

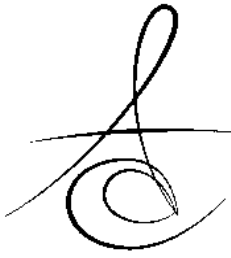
## PAPER DETAILS

TITLE: EVALUATION OF TOTAL AND PARTIAL EDENTULOUS JAWS USING PANORAMIC RADIOGRAPHY

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## EVALUATION OF TOTAL AND PARTIAL EDENTULOUS JAWS USING PANORAMIC RADIOGRAPHY

### TOTAL VE PARŞİYEL DİŞSİZ ÇENELERİN PANORAMİK RADYOGRAFİ KULLANILARAK DEĞERLENDİRİLMESİ

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#### ABSTRACT

**Aim:** Panoramic radiography is a diagnostic modality for providing a view of the entire maxillofacial region and used as an initial screening tool to examine partially and completely edentulous jaws in pretreatment assessment.

**Material-method:** This study included digital panoramic images of 321 partially and totally edentulous patients. The images were evaluated for positive radiographic findings including presence of retained root fragments, impacted teeth, radiolucencies, radiopacities, proximity of the mental foramen and maxillary sinus to the residual alveolar ridge.

**Results:** Totally 538 edentulous jaws were examined in 321 individuals (51.1 % females, 48.9 % males) mean aged 57.3 (standard deviation=11.5). The rate of completely edentulous jaws was 29 % (n=156) and the rate of partially edentulous jaws was 71 %. Prevalence of one or more positive radiographic findings was found to be 51 %. Of the radiographic findings, 49.4 % was in females and 50.6 % in males. The most frequent finding was retained root fragments (15.6 %), followed by location of the maxillary sinus close to the alveolar crest (10.6 %), radioopacities (9.3 %), impacted teeth (8 %), location of the mental foramen on the crest (6.8 %) and radiolucencies (1.2 %).

**Conclusion:** Prevalence of positive radiographic findings was found to be relatively high in clinically healthy looking edentulous patients in this study. This result confirmed that pretreatment panoramic examination is necessary to detect pathologies and requirement of any dental procedure for a successful prosthodontic rehabilitation.

**Key words:** Panoramic radiography, edentulous patients, radiographic evaluation

#### ÖZET

**Amaç:** Panoramik radyografi tüm maksillofasiyal bölgenin görülmesine olanak sağlayan bir diagnostik yöntemdir ve parşiyel ve tam dişsiz çenelerin tedavi öncesi değerlendirmesinde ilk inceleme yöntemi olarak kullanılır.

**Gereç ve yöntem:** Bu çalışmada 321 parşiyel ve total dişsiz hastanın dijital panoramik görüntüsü incelendi. Görüntüler, kök artıkları, gömülü dişler, radyolusensiler, radyoopasiteler, mental foramen ve maksiller sinüsün alveolar kret tepesine yakınlığı gibi pozitif radyografik bulgular yönünden değerlendirildi.

**Bulgular:** Yaş ortalaması 57.3 (standart sapma=11.5) olan 321 (% 51.1 kadın, % 48.9 erkek) hastada toplam 538 dişsiz çene incelendi. Total dişsiz çenelerin oranı % 29 (n=156) ve parşiyel dişsiz çenelerin oranı % 71'di. Bir veya daha fazla pozitif radyografik bulguların görülme sıklığı, % 51 olarak bulundu. Bunların % 49.4'ü kadın, % 50.6'sı erkeklerdeydi. En fazla görülen bulgu artık köklerdi (% 15.6), bunu maksiller sinüsün alveolar krete yakınlığı (% 10.6), radyoopasiteler (% 9.3), gömülü dişler (% 8), mental foramenin alveolar krete yakınlığı (% 6.8) ve radyolusensiler (% 1.2) takip etmekteydi.

**Sonuç:** Bu çalışmada klinik olarak sağlıklı görünen dişsiz hastalardaki pozitif radyografik bulguların görülme sıklığı, göreceli olarak yüksek bulundu. Bu sonuç başarılı bir prostodontik tedavi için herhangi bir işlemin gerekliliğini ve patolojilerin belirlenmesi için tedavi öncesinde panoramik radyografinin gerekliliğini doğrulamaktadır.

