

East African Medical Journal Vol. 89 No. 8 August 2012

ROUTINE RADIOGRAPHIC FINDINGS IN CLINICALLY HEALTHY EDENTULOUS JAW BONES OF PATIENTS SEEKING THEIR FIRST SET OF COMPLETE DENTURE PROSTHESES

B. I. Omondi, BDS, M Clin Dent, F. Maxillofac Pros (UCLA), Lecturer, Department of Conservative and Prosthetic Dentistry and T. J. Ocholla, BDS, MSc, DDR RCR, DDR (SACM), Senior Lecturer, Department of Oral and Maxillofacial Surgery / Oral Medicine, Oral Pathology / Dental Maxillofacial Radiology, School of Dental Sciences, University of Nairobi, P. O. Box 19676 – 00202, Nairobi, Kenya.

Request for reprints to: Dr. B.I. Omondi, Department of Conservative and Prosthetic Dentistry, School of Dental Sciences, University of Nairobi, P. O. Box 19676 – 00202, Nairobi, Kenya.

ROUTINE RADIOGRAPHIC FINDINGS IN CLINICALLY HEALTHY EDENTULOUS JAW BONES OF PATIENTS SEEKING THEIR FIRST SET OF COMPLETE DENTURE PROSTHESES

B. I. OMONDI and T. J. OCHOLLA

ABSTRACT

Objective: To describe the role of routine radiographic examination of clinically healthy completely edentulous jaws prior to fabrication of the first set of complete dentures.

Design: Cross-sectional retrospective descriptive study.

Settings: The departments of Conservative and Prosthetic Dentistry, and Oral and Maxillofacial Surgery, Oral Medicine/Oral Pathology, Dental Maxillofacial Radiology of the School of Dental Sciences, University of Nairobi.

Results: One hundred and eighty eight records were examined of which only 47(25%) had radiographic records. One hundred and fifty two significant radiographic findings and indices were recorded, which included retained roots, impacted teeth, significant radioluscencies and radiopacities, calcified stylohyoid ligament, extensive alveolar bone resorption, condylar changes and mandibular cortical index.

Conclusion: This study confirms the high diagnostic yield of routine preprosthetic treatment radiographic examination. It also puts into perspective various anatomical indices in the jaw which, with proper interpretation, may determine or influence management decisions and prognosis in individual patients.

INTRODUCTION

Radiographic assessment is one of the most significant tests in complete denture prosthodontics (1). Any pathological or potentially pathological condition in the denture bearing area should be managed prior to complete denture fabrication. Some of the conditions may not be easily detected by clinical examination of the denture bearing areas. Therefore, radiographic examination of the edentulous areas is recommended.

Several studies have shown that the diagnostic

yield of radiographic examination of apparently healthy edentulous jaws is high (2,3). The decision to make a radiographic examination of a patient rests upon the professional judgement of the clinician who should be guided by the fact that the benefits which accrue from the overall health of the patient may outweigh the possible risks associated with ionising radiation and the extra cost. The panoramic radiograph is usually the radiographic examination of choice of the edentulous jaws (1). This is because it provides a view of both the jaws in a single film. In addition, it is time saving and less demanding

technically and is considered to emit lower radiation doses than a full mouth periapical series.

Majority of the patients seeking complete denture prostheses at the University of Nairobi Dental School have had their teeth extracted elsewhere. Some of the extractions may have been carried out by people who are not dentists. Most of the patients did not have referral documents from their previous clinicians. Routine pre-prosthetic radiographic examination is not a standard practice because of lack of radiographic guidelines. This study aimed at documenting the significant radiographic findings in apparently healthy edentulous jaws and thereby, describing the role of routine radiographic examination of new patients seeking their first set of complete dentures.

MATERIALS AND METHODS

Clinical records of all new patients who attended the Prosthetic Dentistry Clinic seeking the first set of complete dentures during the period January 1998 to July 1999 were examined retrospectively. The records with radiographs were further examined for significant findings and indices. Ethical approval was obtained from the University of Nairobi research committee before conducting the analysis. All the radiographs were panoramic radiographs taken using the Panelipse Panoramic X-ray system (General Electric, USA). The image receptor was a standard Kodak X-Omatic G film equipped with an intensifying screen. The films were processed using a Durr XR-24 Nova automatic processor, (Durr Dental, Germany). The records of all the patients including those who never had radiographs were examined to confirm that at presentation, the denture bearing tissues did not have evidence of a significant finding. The radiographs were examined by means of a viewing box in a dimly lit room. For consistency of interpretation, only one investigator carried out the interpretation of the radiographs. This is important when judgements were being made on degree rather

than on "absent or present".

