Pediatric parotidectomy

Indications and complications

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ABSTRACT

Objectives: To evaluate the surgical results of pediatric parotid gland masses with specific attention to complications.

Methods: A retrospectively review of medical records n=21 aged one to 18 years who underwent parotidectomy at Doernbecher Children's Hospital, Portland, Oregon, USA from 1993 to 2003. The exclusion criteria were as follows; age above 18 years, incision and drainage of parotid abscess, biopsy of parotid lesions.

Results: Twenty-one children who underwent parotidectomy were included in the study. Seventeen had superficial parotidectomy and 4 had total parotidectomy. One patient had bilateral separate superficial parotidectomy. Sixteen lesions were non-neoplastic. Facial nerve monitor was used in 10 patients. The most common lesions were atypical mycobacterium and first branchial cyst anomaly (5 each). Over all complication rate was 47.6%. The most common complication was temporary facial nerve palsy (33%) followed by ear lobule numbness and Frey's syndrome (14% each). Recurrence occurred in one patient with polycystic disease of the parotid. Duration of follow-up ranged from 3 months to more than 7 years.

Conclusion: Parotidectomy in children can present some difficulties for the otolaryngologist. The mutilating complication of facial nerve palsy in childhood can be devastating especially for benign diseases. Parotid surgery in children should be limited to units with appropriate expertise in this challenging field.

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The most common salivary gland lesions in children are inflammatory in nature, such as mumps, and lymph node hyperplasia. Less than 5% of all salivary gland neoplasm occurs in the pediatric population, and <10% of pediatric head and neck tumors occur in the salivary glands.[1,2] The majority of salivary gland masses is in the parotid gland.[3] Management of such parotid mass has evolved with advances in technology. Parotid gland surgery in children is of particular interest for a number of reasons. Fine needle aspiration as a diagnostic procedure is not tolerated. Hence, superficial parotidectomy is needed some times to establish the diagnosis of a parotid swelling. Also, at birth, infants have no mastoid process, so the stylomastoid foramen is subcutaneous, which must be taken into account during surgery for the treatment of the parotid disorders. Facial nerve palsy is a disaster in a child and for disease that is often benign. In addition, parotid surgery for recurrent disease is technically difficult. The aim of this study is to shed some light on parotid surgery in children in an academic pediatric tertiary center and to evaluate the surgical results of pediatric parotid gland masses, with specific attention to indications and complications.

Methods. A retrospectively review of medical records n=21 aged one to 18 years who underwent parotidectomy at Doernbecher Children's Hospital, Portland, Oregon, USA from 1993 to 2003. The exclusion criteria were as follows; age above 18 years, incision and drainage of parotid abscess, biopsy of parotid lesions. A written informed consent was obtained from the closest available relative or legal guardian. The clinical history, imaging studies, surgical procedure, histopathology findings, and postoperative course were reviewed. Data entered on case-report forms. Summary statistics for continuous data are reported as mean or range. All statistical tests were done using the Statistics program for Social Science (SPSS) software version 12.0 (SPSS Inc, Chicago) for windows.

Results. Twenty-one children (15 females and 6 males) were involved in this study following removal of their parotid gland. The patients' ages at the time of diagnosis ranged from 1-18 years (mean, 6.9) and the majority of cases occurred among those <10 years of age (16/21 patients). Swelling of the parotid gland was the main symptom (15/21, 71%) followed by pain (5/21, 24%). Other presentations were ulcer, drainage from a sinus, or fistula, and facial nerve palsy. One patient had bilateral parotid swellings. The main duration of symptoms was 17 months. Imaging studies (Sialogram, computed tomography, or magnetic resonance imaging) were carried out in 14 patients (67%). Cystic lesions were identified in 9 patients (43%). Fine needle aspiration was attempted in 7 patients (33%). There were 18 superficial and 4 total parotidectomies. One patient had bilateral superficial parotidectomy (polycystic disease of the parotid). One patient underwent superficial parotidectomy to explore the facial nerve after injury during parotid mass biopsy. Facial nerve monitor was used in 10 patients (48%). Frozen section was used in 3 patients. Final pathological diagnosis showed 16 specimens were non-neoplasm and 5 were neoplasms (**Table 1**). Complications rate was 48% (10 patients) and included, facial nerve paralysis, greater auricular nerve palsy, Frey's syndrome, seroma, hematoma, and dehydration (**Table 2**). The incidence of temporary facial nerve palsy was 33% and permanent was 5%. Temporary facial nerve palsy resolved within 3-6 weeks after surgery. Six patients with temporary facial nerve palsy had superficial parotidectomy. The permanent palsy involved the marginal branch only and happened after total parotidectomy for extensive lymphatic malformation. Two patients had neck dissection at the same time of parotid surgery. Duration of follow-up ranged from 3 months to more than 7 years (mean 13.5).

