Prevalence and reasons for extraction of endodontically treated teeth in adult Nigerians

Udeye C.I.1, Sede M. A1
1Department of Restorative Dentistry, College of Medicine, University of Nigeria, Enugu Campus, Enugu.
2Department of Restorative Dentistry, University of Benin Teaching Hospital, Benin City, Edo State.

Correspondence to:
Prof. M. A. Sede,
Department of Restorative Dentistry,
University of Benin Teaching Hospital,
Benin City, Edo State,
Nigeria.
E-mail <sedematt@uniben.edu>
Phone: +2348023332446

Key words: Endodontically treated teeth; extraction; reasons

Accepted 12 May, 2016

Abstract

Objective: To determine the prevalence and reasons for the extraction of endodontically treated teeth in adults Nigerians. Materials and Methods: This is a retrospective cross sectional study in which 2000 case files of patients that had treatment in the Conservative Dental Clinic from 2008 to 2009 were retrieved from the Medical Records Department of the University of Nigeria Teaching Hospital, Enugu, Nigeria, to determine those that had extraction of endodontically treated teeth. The information garnered were patients’ socio-demographic data, tooth type and the main reason for tooth extraction. Others were dental status of the root treated tooth / teeth and patients’ oral health habits. The data were analysed and the result tested with Chi-square, while the critical level of significance was set at p ≤ 0.05. Results: The review of 2000 case files revealed a total of 650 endodontically treated teeth. Out of which 140 teeth in 140 subjects, aged 18-60 years had extractions after treatment; resulting in a prevalence of 21.5%. More teeth were extracted from the mandible than maxilla (p<0.05), with molars in both jaws being the most extracted tooth type. There was a relationship between extraction and post or veneer restoration (p<0.05) while 64.0% of the extractions occurred within the first 3 years of treatment. The reasons for extraction were caries 35 (25.0%), endodontic reasons 34 (24.3%), VRF 33 (23.6%), cusp fracture 20 (14.3%), periodontal disease 13 (9.3%) and trauma 5 (3.5%) but the reasons varied in both arches. Conclusion: The main reasons for the extraction of endodontically treated teeth were caries, endodontic reasons and vertical root fracture (VRF), which varied in the mandibular and maxillary arches.

Oral health implies the preservation of permanent dentition as long as reasonably possible; to maintain aesthetic, masticatory and speech functions.1 Tooth loss is associated with biological, psychological and social effects hence clinicians strive to maintain a vital, non vital or moribund tooth in function in the arch through endodontic treatment.1 However, endodontic therapy has its shortcomings. Its success rate is reported to be about 30-98%; with about 94% of treated teeth being functional for 3.5 years’ post treatment. The report of two studies in the United States indicated that the retention of endodontically treated teeth in the oral cavity were 94% and 97% respectively while a Taiwanese study reported a lower retention rate of 92.3% without specifying the reasons for the extraction of the missing teeth. The probable factors associated with failure are misjudgment about the feasibility of treatment and technical difficulties.6 Unfortunately, most failed cases remain irremovable resulting in the extraction of the affected tooth/teeth. Zadik et al reported that after 8 years of initial treatment, 3% of the teeth were extracted within the first 5 years. Reasons for the extraction of endodontically treated teeth vary among authors.15 These include non-restoreable caries, endodontic treatment failure, cusp fracture, vertical root fracture (VRF) and periodontal diseases. Others are iatrogenic perforations and stripping, orthodontic, prosthetic and traumatic reasons.15 Unfortunately, the level of contributions of these factors remains contentious among authors; with Zadik et al15 suggesting that non-restoreable caries as the main culprit. In related studies, Fuss et al15 blamed the quality of crown restoration as the most common reason, Vire15 reported restorative or prosthetic failure and crown fractures as the main incentive for extraction while Feniks et al suggested that the absence of coronal coverage predisposes endodontically treated teeth to unfavourable fractures19 and subsequent extraction. However, Toure et al7 in their prospective study reported periodontal disease as the main reason for the extraction of endodontically treated teeth while a similar Nigerian study10 that analysed extracted and retreated root canal treatment failures attributed most of the failures to non-endodontic reasons, although the precise number of extracted teeth was not stated.

Earlier reports1 found that mandibular first molars, followed by maxillary first molars, mandibular second molars and maxillary second premolars are the commonly extracted teeth. This pattern of extraction in endodontically treated teeth is more prevalent among smokers than in non-smokers based on the contributory role of periodontal disease.11 It has similarly been observed that root treated teeth without
full coverage crowns were lost at a rate 5-6 fold higher than those with full coverage restorations. However, the use of post in endodontically treated teeth had no significant effect on their extraction rate.

