DIFFUSE ACUTE PULPITIS: DIAGNOSIS AND TREATMENT

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Abstract
Background. In recent years, pulpal diseases, particularly diffuse acute pulpitis, have represented a frequently encountered problem in dental practice, characterized by rapid progression and intense painful symptomatology. Accurate diagnosis and the application of modern endodontic treatment techniques are essential for achieving favorable outcomes and preventing complications.
Objective of the study. To analyze and evaluate diffuse acute pulpitis by highlighting the etiological factors and modern endodontic treatment methods in order to develop an effective therapeutic plan.
Material and methods. The study included the examination and treatment of 13 patients, including 7 women and 6 men, aged between 18 and 45 years, at the Department of Odontology and Periodontology of the Nicolae Testemițanu State University of Medicine and Pharmacy. The diagnosis was established based on medical history, clinical examination, and paraclinical investigations (orthopantomography, retroalveolar radiography, and computed tomography). Endodontic treatment was performed using the vital extirpation method, applying modern techniques of chemo-mechanical preparation, irrigation, and three-dimensional obturation of the root canals.
Results. According to the obtained data, treatment using the vital extirpation method was applied in all 13 cases, with favorable outcomes and no postoperative complications. The success rate was 100%, and patients showed satisfactory clinical evolution, confirming the effectiveness of the method and the importance of establishing a correct diagnosis and an appropriate therapeutic approach.
Conclusions. The application of endodontic treatment using the vital extirpation method in diffuse acute pulpitis demonstrated the effectiveness of this technique in achieving favorable clinical outcomes, ensuring the elimination of the inflammatory process, prevention of complications, and maintenance of tooth functionality.
Keywords: diffuse acute pulpitis, endodontics, vital extirpation, endodontic treatment, root canals.

Introduction

Endodontics represents an essential branch of clinical dentistry, focused on the prevention, diagnosis, and treatment of pulpal and periapical diseases. It encompasses all procedures aimed at maintaining the health of dental tissues, as well as the interventions required to restore their function and integrity under pathological conditions [10].

Pulpal diseases represent a frequent reason for dental consultation and are characterized by intense pain and significant discomfort for the patient. Their progression may lead to severe periapical complications, including tooth loss. According to data from the scientific literature, approximately 35–40% of dental consultations are related to pulpitis and apical periodontitis, which highlights the major importance of accurate diagnosis and appropriate treatment of these conditions [8].

Diffuse acute pulpitis represents a severe form of dental pulp inflammation, characterized by rapid progression and extensive involvement of the pulpal tissue. Its etiology is complex and is frequently associated with deep dental caries, trauma, bacterial infections, or the action of other irritative factors affecting the pulp [12]. The intense clinical manifestations require rapid therapeutic intervention, often in emergency situations, which demands from the clinician solid professional knowledge and prompt decision-making ability.

Achieving effective endodontic treatment requires establishing an accurate diagnosis and applying an appropriate therapeutic approach in accordance with fundamental biological principles. The selection of treatment methods and techniques must be adapted to the type of pulpal involvement and the individual

characteristics of the patient, as the success of the intervention directly depends on the correctness of these decisions [10].

In recent decades, endodontics has undergone considerable development due to advances in imaging technologies, clinical equipment, and endodontic materials. These innovations have contributed to increasing the predictability of treatment and improving clinical outcomes while reducing the risk of postoperative complications [10].

The individualization of endodontic treatment, by adapting it to the patient's local and general health condition, represents an essential factor in achieving favorable results. The use of modern materials and the correct application of root canal obturation techniques allow the achievement of effective sealing, preventing reinfection of the endodontic system [6].

Currently, the scientific literature highlights the importance of modern treatment techniques, such as irrigation of root canals with antiseptic solutions activated by sonic or ultrasonic systems, as well as the realization of three-dimensional hermetic obturation. These methods contribute to the efficient elimination of microorganisms and the complete isolation of the endodontic space, ensuring the long-term success of the treatment [1,3,4].

Respecting the diagnostic stages, including the use of electrical and thermal tests, together with the correct application of protocols for instrumentation, irrigation, and obturation, allows the establishment of an accurate diagnosis and increases the success rate of endodontic treatment. Thus, the preservation of the tooth on the dental arch and the maintenance of its functional role can be ensured [3,5,10].

The continuous development of modern materials and contemporary techniques of endodontic obturation has led to increased safety and efficiency of treatment, with a significant reduction in postoperative complications. However, the clinician's responsibility remains the establishment of a correct diagnosis and the application of appropriate therapeutic methods in order to minimize risks and achieve optimal outcomes [4,7,11,13,18].

