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Pediatric Endoscopic Sinus Surgery in a Tertiary Government Hospital: Patient Profile and Surgical Indications

ABSTRACT

Objective: To describe the clinical and demographic profile of patients who underwent pediatric Endoscopic Sinus Surgery (ESS) and the indications for which the procedure was performed.

Methods:

Design: Cross-sectional Study

Setting: Tertiary Government Hospital

Subjects: Using the medical record registry, all patients below 18 years of age who underwent ESS under the Department of Otorhinolaryngology – Head and Neck Surgery of a tertiary government hospital in Metro Manila between December 31, 1999 and January 1, 2008 were reviewed. The age, sex, clinical presentation indications for doing ESS and extent of surgery done were described. The Lund MacKay Grading for nasal polyposis and Scoring for sinusitis were also applied and cross-referenced.

Results: Twenty-seven children aged 7 to 17 years underwent ESS. The mean age was 12.9 years with most (15 patients) belonging to the adolescent age group (13-17 years). Male to female ratio was 1.45:1. The mean interval from onset of symptoms to the first outpatient consultation was 1.5 years; the most common presenting symptoms were nasal obstruction (85.2%) and discharge (59.3%).

All of the patients who underwent pediatric ESS had chronic rhinosinusitis: either with nasal polyposis (85.2%), an antrochoanal polyp (11.1%) or both (3.7%). The Lund Mackay Grading for nasal polyps and sinusitis scores were cross-referenced: patients with larger, grade III nasal polyps tended to have more extensive sinus disease than those with grade II polyps. On their first consultation, the patients tended to present with extensive nasal polyp and sinus disease indicating the need for surgery.

All patients with CRS and nasal polyposis underwent polypectomy with ethmoidectomy, uncinectomy and maxillary antrostomy, with additional frontal sinusotomy for a 17-year-old male and a 17-year-old female, both with grade 3 polyposis. The three patients who had antrochoanal polyps underwent polypectomy with uncinectomy and maxillary antrostomy. There were no operative complications such as cerebrospinal fluid leak and orbital injury reported.

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Conclusion: Most of the patients who underwent pediatric ESS were older children who were brought for consultation with long-standing, extensive nasal polyp and sinus disease or with antrochoanal polyps, necessitating surgical management. Patients with larger polyps tended to have more extensive sinus disease. They all underwent conservative surgery, with extent of the procedure limited to the extent of the disease present. Efforts to raise public awareness about chronic rhinosinusitis and nasal polyposis in children may result in seeing such cases at an earlier, conservatively treatable stage.

Key words: *Pediatric Endoscopic Sinus Surgery, Nasal Polyposis in Children*

Endoscopic Sinus Surgery (**ESS**) is a surgical procedure for restoration of physiological function to the drainage pathways of the paranasal sinuses. Since Gross *et al* introduced ESS for children in 1989, it has rapidly gained acceptance as the primary surgical procedure for the treatment of chronic rhinosinusitis (**CRS**) and nasal polyposis in pediatric patients.[1,2] The reported success rates range from 76% to 97.5% following improvements in surgical techniques and the development of optical equipment and instruments. [3]

Initial surgical indications for pediatric ESS were broad, applying adult ESS indications to the pediatric population without evidence-based data.[3] Early studies of pediatric ESS were often retrospective without comparison to a medically treated or non-treated group. A paradigm shift occurred when prospective studies indicated that medical therapy was an effective approach to treatment for CRS in the pediatric population.[4]

A meta-analysis of eight published articles reported positive outcomes for pediatric ESS ranging from 77% to 100% with a pooled positive outcome in 88.4% of children.[5,6,7]

As with adults, ESS for children with CRS is usually reserved for failure of maximal medical management. The definition of optimal medical management, as well as indications and degree of surgical intervention, however, are less clearly defined in children. Clary described a surgical candidate as a child with normal immune function testing who has failed to respond to both maximal medical therapy and adenoidectomy and meets criteria of chronic rhinosinusitis by history and CT findings.[8] Consensus guidelines list nine indications for ESS in children: complete nasal obstruction in cystic fibrosis caused by massive polyposis or closure of the nose by medialization of the lateral nasal wall, antrochoanal polyps, intracranial complications of sinus disease, mucoceles and mucopyoceles, orbital abscesses, traumatic injury to the optic canal, dacrocystorhinitis secondary to sinusitis, fungal sinusitis and some meningoencephaloceles.[9]