**Anahtar kelimeler:** Panoramik radyografi, dişsiz hastalar, radyografik değerlendirme

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## INTRODUCTION

Panoramic radiography is a diagnostic modality for providing a view of the entire maxillofacial region. It is frequently used as an initial screening tool to examine partially and completely edentulous jaws in pretreatment assessment.<sup>1-4</sup> Firstly, Logan evaluated the radiographs of edentulous jaws and detected pathologies such as root fragments and impacted teeth in 28.6 % patients.<sup>5,6</sup>

Routine panoramic examination of edentulous patients is a controversial subject and there is no agreement between the authors. Food and Drug Administration (FDA) and American Dental Association (ADA) suggest a full-mouth intraoral or panoramic radiographic examination for newly edentulous patients.<sup>7</sup> On the contrary, European Guidelines on Radiation Protection in Dental Radiology doesn't suggest radiographic examination for healthy edentulous patients.<sup>8</sup> Previous studies reported that several anatomic considerations such as location of mandibular canal, mental foramen, mucosal thickness, status of alveolar crest, relationship between alveolar crest and maxillary sinus may affect prosthetic treatment planning.<sup>9-11</sup> Radiographic examination is necessary for evaluation of these conditions.<sup>5</sup>

Many pathologic changes are observed in radiographic examination of apparently healthy edentulous jaws during clinical examination.<sup>1,4</sup> Although it's diagnostic advantages are clear, routine radiographic examination of edentulous patients is currently being questioned because of well known detrimental effects of radiation.<sup>4,12,13</sup>

The aim of this study was to evaluate prevalence of significant radiographic findings in panoramic radiographs of edentulous jaws. Our hypothesis was that panoramic radiographic examination is helpful for edentulous patients before prosthetic rehabilitation.

## MATERIAL AND METHODS

This study included digital panoramic images of 321 partially and totally edentulous patients aged between 25 and 89. The clinical examination was carried out and the panoramic images were obtained from clinically apparent healthy subjects for preoperative implant planning in Gazi University

Faculty of Dentistry, Department of Dentomaxillofacial Radiology (Ankara, Turkey). No additional radiographs were taken from the patients for the study. Digital panoramic images were obtained with a Orthoralix 9200 DDE (Gendex Co, Milan, Italy) panoramic unit and a CCD-based system used with VixWin 2000 software (Gendex Co, Milan, Italy). The images were examined on the monitor using 8-bit resolution.

The images were evaluated for positive radiographic findings by an oral radiologist at least 12 years of experience. The following information was considered: (1) age and sex; (2) presence of retained root fragments; (3) impacted teeth; (4) radiolucencies (5) radiopacities; (6) location of the mental foramen at the crest of the residual alveolar ridge; (7) location of the maxillary sinus close to the residual alveolar ridge. The lesions looking like odontogenic or non-odontogenic cysts were categorized as radiolucencies and osteosclerosis, fibro-osseous lesions and soft tissue calcifications were categorized as radioopacities. Poor quality radiographic images were excluded. The obtained data were analyzed with descriptive statistics and cross-tabs.

## RESULTS

Totally 538 jaws were examined in 321 individuals mean aged 57.3 (standard deviation= 11.5), 51.1 % (n=164) were females and 48.9 % (n=157) were males. The rate of completely edentulous jaws was 29 % (n=156) and the rate of partially edentulous jaws was 71 % (n=382) (Table 1).

Table 1. Distribution of examined edentulous jaws

| Edentulous jaws    | Maxilla |      | Mandible |      |
|--------------------|---------|------|----------|------|
|                    | N       | %    | N        | %    |
| Total edentulous   | 89      | 27.7 | 67       | 20.9 |
| Partial edentulous | 177     | 55.1 | 205      | 63.9 |
| Total              | 266     | 49.4 | 272      | 50.6 |

Prevalence of one or more positive radiographic findings was found to be 51 % (n=164). Of the radiographic findings, 49.4 % (n=81) was in females and 50.6 % (n=83) in males (Table 2). The most frequent finding was retained root fragments, followed by location of the maxillary sinus close to the

alveolar crest, radioopacities, impacted teeth, location of the mental foramen on the crest and radiolucencies (Table 2).

