
Occurrence of lesions, abnormalities and dentomaxillofacial changes observed in 1937 digital panoramic radiography

Ocorrência de lesões, anomalias e alterações dento-maxilo-facial observados em 1937 radiografias panorâmicas digitais.

Felipe Paes Varoli², Luiza Verônica Warmling¹, Karina Cecília Panelli Santos¹, Jefferson Xavier Oliveira¹

School of Dentistry, University of São Paulo, São Paulo-SP, Brazil; School of Dentistry, University Paulista, São Paulo-SP, Brazil

Abstract

Objective – Radiographic examination is the most affordable and widely used complementary examination in dentistry. Recently, techniques for digital panoramic radiography have been developed. **Methods** – A total of 1937 panoramic radiographies were evaluated in this study, the female group has accounted for the most of the sample: 1090 (56.3%) in comparison to 847 (43.7%) men. The patients were not identified, and data have only included gender, age, main injuries, anomalies and alterations at maxillofacial region or adjacent structures. Unusual injuries or doubtful diagnosis were excluded. **Results** – The most common injuries and alterations that were found in this study were teeth absence / anodontia, extrusion / inclination / migration / transposition / rotation, image suggestive of carious lesions and periapical lesions. The injuries and anomalies less common were condyle alteration, hypercementosis, mandible fracture, odontoma, dentigerous cyst, odontogenic keratocyst, periapical cement osseous dysplasia, foreign body, cleft palate and surgical fixation. **Conclusions** – Digital panoramic radiography is of the great value for lesions and anomalies diagnosis, as a complement of clinical practice. This study reports as the most common alterations teeth absence / anodontia, teeth extrusion / inclination / migration/ transposition/ rotation, image suggestive of carious lesions and periapical lesions, which were predominant in the female group.

Descriptors: Diagnostic imaging; Dental radiography; Panoramic radiography

Resumo

Objetivo – O exame radiográfico é um dos exames complementares mais acessíveis e usados em Odontologia. Recentemente, técnicas para radiografias panorâmicas vem sendo desenvolvidas. **Métodos** – Um total de 1937 radiografias foram avaliadas neste estudo, sendo o grupo das mulheres maior que dos homens (1090 e 847) respectivamente. Os pacientes não foram identificados e só os dados foram incluídos: sexo, idade, principais lesões, anomalias e alterações dento-maxilo-faciais. Lesões incomuns ou diagnóstico duvidoso foi excluído também. **Resultados** – As lesões e as alterações mais encontradas foram: ausência dental / anodontia, extrusão / inclinação / migração / transposição / rotação, imagem sugestiva de lesão cariosa e lesão periapical. As lesões e injúrias menos comuns encontradas foram: alteração da cabeça da mandíbula, hipercementose, fratura mandibular, odontoma, cisto dentígero, queratocisto, displasia periapical cemento-óssea, corpo estranho, fenda palatina e fixação cirúrgica. **Conclusões** – A radiografia panorâmica digital é de grande valor para as lesões e diagnóstico de anomalias, como um complemento da prática clínica. Este estudo mostrou como lesões e alterações mais comuns, ausência dental / anodontia, extrusão / inclinação / migração / transposição / rotação, imagem sugestiva de lesão cariosa e lesão periapical, que foram predominantes nas mulheres.

Descritores: Diagnóstico por imagem; Radiografia dental; Radiografia panorâmica

Introdução

Radiographic examination is the most affordable and widely used complementary examination in dentistry. Panoramic radiography is part of routine practice of dentists¹, due to its operation simplicity, low radiation dose, low cost and wide examined area^{2-4,1}.

The main disadvantage of this method is the structures superimpositions, and, due to technique image acquirement, only structures at the center of the rotational area are evident⁵. However, in a single radiography it is possible to observe both jaws⁶ and that is the reason why it has been widely used in epidemiologic studies, pre-treatment of partially and completely edentulous patients, orthodontic planning, and lesions and dental anomalies diagnosis as a complement of clinical evaluation^{2,7-10}.

Recently, techniques for digital panoramic radiography have been developed, and in recent years solid-state X-ray units (charged couple device-CCD) and photostimulable phosphor systems were developed to

be used in conventional equipment¹¹. Image quality from digital units is meant to be better than conventional one, and the exam process involves less radiation dose¹². According to Benediktsdottir *et al.*¹¹ (2003) digital panoramic systems are equally useful for diagnosis of dental anomalies and pathologies as conventional systems.

Prevalence of abnormalities and dental injuries are of great value for knowledge of oral problems of a certain population. Faria¹³ and some authors have taken advantage into panoramic radiography utility and practicality to elaborate some studies. Carvalho *et al.*¹⁴ (1997) have analyzed 934 panoramic radiographies and 550 presented some kind of anomaly: microdontia (2.3%), laceration (5.6%), taurodontism (1%), hypodontia (7%), supernumerary teeth (2.3%), impacted tooth (21.2%) and rotation (60.6%). Watanabe *et al.*¹⁵ (1997) have studied 5000 panoramic radiographies from 55% female and 45% male, and they have found greater occurrence of dental anomalies in patients between 8 and 12 years.

