ASSESSMENT OF FREQUENCY OF TRANSALVEOLAR EXTRACTIONS OF FAILED ROOT CANAL TREATED MOLAR TEETH PERFORMED IN PATIENTS REPORTED TO A UNIVERSITY HOSPITAL

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ABSTRACT

Introduction: Extraction is considered to be one of the last treatment options for an affected tooth if there are no means of saving it. Some of the reasons for removing the tooth can be extensive caries, orthodontics & periodontal purpose, impacted teeth and failed endodontic treatment. Failed root canal treatments can be accompanied by swelling or pain in the affected tooth.

Aim: The aim of the study was to assess the frequency and association of Transalveolar extractions of failed root canal treated molars among patients reported to Saveetha.

Materials and methods: Patients referred to OMFS department of Saveetha Dental College with failed RCT molar teeth for extraction between June 2010 to April 2020 were taken into this study. The case reports of patients were obtained by reviewing their case sheets and were tabulated in excel. The data analysis was done using SPSS software and the output was generated as bar charts.

Results: Mandibular molars were prone for transalveolar extractions due to failed endodontic treatment. 41.86% of the extractions were done in molars as they showed failed root canal treatments. 51.16% were females while 48.84% were males. 37.24% had undergone extractions between the ages of 35 to 45 years. Within the limitations of the current study, mandibular molars of females were more prone for Transalveolar extractions due to root canal treatment failure.

I. INTRODUCTION

Dental extractions are the most commonly performed procedures in dental clinics. An ideal extraction of a tooth is the painless removal of the whole tooth or root of the tooth with minimum trauma to the investing tissues so that there would be wound healing uneventfully and no postoperative prosthetic problem would be created. Dental anxiety and fear are common among patients, and dental extractions are one of the most feared procedures (Rao and Santhosh Kumar, 2018).

Preservation of teeth has been the treatment of choice and the fundamental principle of dentistry. In contrast, extraction of natural teeth is considered to be undesirable due to the limited long term success of the alternate loss of function and aesthetics (Sedgley and Wagner, 2003). Heroic effects have been made to preserve the tooth, ranging from orthodontic treatment and periodontal therapy. The need to extract or endodontic therapy is dependent on the quality of teeth based on which the treatment plan is decided. The success rates of endodontic theory usually ranges from 70% to 95% (Weiger, Axmann-Krcmar and Lm, 1998) (Abhinav, Sweta and Ramesh, 2019). Endodontically treated teeth can be repeatedly restored but they tend to fail when the conventional endodontic therapy fails to meet the needs (Reeh, Messer and Douglas, 1989). The key to success for endodontic treatment is to debride the root canal system thoroughly to eliminate necrotic and infected pulp tissues, microorganisms and complete sealing of the root canal space to avoid reinfection (Siqueira, 2001). It is very important to make sure that there are no persistent or lingering microorganisms in the pulp spaces and prevent
reinfection. The failure of endodontic treatment is determined by clinical signs and symptoms and it is made accurate and confirmed by radiographic findings of the root canal treated molars. The literature shows that many factors are considered responsible for endodontic treatment failure(Kumar and Rahman, 2017). This includes any residual necrotic pulp tissue, presence of periradicular or periodontal disease, root fractures with broken instruments, mechanical perforations, root canal overfilling, root canal underfillings, missed canals or unfilled canals(Engström and Frostell, 1964),(Seltzer, Bender and Turkenkopf, 1963; Seltzer et al., 1967)

The failure to localise and treat all the canals of the root canal system especially among the molars, failed by the operator is considered one of the major causes of endodontic failure. Most of the time, the endodontic failure is responsible for the general dental practitioner as they try to do RCT. Incomplete treatment or panic due to medical emergencies can also be a reason for failure(Jesudasan, Abdul Wahab and Muthu Sekhar, 2015).