The rapidly changing concepts in endodontic practice underscore the need for the integration of evidence based decision in case selection and treatment planning. Evidently, the functionality of the endodontically-treated tooth is often the most important aspect of endodontic treatment outcomes; but the extraction of such teeth shortly after endodontic treatment leaves much to be desired. The purpose of this study was to investigate the prevalence of extraction of endodontically treated teeth in adults in a Nigerian tertiary hospital and to highlight the reasons for such extractions.

Materials and method

This cross sectional study involved a retrospective examination of 2000 case files of patients treated in the Conservative Dental Clinic; obtained from the archives of the Medical Records Department of the University of Nigeria Teaching Hospital, Enugu, Nigeria.

Inclusion criteria were case files (2008-2009) of subjects aged 18-60 years, who had non surgical root canal treatment (NSRCT) that required extraction. However, cases without periapical radiograph or those with poor quality radiographs were excluded. Others were teeth extracted before RCT was completed, endodontically treated third molars and case files with incomplete data.

Subject’s socio demographic data, tooth type and the main reasons for extraction were recorded in the data sheet. Others were dental status (whether tooth was restored with a crown or post-crown) and oral health habit (smoking). The data were analysed and the result tested with Chi-square, while the critical level of significance was set at p $\leq$ 0.05

Results

A total of 2000 dental case files were retrieved; yielding 650 endodontically treated teeth. Out of the endodontically treated teeth, 140 (21.5%) teeth in 140 subjects had extractions. The subjects in the study were aged 18-60 years with a mean age of 32.63 ± 12.25 years. The prevalence of extractions in the population was 21.5%. This was more often in the mandible 95 (67.9%) than in the maxilla 45 (32.1%) (p > 0.05). In both jaws, more molars were extracted 80 (57.1%), followed by premolars 38 (27.1%) and incisors and canines 22 (15.7%) (p < 0.05). Extractions occurred 57.1% of times in females (80) than in males (60) (p > 0.05). However, the rate of extraction decreased with age, but peaked in the 51-60 year age range (p < 0.05)(Table 1).

The relationship between tooth extraction and post or veneered restoration was highly statistically significant (p<0.05). About 89 (64.0%) of the extractions occurred within the first 3 years (p<0.05)(Table 2).

The association between age and extraction was statistically significant (p<0.05). Furthermore, caries 35 (25.9%), endodontic reasons 34 (24.3%), VRF 33 (23.6%), cusp fracture 20 (14.3%), periodontal disease 13 (9.3%) and trauma 5 (3.5%) but the reasons for extraction in both arches differ (p<0.05)(Table 3). Also, the association between smoking and extraction was not statistically significant (p>0.05).

Discussion

This study being a retrospective report, suffers from limitations common to studies of similar nature. The procedures in this study were carried out by different operators with varied skills and proficiencies; which may have impacted on the endodontic outcome. It is therefore likely that most of the extracted ETT may have lacked standard isolation, utilized different treatment protocols, recall rate and observation periods. Nevertheless, retrospective studies are still of value epidemiologically and clinically in providing both clinical and research information useful in advancing knowledge.

Compared with about 3% extraction rate in Zadik et al’s study, the 21.5% rate in the current report is high. The disparity may be due to non standardization in design, methodology, treatment protocols, etc. Application of modern concepts, materials and techniques as opposed to the practice in developing nations, may have accounted for the lower extraction rate in the study by Zadik et al’s. It is also possible that more subjects in the current study suffered procedural accidents or as a result of the effect of smoking which manifests in a 5-8 fold increase in extractions due to periodontal disease in current smokers. However, the association between smoking and extraction in this study was not statistically significant.

Table I. Extraction by jaw, gender and age

<table>
<thead>
<tr>
<th>Jaw</th>
<th>Molars</th>
<th>Premolars</th>
<th>Anteriors</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mandible</td>
<td>52</td>
<td>29</td>
<td>14</td>
<td>P=0.422</td>
</tr>
<tr>
<td>Maxilla</td>
<td>28</td>
<td>9</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>39</td>
<td>12</td>
<td>9</td>
<td>P=0.208</td>
</tr>
<tr>
<td>Female</td>
<td>41</td>
<td>26</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-30</td>
<td>34</td>
<td>13</td>
<td>12</td>
<td>p=0.001</td>
</tr>
<tr>
<td>31-40</td>
<td>15</td>
<td>9</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>41-50</td>
<td>11</td>
<td>5</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>51-60+</td>
<td>20</td>
<td>11</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