Unfortunately, pediatric ESS is not simply adult FESS in a smaller patient. When surgery is indicated, it usually remains conservative, consisting of a maxillary antrostomy and anterior ethmoidectomy. Children pose special operative challenges because of the small anatomy and differences in underlying causes of sinus disease. The conservative ESS technique dictates that the extent of the procedure performed is proportional to the extent of the disease present. This limited technique of ESS was proven to be an effective treatment modality for severe, medically-refractory CRS in children.[10]

The overall incidence of nasal polyps in children is 0.1%; the prevalence of CRS with nasal polyps is likewise 0.1%[11]. Nasal polyps usually are manifested after the age of 12 years, with affected males outnumbering females two to one.[11,12] The reported prevalence of surgically amenable sinus and polyp disease in children varies from 1 to 5%.[12]

This paper aims to determine the clinical and demographic profile of pediatric patients who underwent ESS at the Jose R. Reyes Memorial Medical Center between December 31, 1999 and January 1, 2008. Specifically, it aims to describe their clinical presentation, symptom duration, radiographic and endoscopic findings, extent of surgery done and to review the indications and/or disease for which pediatric ESS was performed.

METHODS

Design: Cross-sectional Study

Setting: Tertiary Government Hospital

Subjects: Using the medical record registry, the records of all patients below 18 years of age who underwent ESS under the Department of Otorhinolaryngology – Head and Neck Surgery of a tertiary government hospital in Metro Manila between December 31, 1999 and January 1, 2008 were retrospectively reviewed *(Appendix A)*. The age, sex, geographic distribution, clinical presentation and indications for doing ESS were described. Radiographic and endoscopic findings were recorded and the Lund MacKay Grading for nasal polyposis and Scoring for sinusitis *(Appendix B)* were used to classify the endoscopic and radiographic findings and cross-referenced.[13,14]

RESULTS

Twenty seven (27) children aged 7 to 17 years underwent ESS during the 8-year period. The mean age was 12.9 years, with most (15 patients) belonging to the adolescent age group (13-17 years). Except for a 7-year-old with nasal polyposis, the four youngest patients (ages 8, 9, 9 and 10) all had antrochoanal polyps. Sixteen were male and 11 female, with a 1.45:1 male to female ratio.

The mean interval from the onset of symptoms to the first outpatient consultation was 1.5 years. Patients with nasal polyposis and CRS started to have symptoms at 11.4 years on the average and they were first brought for consultation at 12.9 years. Those with antrochoanal polyposis were seen at an

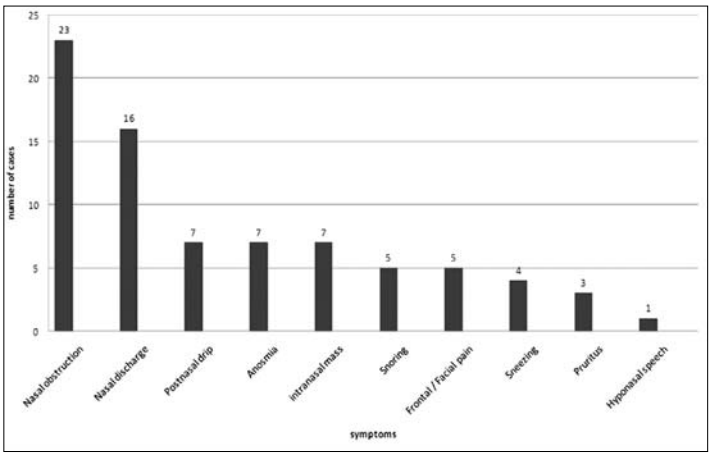

Figure 1. Presenting Symptoms Reported During the First Outpatient Consultation

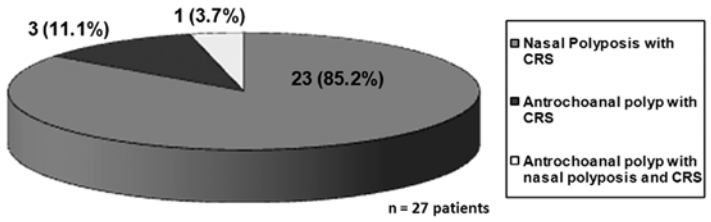

Figure 2. Clinical Diagnosis Prior to Pediatric ESS

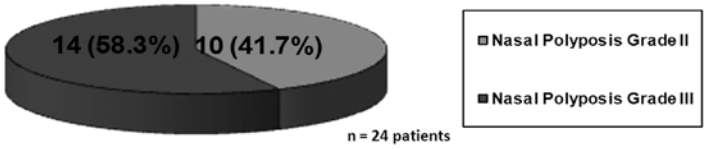

Figure 3. Lund Mackay Grading of Nasal Polyps in Patients with Nasal Polyposis

Lund Mackay Score for Sinusitis	# of cases		
	Grade I polyposis	Grade II polyposis	Grade III polyposis
12	0	2	0
14	0	2	2
16	0	3	2
18	0	2	2
19	0	0	5
20	0	0	2
21	0	0	1

Figure 4. Correlation of the Lund Mackay Scores for Sinusitis and Polyp Grading

average age of 9 years, but started to have symptoms around the age of 7.5 years.

