ORIGINAL ARTICLE

Endodontic Treatment Indications Classification in 400 Patients

Ünal ALBAYRAK[1], Buğra DOĞAN[1], Mehran MOGHBEL[2]

Abstract

Aim The aim of this study is to determine the distribution of etiological factors for endodontic treatment and to assess the condition of teeth and cases before endodontic treatment.
Material and method This study included the first 400 patients who sought treatment and were indicated for endodontic treatment
Results Among the teeth indicated for endodontic treatment, 195 (48,75%) had irreversible pulpitis, 63 (15,75%) had defective restoration, 81 (20,25%) had root canal treatment failure, 41 (10,25%) had necrosis and/or periapical lesions, and 20 (5%) had trauma as the etiological factors.
Conclusion This study revealed that irreversible pulpitis is the most important etiological factor for endodontic treatment. Root canal treatment failure and defective restorations are also significant factors. The most commonly affected teeth are the mandibular molars, maxillary molars, and maxillary central incisors.

Keywords Dental pulp necrosis, Incisor, Molar, Pulpitis, Trauma

Introduction

Dentists are well aware of the negative effects of dental diseases on overall health and try to avoid them as much as possible. As a result, conservative and endodontic treatments have gained more importance in dental practice (1-3).

The aim of endodontic treatment is not only to restore teeth with root canal therapy but also to preserve the health of periapical tissues. Therefore, endodontic treatment is indicated when progressive degeneration of periapical tissues occurs due to pulp diseases, as well as when pulp diseases and necrosis result in the destruction of surrounding dental tissues (4-8).

The most common causes of pulp diseases are bacterial, traumatic, iatrogenic, systemic, and idiopathic factors. Therefore, the etiological factors of endodontic treatments and the condition of teeth and cases before endodontic treatment are examined by researchers. The clinical and radiographic diagnosis of pulp diseases is crucial in determining the indication for endodontic treatment (9-15).

The aim of this study is to determine the distribution of etiological factors in 400 patients who were admitted for endodontic treatment and to assess the condition of teeth and cases before endodontic treatment.

Material and Methods

This study included the first 400 patients who sought treatment and were admitted for endodontic treatment at the Department of Oral Diagnosis and Radiology of our Dental Faculty (Istanbul University Faculty of Dentistry) between March 13 and May 5, 2023. A form was prepared to record the necessary clinical and radiographic evaluations of the patients, and the indication for endodontic treatment was marked on the form (Figure 1).

Protocol No:			Age:			
Tooth:						
Preoperative Pain			Yes		No	
Percussion Pain	Vertical		Yes		No	
	Horizontal		Yes		No	
Vitality			Vital		Non – vital	
Etiological Factor	Necrosis and/or Periapical Lesion					
	Irreversible Pulpitis					
	Defective Restorations					
	Root Canal Treatment Failure					
	Trauma					

Figure 1: The form in which the indications for root canal treatment are marked.

Etiological factors are classified according to the following criteria. These criteria were determined according to literature review.

1. Necrotic pulp and/or periapical lesion: All investigated teeth were subjected to electrical pulp vitality testing and diagnosed with necrosis if they did not respond to the test. In radiographic examination, electrical pulp testing was applied to distinguish it from any lesions around the root. The test results were compared in symmetric teeth. Root canal treatment failures were not included in this group.
2. Irreversible Pulpitis: These cases presented with severe and continuous pain, especially at night. The most common cause of irreversible pulpitis among our cases was determined to be dental caries. Pulp inflammations resulting from defective restorations were not included in this group.
3. Defective Restorations: This patient group consists of cases with pulp inflammation due to faulty composite and silicate fillings and faulty crown restorations.
4. Root Canal Treatment Failure: This patient group re-

Correspondence: Ünal ALBAYRAK, ualbayrak@istanbul.edu.tr

[1] Istanbul University, Faculty of Dentistry, Department of Oral and Maxillofacial Radiology, Istanbul, Turkiye

[2] Private Practice, Isanbul, Turkiye

Received: 17.10.2023 / Accepted: 25.11.2023 / Published: 20.12.2023

quires root canal treatment due to reasons such as incomplete filling, instrument fracture inside the root canal, etc., despite having undergone previous endodontic treatment.