Vicci and Capelozza¹ (2002) have analyzed 471 pa-

noramic radiographies and 104 (76 women and 28 men) presented no lesions or abnormalities. From those exams which presented alterations, the most frequent were endodontically treated teeth (25.5%), periapical lesions (13.2%), bone atrophy and teeth rotation (12%), sclerosis (6%), endodontic treatment associated with apical lesion (6%), dilaceration apical (4.9%), residual root (4.3%), hypercementosis (4.2%), thickening of the periodontal ligament (2.5%), periapical cement-osseous dysplasia (1.8%) and extensive carious lesions (1%). The presence of alterations was more frequent in females, except for the extensive carious lesions.

Girondi *et al.*⁹ (2006) have evaluated 533 panoramic radiographies from patients of both genders, seeking to identify the occurrence of dental abnormalities. They found prevalence of 1.5% for taurodontism, 6.57% for anodontia, 1.5% for supranumerary teeth, 31.52% for non erupted teeth, 0.38% for teeth transposition.

Bondemark *et al.*⁷ (2006) have assessed the prevalence and location of incidental findings and anomalies before orthodontic treatment in 496 panoramic radiographies, 232 girls and 264 boys. Carious lesions, eruption disturbances and absence or supernumerary teeth were not recorded. The most common findings were idiopathic sclerosis in alveolar bone (n=22) and periapical inflammatory lesions (n=10).

Masood *et al.*¹⁰ (2007) have analyzed 327 panoramic radiographies to assess the presence of residual roots, impacted teeth, radiolucent and radiopaque areas, soft tissue calcifications and foreign bodies. Approximately 42.5% radiographs contained one or more findings.

Armond *et al.*¹⁶ (2008) have evaluated panoramic radiographies of 335 patients of both genders, from 2 to 13 years. About 54% had dental abnormalities, 204 teeth lost prematurely, 120 apical lesions, 30 anodontia, 20 rotation, 12 and 4 taurodontism supernumerary. According to the authors taurodontism prevalence was low, probably because it is a relatively rare anomaly.

Thus, considering the advantages of panoramic radiographies and the relevance of epidemiological studies,

the aim of this study is to evaluate the occurrence of oral lesions and abnormalities by observing digital panoramic radiographies.

Material and Methods

A total of 1937 panoramic radiographies were evaluated in this study, and the results were divided into groups according to patient's gender and age. All panoramic radiographies were obtained by the same digital equipment: Planmeca Proline XC digital, Finland. They were previously requested by dentists and were sent to the patient with appropriate report.

Table 1 shows the reports distribution according to patient's gender (male/female) and age (10-14, 15-19, 20-24, 25-29, 30-34 years). Radiographies from patients younger than 10 years and older than 34 years were excluded due to its small incidence.

The radiographies were evaluated by one of the authors, who is also a dental radiologist with experience in the area. The patients were not identified, and data have only included gender, age, main injuries, anomalies and alterations at maxillofacial region or adjacent structures, as shown in Table 2. Unusual injuries or doubtful diagnosis were excluded.

Table 1. Number of reports per age and gender

Age	Female reports	Male reports	Total of reports
10-14	223 (11,5%)	193 (10%)	416 (21,5%)
15-19	276 (14,3%)	247 (12,8%)	523 (27,1%)
20-24	251 (13%)	178 (9,1%)	429 (22,1%)
25-29	208 (10,7%)	113 (5,8%)	321 (16,5%)
30-34	132 (6,8%)	116 (6%)	248 (12,8%)
Total	1090 (56,3%)	847 (43,7%)	1937 (100%)

Results

Table 2 shows the total of lesions and maxillofacial anomalies and alterations that have been evaluated in this study, according to patient's gender and age.

Table 2. Lesions, maxillofacial anomalies and alterations observed by patient's gender and age

