

DISTRIBUTION AND TYPES OF ARTIFICIAL CROWNS AND BRIDGES PRESCRIBED AT A NIGERIAN TEACHING HOSPITAL.

A.O. Oginni, A. O. Olusile, C. I. Udoye.

Department of Restorative Dentistry, Faculty of Dentistry, Obafemi Awolowo University, Ile-Ife, Nigeria.

ABSTRACT

***Objectives:** To determine the types and distribution of artificial crowns and fixed partial dentures, to analyse the age and gender distribution of patients receiving these prostheses and to compare results with studies elsewhere.

Materials and methods: The present study consists of patients who received crowns and fixed partial dentures from January 1998 to December 2002, at the Dental Hospital of the Obafemi Awolowo University Teaching Hospital Complex Ile-Ife, Nigeria.

Results: A total of 380 crowns were prescribed and fabricated for 224 patients (F=108, M=116), giving an average of 1.7 crowns per patient. The majority of the crowns were fabricated for patients in the age group 20-29 years. There were no statistically significant differences between vital and pulp filled teeth that were crowned among the age groups ($p > 0.05$). The most frequently crowned tooth was the maxillary central incisor constituting 59.7 per cent. All-resin crowns were the most prescribed (59.2 per cent) followed by porcelain-fused-to-metal crowns (38.1 per cent). A total of 68 fixed partial dentures, consisting of 178 retainers and 117 pontics were made for 68 patients.

Conclusion: Although the pattern of distribution was similar to that reported in the western world, there was discrepancies in the age distribution. While in the western world, patients who received crowns were on the average 4 years younger than those who received fixed partial dentures, in the present study they were on the average 10 years younger. It may be that people in the western world lost more teeth earlier in life than in Nigerians.

KEY WORDS: Artificial crowns, bridges, distribution, epidemiology.

INTRODUCTION:

The availability and use of fixed prosthetic restorations varies in different parts of the world and so does the composition of the clientele. Fixed prosthetic restorations may be grouped into two broad categories. Artificial crowns and fixed partial dentures (bridges).

Artificial crowns are extra coronal restorations, which may cover the whole clinical crown - full crown or part of the clinical crown - $\frac{3}{4}$ and $\frac{7}{8}$ crowns. They may be used to restore function and or aesthetic to a tooth, while at the same time protecting the remaining tooth structure. Crowns may also serve as retainers on abutment tooth when replacing missing tooth or teeth. A fixed partial denture is an artificial prosthesis used to replace missing tooth or teeth. Although its use is becoming gradually unpopular in the western world due to the introduction of dental implant, bridges are still the main stay of replacement of missing tooth or teeth in Nigeria.

These prostheses may be fabricated from a variety of materials such as composite resin-bonded-to-metal, all metal, all ceramic (porcelain) and porcelain-fused-to-metal (P F M). The choice may depend upon mechanical and aesthetic considerations, availability of material, patient and dentist preferences. Several studies have been carried out in the United Kingdom,^{1,2} Norway³ and Australia⁴ on the prescription and provision patterns of crowns. In England and Wales P F M crowns comprised 94.7 per cent of all crowns and is the most frequently used followed by all porcelain (2.9 per cent).¹ The same pattern has been reported in Australia with

P F M being the most frequently prescribed accounting for 82.9 per cent followed by all porcelain crowns (8.2 per cent).⁴ Whereas in Scotland 52.4 percent of the crowns prescribed were all porcelain followed by P F M crowns (31.0 per cent).⁵

Considering the location and distribution of crowns, Fyffe found the maxillary anterior teeth to be the most frequently crowned (67.7 per cent) followed by maxillary posterior teeth (17.4 per cent), Mandibular posterior (11.8 per cent) and mandibular anterior (3.3 per cent).⁵

Previous work on fixed partial dentures by Silness,³ Valderhaug and Karlsen⁶ showed that more females than males had been treated and that the majority of the restorations were also for maxillary teeth.

All the above figures are for western countries where heavily restored teeth, which resulted from treatment of higher levels of caries in the 1950s, 60s, and 70s are being replaced by full coverage crowns.⁷ In Nigeria as it may be in many African countries, there is dearth of information on the prescription and provision pattern of crowns and fixed partial dentures. It is therefore the aim of the present study to determine the types and distribution of crowns and fixed partial dentures, and to analyse the age and gender distribution of patients who received crowns and fixed partial dentures at the Dental Hospital, Obafemi Awolowo University Teaching Hospital Complex Ile-Ife, Nigeria.

Materials and methods

The present study consists of patients who received crowns and fixed partial dentures from January 1998 to December 2002, at the Dental Hospital of the Obafemi Awolowo University Teaching Hospital Complex Ile-Ife, Nigeria.

