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Online articles not yet published;

Das RR, Singh M, Naik SS. Vitamin D as an adjunct to antibiotics for the treatment of acute childhood pneumonia. *Cochrane Database System Rev.* 2018 Jul 19;7:CD011597. doi: 10.1002/14651858.CD011597.pub2. [Epub ahead of print] Review.

Books;

1) Krogman WM, Iscan MY. *The Human Skeleton in Forensic Medicine*. Second ed. Springfield Illinois: Charles Thomas Publisher, 1986:189-243.

2) Beard SD, Gaines PA, eds. *Vascular and Endovascular Surgery*. London: WB Saunders, 1998:319-29.

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1) Soysal Z, Albek E, Eke M. Fetus rights. Soysal Z, Çakalır C, ed. *Forensic Medicine, Volume III*, Istanbul University Cerrahpasa Medical Faculty Publications, Istanbul, 1999: 1635-1650.

2) Dogan, M.S. 2018. Relation of trace elements on dental health. In Saleh, H.E.M. and El-Adham, E. (eds.) *Human Health and Environment*. United Kingdom: IntechOpen. 2018:856-910.

Web Articles;

Aboud S. Quality improvement initiative in nursing homes: The ANA acts in an advisory role. *Am J Nurs* [serial on the Internet] 2002 [cited 12 Aug 2002]. Available from: www.nursingworld.org/AJN/2002/june/wawatch.htm

Website;

Cancer-pain.org [homepage on the Internet]. New York: Association of Cancer Online Resources [last reach 16 May 2002]. Available from: www.cancer-pain.org

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Assesment of Patients' Basic Knowledge and Concerns About Anesthesia: A survey study

Andaç Dedeoğlu^{1*}, Yusuf İpek², Cem Kıvılcım Kaçar¹, Hakan Akelma³, Haktan Karaman⁴

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Abstract

Background/Aim: This survey study aimed to investigate the knowledge and concerns of patients about anesthesia in the preoperative period.

Materials and Methods: A total of 150 patients scheduled for elective surgery, aged 18 to 65, with ASA (American Society of Anesthesiologists) classification 1-2, were included in the study. Patients who come to the anesthesia outpatient clinic in the preoperative period were asked to complete survey forms.

Results: It was observed that 47% of patients aged 60 and older had previous experiences with anesthesia (p=0.01). When the responses to the question "Do you know why you came to the anesthesia outpatient clinic?" were examined by age groups, it was found that 70% of patients aged 18-30, 70% of patients aged 31-60, and 29% of patients aged 60 and older did not know why they came to the anesthesia outpatient clinic (p=0.004). It was determined that as the level of education increased, the knowledge level about anesthesia increased and the level of concern decreased. Furthermore, it was found that as the socioeconomic status increased, the knowledge level about anesthesia increased.

Conclusion: It was determined that the level of education and socioeconomic status were factors affecting the level of anesthesia knowledge. Furthermore, it was found that the level of concern related to anesthesia was also associated with the level of education.

Research Article (HRU Int J Dent Oral Res 2023; 4(1):1-9)

Keywords: Anesthesia, questionnaire, anxiety

Introduction

Preoperative assessment plays a key role in reducing morbidity and mortality during surgical procedures and in the postoperative period. This assessment allows for the identification of previously undiagnosed health issues, reviewing anesthesia and surgical approaches, and preventing undesirable events during the perioperative and postoperative periods. Preoperative assessment is a clinical examination that falls under the responsibility of

an anesthesiologist before administering anesthesia for any procedure (1). If anesthesiologists can adequately assess the patient's true condition during the preoperative visit, they can plan the procedure and the accompanying sedation or anesthesia more safely and effectively (1,2). The anesthesia method to be applied to the patient by the anesthesiologist and the associated preparations are based on evaluating anesthesia risk, ensuring that the procedure is performed under the most suitable conditions for the patient, assessing their physical and psychological

condition, and considering their pharmacological and therapeutic history (2,3).

In the field of anesthesiology research, using survey studies to inquire about patients' opinions about anesthesia during the preoperative period, determine anxiety levels, and validate the quality of anesthesia is not a new practice. The belief that anesthetists and anesthesia practices are not well understood has led to numerous studies in this regard. These studies have explored patients' knowledge about anesthesia, the importance they attach to anesthetists, their preferences for anesthetists and anesthesia methods, and their desire to acquire information about anesthesia (4). These studies are important in providing information about patients' potential needs, expectations, and perceptions.

Preoperative anxiety in patients scheduled for surgery is important for anesthetists and surgeons. In a study of more than 15,000 patients undergoing non-obstetric surgery, preoperative anxiety was found to be the most challenging aspect of the perioperative period(5). Preoperative anxiety encompasses anxiety related to both anesthesia and the surgery itself. The intensity of the latter varies significantly in many patients (6). Due to its potential to lead to not only physical but also emotional and psychiatric issues, preoperative anxiety is one of the most significant concerns for patients (7). A recent survey study has indicated that fear of pain is the primary cause of anxiety (8).

In our country, the field of anesthesiology was recognized as a specialization in 1956. The importance attributed to anesthesiology and anesthetists has increased over the years. However, there still exists a presence of inadequate and incorrect information and education. Studies have shown that there is a lack of sufficient information concerning anesthesiology and anesthetists (9,10).

Based on this information, the aim of this planned study is to assess the level of knowledge of patients who present to the preoperative anesthesia clinic for elective surgery and to identify their preoperative concerns regarding anesthesia.

2. Materials and Methods

2.1. Patients and Study Design

Following the approval of the Ethics Committee (.....), a total of 150 patients between the ages of 18 and 65, with American Society of Anesthesiologists (ASA) physical status classification 1-2, who presented to the anesthesia clinic for elective

surgery between May and July 2010, were included in this survey study. Apart from these 150 patients, 26 patients who did not agree to participate in the study were excluded from the study. Mentally retarded patients, individuals with known psychiatric disorders, and those with any medical conditions that could limit the assessment were excluded from the study. Illiterate patients filled out the questionnaire with the help of their first degree relatives. This study was conducted in accordance with the 2008 Helsinki Declaration criteria.

Patients who presented to the anesthesia clinic in the preoperative period were asked to introduce themselves and fill out questionnaire forms by the anesthesiologist before the examination. The survey questions were formulated in a way that the patients could understand, and in cases where the patients did not understand a question, necessary explanations were provided by the anesthesiologist. The questionnaire consisted of two sections. The first section included personal information such as age, gender, education level, occupation, socioeconomic status, drug allergies, habits, and previous experiences with anesthesia, in addition to demographic information. The second section contained anesthesia-related questions, where patients' knowledge and concerns about anesthesia could be assessed (Table I).

Table I. Survey form

| |
|--|
| This survey is conducted to evaluate your knowledge about anesthesia and anesthesiologist. |
| History: |
| Form Number: |
| 1. Your Gender: |
| Female |
| Male |
| 2. Your age: |
| a-18/ 30 years old |
| b-31/ 60 years old |
| c-61 years and above |
| 3. According to educational status: |
| a- Is illiterate |
| b- Primary education |
| c- Higher education |
| 4. By professional group: |
| a- Unemployed |
| b- Worker/freelancer |

| |
|--|
| c- Public employee |
| 5. According to socioeconomic status: |
| a-Low |
| b-Medium/high |
| 6. "Do you know of any disease?" |
| a- Yes |
| b- No |
| 7. "Do you have any habits?" |
| a- Cigarette |
| b- Drug/alcohol |
| c- None |
| 8. "Have you had surgery under anesthesia (narcosis) before?" |
| a- Yes |
| b- No |
| 9. "Are you allergic to any medications?" |
| a- Yes |
| b- No |
| 10. "Do you know why you came to the anesthesia clinic?" |
| a- I know |
| b- I have no idea |
| 11. "Where does an anesthesiologist work in a hospital?" |
| a- Outside the operating room (outpatient clinic, pain, intensive care, lithotripsy, radiology unit) |
| b- Operating room |
| c- I have no idea |
| 12. "Which anesthesia method do you know?" |
| a-General |
| b-Local and/or regional |
| c- I have no idea |
| 13. "Do you know what the anesthesiologist does in surgery?" |
| 1- It follows the state of sleep, wakefulness, that is, consciousness. |
| 2- Apart from monitoring sleep, wakefulness, that is, consciousness, heart rate, blood pressure, It monitors fluid and blood loss, that is, all vital functions. |
| 3- I have no idea |
| 14. "Who should give you information about the anesthesia procedure to be applied during surgery?" |

| |
|---|
| a- Surgical doctor |
| b- Anesthesiologist |
| 15. "Who do you think gave the anesthesia during the surgery?" |
| a- Personnel (nurses and/or technicians) |
| b- Anesthesiologist |
| 16. "What are your fears about the anesthesia procedure?" |
| 1- I am afraid that I will not be able to sleep properly and will feel pain during the surgery. |
| 2- I am afraid that I will not be able to wake up from anesthesia and that I will die. |
| 3- I don't have any fear. |
| 17. "Have you heard of regional anesthesia?" |
| a- Yes |
| b- No |
| 18. "Who performs regional anesthesia?" |
| a- Personnel (nurses and/or technicians) |
| b- Anesthesiologist |
| c- I have no idea |
| 19. "Do you have any concerns about the regional anesthesia procedure?" |
| 1-I think I might have a stroke |
| 2-I'm worried about staying awake and being aware of what's happening around me |
| 3- I have no worries |

2.2. Statistical Analysis

In our statistical analysis, the SPSS 16.0 for Windows (SPSS Inc. Chicago, IL, USA) software package was utilized. Descriptive statistics, including mean and standard deviation, were calculated for continuous variables in our study. Categorical variables were presented as percentages. To explore the relationships among the categorical variables in the survey, cross-tabulations were created, and Pearson's Chi-squared test was applied for larger than 2x2 contingency tables. For 2x2 contingency tables, Yates' corrected Chi-squared test was used. A significance level of $p < 0.05$ was considered as the threshold for statistical significance in all evaluations.