Bone condensation	9	16	13	14	13	65	4	9	13	11	3	40	105	5,42%
Taurodontia	4	5	2	—	4	15	21	8	4	1	6	40	55	2,84%
Maxillary sinus extension	6	13	21	23	14	77	—	10	22	20	26	78	155	8,00%
Residual root	—	6	19	16	8	49	3	5	12	7	16	43	92	4,75%
Supernumerary teeth	8	7	10	5	1	31	18	23	8	9	1	59	90	4,65%
Ligament calcification or elongated styloid process right/left	1	3	1	3	3	11	—	3	2	8	5	18	29	1,50%
Dental fracture	—	2	3	—	—	5	3	6	1	4	—	14	19	0,98%
Odontoma	—	—	1	1	—	2	2	2	1	—	—	5	7	0,36%
Dentigerous cyst	1	—	—	—	—	1	1	—	—	—	—	1	2	0,10%
Odontogenic kerafocyst	—	—	—	—	—	—	—	1	—	—	—	1	1	0,05%
Surgical fixation	—	—	—	—	—	—	—	—	1	1	—	2	2	0,10%
Hypercementosis	—	—	1	—	9	10	—	—	3	—	—	3	12	0,62%
Mandible fracture	—	2	—	—	—	2	—	—	—	—	—	—	2	0,10%
Periapical cement osseous dysplasia	—	—	—	—	1	1	—	—	—	—	—	—	1	0,05%
Condyle alterations	—	3	2	1	2	8	—	1	—	1	—	2	10	0,52%
Foreign body (bullet)	1	—	—	—	—	1	—	—	—	—	—	—	1	0,05%
Cist palate	1	—	—	—	—	1	1	—	—	—	—	1	2	0,10%

Discussion

Currently, the panoramic radiography is one of the most common auxiliary exams in dental practice. It's fast, affordable and allows the evaluation of both jaws by using low radiation dose^{1-4,6,8}. While soft tissue alterations and teeth crown are clinically evaluated, panoramic radiography reveals alterations as periapical diseases, cysts, tumors, jaws abnormalities, fractures and alterations in the maxillary sinus and condyle^{6-8,10}, and it may be the cause of its indications for epidemiological studies^{1-2,5,8,11-13,16}.

The female group has accounted for the most of the sample: 1090 (56.3%) in comparison to 847 (43.7%) men. At all groups of age women were predominant, however, for both genders, the attendance was higher at 15-19 years. These results may reveal a cultural dilemma: women are more careful about health and are seeking for more specialized assistance than men. The female majority has also been reported by Vicci and Capellozza¹ (2002), Watanabe *et al.*¹⁵ (1997) and Bondemark *et al.*⁷ (2006), authors that also showed the prevalence of anomalies in the female group. Only a few lesions and anomalies can be detached due to its male predominance in this study: taurodontism, maxillary sinus extension, supernumerary teeth, dental fracture, odontoma and ligament calcification or elongated styloid process. These lesions and anomalies were also the less frequent on the study.

The most common injuries and alterations that were found in this study were teeth absence / anodontia, extrusion / inclination / migration / transposition / rotation, image suggestive of carious lesions and periapical lesions. Others epidemiological studies also reported such prevalence like Vicci and Capellozza¹ (2002) that showed 13.2% of periapical lesions and 12% of teeth rotation, Bondemark *et al.*⁷ (2006) who assessed 496 radiographies and 2 % presented periapical lesions, Carvalho *et al.*¹⁴ (1997) analyzed 934 panoramic radiographies and 60.6% showed teeth rotation and Armond *et al.*¹⁶ (2008) who evaluated 335 images that presented 60.89% of teeth absence and 35.82% of periapical lesions. However, contrary to this findings, other reports revealed the prevalence of impacted teeth, as the works of Carvalho *et al.*¹⁴ (1997) that presented 21.2%; non erupted teeth as reported by Girondi *et al.*⁹ (2006) with 31.52%; and residual root as mentioned by Masood *et al.*¹⁰ (2007).

The injuries and anomalies less common were condyle alteration, hypercementosis, mandible fracture, odontoma, dentigerous cyst, odontogenic keratocyst, periapical cement osseous dysplasia, foreign body, cleft palate and surgical fixation. The only study that is in accordance to these results mentioned above is Vicci and Capellozza¹ (2002) that detached 1.8% of periapical cement osseous dysplasia. Other authors have found as less common: taurodontism, as Carvalho *et al.*¹⁴ (1997), Girondi *et al.*⁹ (2006) and Armond *et al.*¹⁶ (2008) that showed 1%, 1.5% and 3.5% of prevalence respectively; supernumerary teeth, as reported

by Carvalho *et al.*¹⁴ (1997) with 2.3%, Girondi *et al.*⁹ (2006) with 1.5% and Armond *et al.*¹⁶ (2008) with 1.2%; non erupted and impacted teeth, as revealed by Girondi *et al.*⁹ (2006) (0.38%); and image suggestive of carious lesion as cited by Vicci and Capellozza¹ (2002) with 1%.

In conclusion, digital panoramic radiography is of the great value for lesions and anomalies diagnosis, as a complement of clinical practice. This study reports as the most common alterations teeth absence / anodontia, teeth extrusion / inclination / migration / transposition / rotation, image suggestive of carious lesions and periapical lesions, which were predominant in the female group.

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Corresponding author:

Luiza Verônica Warmling
Departamento de Estomatologia
Faculdade de Odontologia – Universidade de São Paulo
Av. Prof. Lineu Prestes, 2227
São Paulo-SP, CEP 0558-000
Brazil

E-mail: warmling.luiza@hotmail.com

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