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ORIGINAL RESEARCH

Misdiagnosis-Driven Dental Extractions in Patients with Trigeminal Neuralgia: A Retrospective Study

Ahmad Fliah Hassan[1], Ali Al Sheakh[2], Saif Anmar Badran[3], Athraa Ali Mahmood[4], Faaiz Yaqub Alhamdani[5]

[1]Oral Medicine Department, College of Dentistry, Mustansiriyah University, Baghdad, Iraq; [2]Dentistry Department, Al-Yarmouk University College, Baghdad, Diyala, 32001, Iraq; [3]Department of Surgery, College of Medicine, Ibn Sina University of Medical and Pharmaceutical Sciences, Baghdad, Iraq; [4]Department of Periodontology and Oral Surgery, College of Dentistry, Mustansiriyah University, Baghdad, Iraq; [5]Oral and Maxillofacial Surgery and Oral Diagnostics Department, College of Dentistry, Ibn Sina University of Medical and Pharmaceutical Sciences, Baghdad, Iraq

Correspondence: Athraa Ali Mahmood, Department of Periodontology, College of Dentistry, Mustansiriyah University, Baghdad, Iraq, Email athrauali@gmail.com, athraa.a.mahmood@uomustansiriyah.edu.iq

Background: Dental extraction is an invasive dental procedure. It should not be considered unless indications apply purpose. However, many trigeminal neuralgia (TN) cases have been treated with dental procedures including dental extraction.

Objective: To investigate the frequency of dental extractions for trigeminal neuralgia patients. The objectives of the study were to determine the frequency of dental extractions performed due to the misdiagnosis of trigeminal neuralgia and to assess the role of both dentists and patients in the extraction decision-making process.

Materials and Methods: This retrospective study analyzed data from 104 TN patients treated at a neurosurgical hospital between January 2020 and September 2023. One hundred and eight patients were admitted to the Hospital for the management of TN. Patients' data were collected including biographic data, previous treatments, and the patient's response to dental treatment provided.

Results: Out of 104 treated cases with TN, 88 patients were initially misdiagnosed and treated by dentists for dental pain. Among these patients, fifty-five patients were treated with dental extraction. Thirty-two were females, and 23 patients were males. The highest reported cases were found in the single tooth extraction category (27.3%) of the cases. The frequency of cases with multiple extractions decreases with the increase in the number of extracted teeth. The vast majority of the cases (92.7%) showed no response. The vast majority of the cases (92.7%) showed no improvement in pain symptoms following dental extraction. Only 4 cases showed moderate response to dental extraction. Mild response was not reported in this sample. There was no statistically significant relationship between the diagnosis and the number of extractions. Also, no statistically significant relationship between the diagnosis and the patient's role in the extraction decision.

Conclusion: There is obvious misdiagnosis leading to a considerable number of unnecessary, and multiple dental extractions for patients with TN. A considerable percentage of which is requested by patients. This reflects poor dental management of oro-facial pain. Dental education programs on both undergraduate and postgraduate levels need to focus on diagnostic defects in facial pain. These findings underscore the need for improved diagnostic training for dental professionals to prevent unnecessary invasive procedures in TN patients.

Keywords: dental extraction, trigeminal neuralgia, facial pain, dental education

Introduction

Dental extraction is an invasive dental treatment.[1] It should be reserved for cases of teeth that cannot be preserved and could be a source of potential infection in the oro-facial region or cases where some teeth might interfere with certain orthodontic treatments.[2,3] However, unjustified dental extraction is not uncommon. It has been reported that dental extraction is due to misdiagnosis with other conditions.[4–6]

Trigeminal neuralgia is one of these conditions, which has been misdiagnosed by dentists and treated with tooth extraction.[7] TN is an uncommon cause of oro-facial pain, affecting the population worldwide. It has a significant

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influence on patients' quality of life. It is characterized by paroxysmal episodes of sharp pain involving one or more divisions of the fifth cranial nerve.

