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ASSESSMENT OF SINUS PATHOLOGIES OF CLEFT LIP AND PALATE PATIENTS BY USING CBCT

Sacide DUMAN[*1] & Şuayip Burak DUMAN[2]
[*1]Paediatric Dentistry, Inonu Universty, TURKEY
[2]Oral and Maxillofacial Radiology, Inonu Universty, TURKEY

Keywords:
Conebeamcomputedtomography, retention cysts, inflammatory mucosal change.

Abstract

Objective: The aim of present study is, by retrospectively assessing the CBCT images, to evaluate the prevalence of chronic maxillary sinusitis, inflammatory mucosal change (IMC), retention cysts (RC), and maxillary sinus pathologies, which is considered as the sum of them, among the CLP patients, and to compare it to that of control group patients having no craniofacial syndrome.

Materials and methods: 36 CLP patients and 36 control group patients, a total of 72 patients and totaly 144 sinuses were evaluated by CBCT.

Results: 15 (20.8%) of the patients in control group and 7 (10%) of CLP group were found to have chronic sinusitis, 5 (6.9%) of the patients in control group and 15 (21.4%) of CLP group were found to have IMC, 5 (6.9%) of the patients in control group and 13 (18.6%) of CLP group were found to have retention cyst.

Conclusions: Prevalence of retention cysts was higher among the CLP patients when compared to control group. There was no statistically significant difference between CLP patients and control group in terms of the prevalence of chronic maxillary sinusitis and IMC

Introduction

Among the congenital anomalies, the Cleft and Lip Palate (CLP) patients have an important place, its prevalence varies between 1/800 and 1/1000 among the patients without any syndrome(1). CLP might cause functional disorder in various domains such as nourishment, speaking, hearing, respiratory system, and dentofacial development (2-6). For this reason, in treating this disorder, the multidisciplinary procedures involving experts from various branches such as speech therapy, otolaryngology,psychology, audiology, pedodontict, orthodontics, prosthodontics, and plastic, and maxillofacial surgery are required(7).

Because of their superposition, the conventional methods are insufficient in imaging the sinonasal zone(8). In imaging this region, the computed tomography (CT) is considered as the golden standard, but it has an important disadvantage of high radiation dose (9, 10).Conic Beam Computed Tomography (CBCT) offers lower dose and costs; it has been developed for imaging the maxillofacial zone and is considered to be the alternative to CT since it offers detailed imaging of sinonasal zone(11, 12).

In their study, Sk et al.reported that CLP negatively affects the maxillary sinus volume and thus the CLP patients might be inclined to chronic maxillary sinusitis(13).

The aim of present study is, by retrospectively assessing the CBCT images, to evaluate the prevalence of chronic maxillary sinusitis, inflammatory mucosal change (IMC), retention cysts (RC), and maxillary sinus pathologies, which is considered as the sum of them, among the CLP patients, and to compare it to that of control group patients having no craniofacial syndrome.

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Material and Methods

The present study was carried out retrospectively on the records of patients, who applied to Dentistry Faculty of Inonu University and were undergone Conic Beam Computed Tomography. 36CLP patients and 36 control group patients, a total of 72 patients were involved in this study.Totally 144 maxillary sinuses of 72 patients were examined. In CLP group, there were 13 females and 23 male, whereas there were 23 females and 13 males in control group. The CBCT images were taken for orthodontics and surgery planning in study group, whereas the images of control group were taken for various dental and maxillofacial problems such as orthodontic treatment planning, impacted tooth, implant planning, and TME diseases. For the patients applying to our faculty, the informed consent is obtained prior to CBCT imaging. The CBCT images were examined by an experienced oral and maxillofacial radiologist. The patients having large tumor, cyst or fibro-osseous lesion extending towards maxillary sinus, the patients having surgical operation history for nasal cavity and maxillary sinus, the patients having history of any traffic accident or trauma affecting the anatomy of study area, and the patients having distorted image quality because of movement artefact or intense metal artefact were excluded from the analyses.

CBCT images were taken by using Newtom 5G(Verona/Italy)device. The coronal sections with 1mm thickness were used in evaluations. In the present study, the chronic sinusitis, inflammatory mucosal change, retention cyst, and pathology as the sum of those three were recorded as “present” or “absent” in CLP and control groups.The inflammatory change was considered as opacifications ≤3mm from sinus floor. The retention cyst was considered as the come-shaped homogenous masses with air-drawn edges. The chronic sinusitis was considered as complete or partial opacification exceeding 3mm.

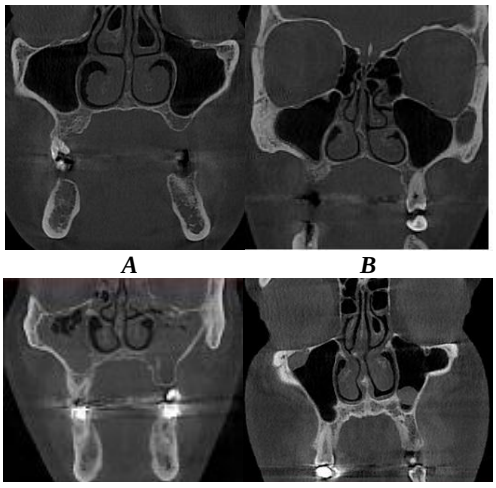

FIGURE 1. CBCT images. (A) Normal. (B) IMC. (C) Chronic Sinusitis. (D) Retention Cyst

Chi-Square test was employed in order to determine if there is any statistically significant difference between CLP and control groups in terms of chronic sinusitis, retention cyst, IMC, and pathology prevalence ($p<0.05$). This study was retrospective in design therefore no ethical approval was required.