3. Results

This study, which aimed to assess the level of knowledge and preoperative concerns about anesthesia in patients presenting to the anesthesia clinic during the preoperative period for elective surgery, included 150 patients. Of the patients included in the study, 67 (45%) were between the ages of 18-30, 66 (44%) were between 31-60, and 17 (11%) were 60 years or older. Of the patients, 67 (45%) were female, and 83 (55%) were male. The majority of the patients in the study were primary school graduates (82 patients, 55%), unemployed (68 patients, 45%), and had a middle to high socioeconomic status (99 patients, 66%). It was determined that 66 patients (44%) had additional medical conditions, 33 (22%) had previous experience with anesthesia, and 18 (12%) had a history of allergies. The details of the patients' demographic characteristics can be seen in Table II.

Table II. Demographic characteristics of patients

| Gender | n | % |
|-------------------------------|-----|----|
| Male | 83 | 55 |
| Female | 67 | 45 |
| Age | | |
| 18-30 | 67 | 45 |
| 31-60 | 66 | 44 |
| >60 | 17 | 11 |
| Educational background | | |
| Primary school | 82 | 55 |
| Master's degree | 37 | 24 |
| Illiterate | 31 | 21 |
| Job | | |
| Worker-freelancer | 54 | 36 |
| Officer | 28 | 19 |
| Unemployed | 68 | 45 |
| Socioeconomic level | | |
| Low | 51 | 34 |
| Medium-High | 99 | 66 |
| Comorbidity | | |
| Yes | 66 | 44 |
| None | 84 | 56 |
| Anesthesia experience | | |
| Yes | 33 | 22 |
| None | 117 | 78 |

| Allergy history | | |
|-----------------|-----|-----|
| Yes | 18 | 12 |
| None | 132 | 88 |
| Total | 150 | 100 |

When the responses to the questionnaire questions were compared by gender, it was found that male patients had a higher history of smoking, alcohol, and drug use compared to female patients ($p < 0.001$). Looking at the responses to the question "What are your fears about the anesthesia procedure?", it was observed that the majority of female patients responded with "not waking up and dying," while male patients mostly responded with "I'm not afraid" ($p < 0.001$). There was no statistically significant difference by gender in the responses to other questions ($p > 0.05$).

When the responses to the questionnaire questions were compared by age group, it was observed that:

- 65% of patients aged 60 and above had chronic diseases ($p = 0.01$).
- 58% of patients aged 31-60 had a smoking habit
- 47% of patients aged 60 and above had previous experience with anesthesia ($p = 0.01$)
- 35% of patients aged 60 and above had allergies to any medication ($p = 0.01$).

When the responses to the question "Do you know why you came to the anesthesia outpatient clinic?" were examined by age group, it was found that 70% of patients aged 18-30, 70% of patients aged 31-60, and 29% of patients aged 60 and above did not know why they came to the anesthesia outpatient clinic ($p = 0.004$). There were no statistically significant differences in responses to other questions based on age ($p > 0.05$).

When the responses to the survey questions were examined based on the level of education, it was observed that as the level of education increased, the knowledge level about anesthesia increased, and the level of anxiety decreased. Details can be seen in Table III.

Table III. Responses to Survey Questions by Education Level

| Do you have any known medical conditions? | Yes | No | Total | p value |
|---|-------|-------|--------|-------------|
| Illiterate (n/%) | 9/29 | 22/71 | 31/100 | |
| Primary school (n/%) | 15/18 | 67/82 | 82/100 | $p = 0.003$ |
| High education (n/%) | 15/41 | 22/59 | 37/100 | |

| Do you have any habits? | Smoking | Alcohol-Drug | None | |
|---|----------------------------|---|----------------|---------|
| Illiterate (n/%) | 15/48 | 5/16 | 11/36 | |
| Primary school (n/%) | 30/37 | 5/6 | 47/57 | p=0.202 |
| High education (n/%) | 15/41 | 5/13 | 17/46 | |
| Have you had surgery under anesthesia (narcosis) before? | Yes | No | Total | |
| Illiterate (n/%) | 6/19 | 25/81 | 31/100 | |
| Primary school (n/%) | 19/23 | 63/77 | 82/100 | p=0.907 |
| High education (n/%) | 8/22 | 29/78 | 37/100 | |
| Do you have any allergies to medications? | Yes | No | Total | |
| Illiterate (n/%) | 5/16 | 26/84 | 31/100 | |
| Primary school (n/%) | 5/6 | 77/94 | 82/100 | p=0.079 |
| High education (n/%) | 7/19 | 30/81 | 37/100 | |
| Do you know why you came to the anesthesia clinic? | Yes | No | Total | |
| Illiterate (n/%) | 16/57 | 15/43 | 31/100 | |
| Primary school (n/%) | 50/61 | 32/39 | 82/100 | p=0.005 |
| High education (n/%) | 32/86 | 5/14 | 37/100 | |
| Where does the anesthesia doctor work in the hospital? | Outside the operating room | In the operating room | I have no idea | |
| Illiterate (n/%) | 5/16 | 5/16 | 21/68 | |
| Primary school (n/%) | 10/12 | 42/51 | 30/37 | p=0.001 |
| High education (n/%) | 9/24 | 22/59 | 6/17 | |
| Do you know any of the anesthesia methods? | General | Local | I have no idea | |
| Illiterate (n/%) | 7/23 | 5/16 | 19/61 | |
| Primary school (n/%) | 24/29 | 18/22 | 40/49 | p=0.001 |
| High education (n/%) | 21/57 | 11/30 | 5/13 | |
| Do you know what the anesthesia doctor does during surgery? | Consciousness monitoring | Both consciousness and vital functions monitoring | I have no idea | |
| Illiterate (n/%) | 5/16 | 5/16 | 21/68 | |
| Primary school (n/%) | 20/24 | 20/24 | 42/52 | p=0.001 |

| High education (n/%) | 11/30 | 21/57 | 5/13 | |
|---|-------------------|-------------------------|----------------|---------|
| Who do you think administers the anesthesia during surgery? | Nurse-technician | Anesthesia Doctor | Total | |
| Illiterate (n/%) | 17/55 | 14/45 | 31/100 | |
| Primary school (n/%) | 32/39 | 50/61 | 82/100 | p=0.001 |
| High education (n/%) | 5/14 | 32/86 | 37/100 | |
| Who should provide information about the anesthesia procedure to be performed during surgery? | Surgeon Doctor | Anesthesia Doctor | Total | |
| Illiterate (n/%) | 21/68 | 10/32 | 31/100 | |
| Primary school (n/%) | 35/43 | 47/57 | 82/100 | p=0.001 |
| High education (n/%) | 7/19 | 30/81 | 37/100 | |
| What are your fears regarding the anesthesia procedure to be performed? | Waking up in pain | Not waking up and dying | I have no fear | |
| Illiterate (n/%) | 6/16 | 6/19 | 20/65 | |
| Primary school (n/%) | 5/6 | 25/30 | 52/64 | p=0.001 |

When the responses to the survey questions were examined based on the socioeconomic status, it was found that as the socioeconomic status increased, the level of knowledge about anesthesia increased, but the level of anxiety did not change with socioeconomic status. Details can be seen in Table IV.

Table IV. Responses to Survey Questions by Socioeconomic Status

| Do you have any known medical conditions? | Yes | No | Total | |
|---|---------|--------------|--------|---------|
| Low (n/%) | 10/20 | 41/80 | 51/100 | |
| Middle-High (n/%) | 29/29 | 70/71 | 99/100 | p=0.278 |
| Total | 39 | 111 | 150 | |
| Do you have any habits? | Smoking | Alcohol-Drug | None | |
| Low (n/%) | 20/39 | 7/14 | 24/47 | |
| Middle-High (n/%) | 40/40 | 8/8 | 51/52 | p=0.544 |
| Total | 60 | 15 | 75 | |

| Have you had surgery under anesthesia (narcosis) before? | Yes | No | Total | |
|---|----------------------------|---|----------------|---------|
| Low (n/%) | 9/18 | 42/82 | 51/100 | |
| Middle-High (n/%) | 24/24 | 75/76 | 99/100 | p=0.474 |
| Total | 33 | 117 | 150 | |
| Do you have any allergies to medications? | Yes | No | Total | |
| Low (n/%) | 6/12 | 45/88 | 51/100 | |
| Middle-High (n/%) | 11/11 | 88/89 | 66/100 | p=1 |
| Total | 17 | 133 | 150 | |
| Do you know why you came to the anesthesia clinic? | Yes | No | Total | |
| Low (n/%) | 20/39 | 31/61 | 51/100 | |
| Middle-High (n/%) | 78/79 | 21/21 | 99/100 | p=0.001 |
| Total | 98 | 52 | 17/100 | |
| Where does the anesthesia doctor work in the hospital? | Outside the operating room | In the operating room | I have no idea | |
| Low (n/%) | 10/20 | 10/20 | 31/60 | |
| Middle-High (n/%) | 14/14 | 59/60 | 26/26 | p=0.001 |
| Total | 24 | 69 | 57 | |
| Do you know any of the anesthesia methods? | General | Local | I have no idea | |
| Low (n/%) | 9/18 | 6/12 | 36/70 | |
| Middle-High (n/%) | 53/54 | 18/18 | 28/28 | p=0.001 |
| Total | 62 | 24 | 64 | |
| Do you know what the anesthesia doctor does during surgery? | Consciousness monitoring | Both consciousness and vital functions monitoring | I have no idea | |
| Low (n/%) | 12/23 | 5/10 | 34/67 | |
| Middle-High (n/%) | 24/24 | 41/42 | 34/34 | p=0.001 |
| Total | 36 | 46 | 68 | |

