

Oral and maxillofacial operations in children and adolescents : A retrospective cohort study of 471 patients

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Abstract

Objectives: The study of Oral and Maxillofacial operations in the pediatric population in Northern Greece has not previously been reported. This study aim to review the spectrum of operations needed at a General Hospital during a 10-year frame time from 2008-2017, and to audit the Oral and Maxillofacial Surgical needs allocated to this specific target group.

Patients And Methods: Data from 471 pediatric patients with oral and maxillofacial surgical needs were included in this retrospective cohort study. Age, gender, urgent or scheduled appointment, cause of attendance, diagnosis, treatment applied, and results were obtained

from this sample. The epidemiologic study was performed with SPSS 25.1, with the level of statistical significance set for $P < 0.05$.

Results: The sample included 471 children and adolescents out of a total of 9,435 patients. 196 patients were girls (mean age $11.8 \pm 3.4y$) and 275 boys (mean age $11.9 \pm 3.5y$). Fractures and soft tissue wounds included 131 cases, infections 98 patients, tumor resection and biopsies 78 cases, removal of impacted and supernumerary teeth 47 cases, cleft lip patients 43. Most of the cases (254) were scheduled appointments and 217 patients addressed to the hospital as emergency cases. Only 8.5% (40 patients) reported a systemic

disease. This study observed 189 patients (40.1%) were operated on under general anesthesia and 214 cases (45.5%) with local anesthesia. While 17 (3.6%) needed sedation and 10.8% of cases were treated conservatively.

Conclusions: The further study of the cases can contribute to the better organization of health units and departments of Oral and Maxillofacial Surgery.

Keywords: Oral Maxillofacial surgery Children adolescents.

Introduction

Children and adolescents with diseases of the oral and maxillofacial (OMF) area consist of a special group of patients. Surgical treatment of these patients requires some modifications compared to the treatment applied in adults. These changes are related either to the developmental phase[1] they are going through or with difficulties in cooperation[2]. On the other hand, the presence of systemic diseases in patients with OMF surgical pathology may necessitate the application of treatment in a well-organized hospital environment, with a multidisciplinary health care approach.

Dental & maxillofacial infections, trauma, OMF lesions are among the causes for admission of developing patients in hospital[3]. Some OMF surgical diseases in this age group may appear as emergencies and may be addressed to the emergency department for prompt treatment[4].

This study aimed to record children and adolescents who have undergone treatment at the Clinic of Oral and Maxillofacial Surgery of the General Hospital Papanikolaou for 10years from 2008-2017 and the evaluation of their surgical needs.

Material And Methods

The study was approved by the Research Ethical Committee of General Hospital G. Papanikolaou as well as by the Ethics Committee of Dental School. The

patient's files of OMF Surgery Clinic were retrieved and anonymously listed for the following records: age, gender, emergency, or scheduled referral, causes of attendance, final diagnosis (clinical or histological), treatment modality, type of anesthesia, the date of the operation and the geographical distribution of cases. Exclusion criteria were patients over 17 years of age and incomplete records in the patients' files.

During a period of 10 years from 2008 to 2017, out of 9,435 (100%) patients, 471 (5%) patients of the sample age 0 to 17years children and adolescents were included. The epidemiological study was carried out with the statistical package IBM Statistics SPSS 25.1 and a graphical Excel (Microsoft Office 10.0) software, while the level of statistical significance in each case was set for $p < 0.05$.

Results

During the period from 2008 to 2017, the data of 471 (5%) adolescent children in a total of 9,435 (100%) patients (Table 1a) was analyzed. 471 patients met the inclusion criteria, with 196 (41.6%) girls at a mean age of 11.8 ± 3.4 years and 275 (58.4%) boys with a mean age of 11.9 ± 3.5 years (Table 1b). 269 patients (57.1%) were between 12 and 17 years and this was the most common age group. No statistically significant difference was found in age distribution between boys and girls, regardless of the cause of admission $\chi^2 (2) = 0.288, p = 0.866$.

