



Radiographic assessment of agenesis of third molars and para-radicular third molar radiolucencies in population of age group 18-25 years old – a radiographic survey

Avaliação radiográfica da gênese e radiolucidez perirradicular de terceiros molares em população de faixa etária de 18-25 anos – um levantamento radiográfico

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Abstract

Introduction: Due to biological, cultural and evolutionary changes with time, humans have experienced a decreased dependency on all tooth types. Because of this, the number of certain teeth which are no longer necessary for function are either getting increasingly impacted or are not developing at all. This is especially the case where third molars are concerned. **Objective:** To assess the prevalence of agenesis of third molars and para-radicular third molar radiolucencies in population of age group 18-25 years. **Materials and methods:** Five hundred patients of age ranging from 18 to 25 years old were selected randomly and subjected to undergo conventional panoramic radiographic procedure. **Results:** 35.4% patients of our study population revealed agenesis of one of the third molars among the four third molars. Agenesis of right maxillary third molar is quite significant as $p = 0.030$; and only 3.4% revealed the prevalence of para-radicular third molar radiolucencies. **Conclusion:** As time goes by, agenesis of the third molars is increasing, so they can be considered as vestigial. However, etiology of the para-radicular third molar radiolucencies is unknown. Hence, further research is needed to describe the nature as well as outcome of mandibular para-radicular third molar radiolucencies.

Keywords: Third molar. Agenesis. Para-radicular radiolucency.

Resumo

Introdução: Em virtude de alterações biológicas, culturais e evolutivas com o tempo, os seres humanos têm experimentado uma diminuição da dependência em todos os tipos de dentes. Por isso, os dentes que já não são necessários para a função estão ficando cada vez mais impactados ou não estão sequer se desenvolvendo. Este é especialmente o caso dos terceiros molares. **Objetivo:** Avaliar a prevalência de agenesia dos terceiros molares e radiolucidez perirradicular em terceiros molares em uma população com faixa etária de 18-25 anos. **Materiais e métodos:** Quinhentos pacientes entre 18-25 anos foram selecionados aleatoriamente e submetidos a um exame radiográfico panorâmico convencional. **Resultados:** 35,4% dos pacientes da população de estudo revelaram agenesia de um dos terceiros molares entre os quatro terceiros molares. Agenesia do terceiro molar superior direito foi bastante significativa com valor $p = 0,030$ e apenas 3,4% revelaram a prevalência de radiolucidez perirradicular nos terceiros molares. **Conclusão:** Com o tempo, a agenesia dos terceiros molares está aumentando, de modo que podem ser considerados vestigiais. Porém, a etiologia da radiolucidez perirradicular nos terceiros molares é desconhecida. Portanto, mais pesquisas são necessárias para descrever a natureza, bem como as consequências de radiolucidez perirradicular em terceiros molares inferiores.

Palavras-chave: Terceiros molares. Agenesia. Radiolucidez perirradicular.

Introduction

For the students of Dentistry, third molars are of special interest. Apart from the students of Dentistry, for students of other scientific fields such as Anthropology, genetics etc., third molars are of much importance because they play an important role to the understanding of the process of Evolution. Evolution is a complex subject and many different theories regarding this concept are emerging. The old ones are being reexamined in the light of emerging genetic discoveries. One common and widely accepted explanation contends that molars evolved when human ancestors roamed the Earth on four legs, more than a hundred million years ago. Due to biological, cultural and evolutionary changes with time, humans have experienced a decreased dependency on all tooth types. This is especially the case where third molars are concerned. Anthropologists state that constantly increasing cerebration of man is enlarging his brain size at the expense of his jaws (1, 2).