| Who do you think administers the anesthesia during surgery? | Nurse-technician | Anesthesia Doctor | Total | |
|---|-------------------|-------------------------|----------------|---------|
| Low (n/%) | 24/47 | 27/53 | 51/100 | |
| Middle-High (n/%) | 30/30 | 69/70 | 99/100 | p=0.065 |
| Total | 54 | 96 | 150 | |
| Who should provide information about the anesthesia procedure to be performed during surgery? | Surgeon Doctor | Anesthesia Doctor | Total | |
| Low (n/%) | 38/75 | 13/25 | 51/100 | |
| Middle-High (n/%) | 25/25 | 74/75 | 99/100 | p=0.001 |
| Total | 63 | 87 | 150 | |
| What are your fears regarding the anesthesia procedure to be performed? | Waking up in pain | Not waking up and dying | I have no fear | |
| Low (n/%) | 6/12 | 14/27 | 31/61 | |
| Middle-High (n/%) | 10/10 | 40/40 | 49/50 | p=0.292 |
| Total | 16 | 54 | 80 | |

4. Discussion

In today's world, advancements in technology and communication have made it easy to access the desired information. Although this situation has led to information overload, the level of knowledge and awareness about health, both globally and in our country, has increased compared to the past. However, patients' knowledge about the role and education of anesthetists remains limited, and their functions are often overlooked and not well understood. These data are consistent with previous literature that recognition of anesthetists as specialist physicians varies between 50% and 99% (11-15).

Preoperative period is associated with significant anxiety and fears related to anesthesia and surgery, primarily due to the lack of sufficient public understanding of the science of anesthesia and inadequate efforts in this regard. Studies have reported that the most common concern in this field is related to the fear of "not waking up from anesthesia. Other concerns include death, intraoperative awareness, postoperative nausea,

and vomiting (16). Lin et al. argued for the necessity of supporting patient education through preoperative video use and written information to reduce preoperative anxiety in patients. In this study, the use of preoperative videos and written information resulted in an increase in patients' knowledge and a slight decrease in anxiety levels (17).

The surgical procedure and anesthesia application to be performed in an unfamiliar environment outside the patient's home, possibly encountered for the first time, can lead to the patient's fear and anxiety, driven by concerns about death, disability, pain, and potential loss of organ functions. A detailed explanation of the anesthesia procedure and surgical interventions to be performed on the patient can reduce anxiety, leading to patient satisfaction and improved quality of care (18). Patients who are given ample time and detailed information about the procedure during the preoperative process consider it a privilege, recognizing the importance and care of meeting with an anesthetist. It has been observed that patients who meet with the same anesthetist multiple times and are well-informed tend to have higher satisfaction levels (19). In our study, 65% of the patients knew the reasons for coming to the anesthesia clinic, while a relatively high percentage, 35%, did not know why they were visiting the anesthesia clinic. This could be due to a lack of detailed information provided to the patients before their preoperative visit to the anesthesia clinic. In addition to not knowing the reason for coming to the anesthesia clinic, patients' lack of knowledge about the surgical procedure planned for them can also contribute to increased preoperative fear and anxiety. It was observed that there was a significant increase in the knowledge of the reason for coming to the anesthesia clinic with the increase in socioeconomic status.

In our study, when patients were asked about what an anesthetist does during surgery, 24% responded with "Monitors consciousness, i.e., sleeping and waking," 30% responded with "Monitors vital signs such as heart rate, blood pressure, fluid and blood loss, in addition to consciousness," while a significant portion (46%) chose "I have no idea." It was observed that as the level of education and socioeconomic status increased, there was an increase in the rate of selecting the correct response. Patients with higher levels of education appeared to be more curious about the anesthesia procedure they would undergo in the preoperative period and made more efforts to obtain information on the subject. In the study

conducted by Demir and colleagues, 90% of patients stated that their anesthesia was administered by a doctor. This result can be seen as a positive development in our country. (20).

Many studies investigating the level of knowledge about anesthesia and anesthesiologists have yielded different results over the years and in different regions where the studies were conducted. In our study, when asked who administers the anesthesia process during surgery, 36% of patients chose "staff," while 64% selected "anesthesiologist." It was found that as the level of education increased, the percentage of those who answered "anesthesiologist" also increased. When asked about who provides information about the anesthesia procedure to be performed during surgery, a significant portion of the patients (42%) answered "surgeon," while 48% answered "anesthesiologist." This is not a favorable development for our region, as it indicates that the perception that information about anesthesia is provided by surgeons has not changed.

In a study conducted by Demir et al., it was reported that when concerns about anesthesia were queried, 35% of patients responded with "I have no fear at all" (20). In our study, when patients were asked about their fears related to the anesthesia they would receive, 10% of patients expressed fear of "not being able to sleep fully during surgery and feeling pain," 36% expressed fear of "not waking up from anesthesia and dying," and 54% stated that "they have no fear at all." It was found that as the level of education increased, patients' fears about the anesthesia procedure also increased. When concerns related to anesthesia were queried based on age groups, all patients aged 60 and above responded with "I have no fear." This result may suggest that fatalism is more common as a way of life in the elderly. Concerns about anesthesia were found to be higher in female patients compared to male patients. This difference is thought to be related to the fact that in our society, men are less expressive of their emotions and complaints. It reaffirms previous studies that have identified female gender as a risk factor for preoperative anxiety (21). In two studies it is stated that older age and male sex decrease preoperative anxiety (22,23).

In a study it was observed that high school graduates were significantly less anxious in comparison to primary school graduates (22). There are contradictory results concerning the educational status. In our study, the distribution of patients' fears about the anesthesia procedure based on their educational level showed that as

the education level increased, fears about the anesthesia procedure also increased. This could be attributed to the awareness that educated people have about the risks involved in an operation. Illiterate patients had a high percentage (around 65%) of having no fears. Interestingly, in the literature, when fears related to anesthesia were investigated, patients often expressed concerns about "not waking up." It is notable that staying awake during surgery is as significant a concern as not waking up after surgery. In a study conducted by Demir et al., the awareness rate of regional anesthesia was found to be close to 70%, while in our study, we found that 38% of the patients had heard of regional anesthesia, and 62% had not (20).

Various studies have discussed the quantity of information and how it should be conveyed to reduce anxiety about the procedures and prevent it from escalating (24,25). In an other study it was showed that pre-surgery anxiety levels of cancer patients can be significantly reduced by educating patients on the planned surgical and anesthetic procedures in a preoperative anesthetic setting (26).

Therefore, reducing patients' anxieties is important. There is ample evidence in the literature showing that preoperative information plays a crucial role in reducing perioperative anxiety (27). When an anesthesia specialist identifies patients with high anxiety, they should use visual, auditory, and psychoeducational tools, conduct preoperative visits, as these interventions have been shown to reduce anxiety and provide additional information to patients (24).

This study had several limitations. First, the study was part of a single center survey which reduces generalizability of the results. Second, we aimed to focus on specific fears clearly associated with anesthesia. However, it is not always easy to attribute some concerns solely to anxiety related to anesthesia or surgery.

5. Conclusion

In conclusion, unfortunately, our study has shown that the social image of the field of anesthesia is not where it should be and that anesthetists and anesthesia practices are not sufficiently understood. Research is needed to identify the factors affecting patient satisfaction in anesthesia and the patient-doctor relationship and to develop reliable measurement methods. Studies in this field will contribute to improving the quality of anesthesia practices.

Note: Our article was produced from a thesis study conducted in 2010.

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The In Vitro Thermal Effect of A 980-Nm Diode Laser In A Gingival Simulation Model

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Abstract

Aim: In periodontology, photobiomodulation therapy applications are increasing due to their acceleration of regeneration and anti-inflammatory effects. It is known that there is an increase in temperature during laser therapy. The aim of this study is to measure the temperature changes while using a 980-nm diode laser with different parameters in a new gingival simulation method.

Materials and Methods: Silicone impression material was placed in a prefabricated 3-cm diameter teflon mold with the measuring tip of the digital thermometer in the center. To simulate gingiva, a 1x1 cm² bovine collagen membrane was placed. The diode laser was set at 0.4 watts (W), 0.6W, 0.8W, 1W, 1.5W, 2W, 3W, 4W, 5W, and 6W powers pulsed (PW), the continuous mode (CW) was applied to the dry membrane, and 0.05 cc and 0.1 cc of blood impregnated the membrane for 60 seconds. Temperature changes were measured with a digital thermocouple.