Table 1 - Pathological indications for parotidectomy.

Type of pathology	n	(%)
Non-neoplastic	16	(76)
Congenital		
First branchial cleft cyst	5	(24)
Lymphatic malformation	4	(19)
Atypical Mycobacterium	5	(24)
Polycystic disease	1	(5)
Facial nerve exploration	1	(5)
Neoplastic	5	(24)
Pleomorphic adenoma	2	(9.5)
Mucoepidermoid carcinoma	2	(9.5)
Malignant melanoma	1	(5)

Table 2 - Complications of parotidectomy

Complications	n	(%
Hematoma	1	(5)
Dehydration	1	(5)
Seroma	2	(9.5)
Greater auricular nerve palsy	3	(14)
Frey's syndrome	3	(14)
Facial nerve palsy	8	(38)
Temporary	7	(33)
Permanent	1	(5)

Discussion. Parotid lesions in the pediatric population are rare and have diverse pathology. The most common lesion is usually benign disease. Removing the parotid gland in a child is challenging especially for surgeons not familiar with salivary gland surgery. Few studies have been carried out looking at parotid surgery in children.[3-8] Orvidas et al[9] identified 118 children who underwent parotid surgery over 27 years. Manifold et al,[10] reported 250 parotidectomies for neoplastic pathologies and few of them were children under the age of 16 years. Daniel et al[6] however described 15 patients (<18 years of age) underwent surgery with nonmalignant masses of the parotid gland. Differential diagnosis of parotid lesions in children must include infectious, inflammatory, benign, and malignant pathologies. Atypical mycobacterial infections most commonly *Mycobacterium avium-intracellulare* (*M. avium-intracellulare)* complex and *Mycobacterium scrofulaceum* represent 90% of all mycobacterial infections in head and neck in children.[11] Five immunocompetent children of this study patients had parotidectomy for atypical mycobacterial infections (all had *M. avium-interacellulare*) not responding to medical therapy (Clarithromycin for one month). First branchial arch cleft cysts are rare. They are most frequently located close to the parotid gland; especially the superficial lobe that overlies the lesion.[12] Complete cure requires aggressive surgical excision and removal of the entire lesion. Five patients of this series had recurrence after simple excision requiring superficial parotidectomy to achieve a permanent cure. Benign neoplasm of the parotid gland in children can be divided into vascular and nonvascular lesions. Vascular lesion in the form of lymphatic malformation of parotid gland is very rare.[13] It is usually picked-up in the first year of life. This developmental abnormality of the lymphatic system often presents as diffuse mass involving not only the parotid gland but also the surrounding structures. This mass is soft and frequently can be transilluminated. Like hemangioma, most lymphatic malformations are