Table II. Extraction by dental status and longevity

<table>
<thead>
<tr>
<th>Dental status</th>
<th>Molars</th>
<th>Premolars</th>
<th>Anteriors</th>
<th>p-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Posted</td>
<td>16</td>
<td>9</td>
<td>12</td>
<td>P=0.001</td>
</tr>
<tr>
<td>Veneered</td>
<td>-</td>
<td>-</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Longevity (yrs)</td>
<td>P=0.604</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-3</td>
<td>54</td>
<td>23</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>4-6</td>
<td>25</td>
<td>13</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>7-9</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

(c)2016 Nigerian Journal of Restorative Dentistry.
Table III. Extraction reason by age, jaw and smoking habit

<table>
<thead>
<tr>
<th>Age</th>
<th>Caries</th>
<th>Cusp</th>
<th>PD</th>
<th>Endo</th>
<th>VRF</th>
<th>Trauma</th>
<th>p-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>18-30</td>
<td>10</td>
<td>1</td>
<td>2</td>
<td>11</td>
<td>9</td>
<td>4</td>
<td>p=0.001</td>
</tr>
<tr>
<td>31-40</td>
<td>10</td>
<td>6</td>
<td>0</td>
<td>8</td>
<td>10</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>41-50</td>
<td>1</td>
<td>4</td>
<td>2</td>
<td>9</td>
<td>8</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>51-60+</td>
<td>7</td>
<td>9</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

Jaw

- Mandible: 10, 9, 8, 23, 22, 2
- Maxilla: 5, 11, 5, 11, 10, 3

Smoking

- Yes: 5, 3, 2, 8, 5, 2
- No: 10, 17, 11, 26, 28, 3

Key: Cusp = Cusp fracture; PD = Periodontal disease; Endo = Endodontic reasons; VRF = Vertical root fracture.

Although there was a relationship between jaw and extracted tooth type, it was not statistically significant as was observed in an earlier study. The more extractions seen in molar teeth may be associated with unpredictable root configuration and procedural difficulties in the RCT of molar teeth.

Unlike the previous reports, the current study found that the rate of extraction decreased with age, but peaked in the 51-60 year age range. This may be due to physiological age changes within the pulp canal.

The higher incidence of extraction in endodontically treated teeth without extraradicular restorations in the current report agrees with others. Teeth without extraradicular restorations are extracted 5-6 times more than those restored with extraradicular restorations. Their susceptibility to extraction may be due to cumulative loss of tooth structure from caries, restorative as well as endodontic procedures. The loss of a marginal ridge is associated with a 46% reduction in tooth stiffness while the loss of both marginal ridges results in 63% reduction in tooth stiffness.

The rate of extraction of teeth with post-retained restorations in the current study agrees with that of Sorensen et al. This may be due to limited skill (usually common among junior members) in post hole preparation. It is however important to note that the Core is more critical in tooth restoration than Post while the role of the latter in resistance to dislodgement and fracture differs among researchers.

The finding on longevity in the current study agrees with that of Salehri et al. who showed that most extractions occurred in the first 3 years after initial treatment. Longevity may be influenced by pre-existing structural integrity of the tooth. It may however depend more on the adequacy of coronal reconstruction rather than on the quality of the endodontic treatment. Furthermore, the loss of pressure receptors and an elevated pain threshold in endodontically treated teeth may lead to decreased protection and therefore shortened longevity.

The reasons reported for the extraction of endodontically treated teeth vary. These variations may be due to differences in study design and sample, methodology and treatment protocol, etc. Whereas non-restorable caries (recurrent and residual) accounted for majority of extractions in the current study, endodontic and prosthetic reasons featured prominently in the reports of Fuss et al and Vire respectively. Although an earlier study, similarly found non-restorable caries as the reason for extraction; it accounted for over 60% of such extractions. The difference between this study and others in the distribution of reasons for the extraction of endodontically treated teeth may include the study design, the quality of oral hygiene maintained by subjects post treatment, quality of endodontic treatment and the final restoration. Where posts were used, they may have been unskillfully inserted or that excessive pressure was used during insertion.

Conclusion

This study indicates that while there are varied factors contributing to the extraction of endodontically treated teeth, those reasons may differ across arches, gender and age. Considering the fairly high prevalence of extraction of ETT in the study, it is recommended that practitioners should exercise care in case selection and treatment to forestall post endodontic extractions.

References