Results: The highest temperature change was 2.5°C and occurred during the 6W CW mode in a 0.1-cc bloody membrane. In addition, the CW mode created a temperature change ranging from 1 to 2.5 times greater compared to the PW mode. As the W value increased, it was observed that the temperature change increased in direct proportion.

Conclusion: According to the results of this study, it was determined that the photobiomodulation therapy applied with a 980-nm diode laser increased the temperature in the gingival simulation model, but this increase did not exceed 10°C, which is the critical value for bone tissue.

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Keywords: Photobiomodulation, thermal change, gingival simulation-model.

Introduction

"LASER" is an acronym derived from the words "Light Amplification by Stimulated Emission of Radiation." Theodore Mainman did the practical work of the laser in 1960, and the first worked laser was invented by Mainman. In this laser, Mainman used ruby crystals as the main substance, leading to the term "ruby laser." The thermal effect of the ruby laser on teeth was explained in 1965 by two researchers named Goldman and Taylor (1). Research showed that the ruby laser caused an increase in temperature both in the tooth itself and in neighboring teeth (2,3). After the discovery of the first ruby laser and its application in dentistry, a wide variety of lasers were invented and used in both soft and hard tissue treatments in dentistry. However, for the laser to act on

biological tissues, it needs to be absorbed by them. Moreover, absorption is related to the physical and chemical properties of tissue (4). Following absorption, photothermal, photomechanical, and photochemical effects occur in the tissue. While these effects depend on the duration, wavelength, and power of the laser beam, the physical properties of the tissue are also important (2).

Photobiomodulation is a treatment method used to reduce inflammation and increase tissue repair and pain-relieving "analgesic" effects. The biostimulative effect of the laser was found incidentally in 1967 when Dr. Mester did research on the laser and cancer.

Since then, thousands of publications have been added to the literature, and the effect of photobiomodulation on reducing inflammation, accelerating wound healing, and pain reduction continues to be investigated (2,5,6). A number of changes occur in the laser-activated cell, such as a decrease in inflammation and acceleration in wound healing (5). Diode lasers and LEDs are generally used in photobiomodulation therapy. Generally, devices with wavelengths between 600-1000 nm are preferred, and energy density varies from 5 mW/cm² to 5 W/cm². The limits of photobiomodulation in dentistry have not been fully drawn compared to the treatment of skeletal and muscle diseases, but most current studies address this field (5).

Many effects of photobiomodulation therapy are explained by the absorption of light by the mitochondria. Cells can contain thousands of mitochondria, which take part in the cell's energy synthesis. In addition, mitochondria synthesize nitric oxide in ischemic cells. Nitric oxide binds to cytochrome-c oxidase (the terminal enzyme in the electron transport chain) to prevent oxygen from binding. Thus, it both reduces energy synthesis and increases oxidative stress. Increased oxidative stress also causes activation of NF-κB, which is one of the important keys of the inflammatory state (7). However, while all these cellular changes occur, another issue that is the subject of research is the photothermal effect of laser (8).

In clinical studies in the fields of periodontology and implantology, lasers are usually applied on gingiva or inside the periodontal pocket(9,10); however, the extent to which the temperature increases during these applications in the alveolar bone is unclear in gingival simulation models. Moreover, Eriksson et al. showed that a change in temperature above the threshold of 10°C in the alveolar bone causes bone injury and endangers its regeneration (11,12). The purpose of this pilot study was to evaluate the photothermal effect of a 980-nm diode laser applied at different powers and durations using an in vitro gingival simulation with different hemoglobin densities.

Material and Methods

Preparation

To create the main structure, a 3-cm diameter prefabricated prepared teflon was used as a mold. The mold was filled with a condensation silicone impression material (Optosil Xantoprene, Heraeus Kulzer Germany), and a thermocouple (305 handheld

thermometer) probe (J type 1 mm diameter) was placed in the center. During this filling, a negative space was created using a piece of cardboard material with an area of 1x1 cm² and depth of 2 mm. During the laser application, a Collprotect® native collagen membrane (Straumann, Botiss Biomaterials, Zossen, Germany) was adjusted in the specified dimensions (1x1 cm²) to simulate the gingiva (Figure 1A, 1B, 1C).

Laser application

Laser application was conducted using a 980-nm GaAlAs diode laser (CHEESETM, GIGAA Laser, Wuhan Gigaa Optronics Technology Co., Ltd., China) and low laser therapy application tip (Therapy handpiece, Wuhan Gigaa Optronics Technology Co., Ltd., China) on a collagen membrane. The tip was placed at its standard distance by adjusting the spot diameter to 1 cm. The laser powers were 0.4W, 0.6W, 0.8W, 1W, 1.5W, 2W, 3W, 4W, 5W, and 6W, respectively, in both a continuous wave (CW) and pulsed wave (PW) (500ms stop, 500ms irradiation) mode for 60 seconds at an adjusted distance of 1 cm from the membrane. Each laser application was performed while the membrane was dry, while the membrane absorbed 0.05 cc of blood, and while it absorbed 0.1 cc of blood. Peripheral venous blood applied to the membrane was obtained from the author (H.G.). In addition, the membrane was replaced after each laser application (Figure 1D, 1E).

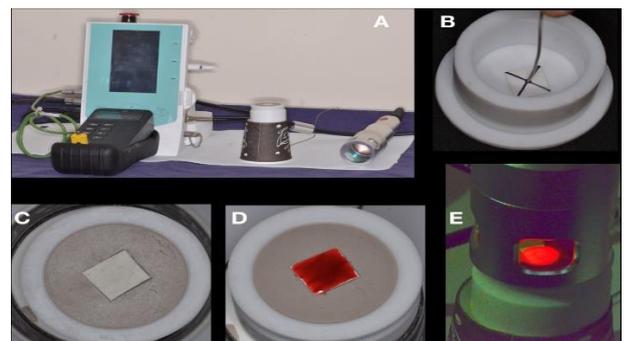


Figure 1: A: Experimental tools and laser, B: Placement of thermocouple tip, C: Placement of the collagen membrane in to impression material, D: Application of blood, E: Application of laser.

Assessment of temperature change

Temperature changes were detected on the digital thermometer screen before the laser application and after 60 seconds of exposure. The temperature difference was calculated, and the temperature change for each application was recorded with Microsoft Excel (Microsoft, Office 365, Redmond, WA, USA). Tables and graphics were also created with Microsoft Excel.

Results

Temperature changes and applied doses are summarized in Table 1 and Figures 2 and 3, respectively. Temperature changes were between 0 and 2.5 °C. The highest temperature change occurred with a 6W CW on the 0.1 cc bloody membrane. With a doubling of the blood density, a temperature changes 1-2.5 times greater than the initial temperature was observed at different doses, with the highest temperature occurring with the 1W pulsed wave. The critical threshold of 10°C was not exceeded under any doses or conditions.

Table 1: Temperature differences at different laser dose.

| Temperature differences | | No blood | 0,05cc | 0,1cc |
|-------------------------|----|----------|--------|-------|
| 0,4W | CW | 0 | 0,1 | 0,2 |
| | PW | 0 | 0,1 | 0,1 |
| 0,6W | CW | 0,1 | 0,3 | 0,4 |
| | PW | 0,1 | 0,1 | 0,2 |
| 0,8W | CW | 0,2 | 0,3 | 0,6 |
| | PW | 0,1 | 0,2 | 0,2 |
| 1W | CW | 0,2 | 0,5 | 0,7 |
| | PW | 0,1 | 0,2 | 0,5 |
| 1,5W | CW | 0,2 | 0,7 | 0,9 |
| | PW | 0,2 | 0,4 | 0,5 |
| 2W | CW | 0,3 | 1,1 | 1,4 |
| | PW | 0,3 | 0,4 | 0,6 |
| 3W | CW | 0,5 | 1,5 | 1,7 |
| | PW | 0,4 | 0,7 | 0,9 |
| 4W | CW | 0,6 | 1,9 | 2 |
| | PW | 0,5 | 0,8 | 1,1 |
| 5W | CW | 0,8 | 2 | 2,2 |
| | PW | 0,6 | 0,7 | 1,1 |
| 6W | CW | 0,9 | 2,3 | 2,5 |
| | PW | 0,8 | 0,9 | 1,3 |

W: watt, CW; continuous wave, PW; pulsed wave.

