximity of several lymph nodes other inflammatory causes are also a possibility such as atypical mycobacterial infections. The rate of malignancy within parotid gland masses has been noted to be higher in the pediatric population than in adults [3,7]. This malignancy rate in pediatric parotid masses has been noted in the literature to be as high as 41% [8,9]. More recently, Camacho and colleagues challenged that rate in their study by noting a much lower 4% malignancy rate [9].

Overall, very few studies have been performed looking at parotid gland surgery in the pediatric population. Studies by Chong et al., Jaques et al., and Schuller et al. [8,10,11] were done in the mid 1970's, and there have been few other publications on the topic in the last 15 years.

The aim of this study was to advance the literature on pediatric parotid gland surgery and to provide better clarification in the management of this very select group of patients by reviewing our experience over a 12 year period at an urban, academic pediatric tertiary care facility. We highlight pre-operative presentation and work up, surgical outcomes and complications, and final pathologic diagnoses with discussion and comparison to previous publications.

## Materials and Methods

We retrospectively reviewed a consecutive series of patients during the study time period. All patients presented at Children's Memorial Hospital with a parotid mass, swelling or recurrent infection from March 1999 to March 2011. We then selected those patients that

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underwent surgical diagnosis and/or treatment with some type of formal parotidectomy. We excluded those patients without adequate chart data, those that underwent parotidectomy for other surgical exposure purposes, and those with biopsies only. Patient charts were reviewed for demographic data, initial clinical presentation and facial nerve function, pre-operative workup, surgical and intraoperative details, final pathologic diagnosis and short term surgical complications.

## Results

We had 54 patients that met our inclusion criteria. Sex distribution was near equal with 26 females and 28 males. The age range at time of surgery was 8 weeks to 19 years old with a mean age at time of surgery of 9.7 years. Initial presentation was noted to be a mass or swelling in all but 2 patients (96%). One of these 2 presented with recurrent parotitis and the other with a draining sinus. Only one patient had a painful mass, which was later diagnosed as metastatic ependymoma from the central nervous system. One patient presented with a mass and a draining sinus. We had one patient that presented with pre-auricular mass that extended into the external ear canal, which was diagnosed as a malignant fibrous histiocytoma. One patient presented with bilateral parotid swelling. All but one patient presented with completely normal facial nerve function. However, this one patient had iatrogenic weakness from an incisional biopsy of her mass done at an outside facility.

All patients but one underwent pre-operative radiologic imaging with either a CT scan or a MRI. The other patient underwent an ultrasound. Twenty of the 54 (37%) patients had a cystic mass, 26 of the 54 (48%) had a solid mass. The generalized radiologic imaging findings can be seen on (Table 1). Twelve of the 54 (22%) patients had undergone a pre-operative fine needle aspiration biopsy. Three patients (5%) underwent an open or incisional biopsy. One patient had a biopsy of her external ear canal mass, the other two patients has an incisional biopsy performed at an outside institution prior to presenting to us. When analyzing the type of surgery performed, 38 of the 54 (70%) patients had a superficial parotidectomy, while the other 16 (30%) had either a total or near total parotidectomy. All patients had facial nerve dissection and attempt for complete preservation. Nineteen patients (35%) also underwent some degree of lymphadenectomy ranging from excision of a single enlarged lymph node to a formal level 1B through 5 neck dissection for our patient that was diagnosed with pleomorphic liposarcoma on outside open incisional biopsy.

Final histologic pathology revealed that the majority of patients had benign pathology; 45 of 54 (83%) patients. The most common pathology was lymphatic malformation, followed by pleomorphic adenoma and then branchial cleft anomalies. Nine patients (17%) were found to have malignant disease, the most common being acinic cell carcinoma. The breakdowns of our benign and malignant pathologies are noted in (Table 2). We also present the distribution of pediatric masses by age and type of lesion in (Figure 1). This shows that the incidence of malignancy rises with the age of diagnosis. Our short term post-operative complication rate was 41% (22 patients). By far, the most common of these complications were either generalized or segmental facial nerve weakness. This rate of paresis was higher among those undergoing total or near total parotidectomy; 8 out of 16 patients (50%) than those that underwent superficial parotidectomy; 11 out of 38 (29%). Other complications include seroma, hematoma, wound infection and wound dehiscence (Table 3).