Table 2. Prevalence of one or more radiographic findings according to gender

| Radiographic findings                                                      | Males |      | Females |      | Total |      |
|----------------------------------------------------------------------------|-------|------|---------|------|-------|------|
|                                                                            | N     | %    | N       | %    | N     | %    |
| Root fragments                                                             | 23    | 14.6 | 27      | 16.4 | 50    | 15.6 |
| Impacted teeth                                                             | 13    | 8.3  | 11      | 6.7  | 24    | 8    |
| Radiolucencies                                                             | 3     | 1.9  | 2       | 1.2  | 5     | 1.2  |
| Radiopacities                                                              | 14    | 8.9  | 16      | 9.7  | 30    | 9.3  |
| Location of the mental foramen at the crest of the residual alveolar ridge | 4     | 2.5  | 17      | 10.3 | 21    | 6.8  |
| Location of the maxillary sinus close to the residual alveolar ridge.      | 20    | 12.7 | 14      | 8.5  | 34    | 10.6 |

Sixty five root fragments were observed in 50 patients and the number of retained root fragments was approximately equal in maxilla and mandible (Table 3). The radioopacities were more common in mandible than in maxilla. Totally 39 impacted teeth were observed in 24 patients and 19 teeth were localized in maxilla and 20 teeth were in mandible (Table 3). The radiolucencies were approximately equal in maxilla and mandible. Impacted teeth were common in males than females and the most frequent impacted teeth was maxillary and mandibular third molars (Table 4).

Table 3. Distribution of evaluated positive radiographic findings according to jaws

| Radiographic findings | Regions in maxilla |                |             |                | Regions in mandible |             |                        | Total                 |                          |
|-----------------------|--------------------|----------------|-------------|----------------|---------------------|-------------|------------------------|-----------------------|--------------------------|
|                       | Anterior n (%)     | Premolar n (%) | Molar n (%) | Anterior n (%) | Premolar n (%)      | Molar n (%) | Total (mandible) n (%) | Total (maxilla) n (%) | Total (whole jaws) n (%) |
| Root fragments        | 5 (7.7)            | 10 (15.4)      | 18 (27.7)   | 1 (1.5)        | 7 (10.7)            | 24 (37)     | 33 (50.7)              | 32 (49.3)             | 65 (100)                 |
| Impacted teeth        | 9 (23.1)           | -              | 10 (25.6)   | -              | 3 (7.7)             | 17 (43.6)   | 19 (48.7)              | 20 (51.3)             | 39 (100)                 |
| Radiolucencies        | -                  | 1 (20)         | -           | 1 (20)         | 2 (40)              | 1 (20)      | 1 (20)                 | 4 (80)                | 5 (100)                  |
| Radiopacities         | -                  | -              | 6 (18.2)    | 1 (3)          | 5 (15.2)            | 21 (63.6)   | 6 (18.2)               | 27 (81.8)             | 33 (100)                 |

Table 4. Distribution of determined impacted teeth according to gender

| Regions of jaws     | Teeth | Males     | Females   | Total    |
|---------------------|-------|-----------|-----------|----------|
| Maxillary canines   | 13    | 4 (66.7)  | 2 (33.3)  | 6 (100)  |
|                     | 23    | 1 (33.3)  | 2 (66.7)  | 3 (100)  |
| Maxillary molar     | 18    | -         | 4 (100)   | 4 (100)  |
|                     | 28    | 1 (16.7)  | 5 (83.3)  | 6 (100)  |
| Mandibular premolar | 34    | 1 (100)   | -         | 1 (100)  |
|                     | 45    | 1 (50)    | 1 (50)    | 2 (100)  |
| Mandibular molar    | 46    | 2 (100)   | -         | 2 (100)  |
|                     | 38    | 5 (62.5)  | 3 (37.5)  | 8 (100)  |
|                     | 48    | 6 (85.7)  | 1 (14.3)  | 7 (100)  |
| Total               |       | 21 (53.8) | 18 (46.2) | 39 (100) |