The radiographs were examined for the following significant findings and indices: retained roots and teeth, impacted teeth, radioluscencies, radiopacities, calcification of the stylohyoid ligament, sclerotic bone density, alveolar ridge resorption classified as mild (less than 1/3 of the depth of the alveolar ridge), moderate (more than 1/3 of the depth of the ridge) and severe (where 2/3 of or more of the ridge was resorbed). The following significant condylar bone changes were found and included;

- I. erosion of the cortex
- II. flattening of the supero-anterior surface of the condyle
- III. "beaking" of the condylar process and
- IV. appearance of osteophytes.

The mandibular cortical index (MCI) was recorded by observing the appearance of the lower border of the cortex distal to the mental foramina on the radiograph. It is a three scale index denoted by the symbols C1, C2, C3 based on the endosteal margins of the cortex.

- C1, = The endosteal margin is even and sharp on both ends.
C2, = The endosteal margin shows semilunar defects or lacunar resorption on one or both ends.
C3 = the cortical layer forms heavy endosteal residues and is porous.

These findings and indices were recorded in a specially designed form then analysed manually using the tally method.

RESULTS

During the study period, 188 new patients seeking the first set of complete dentures were treated at the clinic. Of these, only 47 patients had radiographic examination done prior to denture fabrication. The age range of all the new patients was 37 to 82 years. A total of 141 significant radiographic findings and indices were observed and recorded (Table 1).

Table 1
Significant radiological findings and indices recorded

Finding/Index	Male	Female	Total
Retained roots	8	4	12
Impacted teeth	1	1	2
Retained teeth	6	4	10
Radioluscencies	1	0	1
Radiopacities	3	4	7
Sclerotic bone density	11	8	19
Calcified stylohyoid ligament	11	9	20
Extensive alveolar ridge resorption			
Maxillary	3	4	7
Mandibular	2	3	5
Condylar changes	12	8	20
Maxillary sinus shadow	5	3	8
Mandibular cortical index			
C2	17	9	26
C3	2	2	4
TOTAL	82	59	141

Figure 1

A panoramic radiograph revealing an impacted left maxillary canine.

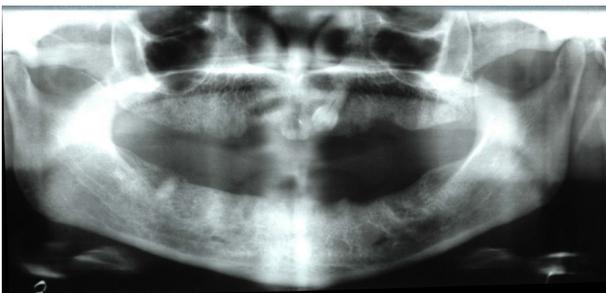


Figure 2

A panoramic radiograph showing a right mandibular radioluscent appearance consistent with that of the Stafne's bone cavity.

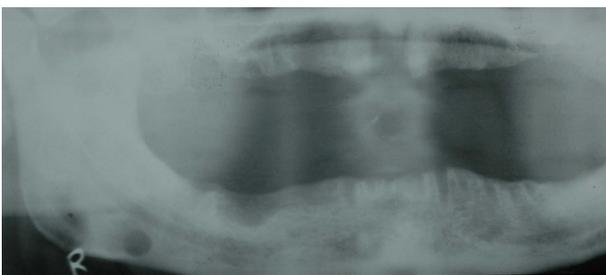
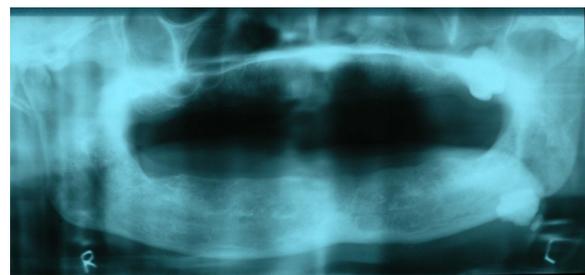


Figure 3

A panoramic radiograph depicting a calcified left submandibular node in addition to a calcified right stylohyoid ligament. Note the left maxillary radiopacity that is consistent with that of fibro-osseous dysplasia.



Retained roots were observed in 12 radiographs, while only two radiographs showed the presence of impacted teeth (Figure 1). A well-defined radioluscency below the mandibular canal in the mandible suggestive of the Stafne's bone cavity was observed in one radiograph (Figure 2). Two of the non-specific radiopacities were suspected to have been residual fibro-osseous dysplasia and a calcified submandibular lymph node (Figure 3). Calcification of the stylohyoid ligament was observed in 20 radiographs (Figure 3). Extensive alveolar ridge resorption (over 2/3 resorbed surface), was observed in 12 radiographs. "Beaking" of the condyles and

osteophyte formation was observed in 20 radiographs. Finally an analysis of the mandibular cortical index scored 30 radiographs as C2 and C3.