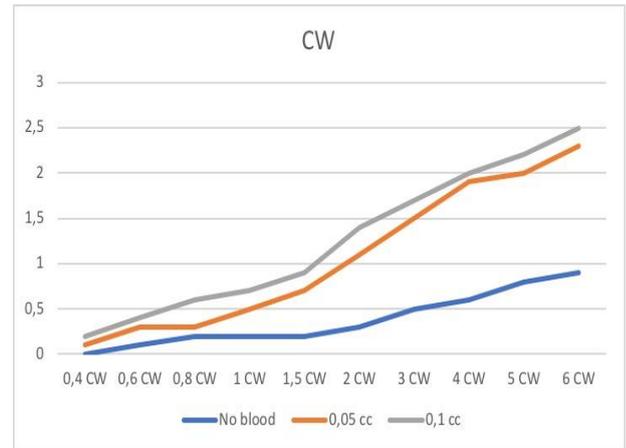


Figure 2: Temperature change graph in CW

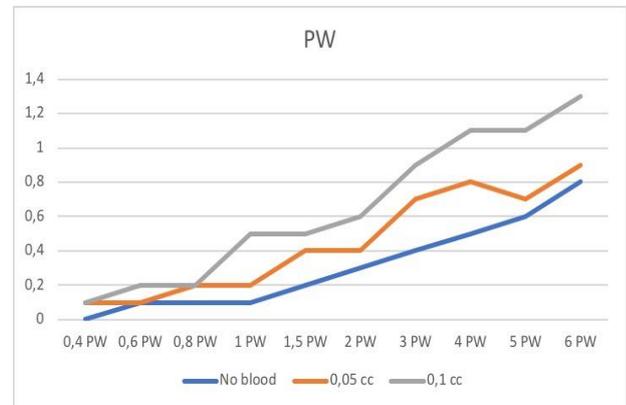


Figure 3: Temperature change graph in PW

Discussion

Studies on photobiomodulation are primarily animal studies or conducted in vitro. In vitro studies have been used to examine the effects of photobiomodulation applications and various laser doses on human periodontal tissues; laser application has been emphasized to have a positive effect on cell proliferation in gingival fibroblasts (13). However, studies on oral tissues have generally been on the proliferative effects of different doses. Although the photothermal effect of lasers is mentioned in studies in the field of dermatology (14), there are no in vitro studies regarding oral tissue simulation methods. Our study is one of the first studies showing gingival simulation in this context. In addition, according to the results of our study, it can be said that the temperature differences occurring in this in vitro model depended on the laser dose and hemoglobin density but did not exceed the critical threshold (10°C).

The recently published studies of Barros et al. emphasized that the color and thickness of skin affects the transmittance and reflectance of the laser light, and it was stated that the texture properties are important for laser dose and parameter selection (14). According to the results of the present study, it is not possible to say whether tissue thickness has an effect, and it can be counted among the limitations of this study. However, it can be said that the increase in blood density and hemoglobin density is associated with temperature increases. Eriksson et al. stated that a 10°C temperature change occurring in the bone can lead to necrosis in bone tissue (11); however, the results of our study determined that the 980-nm diode laser applied at different watts for 60s showed a maximum increase of 2.5°C, which is below the critical threshold. Moreover, although membrane was as close to the thermocouple type membrane as possible, it was estimated that there is little heat loss. In photobiomodulation treatments, J/cm² is used instead of W as the basic dose-related unit (9). W used in present study because it could be easily converted to J/cm².

In laser research, animal specimens are used more frequently than gingival modeling (15); however, in such studies, the temperature changes of the laser applied to an inorganic material, such as a dental implant in bone and close tissues, are tested. Studies with animal samples can mimic tissues such as human bones and teeth (16), but they are expected to have a similar blood composition to mimic soft tissues such as gingival. As such, in our study, human blood was combined with a bovine collagen membrane. In addition, this combination is often used in guided bone regeneration treatments in the field of periodontology.

In this study, a novel approach was undertaken to simulate gingival tissue in an in vitro setting. Utilizing a prefabricated teflon mold, filled with a condensation silicone impression material, alongside a collagen membrane to mimic the gingiva, provided a controlled environment for laser application. The inclusion of a thermocouple probe allowed for precise temperature monitoring during laser exposure. In this study, the collagen membrane was primarily employed for its ability to absorb blood and secondarily for its standardized thickness, mimicking physiological tissue. The inclusion of both continuous and pulsed modes in laser application holds clinical significance. Thus, to emulate clinical practice, both modes were employed in the study.

Laser application, performed using a 980-nm GaAlAs diode laser, was systematically conducted at varying power levels and modes on the collagen

membrane. Notably, the study explored the effects of different blood densities, simulating physiological conditions encountered during clinical procedures. Temperature changes were measured and recorded meticulously, showcasing the impact of laser dose and hemoglobin density on thermal responses. Comparative analysis with existing literature underscored the novelty of this research, particularly in the context of oral tissue simulation. While previous studies predominantly focused on animal models or in vitro assessments without tissue simulation, this study provided valuable insights into the photothermal effects of lasers on simulated gingival tissue. The findings indicated that temperature variations remained below the critical threshold, suggesting safety within the parameters tested. Furthermore, limitations such as the influence of tissue thickness on laser effects were acknowledged, providing avenues for future research refinement.

Conclusions

In summary, our study is among the first to explore gingival simulation in the context of photobiomodulation. We investigated the impact of laser dose and hemoglobin density on temperature changes in an in vitro model, finding that the 980-nm diode laser, applied at different watts for 60 seconds, resulted in a maximum temperature increase of 2.5°C, below the critical threshold of 10°C.

While our study did not specifically address the potential influence of tissue thickness on the observed effects, we did establish a correlation between increased blood density and hemoglobin density with temperature increases. Our unique approach involved combining human blood with a bovine collagen membrane, commonly used in guided bone regeneration treatments in periodontology.

Our findings contribute valuable insights into the temperature dynamics associated with different laser doses on human oral tissues. By offering a novel perspective on gingival simulation and its relevance to photobiomodulation, our study may inform future research and clinical applications in periodontology.

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Conflict of Interest: The authors declare that he has no conflicts of interest in publishing this article.

Compliance with ethical standards

This study was approved by University Local Ethics Committee; decision no: 2020/361, date:16.12.2020.

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Bibliometric Analysis of Endocrown Studies Published in Endodontic Journals within The Scope of Sci-Expanded

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Abstract

Aim:This study aimed to make a bibliometric analysis of endocrown studies published in the International Endodontic Journal (IEJ), Journal of Endodontic (JOE) and Australian Endodontic Journal (AEJ) within the scope of Science Citation Index Expanded (Sci-Exp).

Methods: Studies published in IEJ, JOE and AEJ journals were determined using the keyword 'endocrown'. The article title, keywords and content of the articles were examined. The publications were recorded, including the journal, publication year, countries where the authors were located, type of publication, number of citations.

Results: One abstract, three research articles, and four reviews, were retrieved. Five of these studies were published in the IEJ and the remaining three were in the JOE, any publication related to endocrowns could not be found in the AEJ. JOE was superior to IEJ in terms of the number of citations. The number of researchers participating in studies was the highest in Brazil.

Conclusion: Limited number of articles were found on endocrowns in the endodontic journals within the scope of sci-expanded. All reviews and the abstract were included in IEJ whereas all of the research articles were published in JOE. The most cited publication was a research article in JOE.

Review Article (HRU Int J Dent Oral Res 2024; 4(1): 15-18)

Keywords: Bibliometrics, crowns, database, endodontics, publications.

Introduction

The restoration of endodontically treated teeth with excessive coronal material loss is one of the most common clinical problems faced by dentists. These teeth lose their mechanical properties significantly compared to vital teeth, and in these cases, regaining function and aesthetics may require complex treatments (1). Tooth tissue loss does not only occur as a result of extensive caries, preparation of the access cavity for endodontic treatment can also lead to weakening of the tooth tissue. Following the removal of the pulp tissue, the loss of the tooth's neurosensory feedback system reduces the protection of the tooth against chewing forces (2). The importance given to the priority of minimally invasive principles has led to the development of restoration

options to be applied to the teeth after the endodontic treatment process. Endocrowns are among the leading choices in this sense. In addition to replacing the coronal anatomy, it shows that endocrowns are an important alternative in terms of preventing bacterial microleakage by performing successful sealing at root canal entrances and obtaining aesthetic and conservative restoration (3). Clinical and in vitro studies on the subject would be important.

Studies conducted in journals within the scope of Science Citation Index Expanded (Sci-Exp) in the field of endodontics also contribute to the research and development of endocrowns. Within the scope of Sci-Exp, there are three journals in the field of endodontics: International Endodontic Journal (IEJ), Journal of

Endodontics (JOE) and Australian Endodontic Journal (AEJ) (4). The International Endodontic Journal is published monthly on behalf of the British Endodontic Society. Original scientific articles are published on biomedical science, applied materials science, bioengineering, epidemiology and endodontic problems and their treatment, and restoration of root canal treated teeth. In addition, review articles, clinical case reports, book reviews, scientific meeting summaries are also accepted. All studies are subject to peer review (5). Journal of Endodontics belongs to the American Association of Endodontists. The monthly published journal includes clinical studies, studies on biological aspects of endodontics, studies on endodontic techniques, case reports, or research articles on scientific or applied aspects of endodontics (6). The Australian Endodontic Journal deals with the morphology, physiology and pathology of the human tooth, particularly pulp, root and peri-radicular tissues, and is published three times a year (7).

Bibliometric research has a prominent role in assessing the scientific chain, with the way researchers measure the scientific productivity of communities. Published data work is widely applied in assessment and summarizes bibliometric data to present the academic activity structure and emerging trends of a research topic or field (8). In this study, it was aimed to make a bibliometric review of endocrown studies published in the International Endodontic Journal (IEJ), Journal of Endodontics (JOE) and Australian Endodontic Journal (AEJ) within the scope of Sci-Exp.

2. Materials and Methods

Studies published in IEJ, JOE and AEJ journals were listed using the keyword 'endocrown'. The articles published between the publication start date of the journals and January 2023 on endocrown were classified as including the journal name, publication year, countries where the authors were located, type of publication, number of citations, and recorded in the Excel software package (Microsoft). The results were evaluated.