Oro-facial involvement with TN makes it misdiagnosed with other more common causes of pain in the region,[8] most commonly dental pain,[9] and TMJ disorders.[10,11] Dental professionals are the ones who are mostly involved in the diagnosis of oro-facial pain, due to the fact that dental caries is the single most common cause of pain in this region.[12] Patients usually seek dental advice for different types of pain. This puts the dentist in the responsibility of correctly diagnosing and managing different types of pain in the region.[13–15]

However, misdiagnosis and management of TN by dental professionals are not uncommon.[16] This usually leads to different dental treatments out of the context of the problem.[9] Some of these treatments are invasive, such as root canal treatment, and dental extraction.[16,17] Unnecessary dental extractions have negative consequences on patients both psychologically, functionally, and financially. They also inflict financial burdens on healthcare systems.

The primary objective of this study was to investigate the frequency of dental extractions in TN patients due to misdiagnosis. We hypothesized that a significant proportion of TN patients undergo unnecessary dental extractions, driven by diagnostic errors and patient requests.

Materials and Methods

This study followed ethical principles, including the World Medical Association Declaration of Helsinki and its later amendments to human research. Ethical approval was provided by the Ethical Committee at Ibn Sina University of Medical and Pharmaceutical Sciences (ECC: ISU.4.2.24). Data were collected from patients' charts by the third author at the Hospital for Neurosciences. Patients' dental history was self-reported by the patients. TN Patients' information from January 2020 to September 2023 was included. The included patients were treated in the Neurosurgery, Gamma Knife, and Neurosurgery Consultation Clinic departments.

Patients' data included the patient's age, patient's gender, involved side, number of involved branches, and severity of TN. Dental treatment provided before, and the response to dental treatment was also reported. This is a retrospective study, and data were extracted from hospital records personal patients' information was not disclosed. As the extracted personal patient's information in this retrospective study was kept confidential, the consent form was waived by the Ethical Committee.

TN severity was assessed using the Numeric Pain Rating Scale from 1 to 10. These scales' measurements were taken from patients' charts. The range from 1 to 3 was considered mild; 4–6 was considered moderate; and 7–10 was considered severe. Response to dental treatment relied mainly on patient self-report. Rating to dental treatment response was categorized into 3 categories. Fair improvement was assigned to a hardly noticeable response. Moderate was considered when there was a reasonable response, whereas excellent was given for cases where the condition had been cured.

Patients admitted to the hospital with TN who were previously treated by dentists for their facial pain during the period of the study were included. Patients admitted to the hospital with TN with no previous dental treatment for their facial pain complaint, and whose information was incomplete, were excluded.

Both descriptive and inferential statistics were employed. Chi-square Test and Spearman correlations were applied. Chi-square was used to determine the relationship between nominal variables, whereas, Spearman Correlation was used to find the relationship between ordinal variables. SPSS Ver. 25 software was used with a P value <0.05 considered as significant. Statistical analysis was blinded to reduce the chance of bias.

Results

Out of 104 treated cases with TN, 88 were first diagnosed and treated by dentists. Among these patients, fifty-five patients were treated with dental extraction. Thirty-two were females, and 23 patients were males. The mean age was 52.48 years, with a 17–85 age range. Their involvement with TN was predominantly on the right side (38 patients) compared to 17 cases on the left side.

Trigeminal nerve branch involvement is shown in Figure 1. One branch and two branch involvement were 21, and 20, respectively, whereas 3 branch involvement was reported in 8 patients.

Figure 2 demonstrates the severity of the included TN cases. The majority of the cases were severed, whereas, 27.3% were considered moderate. Only one case was considered as mild.

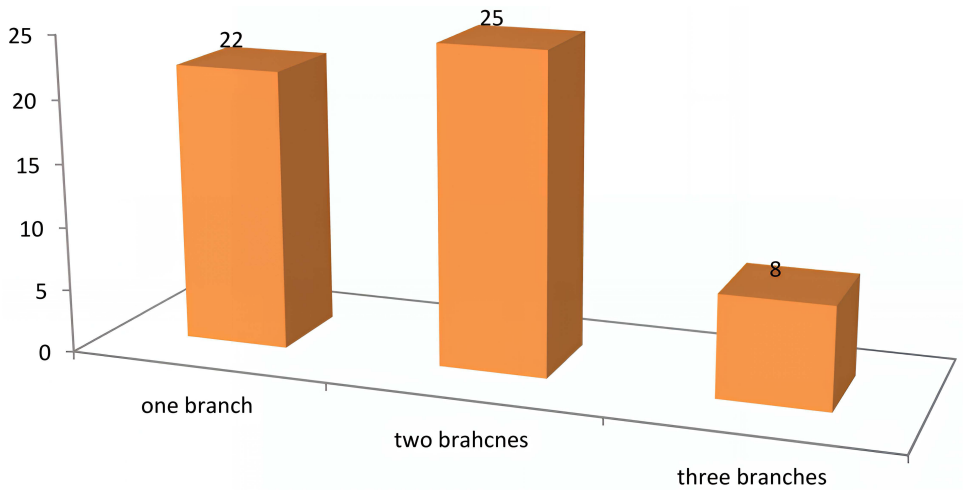

Figure 1 Trigeminal Nerve involvement in the study sample.