It is a well-known fact that nature tries to eliminate what is not in use. Likewise, the advent of civilization and use of soft and refined diet has eliminated the human need for large and powerful jaws. In this decrease in size, the number of certain teeth no longer necessary for function of mastication and feeding is either getting increasingly impacted or is not developing at all. So, the incidence of the third molars getting impacted or genetically missing is the highest. Hence, third molars may be considered

as “vestigial” (2). Agenesis is the congenitally absence of at least one permanent tooth. It is the most frequently encountered dental anomaly. Since the first reported study by Albert W. Goblirsch in 1930 (3), there have been several studies done in various countries all over the world proving that the percentage of agenesis of third molar agenesia is increasing.

Apart from the aspect of agenesia of the third molars, third molars are also found to be associated with para-radicular radiolucencies. It is most often situated just distal to the third molar roots. They are considered to be a variation of normal radiographic anatomy (4).

Studies have been conducted to determine the agenesia of the third molars in different parts of the world like Jordan (5), Australia (6), Jerusalem (7), Singapore (8), South Korea (9) etc., but no similar study has been documented till now in Haryana state of North India.

The present study was undertaken to review the prevalence of agenesia as well as para-radicular third molar radiolucencies in population of age group 18-25 years old.

Materials and methods

In this study, a total number of 500 students of age group ranging from 18 to 25 years old irrespective of sex, status, caste were selected randomly from different institutions of M. M. University, Mullana, Ambala,

Haryana. The patients included in this study sample were of average middle socioeconomic level belonging to both rural and urban backgrounds. An ethical clearance was obtained from the ethical committee of M.M. University, Mullana, Ambala, Haryana. The purpose of the study was explained to them verbally and written consent was obtained.

Patients were instructed to rinse mouth with 0.12% chlorhexidine mouth wash to double ensure the asepsis of examination procedure and to remove any superficial attached food debris, and were examined in dental chair having good illumination. Their demographic data and detailed clinical history along with previous history of extraction of third molar was recorded in the designed proforma. Patients having history of third molar extraction were not included in the study. Radiographic procedure was accomplished by panoramic machine (Rotagraph plus, panoramic and cephalometric machine VILLA SISTEMI MEDICALI, 2002, Made in Italy) at 80 KVp, 10 mA for 17 seconds with total filtration of 2.5 mm aluminium. 5X12 inches curved rigid aluminium cassette with green light sensitive intensifying screens (Konika KR-II) and 5X12 inches Kodak T-Mat green sensitive panoramic dental films made in U.S.A. by Eastman Kodak, Rochester, New York were used in the study. The radiographs were observed and interpreted independently by two observers having Masters in Oral Medicine and Radiology and having experience of ten years in their respective fields and then the results were prepared. Any well defined radiolucency in the para-radicular region of the third molars which may or may not have

destroyed the lamina dura was classified as para-radicular radiolucency.

Results

Out of 500 study population, 206 were the females and 294 were males. The obtained data was statistically analyzed using chi square test. The mean age of the patients was of 20.94 years old and 44.8% patients revealed the agenesis of maxillary third molars as compared to 27.6% subjects who revealed the prevalence of agenesis of the third molars in mandible. The right maxillary third molars were found to be more missing as compared to third molars of other quadrants. Agenesis of third molars was found to be more in males as compared to females (Table 1).

In the present study group 13.2% of patients had a missing single third molar, 12.4% had missing two third molars, 4.8% had missing three third molars and 5% had missing all the third molars (Figure 1).

In our study subjects, only 3.4% revealed the prevalence of para-radicular radiolucencies. This is a statistically insignificant finding as $p > 0.05$. This finding is implying the fact that para-radicular radiolucencies are a rare occurrence with respect to third molars. The prevalence of para-radicular radiolucencies is shown in Table 2; 0.2% para-radicular third molar radiolucencies were found in relation to mesial root of 48, 1.2% in relation to distal root of 38 and 2.0% in relation to distal root of 48 (Figure 2).