3. Results

A total of 8 studies on endocrowns were found in endodontic journals within the scope of Sci-Exp. While five of these studies were published in the International Endodontic Journal and the remaining three were published in the Journal of Endodontics, no publications on endocrowns were found in the Australian Endodontic

Journal. It was determined that the published articles consisted of one abstract, three research articles and four reviews. All studies are shown in table 1. It was seen that all reviews and abstracts were included in IEJ, whereas it was determined that all of the studies in JOE were published as research articles. The first study on endocrown was published in IEJ in 2019, however it was seen that the first study in JOE was published in 2009. The most cited publication was a research article in JOE, and the least cited publication was a review published in IEJ. When evaluated in terms of the number of citations, it was determined that JOE was superior to IEJ. Number of researchers participating in studies on endocrowns was highest in Brazil, followed by Taiwan and the United Kingdom, which had the same number of participants (Figure 1).

Table 1. Endocrown studies published in JOE and IEJ.

| |
|---|
| D Angerame, M De Biasi, G Marchesi, A Frassetto, L Bevilacqua. Influence of restorative material and margin relocation on the fracture resistance of teeth restored with CAD/CAM endocrowns. <i>Int Endod J</i> . 2019;52: 3-41. doi.org/10.1111/iej.13172 |
| Bhuva B, Giovarruscio M, Rahim N, Bitter K, Mannocci F. The restoration of root filled teeth: a review of the clinical literature. <i>Int Endod J</i> . 2021;54(4):509-535. doi:10.1111/iej.13438 |
| European Society of Endodontology developed by:, Mannocci F, Bhuva B, Roig M, Zarow M, Bitter K. European Society of Endodontology position statement: The restoration of root filled teeth. <i>Int Endod J</i> . 2021;54(11):1974-1981. doi:10.1111/iej.13607 |
| Mannocci F, Bitter K, Sauro S, Ferrari P, Austin R, Bhuva B. Present status and future directions: The restoration of root filled teeth. <i>Int Endod J</i> . 2022;55(S4):1059-1084. doi:10.1111/iej.13796 |
| Patel S, Bhuva B, Bose R. Present status and future directions: vertical root fractures in root filled teeth. <i>Int Endod J</i> . 2022;55(S3):804-826. doi:10.1111/iej.13737 |
| Dartora NR, de Conto Ferreira MB, Moris ICM, et al. Effect of Intracoronary Depth of Teeth Restored with Endocrowns on Fracture Resistance: In Vitro and 3-dimensional Finite Element Analysis. <i>J Endod</i> . 2018;44(7):1179-1185. doi: 10.1016/j.joen.2018.04.008 |
| Lin CL, Chang YH, Pa CA. Estimation of the Risk of Failure for an Endodontically Treated Maxillary Premolar with MODP Preparation and CAD/CAM Ceramic Restorations. <i>J Endod</i> . 2009;35(10):1391-1395. doi: 10.1016/j.joen.2009.06.020 |
| Lin CL, Chang YH, Hsieh SK, Chang WJ. Estimation of the Failure Risk of a Maxillary Premolar with Different Crack Depths with Endodontic Treatment by Computer-aided Design/Computer-aided Manufacturing Ceramic Restorations. <i>J Endod</i> . 2013;39(3):375-379. doi: 10.1016/j.joen.2012.11.042 |

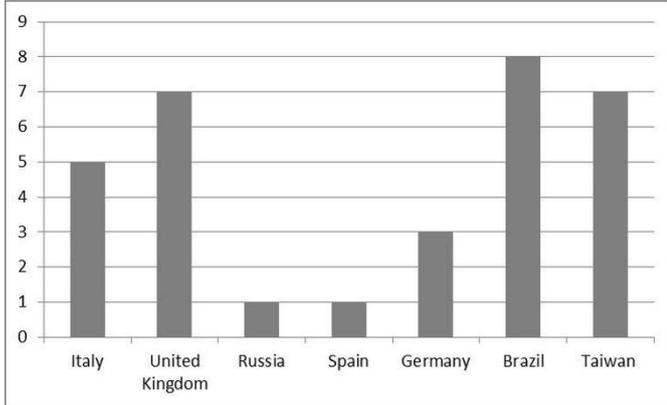


Figure 1. Researcher numbers by countries

4. Discussion

In this study, bibliometric analysis of endocrown-related articles published in the field of endodontics within the scope of Sci-Exp was performed. Endocrowns are reported to be a reliable choice in the restoration of endodontically treated teeth with excessive substance loss. It is possible to describe them as a one-piece restoration with an extension towards the pulp chamber. The retention requirement is met from the axial walls of the pulp chamber. However, it should not be applied in situations that will cause insufficient adhesion, such as a pulp chamber shallower than 3 mm or a finish line narrower than 2 mm. However, there are various opinions about the wall angles that should be formed in the preparation of the pulp chamber (9). The effect of the extension amount of the endocrown on the mechanical properties, the differences in stress distribution and the risk of failure of the restoration when compared to other restoration preferences were also discussed in the research articles on the endocrown published in the journals of Endodontics within the scope of Sci-Exp (3,10,11). In the reviews, it was determined as the main aim of these studies to make the most effective restoration choice in terms of prognosis of the teeth following root canal treatment (12-15). It is thought that the fact that the application history of endocrown restorations is not very old has contributed to the publication of 8 studies, one of which is a summary statement, four reviews and three research articles, in the field of Endodontics within the scope of Sci-Exp. However, it is anticipated that studies on the design, adhesion and mechanical properties of endocrown restorations may be studied more due to the subjects of interest in the field of Prosthetic Dentistry. However,

further analysis is needed to make a comparison on this subject. In a study (16), it was reported that publishment acceptance possibility of research articles were higher in bibliometric analyzes than reviews. However, it has been seen that there are more reviews in studies on endocrowns in endodontic journals within the scope of Sci-Exp. However, while JOE only published research papers, IEJ only published reviews. In this study, the first study in journals with bibliometric analysis was published as a research article in 2009. All studies were conducted between 2009 and 2022. There is no specific period in which researches related to the subject are concentrated. However, there is no study of endocrowns in AEJ.

Bibliometric analyzes contain important results for the analysis of current studies. In addition, informative and guiding data are obtained in terms of publication principles, aims and scopes of journals (8). In the present study, it is concluded that articles on endocrowns in the journals of the field of Endodontics within the scope of Sci-Exp are not preferred much in terms of the scope of publication of the journals. However, it is thought that the need for a bibliometric analysis of the studies on the parameters related to endocrown restorations in the journals in the field of Prosthetic Dentistry will be useful in terms of evaluating academic trends.

5. Conclusion

Endocrowns are an alternative method that can be preferred in addition to post application in root canal treated teeth with crown destruction. When the studies published in the journals within the scope of Sci-Exp in the field of endodontics are examined, endocrowns are generally discussed within the evaluation of the most ideal restoration option in terms of prognosis in teeth that have undergone root canal treatment. In research articles, the evaluation of the stress that may occur in teeth restored with endocrown and the biomechanical changes are examined. While the IEJ published review articles, the research articles had the opportunity to be published in the JOE. JOE seems to be advantageous in terms of the number of citations. However, AEJ had no publications on the endocrowns.

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Case Series on Implant Supported Overdenture Prosthesis

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Abstract

The biggest problem of patients with total edentulism is the lack of retention and stabilization of their dentures and the insufficient chewing function. In these patients, implant-retained prosthetic treatment approaches provide function, phonation and aesthetic expectations. In this case series, the rehabilitation of two patients with 4 implants in the maxilla and 2 implants in the mandible with different implant-supported overdenture prosthesis planning is described.

Case Report (HRU Int J Dent Oral Res 2024;4(1): 19-23)

Key words: Dental-implant, locator, splinted prosthesis.

Introduction

For many years, the first treatment option in the treatment of completely edentulous patients has been classical complete dentures (1). Patients have difficulty in chewing and speaking when the retention and stabilization of classical dentures made with support from edentulous ridges is inadequate (2). In such cases, implant-retained prosthetic treatment approaches increase function, phonation and aesthetic expectations (3).

There are two different treatment options for completely edentulous patients: implant-tissue supported removable prostheses and fixed prostheses. The choice of treatment is based on the anatomical structure of the bone, the patient's expectations and economic situation. In addition, the relationship between the jaws, the distance between the arches, the arch shape and the lip line are among the factors that affect treatment planning (3,4). Ball, bar, locator, magnet or telescope-based systems are used to ensure retention in implant-supported removable prostheses (5,6).

In this case series, the rehabilitation of two patients with 4 implants in the maxilla and 2 implants in the mandible with different implant-supported overdenture prosthesis planning is described.

Case Report 1

A sixty-nine-year-old male patient without any systemic disease was referred to the Department of Prosthodontics after implant surgery. Intraoral examination revealed 4 implants in the upper jaw and 2 implants in the lower jaw of Medentika (Medentika, A straumann group brand, Germany) brand.

In the first session, alginate impressions were taken from the upper and lower jaw using a prefabricated spoon. The base was prepared with acrylic resin based on the obtained diagnostic model. Afterwards, closed impression pieces were placed on the implants and closed-tray impressions were taken with condensation reaction silicone (Zhermack-Zeta plus) impression material (figure 1). In the same session, the vertical dimension and the relationship between the jaws were recorded using the prepared base and wax rims. Afterwards, the multiunit and locator system was selected by evaluating the gingival heights, implant angles and the relationship between the jaws on the model. Open-tray impression posts were placed on the model and splinted together using dental floss and pattern resin (GC) (figure 2).