The most common presenting symptoms were nasal obstruction (23/27 or 85.2%) and nasal discharge (16/27 or 59.3%). Seven (25.9%) of the patients had anosmia, postnasal drip and/or palpable intranasal masses *(Figure 1)*.

All of the patients had CRS with nasal polyposis in 23 (85.2%), with an antrochoanal polyp in 3 (11.1%), or with both in 1 patient *(Figure 2)*. On nasal endoscopy, 14 (58.3%) of those with nasal polyposis had grade III polyps and 10 (41.7%) had grade II polyps by Lund Mackay Grading *(Figure 3)*. Polyp grading was compared with the Lund Mackay Scores for sinusitis *(Figure 4)*. Patients with higher grade polyps also had more extensive paranasal sinus disease: those with grade II polyps had a mean score of 16, while those with grade III polyps had a mean sinusitis score of 18.6.

All patients (24) with CRS and nasal polyposis underwent polypectomy with ethmoidectomy, uncinectomy and maxillary antrostomy with additional frontal sinusotomy for a 17-year-old male and a 17-year-old female, both with grade 3 polyposis. The three patients who had antrochoanal polyps underwent polypectomy with uncinectomy and maxillary antrostomy. There were no operative complications such as cerebrospinal fluid leak nor orbital injury reported.

DISCUSSION

Nasal polyposis is an inflammatory chronic disease of the upper respiratory tract of unknown etiology although it may be associated with cystic fibrosis. In one recent study, the prevalence of nasal polyps in 211 adult patients with cystic fibrosis was 37%.[15] However, cystic fibrosis is an autosomal recessive condition affecting mostly Caucasians and it is very uncommon in Filipinos.

The reported prevalence of surgically amenable sinus and polyp disease in children varies from 1 to 5%[12]. Nasal polyps usually are manifested after the age of 12 years, with affected males outnumbering females two to one.[11,12] Similarly in this study, pediatric ESS was found to be mostly performed on older children with nasal polyposis and CRS. Our survey had a male to female ratio of 1.45:1.

The mean interval from the onset of symptoms to the first outpatient consultation was 1.5 years. The tolerance for months or years of persistent nasal obstruction and discharge may account for the relatively advanced polyp and sinus disease on initial consultation. The children may have been too young to give importance to the disease and related symptoms or unable to express themselves adequately.[16] In our setting, socio-economic constraints also affect access to health care and must be considered with such delays in consultation.

All patients with grade II to III nasal polyposis had equally extensive sinus disease. According to a study done by Hopkins *et*

al, sinusitis scores increased with increasing grade of polyposis.[17] In our patients, Lund Mackay Grading for nasal polyps were directly proportional with sinusitis scores as demonstrated by computed tomography of the paranasal sinuses. Patients with larger, grade III nasal polyps tended to have more extensive sinus disease than those with grade II polyps.

Following the conservative ESS technique, the extent of surgery for majority of cases was limited to polypectomy, ethmoidectomy, uncinectomy and maxillary antrostomy. Frontal sinusotomy was only considered an option for 2 of the older patients, both of which had extensive sinus disease.

Most of the patients who underwent pediatric ESS were older children who were brought for consultation with long-standing, extensive nasal polyp and sinus disease or with antrochoanal polyps, necessitating surgical management. They all underwent conservative surgery, with extent of the procedure limited to the extent of the disease present. Efforts to raise public awareness about chronic rhinosinusitis and nasal polyposis in children may result in seeing such cases at an earlier, conservatively treatable stage.