present at birth or soon thereafter. Unlike hemangioma, lymphatic malformations do not replace the normal parenchymal tissue. Islands of normal salivary tissue are often seen next to thin-walled lymph-containing vessels. They will usually slowly enlarge with time though rapid growth may occur with trauma, upper respiratory tract infections, or hemorrhage into the cyst. Acute enlargement may be associated with upper airway compression or facial weakness secondary to facial nerve compression. Either CT or MRI can make definite diagnosis. Ultrasound may help determine if a lesion is cystic but the former modalities are better for anatomic delineation. Surgical excision is the treatment of choice although new modalities such as OK-432 (Picibanil; Chugai Pharmaceutical Co, Tokyo, Japan) injection is promising.[14] It is a lymphilized biological preparation containing the crushed cells of Streptococcus pyogenes (group A, type 3, Su-strain) treated with benzylpenicillin G. Surgery is difficult in such malformation and vital structures may be scarified. Recurrence rates of 10-15% have been reported within the first year after excision.[15] Pleomorphic adenoma is the most common solid tumor mass seen in children.[6] It often presents as a small, 1 cm firm discrete nodule, which is slow-growing and mobile during examination. It is usually seen in an older age group compared to vascular tumors (often in adolescence) and more often in girls. Computerized tomography and MRI are useful for anatomic delineation. Superficial parotidectomy with facial nerve preservation is usually the treatment of choice. Though recurrences are now rare because of their slow-growing nature, long-term follow-up is recommended.[16] Primary malignant tumors of the parotid are rare in children, but together they make up over 50% of solid firm lesions detected in the gland;[10] thus, any solid firm parotid mass in a child should be taken very seriously. They tend to occur later in childhood or in adolescence. Rapid growth or fixation or any facial nerve involvement is highly suggestive of malignancy as the local pain, especially if it is out of proportion to any apparent inflammatory reaction. Computerized tomography and MRI should be carried out for anatomic delineation and surgical planning.[8] Fine needle aspiration cytology (FNAC) has become the standard of care in adults but data regarding its usage in children with salivary gland masses are still sparse.[17,18] Six patients of this study underwent FNAC with accurate diagnosis in 4 of them. Because incisional biopsy is not recommended for fear of seeding, parents should be prepared preoperatively for the potential need for wide resection. Among malignant parotid tumors, mucoepidermoid carcinomas are by far the most common. Mucoepidermoid tumors are derived from the intralobular salivary ducts. It can be classified as low or high grade. For low-grade lesions superficial parotidectomy is recommended, while total parotidectomy is usually performed for high-grade lesions.[10] Lymph node metastasis occurs in approximately 20% and despite complete surgical excision, local recurrence occurs approximately 30% of the time. Neck dissection is recommended in children only for clinically evident cervical lymph nodes with poorly differentiated and high-grade lesions.[6] However, with aggressive surgical treatment and adjunctive radiation therapy, overall 5-year survival rates of 90% have been reported.[10,19] Beside recurrence of disease, the main complications of parotid gland surgery reported in the literature are facial nerve damage, salivary fistula, and Frey's syndrome.[20] Consequently, attention is now focused on problems that occur more frequently. These include anesthesia/hypoaesthesia of the area innervated by great auricular nerve (GAN), but also scarring and deformity in the region.[21] Facial nerve paralysis has a significant functional and emotional impact on children. The incidence is high as 30-65% for temporary weakness and 3-8% for permanent damage.[21] The relatively low incidence of temporary facial nerve paresis in the present study is similar to other reported series.[22,23] Many surgeons recommend the use of intraoperative facial nerve stimulation for parotid surgery. The best means of reducing iatrogenic facial nerve injury in parotid surgery remain a clear understanding of the anatomy and good surgical technique. Frey's syndrome (also known as the auriculotemporal syndrome or gustatory sweating and flushing), a localized sweating, and flushing during the mastication of food, is a well-established complication of parotid surgery. The majority of patients are asymptomatic; however, if they are symptomatic, it can be distressing and embarrassing to children. The incidence of Frey's syndrome has been reported to vary widely between 11 and 100%, with approximately 10% of patients being distressed by their symptoms.[21] In this series, 14% of patients had complaints related to Frey's syndrome that caused some concern, consistent with results reported in the literature. The GAN emerges from the posterior border of the sternocleidomastoid muscle at Erb's point. It crosses the mid portion of the muscle approximately 6.5 cm beneath the external auditory meatus. It travels parallel and superior to the external jugular vein to supply sensation to the ear and preauricular region. It passes on the surface of the parotid gland and can be preserved unless invaded by tumor by retracting it posteriorly. If the nerve must be sacrificed, it is preserved in saline solution for possible use as a nerve graft. Loss of the branches to the ear can cause disturbing numbness of the lobule, making earrings difficult to wear and, in some cases, causing frostbite. The overall incidence of this complication is 13-34%.[24] (14% in this study).

In conclusion, parotid gland surgery in children can present some difficulties for the otolaryngologist. The disfiguring complication of facial nerve palsy can be disastrous in a patient who is often young, for a disease that is often benign. Surgery on children with parotid masses should be limited to units with appropriate expertise in this interesting field.