## DISCUSSION

Previous studies investigated positive radiographic findings in completely and partially edentulous patients in several countries and different results were reported that the prevalence of positive radiographic findings varied between 0.33 % and 68 %.<sup>1,4,9,10,14-21</sup> The differences between results may arise from the considered variables, socio-cultural differences, improved technology, a greater accessibility of imaging facilities etc. In this study, one or more positive radiographic findings were found in 51 % of the patients. This result is comparable with previous studies.<sup>1,4,9,19</sup>

It was reported that the most frequent finding was retained root fragments in edentulous patients.<sup>1,2,9,15-17,22</sup> Also, this finding was observed in posterior regions of the jaws, especially in maxilla.<sup>(1,9,15-17)</sup> There are many difficulties including small root fragments, limited visibility and possibility of complications due to proximity of maxillary sinus during extraction of maxillary molar teeth.<sup>1,18,23,24</sup> In this study, the most frequent finding was retained root fragments (15.6 %) and they were most commonly located in mandibular and maxillary molar regions in accordance with previous studies.

The amount of available bone between floor of maxillary sinus and alveolar crest is an important factor in preoperative implant placement with respect to decision of sinus lifting necessity.<sup>9</sup> Similarly, distance between mental foramen and the alveolar crest is another important factor in edentulous patients. When mental foramen positioned directly at the alveolar crest, some complaints such as pain and numbness can appear because of compression of prosthesis to mental nerve.<sup>5</sup> Panoramic radiography is

accepted reliable imaging method for measurements and investigations in vertical direction.<sup>(9,25,26)</sup> Prevalence of maxillary sinus close to the alveolar crest found to be 8.6 % and 30.6 %<sup>4,9</sup> and prevalence of location of the mental foramen at the crest of the residual alveolar ridge reported as 1.7 %, 4.4 % and 14 % in previous studies for edentulous patients.<sup>4,5,9</sup> In this study, maxillary sinus close to the alveolar crest and location of the mental foramen at the crest of the residual alveolar ridge were found as 10.6 % and 6.8 %, respectively. This result is comparable with previous studies.<sup>4,9</sup>

Previous studies evaluated prevalence of radioopacities and radiolucencies in edentulous patients. The prevalence of radioopacities was reported as 12.1 %, 4.8 % and 12.9 %.<sup>4,5,9</sup> Several radiolucencies were found in edentulous patients<sup>(9,23,27)</sup> and the prevalence of radiolucencies was reported as 0.9 %, 2.2 % and 9.9 %.<sup>4,5,9</sup> In this study, the rates of radioopacities and radiolucencies were found to be 9.3 % and 1.2 %, respectively. The results of the present study were in accordance with previous studies.

The prevalence of positive radiographic findings such as retained root fragments, impacted teeth, radioopaque, radiolucent lesions etc. is generally high in edentulous patients. The results of this study supported that our hypothesis was that panoramic radiography may be helpful for edentulous patients. Sumer et al.<sup>9</sup> suggested that routine panoramic examination is necessary in edentulous patients to detect required treatment procedures before prosthetic rehabilitation. This point of view was supported by Jindal et al.<sup>5</sup> However, Masood et al.<sup>1</sup> and Awad et al.<sup>4</sup> disagreed with mentioned authors related with necessity of routine panoramic examination in edentulous patients due to the positive radiographic findings rarely require any treatment.

## CONCLUSION

Prevalence of positive radiographic findings was found to be relatively high in clinically healthy looking edentulous patients in this study. Prevalence of positive radiographic findings was found to be relatively high in clinically healthy looking edentulous patients in this study. This result confirmed that pretreatment panoramic examination is necessary to

detect pathologies and requirement of any dental procedure for a successful prosthodontic rehabilitation.

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