The most common pathology was fracture associated with soft tissue injuries in 131 patients (27.9%). The following pathologic entities were infection with 98 patients (20.9%), Tumor incision and biopsies 78 (16.6%), surgical extraction of teeth 47 (10%), Clefts - Developmental disorders 43 (9.2%), Cystic jaw lesions (dental and non-dental) 34 (7.2%). Finally, more rarely encountered pathology were Dental trauma 15 (3.2%),

Bone resection 7 (1.5%), Soft tissue diseases 4 (0.9%), and Conservative Treatment 4 (0.9%) (Table 2 / Figure 2)

Distribution among causes of admission is shown in table 3/ Figure 3. Scheduled appointments were 254 cases (53.9%) and 217 cases (46.1%) was an emergency. From the cases studied, it was found that 430 cases (91.5%) reported no medical history and only 40 cases (8.5%) reported systemic disease. As for the kind of anesthesia, analysis of the findings showed that 50 (10.8%) cases were managed without anesthesia, local anesthesia was applied in 211 patients (45.5%) and 186 (40.1%) cases received general anesthesia. Finally, 17 cases (3.6%) received sedation (Table 4). A statistically significant difference was observed between the types of distribution of anesthesia and the two types of appointment (i.e. scheduled or emergency: $\chi^2 = 26,853$ $p < 0.001$) (table 5).

Discussion

The developmental process of facial bones in children and adolescents necessitates modification in their surgical treatment plan. Surgical intervention performed at this age group may influence the normal developmental process. Development is also affected by medications administered for treatment of serious medical conditions (immunosuppressive drugs, chemotherapy, or radiotherapy) [1], [5], [6].

According to some researchers, the percentage of the pediatric population that is needed in OMF operations ranges between 5.3 and 10% of all Oral & Maxillofacial patients (de Arruda et al., 2017; [3], [7], [8]). In our study, children and adolescents consist of 5% the total number of patients treated in OMF Surgery Clinic. The data analysis of this study showed that boys predominate with a percentage of 58.4% and an average age of 11.9. In international literature, the predominance of boys

trauma patients appears with a ratio of 2:1 over the girls [9]. In the study of [10], boys showed an increased rate related to girls (61 boys/94 children) and this difference attributed to the high implication of boys in more risky activities than girls.

Facial fractures represent the most common cause of hospitalization in children and adolescents with an incidence of 10-25% according to some authors [11]. Other studies report a lower percentage for facial fractures (5-15%) [9]. The highest percentage of fractures is recorded at the ages of 6-7 years, during early school activities, followed by the ages 12-14 years, a period related with more intense activity of adolescents, like participating in sports [12]. In our study, fractures and soft tissue wounds consists of 27.9% cases and were the most frequently encountered surgical disease.

The second frequently observed disease was dental infection with a percentage of 20.9%. Odontogenic infection is the most common infection of the face [13] and 88% of the odontogenic infection was from dental caries [10]. Odontogenic infections in most of the cases affected children of preschool-age [10]. Despite high level of hygienic and educational programs in developed countries, children at early childhood are vulnerable in caries, arising on a percentage of 68% to 90% [14]. According to Dar-Odeh et al., antibiotics are the most frequently prescribed drugs by dentists in England, with a percentage of 66.4% [13].

The third most common category seeking treatment in OMF Clinic is tumours, tumour-like lesions, and biopsies, representing a frequency of 16%. Salivary gland lesions with an incidence of 24.3% within the category, followed by reactive hyperplasia with 16.82% and dentigerous cysts with 14.66% were the most frequently encountered tumour like lesions of OMF region [15]. According to another study [7], the three

most common similar conditions arise from the salivary glands (37.1%), followed by mucosal diseases (13.6%) and dental cysts(11.3%). [3], found dental pathology with a percentage of (24.8%) as the most frequently occurring disease, followed by dental and mucosal pathology (17.3%). According to [8], dental tissue pathology with 22.7% was the most frequent entity followed by salivary gland disease 19.6% and 12.5% of mucosal pathology.

For the purposes of this study, diseases other than oral mucosal lesions were pooled and analyzed separately for a better analysis of the results. Although the percentage of lesions of the mouth and neck area is quite small and does not exceed 1%, they may progress to malignancies [16]. In a study in Athens, children and adolescents who had neoplasms, showed benign at a rate of 90.05% [17]. Some children may develop metabolic bone diseases with manifestations in the jaw such as osteopetrosis [18] or osteomyelitis [19]. The appearance of impacted teeth that affect the normal development of a dental arch occurs quite often during the period of mixed dentition [20]. The resection of soft tissues such as the bridles to restore the normal function of the tongue (ankylosing spondylitis) is another condition that needs surgery and occurs in 4 to 10% of children [21]. These cases usually come as scheduled appointments to receive treatment.

The percentage of supernumerary teeth that needed extraction reaches 10% in the processed material. The highest percentage was shown by the age group of 6-11 years with a percentage of 11.4%. Hyperdontia occurs in neonatal dentition in 0.8%, permanent dentition 2% and more often in the anterior region of the upper jaw [22]. In our study, 8.5% of events were observed in patients with systemic diseases. According to other studies, patients who had a systemic condition were 4 in a total of 153 patients[23] or accounted for 2.1%[24].