Table 1 - Agenesis of third molars in different quadrants

Sex		Tooth Number			
		38	48	18	28
Female (n = 206)	Mean \pm SD	0.1553 \pm 0.36311	0.1359 \pm 0.34354	0.1748 \pm 0.38068	0.1845 \pm 0.38881
	Missing 3 rd molars (%)	32.00 (15.5)	28.00 (13.5)	36.00 (17.4)	38.00 (18.4)
Male (n = 294)	Mean \pm SD	0.1293 \pm 0.33605	0.1361 \pm 0.34343	0.2789 \pm 0.44923	0.2313 \pm 0.42238
	Missing 3 rd molars (%)	38.00 (12.9)	40.00 (13.6)	82.00 (28.0)	68.00 (23.1)
Total (n = 500)	Mean \pm SD	0.1400 \pm 0.34733	0.1360 \pm 0.34313	0.2360 \pm 0.42505	0.2120 \pm 0.40913
	Missing 3 rd molars (%)	70.00 (14.0)	68.00 (13.6)	118.00 (23.6)	106.00 (21.2)
p value		0.409	0.997	0.007**	0.208

Source: Research data.

Table 2 - Prevalence of para-radicular radiolucencies

	Frequency	Percent
	484	96.8
Distal root of 38	5	1.0
Distal root of 38 & 48	1	.2
Distal root of 48	9	1.8
Mesial root of 48	1	.2
Total radiolucency	16	3.4%
Total	500	100.0

Source: Research data.

Discussion

The third molars are the last teeth to erupt in the oral cavity. Since they erupt at about the time when the youth goes off in to the world to become wise, they referred to as *wisdom teeth*.

The word wisdom tooth is derived from latin word *dens sapientiae*. In many Spanish speaking countries it is called as the molar of judgement. This is because when they appear, the person is considered to have a better judgement ability than that of a child. Turkish refers the third molar directly to the age at which wisdom teeth appear and calls it *20 yas disisi*, which means 20th year tooth.

Racial variation, nature of diet, degree of use of masticatory apparatus and genetic inheritance can affect the jaw size and tooth size (10, 11).

In this study, the conventional panoramic radiographic examination of 500 patients of age group ranging from 18 to 25 years old was done to detect the prevalence of agenesis of third molars and para-radicular third molars radiolucencies. The patients included in this study sample were of average middle socioeconomic level belonging to both rural and urban backgrounds.

The positive results revealed that in 35.4% patients, there was agenesis of at least one of the third molars. However in only 3.4% patients revealed the presence of para-radicular third molar radiolucencies.

Panoramic radiographic procedure was selected over the intra oral periapical radiographs, due to its advantage of being a fast process and wherein the view of entire maxilla-mandibular region on a single film could be obtained. The procedure is convenient to patient and requires little expertise of the

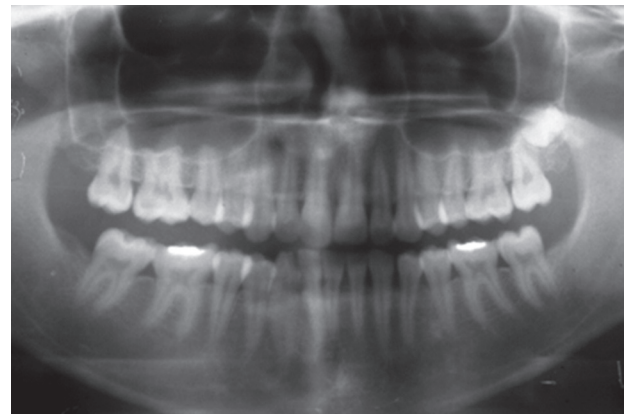


Figure 1 - Agenesis of right maxillary and bilateral mandibular third molars

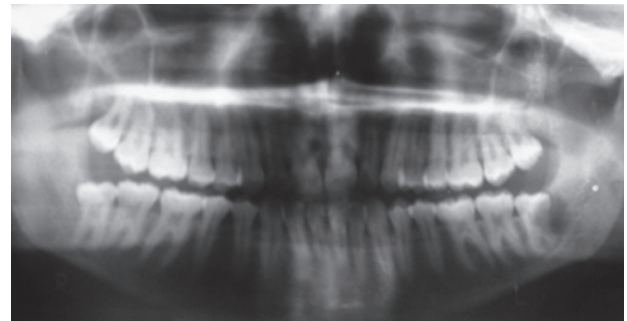


Figure 2 - Para-radicular radiolucency in relation to distal root of left mandibular third molar