5. Trauma: These cases have a history of chronic or acute trauma to their teeth.

Results

The results of the study are presented in Table 2-9. According to the results:

1. Of the selected 400 cases, 207 (51,75%) were male and 193 (48,25%) were female. (Table 1)
2. 219 patients (54,75%) reported preoperative pain. (Table 2)
3. 32 patients (8%) showed pain on vertical percussion, 17 patients (4,25%) showed pain on horizontal percussion, and 4 patients (1%) showed pain on both vertical and horizontal percussion. (Table 3)
4. Among the 400 examined teeth, 43 (10,75%) were non-vital, 293 (73,25%) showed vital reactions, and 64 (16%) had root canal treatment failure. (Table 4)
5. Among the teeth chosen for endodontic treatment, 195 (48,75%) had irreversible pulpitis, 63 (15,75%) had defective restoration, 81 (20,25%) had root canal treatment failure, 41 (10,25%) had necrosis and/or periapical lesions, and 20 (5%) had trauma as the etiological factors. (Table 5)
6. The average age of the patients was 34,3. When considering the etiological factors, the highest average age was 45 - 41 in patients with necrosis and/or periapical lesions, while the lowest average age was observed in children who experienced trauma (17,22). (Table 5)
7. The most commonly indicated teeth for endodontic treatment were the first mandibular molars (18%), followed by the first maxillary molars (14,75%) and the maxillary central incisors. (11.5%). (Table 6)
8. In maxilla, 220 teeth were indicated for root canal treatment, accounting for 55% of all cases. (Table 6)
9. In mandible, 180 teeth were indicated for root canal treatment, accounting for 45% of all cases. (Table 6)
10. In maxilla, 102 teeth were indicated for irreversible pulpitis, 48 teeth had defective restorations, 30 teeth had root canal treatment failure, 23 teeth had necrosis, and 17 teeth had trauma. (Table 8)
11. In mandible, 93 teeth were indicated for irreversible pulpitis, 15 teeth had defective restorations, 51 teeth had root canal treatment failure, 18 teeth had necrosis, and 3 teeth had trauma. (Table 9)
12. Dental trauma are mostly observed in the maxillary anterior teeth. Root canal treatment failure is most common in the mandibular molars. Defective restorations are also more common in the maxillary anterior teeth. Irreversible pulpitis is almost equally seen in both the maxilla and mandible, but it is more prevalent in the posterior compared to the anterior.

Table 1: Distribution of patients according to their gender.

Man	207	51,75%
Woman	193	48,25%
Total	400	

Table 2: Examination of patients in terms of preoperative pain.

Has preoperative pain	219	54,75%
Has not preoperative pain	181	45,25%
Total	400	

Table 3: Percussion examination results.

Vertical percussion	32	8,00%
Horizontal percussion	17	4,25%
Vertical and horizontal percussion	4	1,00%

Table 4: Vitality test results.

Vital	293	73,25%
Non-vital	43	10,75%
Root canal treatment failure	64	16,00%
Total	400	

Table 5: Distribution of etiological factors and average age of patients.

Etiological Factor	Number of Patients		Average Age
Irreversibl Pulpitis	195	48,75%	32,16
Root Canal Treatment Failure	81	20,25%	37,72
Defective Restorations	63	15,75%	39,01
Necrosis / periapical lesion	41	10,25%	45,41
Trauma	20	5,00%	17,22
Total	400		34,304

Table 6: Distribution of root canal treatment indications by teeth.

Tooth	Number of Teeth	
Maxilla		
3. Molar	0	0,00%
2. Molar	26	6,50%
1. Molar	59	14,75%
2. Premolar	16	4,00%
1. Premolar	14	3,50%
Canine	31	7,75%
Lateral Incisor	28	7,00%
Central Incisor	46	11,50%
Mandible		
3. Molar	0	0,00%
2. Molar	42	10,50%
1. Molar	72	18,00%
2. Premolar	24	6,00%
1. Premolar	21	5,25%
Canine	10	2,50%
Lateral Incisor	4	1,00%
Central Incisor	7	1,75%
Total	400	

Discussion

In this study, it was found that the number of male patients seeking endodontic treatment was slightly higher than female patients. This finding contradicts with the study by Wingsten in 2019. Wingsten et al. reported a male-female ratio of 47,3% to 52,7% (1). Our study showed a ratio of 51,75% male to 48,25% female.

The most important etiological factor identified in our study was dental caries. This finding is in line with the findings of Wingsten et al. and Scavo et al. (1,2). However, Cyr et al. reported that defective restorations were the most important etiological factor (3). In our study, defective restorations ranked third.

Among the etiological factors, all of them affected the age group to some extent, but trauma had a lower average age. This is due to the fact that children who experienced trauma to their teeth were included in our study. This finding is consistent with the findings of Saad and Clem (4).

Our study showed that the most commonly affected teeth were the first mandibular molars, followed by the first maxillary molars. Al-Negrish, reported that the most affected teeth were the maxillary central incisors (5). In our study, about 54.75% of the patients reported preoperative pain. This finding is consistent with Saad and Clem's findings (4).