Furthermore, the type of anesthesia needed in patients was ranged as follows: 40.1% needed general anesthesia, 3.6% needed sedation, and 45.5% needed local anesthesia, while only 10.8% of cases were treated conservatively.

Limitations Of The Study

This study was carried out at a Hospital covering part of Northern Greece so that sample is probably not representative of the whole Greek population. Several OMF cases of children and adolescents are covered by other specialties, as well as by private maxillofacial surgeons and dentists. For several conditions, we noticed disagreement with international literature. Disease records below 10%, unfortunately, could not give results comparable to international literature. Other studies in oral and maxillofacial surgery clinics should be performed to better reflect the OMF needs of children and adolescents.

Conclusions

The study of the needs of children and adolescents improves the level of health system. The further study of the cases can contribute to the better organization of health units and departments of Oral and Maxillofacial Surgery.

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Legend Figure and Table

Figure 1: Evolution of the number of children and adolescents registrations up to 17 years from 2008 to 2017 in total and by gender

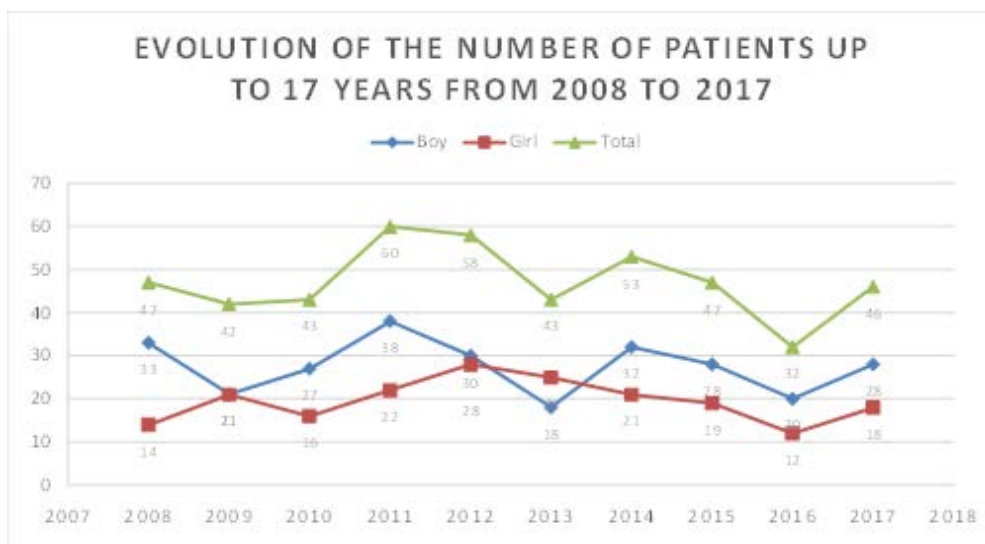


Table 1a: Evolution of the number of children and adolescents per year from 2008 to 2017

Year	Total number of patients per year	Total number of child-adolescents per year	Percentage of children - adolescents per year
2008	844	47	5.57
2009	920	42	4.57
2010	867	43	4.96
2011	868	60	6.91
2012	807	58	7.19
2013	1168	43	3.68
2014	1034	53	5.13
2015	1008	47	4.66
2016	996	32	3.21
2017	923	46	4.98
Total	9435	471	5.00

Table 1b: Evolution of the number of children and adolescents registrations up to 17 years from 2008 to 2017 in total and by gender

		Year										Total
		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	
Boy	N	33	21	27	38	30	18	32	28	20	28	275
	%	12.0%	7.6%	9.8%	13.8%	10.9%	6.5%	11.6%	10.2%	7.3%	10.2%	100.0%
Girl	N	14	21	16	22	28	25	21	19	12	18	196
	%	7.1%	10.7%	8.2%	11.2%	14.3%	12.8%	10.7%	9.7%	6.1%	9.2%	100.0%
	N	47	42	43	60	58	43	53	47	32	46	471
	%	10.0%	8.9%	9.1%	12.7%	12.3%	9.1%	11.3%	10.0%	6.8%	9.8%	100.0%

Figure 2: Evolution of the appearance of main cases of oral pathology from 2008 to 2017