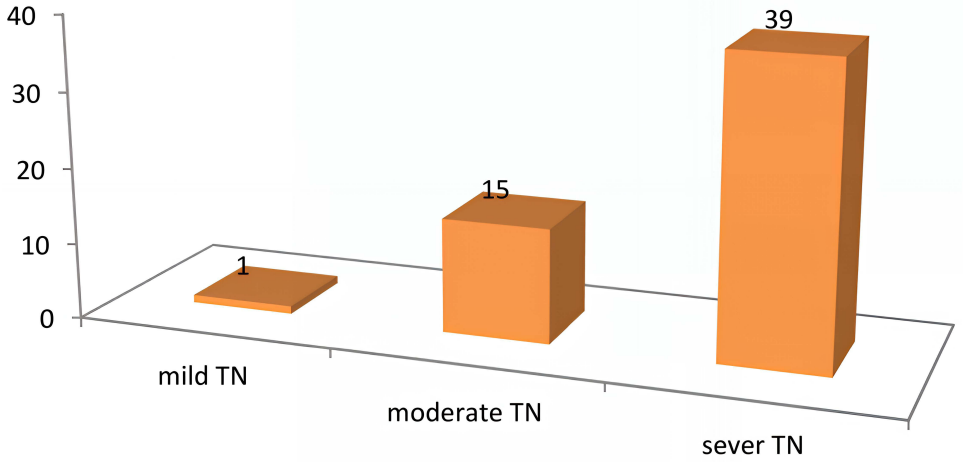

Figure 2 Severity levels of the included Trigeminal Neuralgia cases.

All TN patients included in this study requested dental treatment for pain. Figure 3 shows the frequency of dental extraction for these patients. The highest reported cases were found in the single tooth extraction category (27.3%) of the cases. The frequency of cases with multiple extractions decreases with the increase in the number of extracted teeth. This is noticed in two extractions, three extractions, and four extractions' categories. This trend, however, is broken into five

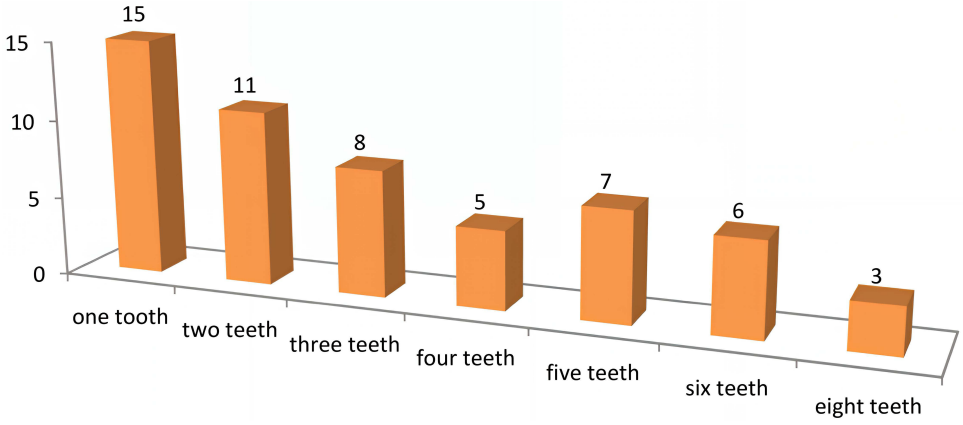

Figure 3 Level of improvement for dental extraction in the included cases.