Information collected includes the age and gender of the patients, the tooth to be crowned, reason for crowning and the material used in fabricating the crown. For patients receiving fixed partial dentures, the tooth to be replaced, type of fixed partial denture and the abutment of tooth or teeth were also recorded. The recorded data were collated and analysed with the aid of a computer.

Results

Artificial crowns

A total of 380 crowns were prescribed and fabricated for 224 patients (F=108, M=116), giving an average of 1.7 crowns per patient for the period under review. Altogether 315 crowns were made in the maxilla and 65 in the mandible. The age of patients ranges from 18 to 67 years. Mean age \pm Standard deviation is 29.8 ± 10.7 years.

Of the 380 artificial crowns 210 (55.7 per cent) were fabricated on endodontically treated teeth. Endodontically treated teeth comprised 54.3 per cent of the crowned teeth in the maxilla and 169 per cent in the mandible. The majority of the crowns were fabricated for patients in the age group 20-29 year followed by the 30-39 year age group. There were no statistically significant differences between vital and pulp filled teeth that were crowned among the age groups ($p > 0.05$), Table 1. The most frequently crowned tooth was the maxillary central incisor constituting 59.7 per cent. In both the maxilla and mandible the anterior teeth were crowned more than posterior teeth. There was no clear difference in the number of teeth receiving crowns in the right and left side of the upper and lower jaws. All-resin crowns were the most prescribed (59.2 per cent) followed by P F M crowns (38.1 per cent) all-metal crowns accounted for 2.6 per cent (Table 2). All ceramic (porcelain jacket crowns) and resin-bonded-to-metal were not prescribed.

Table 3 shows that trauma was the most common reason for crowning accounting for 70 per cent, followed by discolouration either as a result of tetracycline stains or secondary to traumatic injury at an earlier age fixed partial dentures.

In all 68 patients (F=28, M=40) received 68 fixed partial dentures (FDP). No patient received more than one FDP. The dentures were made up of 178 retainers and 117 pontics. The ratio of retainers to pontics was 1.52:1. About 28 per cent of the fixed partial dentures were fabricated for patients in the age group 40 - 49 followed by the age group 50-59 with 22 per cent. Three unit bridges constituted the majority, accounting for 33.8 per cent (Table 4).

In the maxilla 56 fixed partial dentures were fabricated for 21 females and 35 males. The dentures constituted of 144 retainers and 91 pontics, a ratio of 1.58:1. The mean age for the females and males was 33.4 and 35.7 years respectively. In the mandible 12 fixed partial dentures were fabricated for 7 females and 5 males. The dentures comprised of 34 retainers and 26 pontics, a ratio of 1.3:1. The mean age for the females and males was 38.1 and 42.4 respectively. The central incisors were the most frequently replaced by fixed partial dentures, while the canines were the most frequently used teeth as abutment comprising 38.9 per cent in the maxilla and 38.2 per cent in the mandible (Table 5 and 6).

Table 5 shows the number, percentage and location of missing teeth replaced by fixed partial dentures. More missing teeth were replaced in the maxilla than in the mandible. There was no clear difference when comparing the

right and left side of the upper and lower jaws with respect to the number of missing teeth replaced by fixed partial dentures. They were statistically significant ($p < 0.05$).

Discussion.

In Nigeria, the fees of dental treatment are based on out of pocket payment by patients (the national health insurance scheme is yet to be fully operational). Therefore, financial considerations will certainly influence the choice of patients and the type of restorations.

Artificial Crowns

About 83 per cent of all crowns were fabricated for maxillary teeth as shown in Table 2. This corresponds fairly well with the results of other studies. For example, Valderhaug & Karlsen⁶ (about 2/3rd) and Silness,³ 69 per cent. However, our figure is higher. The highest percentage of patients receiving crowns was in the age group 20-29 years (49.5 per cent) followed by 30-39 years age group (Table 1). This is in agreement with the findings of Tylman⁸ who reported that the majority of the patients were between 20-40 years of age. Similar studies^{6,9} reported the majority of patients to be between 50-59 years of age. The difference in age distribution of the patients in the present study and those of Valderhaug & Karlsen,⁶ Moen and Poetsch⁹ may be due to differences in reasons for fabricating the crowns. While in this study, the majority of crowns were made as a result of fracture secondary to trauma which generally occur at an earlier age (Table 3), in the western world crowns are fabricated to replace heavily restored teeth resulting from the treatment of caries over the years.⁷