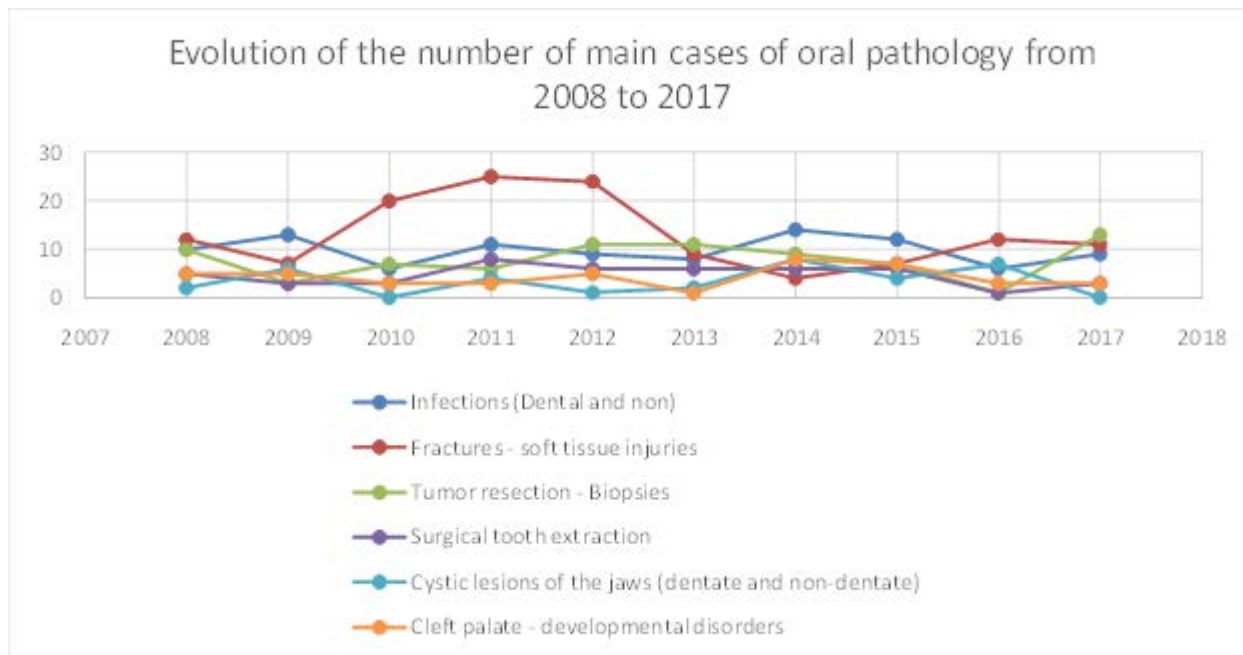


Table 2: Evolution of cases of Oral Pathology during the years 2008 – 2017

Oral Pathology - Categories (condition)		N	Year										Total
			2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	
Infections (Dental and non)	N	10	13	6	11	9	8	14	12	6	9	98	
	%	10.2	13.3	6.1	11.2	9.2	8.2	14.3	12.2	6.1	9.2	100.0	
Dental trauma	N	0	1	1	1	2	2	2	2	1	3	15	
	%	0.0	6.7	6.7	6.7	13.3	13.3	13.3	13.3	6.7	20.0	100.0	
Fractures - soft tissue injuries	N	12	7	20	25	24	9	4	7	12	11	131	
	%	9.2	5.3	15.3	19.1	18.3	6.9	3.1	5.3	9.2	8.4	100.0	
Tumor resection - Biopsies	N	10	3	7	6	11	11	9	7	1	13	78	
	%	12.8	3.8	9.0	7.7	14.1	14.1	11.5	9.0	1.3	16.7	100.0	
frenectomy	N	0	1	2	0	0	1	0	0	0	3	7	
	%	0.0	14.3	28.6	0.0	0.0	14.3	0.0	0.0	0.0	42.9	100.0	
Pathology of TMJ	N	1	0	1	0	0	1	0	0	0	0	3	
	%	33.3	0.0	33.3	0.0	0.0	33.3	0.0	0.0	0.0	0.0	100.0	
Bone diseases	N	1	1	0	0	0	0	0	0	0	1	3	
	%	33.3	33.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.3	100.0	
Soft tissue pathology	N	0	1	0	1	0	0	1	1	0	0	4	
	%	0.0	25.0	0.0	25.0	0.0	0.0	25.0	25.0	0.0	0.0	100.0	
Surgical removal of tooth	N	5	3	3	8	6	6	6	6	1	3	47	
	%	10.6	6.4	6.4	17.0	12.8	12.8	12.8	12.8	2.1	6.4	100.0	
Cystic lesions of the jaws	N	2	6	0	4	1	2	8	4	7	0	34	
	%	5.9	17.6	0.0	11.8	2.9	5.9	23.5	11.8	20.6	0.0	100.0	
Cleft palate - developmental disorders	N	5	5	3	3	5	1	8	7	3	3	43	
	%	11.6	11.6	7.0	7.0	11.6	2.3	18.6	16.3	7.0	7.0	100.0	
Conservative Treatment	N	0	1	0	1	0	2	0	0	0	0	4	
	%	0.0	25.0	0.0	25.0	0.0	50.0	0.0	0.0	0.0	0.0	100.0	
Complications - various	N	0	0	0	0	0	0	1	1	1	0	3	
	%	0.0	0.0	0.0	0.0	0.0	0.0	33.3	33.3	33.3	0.0	100.0	
Total	N	46	42	43	60	58	43	53	47	32	46	470	
	%	9.8	8.9	9.1	12.8	12.3	9.1	11.3	10.0	6.8	9.8	100.0	