Results

The present study involved 36 CLP patients and 35 control group patients. The mean age of CLP group patients was 18.48 years, whereas that of control group patients was 24.05 years.

15 (20.8%) of the patients in control group were found to have chronic sinusitis, whereas chronic sinusitis was observed in 7 (10%) of CLP group patients. There was no statistically significant difference ($p=0.074$).

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5 (6.9%) of the patients in control group were found to have IMC, whereas IMC was observed in 15 (21.4%) of CLP group patients. There was a statistically significant difference (p=0.013).

5(6.9%) of the patients in control group were found to have retention cyst, whereas retention cyst was observed in 13 (18.6%) of CLP group patients. There was a statistically significant difference (p=0.037).

The pathology, which is considered as the sum of chronic sinusitis, retention cyst, and IMC, was observed in 25 (34.7%) of control group patients and 35 (50%) of CLP group patients. There was no statistically significant difference (p=0.065).

Table 1: Distribution of Sinus Pathologies

	Control N(%)	CLP N(%)	p Value
Chronicsinusitis	15(20.8)	7 (10)	0.074
IMC	5(%6.9)	15 (%21.4)	0,013
Retention cyst	5(%6.9)	13 (%18.6)	0,037
Pathology	25(%34.7)	35 (%50)	0,065

Discussion

CLP is one of the most prevalent congenital craniofacial anomalies and its etiology is related with genetic and environmental factors(14). Some of the problems commonly seen among CLP patients are middle ear and mastoid problems, dental anomalies, low maxillary sinus volume, and narrowed nasolacrimal canal.(13,15,16).

Sinusitis is widely seen among the CLP patients, the etiology of this condition has not been sufficiently explained yet and is believed to be multifactorial(17, 18). It was reported that the underdeveloped maxilla and translocated sinus ostium might play role in this condition.The irritation of nasal and paranasal sinus mucosa as a result of regurgitation of food and saliva throughout the cleft line or the insufficient velopharynxmight play role in prevalence of sinusitis among CLP patients(19, 20).Mucosiliar activity dysfunction might play role but it was not explained for the asymptomatic patients(20). Nasal septum deviation is widely seen among the CLP patients and it has strong correlation with sinusitis(18).CLP causes insufficient height in maxillary sinus floor and might lead to sinusitis depending on whether the root tips of teeth are in relationship with sinus (21).

Robinson et al. (22) examined 19 cephalometric radiographies of CLP patients and reported that the maxillary sinuses developed rapidly until 7^{th}-8^{th} ages and the development rate gradually slowed down between 7^{th} and 12^{th} ages. Francis et al.(23) examined the Waters radiographies of 37 CLP patients and reported that sinus development continued until 12^{th} age. On the contrary with those studies carried out using conventional methods, Suzuki et al. (24)carried out a study by using CT and reported that the period of significant development of maxillary sinuses of CLP patients continued until 10^{th} age and this rate was lower at the second decade of life. Jaffe et al. (18) found the maxillary sinusitis rates to be higher among 12 year-old and younger CLP patients. Ishikawa et al. (19)determined the rate of sinusitis to be higher among 9 year-old and younger CLP patients.Suzukiet al. (24) reported that the prevalence of sinusitis among CLP patients was higher among <10 year-old patients when compared to >10 year-old patients. They attributed the reason of this condition to that the maxillary sinuses of <10 year-old CLP patients was not completely developed.

In the present study, although the prevalence of pathology in maxillary sinuses of CLP patient was low when compared to control group patients, there was no statistically significant difference ($p>0.05$). The prevalence of retention cyst and IMC among CLP patients was found to be higher when compared to control group patients ($p<0.05$). The prevalence of chronic maxillary sinusitis considered as pathology showed no statistically significant

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difference between CLP patient group and control group ($p>0.05$). On the contrary with many studies in literature, it can be seen in this study that CLP disorder is not related with the maxillary sinusitis. In the present study, the mean age of CLP group patients was 18.48 years and that of control group was 24.05 years, and it can be seen that they have completed maxillary sinus development to a large extent when compared to the studies in literature.To our opinion, the fact that CLP didn't affect the prevalence of maxillary pathology indicates the absence of negative effects of insufficient development of maxillary sinus due to substantially completed development of maxillary sinus development.

In conclusion, in the present study carried out by using CBCT images, it was observed that the prevalence of retention cysts was higher among the CLP patients when compared to control group. There was no statistically significant difference between CLP patients and control group in terms of the prevalence of chronic maxillary sinusitis and IMC.

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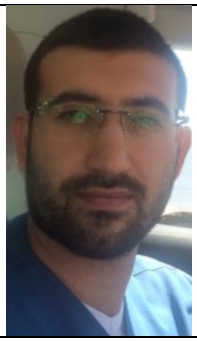
Author Biblography

	**Sacide DUMAN** I graduated from Erciyes University Dentistry Faculty at the age of 23 in 2012. Then I completed Inonu University Dentistry Faculty the Department of Pediatric Dentistry at specialty education. I still work there as specialist.
	**Şuayip Burak DUMAN** I graduated from Erciyes University Dentistry Faculty at the age of 23 in 2012. Then I completed Inonu University Dentistry Faculty the Department of Oral and Maxillofacial Radiology at specialty education. I still work there asAsistant. Prof. Dr.