## Discussion

Pediatric parotid lesions are very uncommon and just like adult

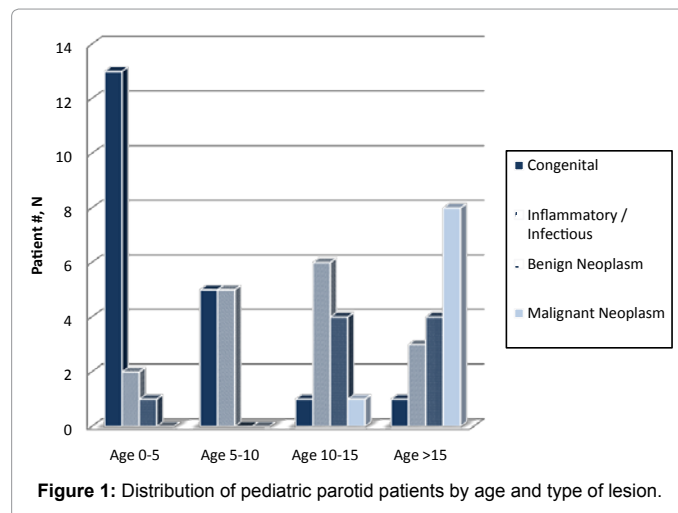
parotid lesions have a very diverse pathology. Several challenges are seen when treating these patients. Due to their rarity, many head and neck surgeons do not encounter pediatric parotid masses on a regular basis. Also, surgical excision in the pediatric population can be challenging, especially in recurrent cases. The workup of pediatric parotid masses is generally the same as in adults with reliance on the history and physical examination and utilizing radiologic imaging and possibly Fine Needle Aspiration (FNA) biopsy. When considering which radiologic study to use, ultrasound is a possible first line study in pediatric patients since it is efficient, fast, painless and can be done without anesthesia or sedation. However for complete assessment of the nature and extent of parotid gland masses, CT or MRI is often

Radiologic Finding	N	(%)
Solid	26	48
Cystic	20	37
Multiple enlarged lymph nodes	3	5.5
Enlarged bilateral parotid	2	3.7
Mixed solid/cystic	1	1.8
No mass	1	1.8
CT fistulogram for sinus tract	1	1.8

Table 1: Radiologic findings of parotid lesions.

Final Pathology	N	(%)
<b>Benign</b>	<b>45</b>	<b>83.3</b>
Lymphatic Malformation	9	16.7
Pleomorphic Adenoma	8	14.8
Branchial Cleft Anomaly	7	13
Chronic Inflammation	6	11
Reactive Follicular Hyperplasia	4	7.4
Granulomatous Lymph Node	3	5.5
Vascular Malformation	3	5.5
5 other single pathologies		
<b>Malignant</b>	<b>8</b>	<b>17</b>
Acinic Cell Carcinoma	3	5.5
Mucoepidermoid Carcinoma	1	1.8
Pleomorphic Liposarcoma	1	1.8
Low Grade Salivary Carcinoma	1	1.8
Malignant Fibrous Histiocytoma	1	1.8
Metastatic Ependymoma	1	1.8
Low Grade Cystadenocarcinoma	1	1.8

Table 2: Final pathologic diagnosis.



necessary. The decision for which study to obtain first depends on the suspicion of the underlying pathology and surgeon preference. Contrast enhanced CT scans is better suited for inflammatory lesions or when bony detail is needed. MRI studies provide a better level of detail for neoplastic pathology including adjacent tissue invasion and peri-neural spread. CT advantages in children are its relative speed and quietness compared to longer, louder MRI machines. As a result, MRI studies may require sedation or general anesthesia. Another more recently emphasized consideration is the radiation exposure of a CT scan in pediatric patients [12]. In our cohort, all patients underwent some form of radiologic imaging with CT scan or MRI being the most common.

Use of fine needle aspiration is routine in adult parotid masses with reports of specificities and sensitivities above 90% when sufficient cells are present [13]. In the pediatric population, tolerance can limit its use and often may require sedation or general anesthesia. Fine needle aspiration use is dependent on the experience and expertise of the cytopathologist. Since fine needle aspirations within the head and neck are not as common in pediatric centers, cytopathologists may be reluctant in making a definitive diagnosis. We had 12 patients, including our youngest at 8 weeks old, which underwent a pre-operative FNA. Fine Needle Aspiration (FNA) was performed on this extremely young patient for further investigation prior to parotidectomy for his rapidly enlarging mass. If this patient is excluded, the mean age of those patients undergoing an FNA is 13.24 years compared to our mean age of 9.7 years for our entire cohort. This is again related to FNA without anesthesia being better suited for older children. In our patient group, the correlation of FNA findings was quite good with the final pathologic diagnosis. Only one patient with benign findings on the FNA had a malignancy on final histopathology. Another patient had a FNA which was read as concerning for lymphoma but the final

diagnosis was reactive follicular hyperplasia (Table 4). These findings correspond well with the results of Liu et al. [14], whose study had 15 out of 17 patients with a correct diagnosis on pre-operative FNA once final surgical excision was performed. As our results show, as well as those of Liu et al., fine needle aspiration in children can be utilized successfully in the appropriate patient. An alternative to FNA is an intraoperative frozen section, especially if anesthesia is required in obtaining the FNA. A frozen section can guide intraoperative decision making; however if the diagnosis is not certain the surgeon must be prepared to delay surgery.