The incisors dominated in the frequency of restorations made in the maxilla and mandible in the present study. This is not in total agreement with previous studies in which the incisors dominated in the maxilla, while premolars and first molars dominated in the mandible as reported by Silness³ and Tylman⁸ respectively. Although the incidence of caries is on the increase in Nigeria as in many other African countries,¹⁰ the premolars and molars that are mostly affected are being filled with dental amalgam and the fillings are presently not as heavy as to warrant their replacement by full coverage crowns. The use of amalgam posteriorly may allow for prolonged direct restoration prior to crown placement.^{11,12}

All resin crowns were the most frequently fabricated (59.2 per cent) followed by P F M 38.1 per cent Table 2. This is in contrast to the findings of studies in Australia,⁴ England and Wales¹ where P F M crowns constituted 82.9 per cent and 94.7 per cent respectively. In this study all ceramic (porcelain) crowns were not prescribed considering the brittleness of porcelain and the high masticatory force required in chewing the more fibrous Nigerian diet. For these reasons also all the crowns on premolars and molars were fabricated in P F M and all metals respectively. The choice of all resin crowns was purely economical. P F M crowns are about 5 times the cost of all resin crowns.

Fixed Partial Dentures.

More males (40) than females (28) received fixed partial dentures. This is contrary to previous reports.^{6,8} It may be that in Nigeria men being the bread winners are more able to seek and pay for treatment.

Most of the fixed partial dentures replaced missing teeth in the maxilla. This is in agreement with the findings of other studies.^{5,6} The replacement of incisors constituted 89 per cent in the maxilla and 73.1 per cent in the mandible. This is at variance with previous studies^{5,8} in which the maxillary first premolars were reported as the most frequently replaced teeth. Among Nigerians the mortality of anterior teeth results mostly from trauma secondary to road traffic accidents (RTA), while that of posterior teeth was reported to be periodontal in aetiology¹³ although mortality as a result of dental caries is observed to be on the increase. Based on the relatively high percentage of missing incisors and the low percentage of missing posterior teeth replaced by fixed partial dentures in this study, aesthetics and social factors may be the main reasons for seeking treatment.

In both arches, the canines were the most frequently used teeth as abutment (Table 6). The strategic location of the canine in the jaws and its strong and long root makes it more favoured as abutment tooth for both anterior and posterior fixed partial dentures.

The majority of patients that received single crowns were in the age groups 20-29 and 30-39, while that of patients receiving fixed partial dentures were in the age groups 40-49 and 50-59. This is in accordance with the findings of Silnes.³ The average age for females and males who received fixed partial dentures in the maxilla. Females received fixed partial dentures at an earlier age than males.

Conclusion

Although the pattern of distribution was similar to that reported in the western world, there were discrepancies in the age distribution. While in the western world patients who received were on the average 4 years younger than those who received fixed partial dentures, in the present study they were on the average 10 years younger. It may be that people in the western world lost more teeth earlier in life than in Nigerians.

Acknowledgements

The authors wish to thank all the doctors, dental technologists and Dental Surgery Assistants that worked in the Department of Restorative Dentistry during the time of this study. We also extend our gratitude to all the members of staff of the Medical Records Department for allowing us into their archives. We are grateful to Dr. A.A Okoya of the Department of Mathematics Obafemi Awolowo University for the statistical analysis.

Table 1: Vital and pulp filled teeth which received single crowns

Age group	Vital teeth		Pulp filled teeth		Total	
	No	(%)	No	(%)	No	(%)
16-19	16	(9.4)	33	(15.7)	49	(12.9)
20-29	93	(54.7)	95	(45.2)	188	(49.5)
30-39	42	(24.7)	59	(28.1)	101	(26.6)
40-49	10	(5.9)	13	(6.2)	23	(6.1)
50-59	3	(1.8)	4	(1.9)	7	(1.8)
60-69	6	(3.5)	6	(2.9)	12	(3.2)
Total	107	(100.0)	210	(100.0)	380	(100.1)

* Rounded up percentages

Age groups 50 - 59 and 60 - 69 were merged for statistical analysis. Chi-square=5.07; df=4; p=0.28.

Table 2: Percentage distribution of maxillary and mandibular crowns

	PFM	All-metal	All-resin	Total
Maxillary crowns				
Central incisors	25.8	0	34.0	59.8
Lateral incisors	5.3	0	9.0	14.3
Canines	0.5	0	2.9	3.4
First premolars	1.3	0	0.5	1.8
Second molars	2.1	0	0.5	2.6
First molars	0	0.5	0	0.5
Second molars	0	0.5	0	0
Third molars	0	0	0	0
Total	35.0	1.0	46.9	82.9
Mandibular crowns				
Central incisors	1.8	0	6.1	7.9
Lateral incisors	0.8	0	3.7	4.5
Canines	0	0	1.6	1.6
First premolars	0	0	0.5	0.5
Second premolars	0.5	0	0.5	1.0
First molar	0	0.8	0	0.8
Second molar	0	0.8	0	0.8
Third molar	0	0	0	0
Total	3.1	1.6	12.4	17.1

Table 3: Percentage distribution of reasons for crowns

Reasons	Caries	Peg shaped	Rotation	Hypoplastic	Discolourati	Fracture	Total
Vital	2.6	2.1	0.8	10.0	10.0	19.2	44.7
Pulpless	3.7	0	0	0	0.8	50.8	55.3
Total	6.3	2.1	0.8	10.0	10.8	70.0	100.0

Table 4: Number of fixed partial dentures according to length in units versus age group of Patients.