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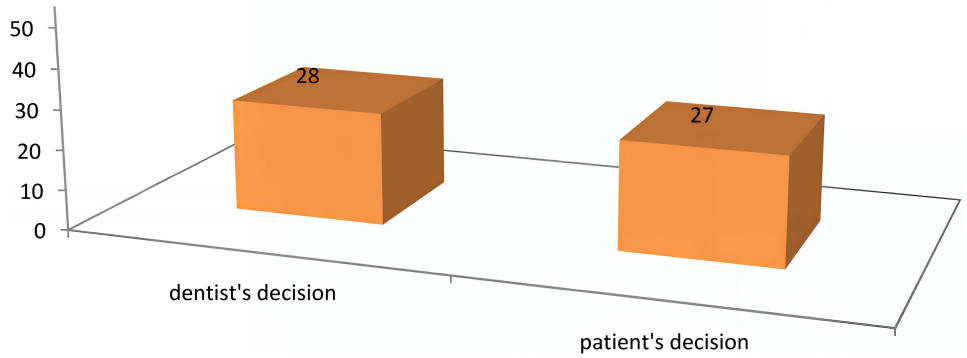

Figure 4 Decision of dental extraction for patients with TN cases.

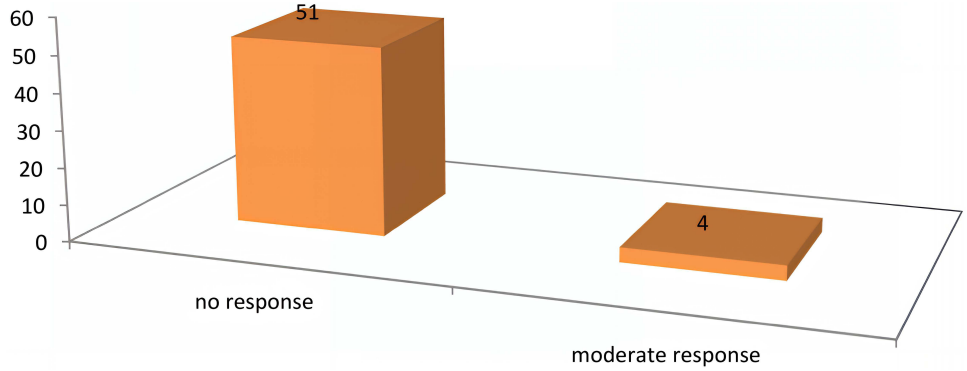

Figure 5 Response of dentist toward dental extraction for patients with TN cases.

teeth, and six teeth extractions' categories. The lowest frequency of extractions is found in the eight teeth extractions' category.

It is clear from Figure 4 that dental extraction for TN patients was not based only on a professional clinical decision. It has been dictated by about half of the cases by the patients themselves.

Response toward dental extraction, as shown in Figure 5 is expectedly disappointing. The vast majority of the cases (92.7%) showed no response. Only 4 cases showed moderate response to dental extraction. Mild response was not reported in this sample. The chi-square test showed no significant relationship (P=0.072) between the patient's gender and response to the treatment. However, the Spearman Correlation Test showed a highly significant relationship (P=0.004) between the patient's age and response to dental treatment.

It seems that performed dental extraction was not based on the diagnosis of the involved teeth. About half of the extraction cases were done based on the request of the patients themselves (Figure 3). Furthermore, dental extractions were not performed based on the diagnosis. The figure shows that only 40.8% of the diagnosed conditions were related to dental caries. The diagnosis was made by the dentists, and 24.5% of the cases were diagnosed with TN. In the other 22.4% of the cases, the diagnosis was not specific. Around 10% of the extractions were performed for periodontal reasons. Only one extraction was performed for the TMD condition.

There was no statistically significant relationship between the diagnosis and the number of extractions. Also, no statistically significant relationship between the diagnosis and the patient's role in the extraction decision.

Discussion

The study sample was determined by the time period. It may give an indication on the extent of the problem. The center, which data were extracted from, is the main neurosurgery center in the country and the only neurosurgery center in the capital Baghdad (with over 5 million residents).

The literature reported comparable age group involvement.[18] Similarly, female predilection[19,20] and right-side predominance are evident in the literature.[21] Comparable side involvement was also reported.[22] Involvement of more than one trigeminal nerve division has been seen in other studies.[16] This gives a higher chance of a high request for dental advice since the dental apparatus lies within the innervation territory of the most likely involved divisions.