DISCUSSION

Patients attending the University of Nairobi prosthetic dentistry clinic seeking complete dentures are mainly from the low socio-economic bracket of the Kenyan population. Their ability to meet the cost of dental treatment is compounded by the fact that there is no national insurance cover for oral health services. The practice at the clinic is such that if the clinical examination does not reveal any evidence of pathology, then denture fabrication is commenced even without radiographic examination. Occasionally, a radiographic examination may not be possible due to lack of films or the chemicals necessary for processing the films. It is thought that the low number of patients who had radiographic examination was due to the aforementioned factors. The radiographs with retained teeth were included in the study since they had been referred to the clinic for immediate complete denture provision due to advanced periodontal disease characterised by advanced alveolar ridge resorption. All patients who had radiographic examination prior to denture construction did not have any evidence of pathology on clinical examination. Since there were different clinicians at each session in the clinic, it is conceivable that the patients who had radiographic examination did so because the clinician understood the importance of the investigation prior to denture construction. The two groups (those with radiographs and those without) presented in this study were, therefore, randomly selected.

While no foreign body was recorded in the present study, Axelsson (2) noted the presence of a foreign body (amalgam) in his study. Retained roots with adequate bone coverage and those that exhibit evidence of periradicular infection are removed prior to denture construction. The decision to remove or not to remove an impacted tooth depends on whether it is adequately covered with normal bone and its position with regard to the crest of the alveolar ridge. In cases where a retained root or an impacted tooth is to be left, the patients were informed and advised accordingly and the findings noted in the patient's records. Calcification of the stylohyoid ligament is an important finding because it may present with symptoms such as pain, which may be incorrectly attributed to the wearing of removable dentures (4).

The severity of alveolar ridge resorption is a valuable indicator of the prognosis of a complete denture prosthesis as far as support and stability of the denture is concerned (5). Previous studies have not quantified this important finding. The panoramic radiograph is not considered the radiograph of choice for assessing temporomandibular joint (TMJ) and maxillary sinus pathology, nevertheless, for purposes of routine assessment, significant findings may be deduced which may impact on the final outcome of the complete dentures. Condylar surface changes ("beaking", erosion and osteophyte formation (6) observed in about 42% of the cases may alter the normal movements of the joint, hence affecting the process of denture construction particularly during recording of jaw relations.

Good bone quality on the denture bearing areas is important for the support of the complete dentures. Identification of patients at risk of osteoporosis and any other systemic conditions which may interfere with the quality of bone is, therefore, a suggested prerequisite to the commencement of full denture fabrication. The mandibular cortical index (MCI) is simple and reproducible (7). Heavy endosteal residues and porosity was noted in four radiographs. These patients were thought to have been more likely to develop osteoporosis. The findings in this study have established a strong basis for the necessity of radiographic guidelines at any institution providing prosthetic dentistry services.

In conclusion, this study confirms the high diagnostic yield of routine pre-prosthetic radiographic examination and also puts into perspective the various indices in the jaws, which with proper interpretation, may influence the treatment outcome of complete denture patients.

ACKNOWLEDGEMENTS

To the administration of the School of Dental Sciences for permission to carry out this study and to Ms. C. Imbayi for the preparation of this manuscript.

REFERENCES

1. Lamb DJ. Patient assessment. In: Lamb DJ, (eds). Problems and solutions in complete denture prosthodontics. London: Quintessence, 1993, pp9-48.
2. Axelsson G. Orthopantomographic examination of the edentulous mouth. *J. Prosthet Dent* 1988; 59:592-598.

-
3. Keur JJ, Campbell JPS, McCarthy JF, Ralph WJ. Radiological findings in 1135 edentulous patients. *J Oral Rehabil.* 1987; **14**:183-191.
 4. Phillip JD, Shawkat AH. Prosthetic implications of eagle's syndrome. *J. Prosthet Dent* 1975; **34**:614-619.
 5. Basker RM, Davenport JC, Tomlin HR. Stability of dentures. In: Basker RM, Davenport JC, Tomlin HR (3rd ed). *Prosthetic treatment of the edentulous patient.* London: Macmillan, 1992, pp53-65.
 6. Solberg WK. Functional and radiological considerations. In: Solberg WK, (eds). *Temporomandibular disorders.* London: BDJ, 1986, pp15-29.
 7. Jowitt N, MacFarlane T, Devlin H, Klemetti E, Horner K. The reproducibility of the mandibular cortical index. *Dentomaxillofac Radiol.* 1999; **28**:141-144.