In the absence of treatment, pulpitis may progress toward progressive destruction of dental tissues and ultimately lead to tooth loss. Furthermore, chronic odontogenic infections may have implications for general health and may be associated with various systemic conditions. For this reason, prompt and correct treatment of pulpitis is essential for maintaining both oral and general health [2,14,16,17].

In the current context, prevention plays a fundamental role in reducing the incidence of pulpal diseases. The World Health Organization promotes the integration of oral health into chronic disease prevention programs, emphasizing the importance of regular dental check-ups, fluoride application, and early treatment of carious lesions, measures that significantly contribute to reducing the incidence of pulpitis [9,15].

Materials and Methods

In the present study, a descriptive research method was employed. The study was conducted at the Department of Odontology and Periodontology of the Nicolae Testemițanu State University of Medicine and Pharmacy. The study group consisted of 13 patients, including 7 women and 6 men, aged between 18 and 45 years. All patients were examined and treated according to clinical indications, using the vital extirpation method.

The final diagnosis was established based on the correlation of data obtained from medical history, clinical examination, and paraclinical investigations, including orthopantomography, retroalveolar radiography, and computed tomography. The subjective examination aimed to identify the chief complaint, the history of the present illness, and the general medical history, with particular attention paid to risk factors and possible therapeutic contraindications.

The objective examination included both extraoral and intraoral evaluation. The extraoral examination assessed facial symmetry, facial proportions, and the presence of any pathological changes. The intraoral examination allowed the assessment of the condition of dental and periodontal tissues, the degree of dental damage, and the level of oral hygiene. Percussion and palpation were used to identify the causative tooth and evaluate local sensitivity.

For the establishment of the pulpal diagnosis, complementary tests such as thermal testing and electroodontometry were performed. The obtained values indicated alterations in pulpal sensitivity, contributing to the confirmation of diffuse acute pulpitis. Radiological investigations allowed the evaluation of dental structures and periapical tissues.

Endodontic treatment was performed using the vital extirpation method under local anesthesia and strict aseptic conditions. The procedure included opening the pulp chamber, removal of the coronal and radicular pulp, determination of the working length, and chemo-mechanical preparation of the root canals. Irrigation was performed using antiseptic solutions such as 5.25% sodium hypochlorite (Figure 1) and 17% EDTA (Figure 2), ensuring effective disinfection and removal of debris.

Fig. 1. Sodium hypochlorite 5.25%

Fig. 2. EDTA 17%

After completion of canal preparation, the root canals were dried and obturated three-dimensionally, ensuring optimal sealing of the endodontic system. Subsequently, for the restoration of the dental crown, a single-component adhesive system, **CLEARFIL™ TRI-S Bond** (Figure 3), was used, providing effective adhesion between the dental structures and the restorative material. Coronal restoration was performed using the light-cured composite material **G-aenial** (Figure 4), known for its aesthetic properties and mechanical resistance, contributing to the functional and morphological restoration of the tooth.

Fig. 3. Single-component adhesive CLEARFIL™ TRI-S Bond

Fig. 4. Light-cured composite G-aenial Anterior A2

Finally, radiological control was performed to verify the quality of the obturation and to evaluate the therapeutic outcome.

Results and Discussion

The study included 13 patients who were examined and treated at the Department of Odontology, Periodontology and Oral Pathology of the Nicolae Testemițanu State University of Medicine and Pharmacy, aged between 18 and 45 years, including 7 women and 6 men.

All patients received endodontic treatment using the vital extirpation method, applied according to clinical and paraclinical indications, without the need for the devitalization method. The final diagnosis was established through the correlation of data obtained from the medical history, clinical examination (inspection, palpation, percussion, probing), and paraclinical investigations, including orthopantomography, retroalveolar radiography, and computed tomography.

Following the performed treatment, favorable outcomes were obtained in all analyzed cases, without the occurrence of postoperative complications. The patients showed a positive clinical evolution characterized by the disappearance of painful symptoms and the restoration of dental function.

The success rate was 100%, confirming the effectiveness of the vital extirpation method. The obtained results highlight the importance of establishing an accurate diagnosis and applying an appropriate therapeutic approach in endodontic treatment.