Age group	Cantilevered	3 units	4 units	5 units	6 units	Total
16-19	5	1	0	0	0	6
20-29	6	1	1	0	0	8
30-39	2	4	1	1	0	8
40-49	0	7	6	4	2	19
50-59	0	5	9	1	0	15
60-69	0	5	4	1	2	12
Total	13	23	21	7	4	68

Table 5: The number and percentage of missing teeth replaced by fixed partial dentures in the maxilla and mandible.

Teeth	Maxilla		Mandible	
	No	(%)	No	(%)
Central incisors	60	(65.9)	13	(50.0)
Lateral incisors	21	(23.1)	6	(0.)
Canines	1	(1.1)	0	(0)
First premolars	3	(3.3)	3	(11.5)
Second premolars	2	(2.2)	1	(3.9)
First molars	3	(3.3)	2	(7.7)
Second molars	1	(1.1)	1	(3.9)
Total	91	(100.0)	26	(100.0)*

*Rounded up percentages

Central, lateral incisors and canines were grouped together as anterior teeth while premolars and molars were grouped together as posterior teeth for statistical analysis.

Mantel-Haenszel chi-square = 4.93; p = 0.02.

Table 6: The number and percentage of teeth used as abutments of first partial dentures in the maxilla and mandible.

Teeth	Maxilla		Mandible	
	No	(%)	No	(%)
Central incisors	25	(17.4)	2	(5.9)
Lateral incisors	50	(34.7)	9	(26.5)
Canines	56	(38.9)	13	(38.2)
First premolars	2	(1.4)	0	(0)
Second premolars	4	(2.8)	3	(8.8)
First molars	3	(2.1)	3	(8.8)
Second molars	3	(2.1)	3	(8.8)
Third molars	1	(0.7)	1	(2.9)
Total	144	(100.1)*	34	(99.9)*

*Rounded up percentages

References

1. Dental Practice Board of England and Wales Dental data Services. Digest of statistics. East Sussex: Dental Practice Board of England and Wales Dental Data Services. 1997.
2. **Farrel T.H, Dyer M.R.Y:** The provision of crowns in the General Dental Service 1948 - 1988. Br Dent J 1989; 167:399-403.
3. **Silness J:** Distribution of artificial crowns and fixed partial dentures. J. Prosthet Dent 1970;23:641-647.
4. **Stankiewicz N. R, Wilson P. R:** A survey of the distribution and types of full crowns prescribed in Melbourne, Australia. Aust Dent J 2000;45: 193-197.
5. **Fyffe H.E:** Provision of crowns in Scotland - a ten year longitudinal study Community Dent Health 1992;9:159-164.
6. **Valderhaug J, Karlsten K:** Frequency and location of artificial crowns and fixed partial dentures constructed at a dental school J Oral Rehabil 1976,3: 75-81.
7. **Kelly M. Steele J, Nuttall N, Bradnock G, Morris J. Nunn J:** et. Al. Adult Dental Health Survey: Oral health in the United Kingdom in 1988. (2000) London TSQ.
8. **Tylman S.D:** Theory and Practice of Crowns and Fixed Partial Prosthodontics (Bridge) C.V. Mosby Company. Saint Louis, 1970:152.
9. **Moen B.D, Poetsch W.E:** More preventive care, less tooth repair. J. Am Dent Assoc 1970; 81:25.
10. **Barmes D.E, Tala H:** Oral health trends in WHO African Region Afr. Dent J 1987;1:2-4.
11. **Smales R.J, Hawthorne W.S:** Long-term survival of extensive amalgams and posterior crowns. J Dent 1997; 25:225-227.
12. **Hawthorne W.S, Smales R.J:** Factors influencing long-term restoration survival in three private practices in Adelaide. Aust Dent J 1997;42:59-63.
13. **Otoyemi O.D, Sofowora C.A:** Traumatic anterior dental injuries in selected rural primary school children in Ile-Ife, Nigeria. Nig Dent J 1991; 10:20-25.
14. **Odusanya S.A:** Tooth loss among Nigerians, causes and pattern of mortality. Int J Oral Maxillofac Surg 1987;16:134-189.