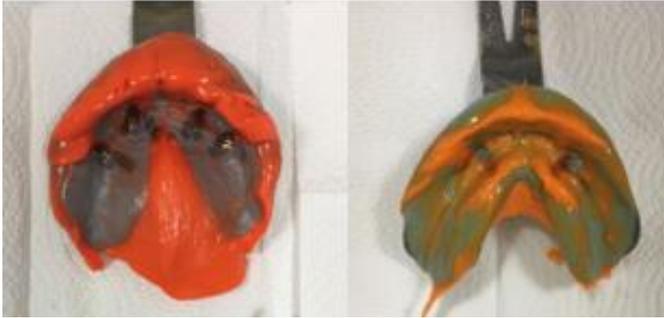


Figure 1: Closed-tray impression.



Figure 2: Open-tray impression preparation with pattern resin.

The selected multiunit system and locator system were placed by torque. Open-tray impression pieces splinted by pattern resin were screwed to the upper jaw. After the necessary checks were made, impression were taken from the upper jaw with additional type silicone impression material (Zhermack Eltie HD+). In the lower jaw, impression pieces were placed on the locator attachments and closed-tray impressions were taken with additional type silicone impression material. Before the bar attachment was designed, the patient's vertical dimension measurement and tooth try-in were carried out. With reference to the tooth arrangement, the bar attachment was designed to best fit the final prosthesis. The prepared bar system was checked and rehearsed with the Sheffield test (figure 3). Afterwards, the metal skeleton was rehearsed. At the finishing stage, the bar system was torqued to the upper jaw. In the lower jaw, the locator system was attached in the laboratory at the final stage (figure 4). Prosthetic edges were checked and occlusal adjustments were made.

The laboratory inserts in the prosthesis were replaced with inserts with appropriate retention. The prostheses were delivered to the patient and the patient was called for a check-up (figure 5).



Figure 3: Intraoral view of the bar attachment.



Figure 4: Placement of attachments within the prosthesis.



Figure 5: Intraoral view of the final prosthesis.

Case Report 2

A 72-year-old male patient with no systemic disease underwent implant surgery for total edentulism and was referred to the Department of Prosthodontics. Oral examination of the patient revealed 4 implants in the maxilla and 2 implants in the mandible.

At the same time, it was observed that the mandibular bone was highly resorbed while the bone volume was preserved in the maxilla. Considering the number of implants applied and the interocclusal distance, a locator-supported removable prosthesis was planned for the lower jaw and upper jaw.

In the first session, the first impression was taken with alginate impression material using a prefabricated spoon. After the diagnostic model was created, a personal spoon was prepared with acrylic resin. In the second session, closed impression pieces were placed and impressions were taken with condensation reaction silicone impression material. The vertical dimension and the relationship between the jaws were recorded with the prepared base and wax rims. Locator attachments were selected based on the model obtained, taking into account gingival heights, implant angles and the relationship between the jaws (figure 6).



Figure 6: Intraoral view of locator attachments.

A personal spoon was prepared based on the model. Afterwards, the selected locator attachments were torqued to the mouth. The edges of the personal spoon were shortened to 2 mm shorter than the sulcus depth with reference to the moving tissues in the mouth. Edge shaping was done on the shortened personal spoon using a thermoplastic impression material, stench (Kerr Impression Compound, Kerr Co., Orange, CA, USA). Then, impression pieces were placed on the locator attachments and impressions were taken with a closed-tray method using polyether (Impregum™ Penta™ Polyeter, 3M ESPE, Germany) based impression material (figure 7). Afterwards, vertical dimensioning and tooth try-in were carried out. The part of the locator system inside the prosthesis was connected in the laboratory at the final stage. Prosthetic edges were checked and occlusal adjustments were made. The laboratory inserts in the prosthesis were replaced with inserts with appropriate retention. The prostheses were delivered to the patient and the patient was called for a check-up (figure 8).

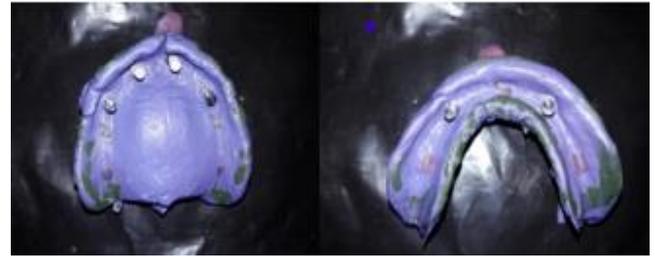


Figure 7: Closed-tray impression.



Figure 8: Intraoral view of the final prosthesis.

Discussion

As implant treatment has become an accepted treatment option over time, it has led to the emergence of different prosthetic options. Implant prostheses; It is divided into two: implant-supported fixed prostheses and implant-supported removable prostheses.

Implant-retained fixed prostheses are prostheses that provide great comfort to patients and feel close to natural teeth when applied under appropriate conditions. For their application, they require at least 4 implant supports and an interocclusal distance of at least 8 mm from the gum to the incisal edge. Implant-retained removable prostheses are one of the most successful treatment options for patients who complain about insufficient bone support and the retention and stability of the classical total prosthesis (7). According to Misch, there are some situations where implant-retained removable dentures have some advantages over fixed dentures. The fact that removable prosthesis applications can be applied with a small number of implants results in the need for fewer preprosthetic surgical procedures. This allows the localization of the implants to be decided more flexibly.

The edge extensions of removable dentures provide support to the soft tissues and lead to better aesthetic results. The fact that removable dentures are removable makes it easier for the patient to maintain oral and denture hygiene. Removing removable dentures while lying down reduces nocturnal parafunction movements and prevents stresses that have a destructive effect on the implants. Overdenture structure has a stress-reducing effect on implants because soft tissues serve as support for the prosthesis (6). Locator attachments help tolerate the angle of implants that cannot be placed parallel. They are preferred in patients with limited interocclusal distance due to attachment height options and retainer system principles. It is possible to increase retention by easily replacing inserts whose retention decreases over time (8). The disadvantages of the system are the inability to clean the attachments correctly and sufficiently in prolonged use, the decrease in the retention of the prosthesis by preventing the correct fit of the prosthesis, and rapid insert deformation due to the prosthesis not being placed in the same position continuously (8).

Bar attachments are preferred in cases where the number of implants cannot be provided for fixed prosthetic treatment, the lost soft tissue must be compensated and the retention requirement is high. In order to use this system, 13-14 mm must be provided between the implant platform and the incisal edge of the prosthesis, and at least 2 mm must be provided between the bar and the gingiva. An inadequate distance of 2 mm between the bar and the gingiva prevents the relevant area from being adequately cleaned (8).

While the construction of bar-retained prostheses requires technical precision, the process is complicated when repair is required. It is not indicated in cases where the distance between the jaws is not sufficient. Loosening of the retaining clips is a common complication. It may irritate the mucosa if it is not cleaned sufficiently (8). In addition to these disadvantages, the advantages of the system are that it has satisfactory retention with a small number of implants, that it can provide lip support to the patient by compensating for the lost soft tissue, and that the force transmitted to the implants is reduced as a result of splinting the implants with the bar system (8).

Addition type silicones and polyethers are two different impression materials that are indicated for use in implant-supported removable prosthesis cases. Studies have reported that these two measurement items do not occur a significant difference in measurement

accuracy (9). The reason why additive type silicone was used in case 1 and polyether in case 2 was that accurate measurement could not be taken due to the fluid nature of polyether triggering the nausea reflex of patient 1.

In the first case, a combination of bar and locator retained system was used due to adequate interocclusal distance, number of implants, smile line and economic reasons. In the second case, a prosthesis with upper and lower jaw locator retained prosthesis was preferred due to both insufficient interocclusal distance and satisfactory prosthesis retention due to low bone loss in the upper jaw.

Conclusion

The clinical success of implant-supported prostheses depends on the correct planning of the treatment, taking into account the anatomical characteristics and needs of the patients. In the follow-up of these two cases, since the patients had previously used traditional total dentures, the newly made implant-retained dentures had a satisfactory effect in terms of retention and stabilization. However, their primary complaint was loss of retention resulting from deformation of the inserts of the locator system. Although no complications were encountered in the bar prosthesis in the first 6 months, a longer follow-up period is needed to evaluate screw loosening, clip performance, and the need for repair in the prosthesis.

Informed consent was obtained from both patients, whose treatment process was explained, for the publication of the cases.

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Resin Infiltration of Hypomineralized Enamel Defects with Composite Resin Combined Restoration: Case Report

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Abstract

The purpose of these case reports is the aesthetic treatment of enamel defects using the resin infiltration method and conservative approach.

The treatment of three patients who came to our clinic complaining of an opaque enamel lesion in the upper anterior region is described. During oral examination, it was determined that the teeth were healthy but there were superficial and deep developmental defects. Before starting the restorative procedures, it was planned to treat the teeth using the resin infiltration method. The Icon infiltration technique, which has microinvasion technology, was applied in accordance with the manufacturer's instructions. Follow-up examinations were performed at 2, 6, 8 months and 1 year in 3 cases.

The most aesthetic results can be achieved in a short time by using the resin infiltration method and minimally invasive approaches. The micro abrasive technique is effective in superficial defects, but is insufficient in more advanced deep enamel defects. A combination of resin infiltration technique, composite resin restoration and bleaching procedures to treat increased opacity, discoloration and defects in the anterior teeth can result in a homogeneous and aesthetic appearance of the teeth.

Case Reports (HRU Int J Dent Oral Res 2024; 4(1): 24-29)

Keywords: White enamel lesion, resin infiltration, aesthetic.