References

1. Johns ME, Goldsmith MM. Incidence, diagnosis and classification of salivary gland tumors. ***Oncology*** 1989; 3: 47-56.
2. Luna MA, Batsakis JG, El-Naggar AK. Salivary gland tumors in children. ***Ann Oto Rhinol Laryngol*** 1991; 100: 869-871.
3. Baker SR, Malone B. Salivary gland malignancies in children. ***Cancer*** 1985; 55: 1730-1736.
4. Scheunemann H. Conservative parotidectomy. ***J Max Fac Surg*** 1975; 3: 37-40.
5. Kessler A, Handler SD. Salivary gland neoplasms in children: a 10-year survey at the Children's Hospital of Philadelphia. ***Int J Pediatr Otorhinolaryngol*** 1994; 29: 195-202.
6. Daniel SJ, Al-Sebeih K, Al-Ghamdi SA, Manoukian JJ. Surgical management of nonmalignant parotid masses in the pediatric population: the Montreal Children's Hospital's experience. ***J Otolaryngol*** 2003; 32: 51-54.
7. Bentz BG, Hughes A, Ludemann JP, Maddalozzo J. Mass of the salivary gland region in children. ***Arch Otolaryngol Head Neck Surg*** 2000; 126: 1435-1439.
8. Bull PD. Salivary gland neoplasia in childhood. ***Int J Pediatr Otorhinolaryngol*** 1999; 49 Suppl 1: S235-S238.
9. Orvidas LJ, Kasperbauer JL, Lewis JE, Olsen KD, Lesnick TG. Pediatric parotid masses. ***Arch Otolaryngol Head Neck Surg*** 2000; 126: 177-184.
10. Manifold DK, Thomas JM. Parotidectomy in childhood-with a review of the literature. ***Eur J Surg Oncol*** 1994; 20: 549-552.
11. Lai KK, Stottmeier KD, Sherman IH, McCabe WR. Mycobacterial cervical lymphadenopathy: relation of etiologic agents to age. ***JAMA*** 1984; 251: 1286-1288.
12. Triglia JM, Nicollas R, Ducroz V, Kolti PJ, Garabedian EN. First branchial cleft anomalies: a study of 39 cases and a review of the literature. ***Arch Otolaryngol Head Neck Surg*** 1998; 124: 291-295.
13. Tsui SC, Huang JL. Parotid lymphangioma. A case report. ***Int J Pediatr Otorhinolaryngol*** 1996; 34: 273-2278.
14. Smith RJ, Burke DK, Sato Y, Poust RI, Kimura K, Bauman NM. OK-432 therapy for lymphangiomas. ***Arch Otolaryngol Head Neck Surg*** 1996; 122: 1195-1199.
15. Takato T, Nakatsuka T, Ohhara Y. Lymphangioma of the parotid gland. ***Ann Plast Surg*** 1984; 13: 353-356.
16. Chong GC, Beahrs OH, Chen ML, Hayles AB. Management of parotid gland tumors in infants and children. ***Mayo Clin Proc*** 1975; 50: 279-283.
17. Diament MJ, Stanley P, Taylor S. Percutaneous fine needle biopsy in pediatrics. ***Pediatr Radiol*** 1985; 15: 409-411.
18. Wakely PE Jr, Kardos TF, Frable WJ. Application of fine needle aspiration biopsy to pediatrics. ***Hum Pathol*** 1988; 19: 1383-1386.
19. Rahbar R, Crimmer JF, Vagas SO, Robson CD, Mack JW, et al. Mucoepidermoid carcinoma of the parotid gland in children: A 10-year experience. ***Arch Otolaryngol Head Neck Surg*** 2006; 132: 375-380.
20. Owen ER, Banerjee AK, Kissin M, Kark AE. Complications of parotid surgery: the need for selectivity. ***Br J Surg*** 1989; 76: 1034-1035.
21. de Ru JA, Hordijk GJ, van Benthem PG. Morbidity of parotid gland surgery: results 1 year post-operative. ***Eur Arch Otorhinolryngol*** 2006; 263: 582-585.
22. Umapathy N, Holmes R, Basavaraj S, Roux R, Cable HR. Performance of parotidectomy in nonspecialist centers. ***Arch Otolaryngol Head Neck Surg*** 2003; 129: 925-928.
23. Bova R, Saylor A, Coman W. Parotidectomy: review of treatment and outcomes. ***ANZ J Surg*** 2004; 74: 563-568.
24. Carlson GW. The salivary glands. Embryology. Anatomy and surgical applications. ***Surgical Clin North Am*** 2000; 80: 261-273.

Ethical Consent

All manuscripts reporting the results of experimental investigations involving human subjects should include a statement confirming that informed consent was obtained from each subject or subject's guardian, after receiving approval of the experimental protocol by a local human ethics committee, or institutional review board. When reporting experiments on animals, authors should indicate whether the institutional and national guide for the care and use of laboratory animals was followed.