Medical Emergencies is an important factor to be considered on the dental chair as it could be uninvited. Lack of training and inability to cope with these can lead to tragic consequences(Kumar, 2017c). Root canal treatment usually fails when treatment is not of acceptable standards. The reason many teeth fail to respond to root canal treatment is because they fail to follow the procedural errors that prevent the control and prevention of intracanal endodontic infection. Keeping in mind the different factors affecting the infected canals, some other factors that the clinician is often misled by the notion of procedural errors are broken instruments, perforations, overfilling, underfilling, ledges and this directly affects the result of the failure(Marimuthu et al., 2018). Usually these procedural errors do not jeopardise the outcome of endodontic treatment unless there is a concomitant infection(Jain et al., 2019). Previously our team has a rich experience in working on various research projects across multiple disciplines((Neelakantan et al., 2015; Ramamoorthi, Nivedhitha and Divyanand, 2015; Abdul Wahab et al., 2017; Eapen, Baig and Avinash, 2017; Manivannan et al., 2017; Patil et al., 2017a; Ezhilarasan, Sokal and Najimi, 2018; Jeevanandan and Govindaraju, 2018; Ravindiran and Praveenkumar, 2018; Wahab et al., 2018; Malli Sureshbabu et al., 2019; Mehta et al., 2019; Rajeshkumar et al., 2019; Samuel, Acharya and Rao, 2020; Sathiish and Karthick, 2020).Procedural errors usually translate to be impossible to accomplish appropriate intracanal procedures, but there is potential for failed root canal treatment when these treatment errors occur during the removal of the infection in the teeth(Sundqvist et al., 1998).

The usual factors attributing to endodontic therapy are-

Persistent bacteria

- Inadequate filling of the canal
- Untreated main or accessory canals
- Iatrogenic procedural errors
- Improper coronal seal
- Complications of instrumentation
- Overextension of root canal filling materials (Tabassum and Khan, 2016)

The main aim of the study was to assess the frequency and association of transalveolar extraction of failed root canal treated molars.

II. MATERIALS AND METHODS

A retrospective study was conducted among patients referred to OMFS department of Saveetha dental college with failed RCT molar teeth for extraction.

Prior to the start of the study, ethical approval was obtained from Scientific Review Board, Saveetha Dental College, SIMATS university, Chennai; from June 2010 to April 2020 and it was examined by two examiners. The study involved data collection of 43 case records of patients that underwent transalveolar extractions due to failed root canal treatment in molars. 43 case sheets were reviewed and cross verification was done through
photographs and radiographs taken of the oral cavity. The external validation can be generalised among the south indian population.

The data was collected from the health records system used at Saveetha Dental College which was used to record and store information and oral health data of the patients reporting to the college. It helps in retrieval of data as starting from diagnosis to treatments rendered, everything is stored and can be accessed by the physicians. The inclusion criteria was patients who had undergone transalveolar extractions of failed root canal treated molars. Unless the tooth was a molar and had to be extracted due to failed root canal treatment, they were among the exclusion criteria.

The data was imported to the software IBM SPSS Version 23.0 and analyzed using descriptive statistics and Pearson's correlation. Graphs were obtained and the results were tabulated. Statistical significance was set at $p < 0.05$. Ethical clearance was obtained and covered under the following ethical approval number - SDC/SIHEC/2020/DIASDATA/0619-0320.

III. RESULTS AND DISCUSSION

Among the 43 selected case records it was found that mandibular molars were more prone to transalveolar extraction due to failed endodontic treatment.

37.24% had undergone extractions between the ages of 35 to 45 years (figure 1).

51.16% were females while 48.84% of them were males (figure 2).

41.86% of the extractions were done in mandibular molars as they showed more failed root canal treatments (figure 3).

$P$ value= 0.530 in association with the frequency of transalveolar extraction of failed root canal treated molars showing that the study was statistically not significant due to less number of case record collection(figure 4).

Figure 1: Bar graph depicting the frequency distribution of age groups between 20 to 73 years that underwent transalveolar extraction of failed root canal treated molars. X axis represents the age groups in which transalveolar extraction was done and Y axis represents the percentage of patients who underwent transalveolar extraction. Age group of 35 to 45 years most commonly underwent transalveolar extractions due to failed root canal treatment.
**Figure 2**: Bar graph depicting the gender distribution among patients who underwent transalveolar extraction of failed root canal treated molars. X axis represents the gender and Y axis represents the percentage of patients who underwent transalveolar extraction. Females underwent transalveolar extractions commonly due to failed root canal treatment. There was no significant difference between gender and the frequency of transalveolar extractions among failed root canal treated molars.