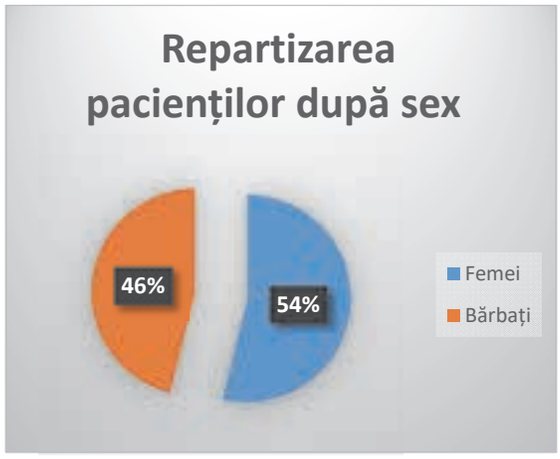

Fig. 5. Distribution of patients by sex

Clinical Case No. 1
Patient: P.M.
Date of birth: 18.05.1992
Sex: Male
Residence: Chișinău
Occupation: Homemaker

Chief complaints. The patient presented with intense, continuous pain with short remission periods of approximately 30–40 minutes. The pain had a radiating character toward adjacent teeth, without the possibility of accurately identifying the causative tooth. The symptoms were aggravated by thermal stimuli.

History of the present illness. According to the patient's statements, the onset of pain occurred approximately three days prior to presentation, with a progressive increase in symptom intensity.

Medical history. The patient is from Chișinău and lives in appropriate social conditions, with no significant pathological history or previous surgical interventions.

Infectious and allergic history. The patient denied any history of infectious diseases (viral hepatitis, HIV/AIDS, tuberculosis), drug allergies, harmful habits, or other systemic diseases.

Extraoral examination. On inspection, the face appeared symmetrical, without evident pathological changes. Facial proportions were harmonious, and the skin had a normal coloration. Mouth opening and closing movements were performed without difficulty. Regional lymph nodes were not palpable, and the temporomandibular joint showed no pathological alterations.

Intraoral examination. The oral mucosa appeared normal, pale pink in color, and without lesions. The tongue was moist, of normal size, and without pathological changes. Oral hygiene was satisfactory. Occlusion was orthognathic, and the dental arches presented a semi-elliptical shape in the maxilla and a hyperbolic shape in the mandible. A deep carious lesion was observed on the occlusal surface of tooth 24. Percussion was sensitive, and probing elicited pain at the level of the pulp horns.

Complementary examination. Electroodontometric testing revealed pulpal sensitivity values of approximately 40 μA. Thermal tests induced persistent pain. Radiological examination confirmed the presence of a deep carious lesion in the affected tooth.

Diagnosis. Based on the clinical and paraclinical findings, the diagnosis of diffuse acute pulpitis of tooth 24 was established.

Treatment plan. After evaluating the indications and contraindications, endodontic treatment using the vital extirpation method was chosen.

Treatment stages

1. Infiltration local anesthesia with Septanest 4% with epinephrine 1:100,000**,** in a volume of 1.7 ml.
2. Isolation of the operative field using a rubber dam.
3. Endodontic access by removing affected hard tissues and opening the pulp chamber of tooth 24.
4. Removal of the inflamed coronal pulp followed by extirpation of the radicular pulp using a pulp extractor (Figure 6).

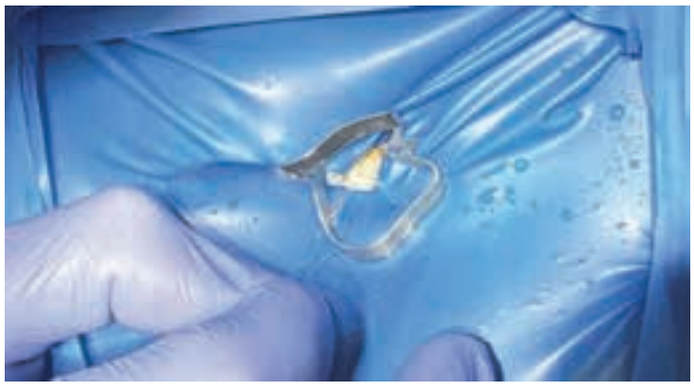

Fig. 6. Extirpation of the radicular pulp.

5. Determination of the working length using an apex locator (Figure 7 A,B).

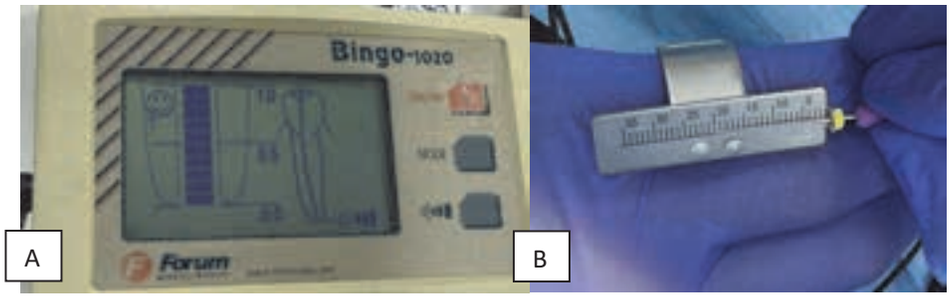

Fig. 7 A,B. Determination of the working length.