Figure 3: Evolution of the frequency of emergencies and scheduled appointments over time from 2008 to 2017

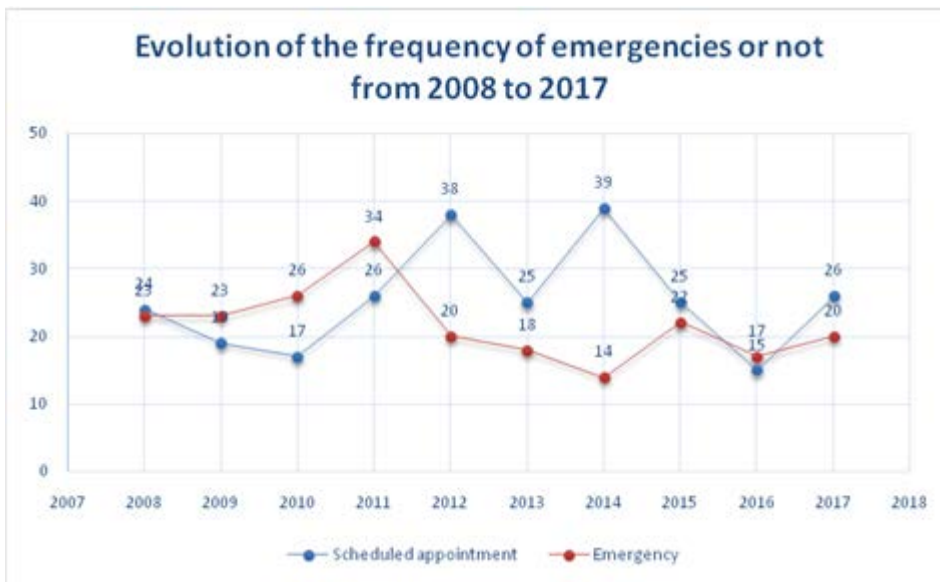


Table 3: Distribution of frequencies of urgent and scheduled appointments from 2008 to 2017

		Year										Total
		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	
Emergency	Scheduled appointment	24 9.4%	19 7.5%	17 6.7%	26 10.2%	38 15.0%	25 9.8%	39 15.4%	25 9.8%	15 5.9%	26 10.2%	254 100.0%
	Emergency	23 10.6%	23 10.6%	26 12.0%	34 15.7%	20 9.2%	18 8.3%	14 6.5%	22 10.1%	17 7.8%	20 9.2%	217 100.0%
Total		47 10.0%	42 8.9%	43 9.1%	60 12.7%	58 12.3%	43 9.1%	53 11.3%	47 10.0%	32 6.8%	46 9.8%	471 100.0%

Table 4: Common distribution of variable types of anesthesia and gender

		Type of anesthesia					Total
		No anesthesia	Local	General	Sedation		
Gender	Boy	N	28	124	110	9	271
		%	10.3%	45.8%	40.6%	3.3%	100.0%
	Girl	N	22	87	76	8	193
		%	11.4%	45.1%	39.4%	4.1%	100.0%
Total		N	51	214	189	17	471
		%	10.8%	45.5%	40.1%	3.6%	100.0%

Table 5. Cross-reference table between type of appointment and type of anesthesia

		Type of anesthesia					Total
		No anesthesia	Local	General	Sedation		
Type of appointment	Scheduled appointment	N	15	132	100	3	250
		%	6.0%	52.8%	40.0%	1.2%	100.0%
	Emergency	N	35	79	86	14	214
		%	16.4%	36.9%	40.2%	6.5%	100.0%
Total		N	51	214	189	17	471
		%	10.8%	45.5%	40.1%	3.6%	100.0%