radiologist. The main advantages of this procedure is that the status of developing third molars can be viewed, their relation to inferior alveolar dental canal, type of impaction and site of third molar can be easily revealed.

The growth of maxilla and mandible ceases by 16-17 years of age. The mean age of patients included in this study was 20.94 years old, which is very close to average age of eruption of third molars reported to be of 20.3 years old. Schersten et al. (12) suggested that 20-25 years old is the third molars to be more in females as compared to males. But contrary to his findings studies conducted by Hattab (5), Lynham (6), Mok (8), Thompson et al. (14) showed no sexual predilection for agenesis of the third molars. But in our study results revealed the agenesis of the third molars more frequently in males.

Keene (15) and Karmani (16) found that agenesis is more common in mandible. Mok (8) and Rahardjo (17) concluded that agenesis is more prevalent in maxilla as compared to mandible. In our results, in

concordance to Mok and Rahardjo, agenesis of third molars is found to be more in maxilla at 44.8% as compared to mandible at 27.6%.

Mok (8) concluded the rate of agenesis in 28.5% of the population while Sermiento (18) revealed the rate of agenesis at 21%. Our results revealed agenesis of the third molars in 35.4% of the study population.

According to Banks (19), two third molars to be missing followed by single third molar missing, all four third molars missing and three third molars missing. According to Hattab et al. (5), Nanda (20) and Kruger et al. (21), the order of frequency for missing third molars is single third molar missing, two third molars missing, three third molars missing and all the four third molars missing.

In our results, the single missing third molar is found at 13.2%, two third molars missing at 12.4%, all the four third molars missing at 5.0% followed by three third molars missing at 4.8%.

Radiolucencies around the radicular portion of the tooth have been collectively termed as para-radicular radiolucencies. Para-radicular radiolucencies may be because of paradental cyst, mandibular infected buccal cyst and lateral radicular cyst. Paradental cyst most commonly involves mandibular third molars. Pericoronitis or inflammation plays an important role in the pathogenesis of paradental cyst. The tooth involved in paradental cyst will be vital, and if it is non vital the diagnosis will be lateral radicular cyst. Mandibular infected buccal cyst mostly involve mandibular first molar but cases have been reported in relation with mandibular second molars. It may occur bilaterally suggesting its developmental etiology. It may arise from crevicular epithelium, reduced enamel epithelium, cell rests of malassez and the dental follicle. But now many reports have suggested that the mandibular infected buccal cyst and paradental cyst are the same entity (22).

Bohay et al. (4) documented only 7.8% frequency of mandibular para-radicular third molar radiolucencies. Females were found to be more affected than males. In our study population, only 3.4% para-radicular third molar radiolucencies are present. Out of 16 positive cases, 13 are in females and 3 in males. Only 1 female revealed the presence of bilateral para-radicular third molar radiolucencies. Hence, total number of detected para-radicular radiolucencies were 17.

On detailed clinical history some patients had previous complaints of pericoronitis. So this para-radicular radiolucency may result because of prolonged

chronic inflammation in the impacted or erupting third molar region. But, Bohay et al., in their study, believed that mandibular para-radicular radiolucencies are the variations of normal radiographic anatomy.

Many studies have been done in different countries as well as in India to assess the prevalence of agenesis of the third molars. But no study has been done in India till date to assess the prevalence of para-radicular radiolucencies associated with mandibular third molars. Further research is needed to describe the nature as well as outcome of mandibular para-radicular third molar radiolucencies.

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