6. Irrigation of the root canals with 5.25% sodium hypochlorite (Figure 8) and application of 17% EDTA for smear layer removal.

Fig. 8. Irrigation of the root canals with 5.25% sodium hypochlorite.

7. Mechanical preparation of the root canals using the Step-Back technique, with manual instruments and an endomotor (Figure 9).

Fig. 9. Mechanical and chemical preparation of the root canals.

8. Drying of the root canals using paper points (Figure 10).

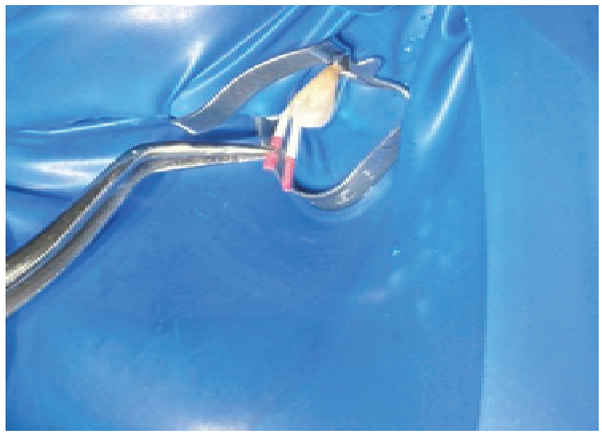

Fig. 10 Trial of the gutta percha tips

9. Root canal obturation using Dia-Proseal epoxy resin sealer **and** 0.04 taper gutta-percha cones (Figure 11 A,B).

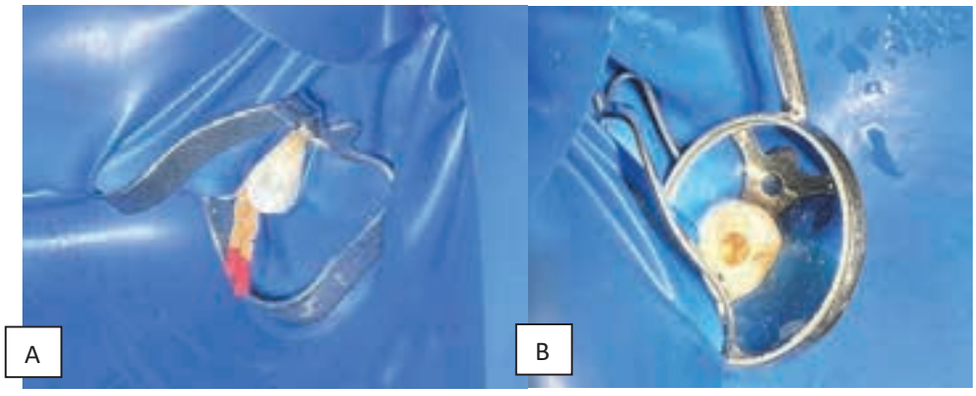

Fig. 11 A,B. Root canal obturation using the single-cone technique.

10. Application of the CLEARFIL™ TRI-S Bond single-component adhesive system to ensure optimal adhesion.
11. Coronal restoration using the light-cured composite material G-aenial (Figure 12).

Fig. 12. Morpho-functional restoration of tooth 24.

12. Control radiograph performed to verify the quality of the root canal obturation and the final restoration (Figure 13).

Fig. 13. Postoperative radiograph.

Conclusions

1. The analysis of the scientific literature has shown that diffuse acute pulpitis is predominantly caused by microbial infection of the dental pulp, which may occur through multiple pathways of penetration. The study of the etiology, morphology, classification, and diagnostic and treatment methods has allowed a comprehensive understanding of the mechanisms involved in the onset and progression of this condition.
2. The clinical presentation characteristic of diffuse acute pulpitis, dominated by intense, spontaneous, and persistent pain associated with increased responses to stimuli, represents an essential element in establishing the diagnosis. The correlation between subjective symptoms and objective clinical signs significantly contributes to the differential diagnosis of this pathology.
3. The application of modern clinical and paraclinical investigation methods, including pulp vitality tests and radiological examinations, allows an accurate assessment of the stage of the disease and the identification of factors that may influence the choice of treatment, facilitating the development of an appropriate therapeutic plan.
4. The evaluation of contemporary endodontic treatment techniques has demonstrated their effectiveness in the management of diffuse acute pulpitis. The use of modern materials and instruments, together with the strict adherence to therapeutic protocols, contributes to achieving favorable clinical outcomes and reducing the risk of postoperative complications.

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