Introduction

White spot lesions (WNL) are very common defects in the anterior region and usually contain only enamel tissue. These may result from enamel demineralization, early carious lesions that develop after orthodontic

treatment, fluorosis, and various developmental disorders. Developmental defects can be in the form of hypomineralization, where the enamel surface is intact, or hypoplasia, where there is structural enamel loss. These; Traumatic hypomineralization, molar incisor hypomineralization (MIH), Turner hypoplasia and idiopathic hypoplasia may occur (1). Initial enamel

demineralization is an opaque white-looking area limited to the enamel tissue, lighter than the natural tooth color without cavitation. BNL are demineralized areas that cause problems in patients with aesthetic concerns (2, 3). It is important to support remineralization before cavitation occurs and to stop the progression of lesions with conservative treatments (4). Many techniques stand out in the treatment of BNL. These techniques are casein phosphuretted amorphous calcium phosphate, fluoride application, laser application, micro abrasion and restorative procedures. In BNL, any technique can be chosen depending on the course of the disease (5).

In the treatment of BNL, the 'Resin Infiltration (RI)' technique, which is a non-invasive method that does not require anesthesia, has come to the fore (3, 6, 7, 8).

The aim of the resin infiltration technique is to ensure the penetration of low viscosity resin into the body of the lesion, blocking the pores and preventing the progression of the lesion. By hardening the resin with light, it provides mechanical support to the fragile enamel in the lesion area and provides a much more resistant structure. However, microporosity is filled and cariogenic microorganisms are kept in the inner parts of the lesion and are not allowed to benefit from nutrients (3, 7, 8).

The treatment approach varies according to different lesion types, with and without cavitation. In case of cavitation, a restorative approach is needed; In cases without cavitation, preventive treatments have been reported to be useful (9).

The resin infiltration system achieves the same bond strength as conventional adhesive systems on demineralized and intact enamel surfaces. These results show that initial cavitated enamel lesions can be successfully restored with composite, and in the same step, demineralized enamel at the edge of the cavitation can be protected by resin infiltration (10).

Case 1

The patient applied to our clinic with the complaint of opaque white lesions on his upper front teeth. In the anamnesis taken, it was learned that the patient had no pain or any systemic discomfort or complaints other than aesthetic complaints.

Depending on the patient's age, oral hygiene status, and treatment expectations, the most conservative approach was to treat BNL with a resin infiltration technique followed by composite resin restoration. First of all, tooth number 21 was treated using the resin

infiltration technique. Then, a composite restoration was applied to the area close to the incisal area of tooth No. 11, where there was a deep developmental defect, following the resin infiltration technique treatment.

In the resin infiltration technique, the enamel surface is first coated with 15% hydrochloric acid gel (Icon Etch, DMG, Hamburg, Germany) for 2 minutes. It was removed by application for a short period of time. Then, acid gel was applied with a micro brush from time to time during application to ensure homogeneous etching. Then 30 seconds. The acid was removed with water. Application of hydrochloric acid eliminated both the discoloration on the surface and the hypermineralized layer that would prevent the resin from penetrating. 30 sec to remove water from the microporosity of the carious lesion body. Ethanol (Icon Dry, DMG, Germany) was applied throughout and air dried. After this procedure, the white appearance of the demineralized areas became more evident. Then, it is applied to the tooth surface for 3 minutes in the first application and 1 minute in the second application. Low viscosity resin infiltration (Icon Infiltration; DMG, Germany) was applied with a microbrush to last. After each application, use a light device (Woodpecker BUILT-INC, China) for 40 seconds. polymerized for a period of time. Then, the deep developmental defect area of tooth no. 11 was restored with Single Bond Universal (3M ESPE, St. Paul, MN, USA), G'ænial Anterior A2 (GC, JAPAN), Modeling Resin (GC, JAPAN) transactions were carried out.



Figure 1. The first version of the case.



Figure 2. Clinical appearance of the case after treatment.



Figure 1. Initial version of the case.



Figure 3. Clinical appearance of the case 1 year later.



Figure 2. Clinical appearance of the case after treatment.



Figure 3. Clinical appearance of the case 1 year later.

Case 2

A 20-year-old female patient applied to our clinic with a complaint of an opaque white lesion on her upper lateral tooth. In the anamnesis taken, it was learned that the patient had no pain or any systemic disorder other than aesthetic complaints. In order to realize the patient's aesthetic expectations, the labial region of tooth No. 12, which has deep developmental defects, was applied to the labial region of tooth No. 12, considering that the lesion was limited to the enamel level, using the resin infiltration technique as described in Case 1, followed by Single Bond Universal ((3M ESPE, St. Paul, MN), USA), G'ænial Anterior A2 (GC, JAPAN), Modeling Resin (GC, JAPAN) and finishing operations were carried out.

Case 3

The patient applied to our clinic with the complaint of opaque white spots on her upper right central, upper right lateral, lower right central and lower left lateral teeth and discoloration of tooth no. 21 due to endodontic treatment.

For this purpose, internal whitening treatment was applied primarily for the discoloration of the patient's devital tooth number 21. Then, as described in Case 1, resin infiltration technique was applied to all the opaque

white spots in the patient, followed by Single Bond Universal (3M ESPE, St. Paul, MN, USA), G-G, in order to obtain a more aesthetic appearance in teeth 11 and 12. Composite resin restoration was performed with G'aenial A'CHORD JE (GC, Tokyo, Japan), Modeling Resin (GC, JAPAN). Following internal whitening treatment with 37% carbamide peroxide (Whiteness Super Endo, Dentscare, Ltda, Joinville, Brazil) on the patient's devital tooth no. 21, the dentin pin on tooth no. 21 was preserved and Single Bond Universal (3M ESPE, St. Paul, MN, USA), G-aenial A'CHORD JE (GC, Tokyo, Japan), Charisma Diamond OL (Kulzer GmbH, Hanau, Germany), Modeling Resin (GC, JAPAN).



Figure 3. Clinical appearance after the 1st session of the resin infiltration technique.



Figure 4. Clinical appearance after the 2nd session resin infiltration technique.



Figure 1. The first version of the case.



Figure 2. Palatal view of tooth number 21 of the case.



Figure 5. Clinical view immediately after applying carbamide peroxide for devital bleaching process.



Figure 6. Clinical appearance of the case 1 year later.

Discussion

Active lesions that do not require restorative treatment in the early stages of enamel caries, lesions in the oral environment and acid exposure are controversial issues that are frequently encountered in the literature in terms of both prognosis and treatment (11).

White spot lesions are the initial sign of enamel caries. Dissolved minerals passing from the surface layer into saliva accumulate and try to protect the external morphology of the enamel. This situation causes a rough, opaque and chalky white appearance on the enamel surface (12).

According to Backer-Dirks, approximately 50% of BNL are able to stop or repair themselves naturally. In addition, there are various and effective treatment methods that can accelerate this repair process (13). Indirect and direct composite resin restoration techniques can be used in white spot lesions and developmental enamel defects that do not respond to micro-invasive treatments and are accompanied by material loss or cavitation. Translucent composites can be used to provide a natural appearance, and opaque composites can be used to hide opacity. It has been reported that removing dense opacities that cannot be masked up to the enamel-dentin border produces more aesthetically successful results (14). Researchers also stated that the masking effect depends on the depth and activity of the lesion (15). Torres et al. They showed that the resin infiltration technique in developmental enamel defects provides better results in terms of color masking in cases of moderate and mild fluorosis. They stated that in cases with severe hypomineralization, color masking could not be completely achieved (12).

Gugnani et al. They treated four cases of fluorosis without BNL and material loss with the resin infiltration technique, and noted this method as micro-invasive, not requiring local anesthesia, completed in a single session, and greatly improved aesthetics (16, 17).

Although there are a large number of treatment approaches reported in the literature, new disciplines are turning to 'non-invasive treatments' (9). Today, tissue loss is minimal; Restorative techniques with the most clinical success are preferred. In this sense, clinically and aesthetically acceptable results are obtained with direct composite applications in the treatment of enamel lesions (18). The fact that the material used in the resin infiltration technique is not radiopaque prevents the radiological distinction between teeth without infiltration and teeth with infiltration. The use of hydrochloric acid causes the development of a rough environment suitable for bacterial colonization in the enamel tissue adjacent to the initial lesion (19).

Kim et al. It was determined that the lesions were completely camouflaged in 11 of 20 teeth (61%) with white spot lesions on which the resin infiltration technique was applied, the lesions were partially masked in 8 teeth (33%), and there was no change in 1 tooth (6%) (20).

Of the 3 cases in which we applied resin infiltration, partial improvement was observed in two cases and no change was observed in one case. Resin composite was applied in line with the patient's aesthetic expectations and a significant improvement was observed.

Permanent teeth, it was reported that Icon resin infiltration application could be an alternative to restorative and microabrasion treatments in non-cavitated initial lesions in which the tooth color appears opaque (17, 21). This treatment appears to fill the 'treatment gap' between non-invasive and invasive interventions for BNLs (9).

Conclusion

By using the resin infiltration method, the most aesthetic results can be achieved in a short time with minimally invasive methods. The microabrasive technique is more effective in superficial defects than in more advanced deep enamel defects. To treat increased opacity, discoloration and defects in anterior teeth, a combination of resin infiltration, composite resin restoration and bleaching procedures can provide a homogeneous and aesthetic appearance in the teeth.

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