Appendix A. Patient Demographics

PATIENT	AGE	SEX	ADDRESS	DIAGNOSIS	POLYP GRADE	EXTENT OF SURGERY	OPERATIVE COMPLICATIONS
1	14	M	Valenzuela	Nasal Polyposis	II	Ethmoidectomy, uncinectomy, maxillary antrostomy	None
2	14	F	Cavite	Nasal Polyposis	III	Ethmoidectomy, uncinectomy, maxillary antrostomy	None
3	9	F	Manila	Antrochoanal polyp with nasal polyposis	III	Ethmoidectomy, uncinectomy, maxillary antrostomy	None
4	15	M	Quezon City	Nasal polyposis	III	Ethmoidectomy, uncinectomy, maxillary antrostomy	None
5	12	F	Manila	Nasal Polyposis	II	Ethmoidectomy, uncinectomy, maxillary antrostomy	None
6	12	M	Quezon City	Nasal polyposis	II	Ethmoidectomy, uncinectomy, maxillary antrostomy	None
7	16	M	Bulacan	Nasal Polyposis	II	Ethmoidectomy, uncinectomy, maxillary antrostomy	None
8	14	F	Quezon Prov.	Nasal polyposis	III	Ethmoidectomy, uncinectomy, maxillary antrostomy	None
9	17	M	Quezon City	Nasal Polyposis	III	Ethmoidectomy, uncinectomy, maxillary antrostomy, frontal sinusotomy	None
10	8	M	Valenzuela	Antrochoanal polyp	n/a	uncinectomy, maxillary antrostomy	None
11	16	M	Valenzuela	Nasal Polyposis	III	Ethmoidectomy, uncinectomy, maxillary antrostomy	None
12	17	F	Manila	Nasal Polyposis	III	Ethmoidectomy, uncinectomy, maxillary antrostomy, frontal sinusotomy	None
13	12	M	Manila	Nasal Polyposis	III	Ethmoidectomy, uncinectomy, maxillary antrostomy	None
14	11	M	Bulacan	Nasal Polyposis	II	Ethmoidectomy, uncinectomy, maxillary antrostomy	None
15	15	F	Manila	Nasal polyposis	II	Ethmoidectomy, uncinectomy, maxillary antrostomy	None
16	10	M	Valenzuela	Nasal Polyposis	II	Ethmoidectomy, uncinectomy, maxillary antrostomy	None
17	7	M	Marikina	Nasal Polyposis	II	Ethmoidectomy, uncinectomy, maxillary antrostomy	None
18	14	F	Manila	Nasal Polyposis	III	Ethmoidectomy, uncinectomy, maxillary antrostomy	None
19	14	M	Pampanga	Nasal polyposis	III	Ethmoidectomy, uncinectomy, maxillary antrostomy	None
20	16	F	Valenzuela	Nasal polyposis	III	Ethmoidectomy, uncinectomy, maxillary antrostomy	None
21	10	M	Albay	Antrochoanal polyp	n/a	uncinectomy, maxillary antrostomy	None
22	15	M	Quezon Prov.	Nasal polyposis	III	Ethmoidectomy, uncinectomy, maxillary antrostomy	None
23	9	F	Quezon City	Antrochoanal polyp	n/a	uncinectomy, maxillary antrostomy	None
24	14	M	Manila	Nasal Polyposis	II	Ethmoidectomy, uncinectomy, maxillary antrostomy	None
25	10	F	Manila	Nasal Polyposis	II	Ethmoidectomy, uncinectomy, maxillary antrostomy	None
26	13	F	Bulacan	Nasal Polyposis	III	Ethmoidectomy, uncinectomy, maxillary antrostomy	None
27	15	M	Cavite	Nasal polyposis	III	Ethmoidectomy, uncinectomy, maxillary antrostomy	None

Appendix B.
Excerpt from the
Jose R. Reyes Memorial Medical Center Department
of Otorhinolaryngology Head and Neck Surgery
Nasal Polyposis Form

Department of Otorhinolaryngology Head and Surgery
Jose R. Reyes Memorial Medical Center

NASAL POLYPOSIS FORM

Patient _____ Age ___ Sex ___ Hospital No._____
Preoperative diagnosis _____

Mackay and Lund Staging of Rhinosinusitis

SINUS	Right	Left
Maxillary	0 / 1 / 2	0 / 1 / 2
Anterior Ethmoid	0 / 1 / 2	0 / 1 / 2
Posterior Ethmoid	0 / 1 / 2	0 / 1 / 2
Sphenoid	0 / 1 / 2	0 / 1 / 2
Frontal	0 / 1 / 2	0 / 1 / 2
Ostiomeatal complex	0 / 1 / 2	0 / 1 / 2
TOTAL		

Legend:
For the sinuses
0: no opacity
1: some opacity
2: total opacity
For the ostiomeatal complex: 0: no obstruction
2: obstructed

Mackay and Lund Grading of Nasal Polyposis

NASAL ENDOSCOPY FINDINGS	POLYP GRADE
No polyps	0
Polyps restricted to the middle meatus	1
Polyps extending below the middle turbinate	2
Massive polyposis	3

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Mackay IS, Lund VJ. Imaging and Staging In Nasal Polyposis: An Inflammatory Disease and its Treatment

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