Furthermore, dental problems are a common cause of oro-facial pain, the dental treatment is the first thought of. Unrestorable or badly carious teeth are not uncommon, which require dental extraction are not uncommon.[23] In addition, TN is relatively rare.[24] This might lead the dentist to not consider it in the diagnosis. Moreover, TN might mimic dental pain, which may lead to unwarranted dental procedures.[25] This might explain the number of tooth extraction in this study sample.

Nevertheless, the absence of an obvious association between the frequency of extractions and the severity of TN could reflect poor dentists' diagnostic approach. It is worth mentioning that most of the un-restorable teeth, retained roots are painless. Otherwise, patients seek their treatment without delay.[26] Furthermore, toothache is either caused by pulpitis or related to Periapical pathology. These pathologies have their characteristic pain that can be traced to their pathological origin.[26,27]

Moreover, TN has its unique pain characteristics.[28] Careful history-taking and thorough clinical examination help in establishing its diagnosis.[10] Performing tooth extraction for TN cases not only reflects improper treatment choice but will make it difficult in the future to diagnose and treat the condition. This might explain multiple dental extractions for the same patient. There are reported cases of temporary pain relief after dental extraction.

The percentage of dental extraction reported in the literature is comparable to other studies.[16,29] Multiple dental extractions for TN patients have been reported in the literature.[30] However, the number of extractions per patient as reported in this study is alarming, with up to 8 dental extractions (mean 3.20%). This number is obviously higher than what has been reported in the literature. The mean extraction per patient in the Tripathi et al study was 1.6%.[1] The possible explanation for such a high number could be related to the patients. Iraqi patients tend to consult other dentists when they find no improvement in their condition. This might disrupt the diagnosis logic for the second dentist who has no clear idea about the previous treatment. In other parts, the anxiety effects of patients in dental clinics may play a role in the misdiagnosis of pain sources during examination.[31]

The lack of improvement in the patient's condition in the vast majority of the cases reflects that these procedures did not address the real reason for the pain. The study shows that the reason for requesting dental treatments in all included cases was dental pain. Pain management in dental practice seems to be an area of weakness,[32] particularly if the pain is of an atypical nature.[11,26] Furthermore, the diagnosis of oro-facial pain is a challenging clinical problem.[33]

Performing invasive dental treatment should not be attempted when there are no clear diagnostic criteria. Dental extraction for TN patients might complicate their condition. Ameri et al stated that these patients need to be as Complex Regional Pain Syndrome CRPS type 1. These patients need higher doses of Carbamazepine, Tricyclic Antidepressants, or interventional radiofrequency therapy.[34]

The fact that around half of the extractions reported in this study were performed based on patient's requests raises the fact that dentists were under the pressure of patients' demands to perform unnecessary procedures. This might be attributed to the temporary relief experienced by patients after the first extraction. Although, the presence of possible overlapping dental problems cannot be excluded, performing invasive dental procedures should not be performed based on the urgency of the patient's request with no justifiable clinical evidence. This represents a serious ethical practical error in patient's management.

Silvana et al provided some explanation for dental mismanagement for TN. The first explanation is that local anaesthesia with or without any tooth extraction will relieve the pain immediately, and for some time, which makes it logical to think it is a dental problem. Iatrogenic trigeminal nerve injury happens[8,9] after a problematic dental procedure, which is the second reason. This might keep the patients from returning back to the dentist to address the problem with further unnecessary dental procedures.[13] The last possible reason is that paroxysmal attacks of pain might be seen during mastication or with tooth percussion, which indicates a dental problem.[30]

This study has its limitations. Firstly, this is a retrospective study, where researchers have no control over the nature of the data with possible missing or inaccuracies. The other limitation of this retrospective study is that data were

collected by neurosurgical specialists. This limits the information regarding the performed dental treatment, and the follow-up period after dental extraction. The fact that the final treatment of TN patients is performed in neurosurgical facilities deprives dental professionals of being well informed about the extent of the problem. Prospective studies on the extent of pain relief and quality of life assessment need to be considered in the future to address the study limitations.

Conclusion

There is obvious misdiagnosis leading to a considerable number of unnecessary, and multiple dental extractions for patients with TN. A considerable percentage of which is requested by patients. These findings underscore the need for improved diagnostic training for dental professionals to prevent unnecessary invasive procedures in TN patients. They also raise an important ethical issue regarding the extractions performed to satisfy patient's request. TN diagnosis and management need further emphasis in the dental education curriculum.

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Disclosure

The authors declare that there are no competing interests related to this study.

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