Conclusion

Our study revealed that irreversible pulpitis is the most prevalent etiological factor for endodontic treatment. Root canal treatment failure and defective restorations are also significant factors. The most commonly affected teeth are the mandibular molars, maxillary molars, and maxillary central incisors. Preoperative pain was observed in slightly more than half of the patients in this study.

Declarations

Author Contributions: *Conception/Design of Study- Ü.A., B.D., M.M.; Data Acquisition- Ü.A., B.D., M.M.; Data Analysis/Interpretation- Ü.A., B.D., M.M.; Drafting Manuscript- Ü.A., B.D., M.M.; Critical Revision of Manuscript- Ü.A., B.D., M.M.; Final Approval and Accountability- Ü.A., B.D., M.M.; Material and Technical Support- Ü.A., B.D., M.M.; Supervision- Ü.A., B.D., M.M.*

Conflict of Interest: *Authors declared no conflict of interest.*

Financial Disclosure: *Authors declared no financial support.*

Acknowledgments: *Sedef Ayşe Taşyapan, Muhammet Cihat İntepe*

REFERENCES

1. Wigsten E, Jonasson P; EndoReCo; Kvist T. Indications for root canal treatment in a Swedish county dental service: patient- and tooth-specific characteristics. Int Endod J. Feb;52(2):158-168, 2019

2. Scavo, R, Martinez R, Zmener O, Dipietro S, Grana D, Pameijer C.: Frequency and distribution of teeth requiring endodontic therapy in an Argentine population attending a specialty clinic in endodontics. Int Dent J., 61:257-60, 2011.

3. Cyr, G., Arvis, L., Safavi, K., Langeland, K.: Major etiological factors leading to root canal procedures. J. Endod., 11:145, 1985.

4. Saad, Y.A., Clem, H.W.: An evaluation of etiological factors in 382 patients treated in a postgraduate endodontic program. Oral Surg. Oral Med. Oral Pathol., 65:91, 1988.

5. Al-Negrish ARS. Incidence and distribution of root canal treatment in the dentition among a Jordanian sub population. Int Dent J., 52:125-129, 2002

6. Kirkevang LL, Hörsted-Bindslev P, Ørstavik D, Wenzel A. Frequency and distribution of endodontically treated teeth and apical periodontitis in an urban Danish population. Int Endod J. Apr;34(3):198-205, 2001.

7. Umanah A, Osagbemiro B, Arigbede A. Pattern of demand for endodontic treatment by adult patients in port-harcourt, South-South Nigeria. J West Afr Coll Surg. Jul;2(3):12-23, 2012.

8. Ahmed H, Durr-e-Sadaf, Rahman M. Frequency and distribution of endodontically treated teeth. J Coll Physicians Surg Pak. Oct;19(10):605-8, 2009.

9. Oliveira B, Cruz A, Menezes C. Prevalence of endodontic diseases: an epidemiological evaluation in a Brazilian subpopulation. Braz J Oral Sci. 15:19-23, 2016.

10. Demirbuga S, Tuncay O, Cantekin K, Cayabatmaz M, Dincer AN, Kilinc Hİ, Sekerci AE. Frequency and distribution of early tooth loss and endodontic treatment needs of permanent first molars in a Turkish pediatric population. Eur J Dent. 7: S099-S104 2013.

11. Iqbal M, Chan S, Ku J. Relative frequency of teeth needing conventional and surgical endodontic treatment in patients treated at a graduate endodontic clinic--a Penn Endo database study. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. Jul;106(1):e62-7, 2008.

12. Ajayi YO, Ajayi EO, Sote EO, Olatosi OO, Orenuga OO. Pattern of endodontic treatment in children in a Nigerian tertiary hospital. Nig Q J Hosp Med. Jan-Mar;19(1):32-6, 2009.

13. Chala S, Abouqal R, Abdallaoui F. Prevalence of apical periodontitis and factors associated with the periradicular status. Acta Odontol Scand. Nov;69(6):355-9, 2011.

14. Albuquerque MTP, Abreu LC, Martim L, Münchow EA, Nagata JY. Tooth- and Patient-Related Conditions May Influence Root Canal Treatment Indication. Int J Dent. 30; 2021:7973356, 2021.

15. Pérez AS, Bolado EC, Camacho-Aparicio LA, Hervert LP. Prevalence of pulp and periapical diseases in the endodontic postgraduate program at the national autonomous University of Mexico 2014-2019. J Clin Exp Dent. 1;15(6), 2023