**Figure 3**: Bar graph depicting the association of tooth number and frequency of extractions done. X axis represents the teeth number and Y axis represents the percentage of patients that underwent transalveolar extraction. Right mandibular molar was the most frequently extracted teeth but there was no significance between the teeth number and the frequency of transalveolar extractions among failed root canal treated teeth.
Figure 4: Bar graph representing the correlation of gender and teeth number that underwent transalveolar extraction due to failed root canal treatment where X axis is gender and Y axis is the count. Blue denotes 16, red denotes 26, green denotes 27, orange denotes 36, yellow denotes 37, teal denotes 46 and pink denotes 47. Chi square test was done and was found to be statistically not significant. Pearson's chi square value -5.108, p value -0.530 statistically not significant proving that there was no association of gender with the tooth undergoing extraction.

The failure of endodontic treatment occurs, as the treatment that has not been done up to the acceptable standards. The major factors responsible for endodontic treatment failure are the persistent infection in the root canal system and periradicular tissue (Packiri, 2017)

In the current study, it was found that 37.24% of the study population that had undergone extractions due to failed root canal treatment were between the ages of 35 to 45 years. According to other studies, age may be an important factor for the success of a root canal treatment in an individual. It was found that the majority of the endodontic failures (41.11%) were found in the age ranges from 41 to 50 years, while least endodontic failures (24.44%) were found in the range from 21 to 30 years. The obvious reason for the high failure rate from 41 to 50 years may be due to calcified canals in older age groups. Second reason may be uncorporated behaviour, poor oral hygiene maintenance and low literacy rate (Iqbal, 2016).

51.16% of the study population were females while 48.84% of them were males, in the recent study. It was reported in a study including a chinese population, that males between older age groups were prone to transalveolar extraction of failed root canal treated molars (Kumar and Sneha, 2016). Nevertheless, the reason was not fully understood but they speculated it to be related to the hard chewy diet, severe attrition or the presence of restorations (Lim et al., 2017). Other studies suggested that females are more prone to transalveolar extractions due to failed root canal treated molars than males, especially in the presence of post or when endodontically treated tooth is used as an abutment for a prosthesis (Matsuda et al., 2011). Gender does not have much of a significance though different studies show different results. It may be due to selection bias or error due to small case study.

The results from this study shows that 41.86% of the transalveolar extractions were done in mandibular molars as they showed more failed root canal treatments. Most of the transalveolar extractions were done to remove impacted third molars or root stumps. In the study by Fransson et al, the most frequently extracted teeth after failed root canal treatment were molars, followed by premolars and anterior teeth. This is in accordance with similar previous studies in a different population sample (Touré et al., 2011). Furthermore, mandibular molars were the most frequently extracted amongst molars (66.5%). This predominance has been noted in multiple studies which have shown a mandibular molar extraction rate up to 51.3% (Zadik et al., 2008).

Many patients refuse to do treatment as they decide for themselves due to the lack of knowledge that extraction is the treatment choice, when it could have been saved if approached earlier. Post extraction it is important to
control bleeding. Hemostasis is an integral and very important aspect of surgical practice (Christabel et al., 2016); (Kumar, 2017b). The first step in bleeding control is direct pressure, and hemostatic agents should always be considered secondarily. The common postoperative complications following the extraction of a molar is a condition known as dry socket. It is characterized by severe pain starting usually on the second or third day postoperatively (Patil et al., 2017b).

It is found in the current study that mandibular left molars showed a higher incidence of extraction (23.36%) when compared to the right ones (18.6%). This requires further investigation with higher mandibular molar sample size to analyze whether dental care in variable quadrants or jaws affects the pattern of transalveolar extraction due to failed root canal treatments (Abhinav et al., 2019); (Kumar, 2017a). Our institution is passionate about high quality evidence based research and has excelled in various fields (Pc, Marimuthu and Devadas, 2018; Ramesh et al., 2018; Ezhillarasam, Apoorva and Ashok Vardhan, 2019; Ramadurai et al., 2019; Sridharan et al., 2019; Vijayashree Priyadharsini, 2019; Mathew et al., 2020). We hope this study adds to this rich legacy.

The limitations of this study could be due to small scale study or due to unequal male to female ratio resulting in bias (Patturaja and Pradeep, 2016). Some of the future scopes of the recent study was to continue the study on a larger population and to create awareness among dentists and patients to avoid failed root canal treatments if could be avoided.

IV. CONCLUSION

Within the limitations of the current study it can be concluded that mandibular molars were the most commonly extracted teeth due to failed root canal treatment and there was no significant association between age, gender with frequency of trans alveolar extractions of failed root canal treated teeth.

REFERENCES