The rate of malignancy within parotid masses in the pediatric population has traditionally been noted to quite high. In 1977, Schuller and McCabe [8] noted a 57% salivary gland malignancy rate for solid lesions (41% when adjusted for the parotid gland only) in a small series of patients. Since then, all other studies have noted a lower rate with Camacho et al. [9] having the lowest rate at 4% [15,16]. In our study, the overall malignancy rate was also lower at 16.7%. When we isolate solitary, solid masses only; as was the criteria used by Schuller et al. and Camacho et al., our malignancy rate was 29.6%. The reports on this topic that are available, including ours, are all retrospective and from single institutions, which can introduce inaccuracies. The upper age limit to define the pediatric population is also varied. Another problem is that the data available is only from those that underwent definitive surgical excision, possibly excluding some inflammatory and vascular lesions. What seems most plausible based on the few reports that are available is that the rate is between the highest figure of 41% and the lowest figure of 4% [8,9]. This range becomes important when counseling parents and deciding on the appropriate course of management. With this aside, surgical excision ends up being performed most of the time not only for definitive pathologic diagnosis but also for therapeutic purposes. Our management philosophy concurs as we err on the side of surgical excision for persistent, unknown parotid masses, especially when the lesion is solid on radiologic imaging.

Our overall complication rate was 40.7% (22 patients). The majority of these complications were temporary generalized facial nerve weakness (7 patients, 13%) or temporary segmental weakness (12 patients, 22.2%). This rate of temporary facial nerve paresis (19 out of 54 patients, 35.2%) is comparable to previous reports among pediatric patients. Orvidas et al. [15,16] reported a 19% paresis rate and Al-Mazrou reported a 38% paresis rate. Paresis among our patients was more evident among those undergoing total or near total parotidectomy (8 of 16 patients, 50%) than those undergoing superficial parotidectomy (11 of 38 patients, 28.9%).

When breaking down our benign pathologies, we had 9 patients with benign neoplasms (pleomorphic adenoma, sialolipoma, 16.7%), 19 patients with congenital lesions (lymphatic or vascular malformations and branchial cleft anomalies, 35.2%) and 17 patients with infectious or inflammatory lesions (31.5%). The mean age of those patients with benign pathology was 8.4 years of age. Our most common malignancy, contrary to other reports, was acinic cell carcinomas (n=3). The mean age of those with a malignancy was 16.25 years of age with the youngest patient being 14 years of age.

## Conclusion

Pediatric parotid masses are an uncommon pathology as evidenced by a limited number of published reports on the topic. As in our study, a wide spectrum of pathology can be seen. The majority of cases prove to be benign pathology; however malignancy was not uncommonly seen. This select patient group can be difficult to manage given their age,

Complication	N	(%)
Marginal mandibular weakness	11	20
Diffuse facial nerve weakness	7	13
Seroma	4	7.4
Midface weakness	1	1.8
Hematoma	1	1.8
Wound infection	1	1.8
Wound dehiscence	1	1.8

Table 3: Complications of pediatric parotidectomy.

Fine Needle Aspiration	Final Diagnosis
Lymphocytes, macrophages, salivary tissue	Lymph node with foreign body reaction
Sialolipoma	Sialolipoma
Pleomorphic adenoma	Pleomorphic adenoma
Pleomorphic adenoma	Pleomorphic adenoma
Lymphoid tissue	Reactive follicular hyperplasia
Cellular epithelial neoplasm	Low grade mucoepidermoid carcinoma
Pleomorphic adenoma	Pleomorphic adenoma
Well differentiated serous acinic cells	Acinic cell carcinoma
Benign salivary tissue	Parotid gland with chronic inflammation
Lymphocytes, concern for lymphoma	Reactive follicular hyperplasia
Macrophages, no malignant cells	Low grade Cystadenocarcinoma
Cyst fluid, blood	Hemangioma

Table 4: FNA finding compared to final diagnosis.

various pathologies, and infrequent presentation. Also the infrequent complication of long term facial paralysis can be devastating to the patient and the family. We advocate a prompt and thorough workup for any child with a parotid mass or swelling, including radiologic imaging and fine needle aspiration when appropriate. Surgical excision with facial nerve identification and preservation remains the mainstay treatment of choice for any persistent, unknown parotid mass. We do not advocate incisional biopsies or excision of lesions without identification of the facial nerve. Children with parotid masses can be treated successfully with few long term complications in the hands of experienced pediatric head and neck surgeons.

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