THE EFFECTIVENESS OF A COMPREHENSIVE APPROACH IN THE TREATMENT OF DESTRUCTIVE FORMS OF APICAL PERIODONTITIS IN CHILDREN

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INTRODUCTION

The treatment of destructive forms of apical periodontitis in children represents one of the key challenges in modern pediatric dentistry. This issue becomes particularly relevant in cases involving significant destructive changes in periradicular tissues, often observed in teeth with immature roots. The introduction of modern endodontic technologies does not always ensure high treatment efficacy, which is due to the morphological and functional characteristics of such teeth [1].

Traditional approaches, including the use of calcium-containing pastes for the formation of an apical barrier, have certain limitations. Among these is a decrease in the mechanical strength of root dentin, which increases the likelihood of tooth fractures [2]. This necessitates the development and implementation of new methods aimed at improving treatment effectiveness and reducing the risk of complications.

A promising direction in the therapy of apical periodontitis is a comprehensive approach combining endodontic and surgical methods. This approach accelerates the recovery processes of periradicular tissues and minimizes the frequency of recurrences and complications [3]. However, the successful implementation of this method requires a high degree of patient involvement, as well as effective collaboration among dentists, surgeons, and other specialists [4].

The purpose of this study is to systematize the experience of using a comprehensive approach to treating apical periodontitis in permanent teeth among children aged 7–18 years, as well as to evaluate its clinical effectiveness and prognostic significance.

OBJECTIVE OF THE STUDY

This study aims to summarize the clinical experience of applying an integrative approach in the therapy of destructive forms of apical periodontitis in permanent teeth in children aged 7–18 years. The primary objective was to evaluate the effectiveness of modern endodontic and surgical techniques using clinical and radiological parameters.

MATERIALS AND METHODS

The study was conducted at the Bukhara Regional Specialized Center for Pediatric Dentistry. The sample consisted of 124 children aged 7 to 18 years with a confirmed diagnosis of destructive forms of apical periodontitis in permanent teeth. The disease manifested in two main forms: 58 patients (46.8%) were diagnosed with granulomatous periodontitis, and 66 patients (53.2%) with granulating periodontitis.

Patients were divided into groups based on the morphological characteristics of the root system and the specifics of the pathological process:

- **54 children (43.5%)** were diagnosed with immature roots.
- **47 children (37.9%)** had a fully formed root system.
- **23 children (18.6%)** exhibited pathological resorption of the apical third of the roots.

Diagnostic measures included clinical examination and radiography as the primary method for visualizing periradicular tissues. In complex diagnostic cases, computed tomography was used for a more detailed assessment, allowing for clarification of the nature and extent of pathological changes.

The comprehensive therapy consisted of two key components:

1. **Endodontic Treatment**

The goal of this intervention was to eliminate the infectious focus and ensure the hermetic sealing of root canals. The treatment included mechanical and chemical preparation of the root canals using antiseptic solutions. Modern biocompatible sealers were employed for obturation, ensuring long-term isolation and sealing.

2. **Surgical Sanitation**

This stage was performed in cases of significant destructive changes in the periradicular tissues (where the pathological lesion exceeded 0.5 × 0.5 cm). The procedure involved the removal of granulation tissue and the execution of minimally invasive surgical interventions. Mineral trioxide aggregate (MTA) was used for sealing apical foramina and perforations, promoting the activation of regenerative processes in bone tissue.

Patients were monitored for 2–4 years with follow-up examinations every 6 months. The evaluation of treatment outcomes was based on the following criteria:

- Absence of subjective complaints and signs of inflammation.
- Radiographic evidence of bone structure recovery in the affected area.

An individualized approach, considering age-related characteristics, the state of the root system, and the extent of the lesion, allowed for improved overall treatment efficacy. This ensured the restoration of periradicular tissues and minimized the risk of complications.

RESULTS OF THE STUDY AND ANALYSIS

The study evaluated the effectiveness of a comprehensive approach in treating apical periodontitis of permanent teeth in children aged 7–18 years. The follow-up period ranged from 2 to 4 years, employing clinical and radiological monitoring methods. The primary criteria for successful treatment included the absence of complaints, signs of inflammation resolution, and bone tissue restoration in the affected area.

Clinical Results

An analysis of clinical data revealed that inflammation was completely eliminated in **115 out of 124 children (92.7%)**. These patients reported no pain or discomfort in the treated teeth, and the gingival mucosa remained in normal condition.

In **9 cases (7.3%)**, the treatment was insufficiently effective. The most common complications included:

- Periodic pain in treated teeth.
- Formation of fistulous tracts.
- Lack of radiological signs of bone tissue restoration within 6–12 months.

To address these complications, repeat interventions were performed, including surgical sanitation and revision of the root canals.

Examples of Clinical Cases

Figure 1: Chronic Apical Periodontitis of Tooth 46 in a 10-Year-Old Boy

Patient: A 10-year-old boy.

Complaints: Periodic pain in the right mandibular region, exacerbated by eating,

especially hard food.

Diagnosis: Chronic apical periodontitis of tooth 46.

Radiograph: Bone tissue destruction in the periapical area of the roots of tooth 46

with significant foci of osteolysis.

Treatment:

- Endodontic treatment of tooth 46 was performed.
- The root canals were thoroughly cleaned and treated with antiseptic solutions.
- Temporary root canal filling with a calcium-containing paste was applied.
- After two weeks, permanent root canal filling was performed using the lateral condensation method with gutta-percha.
- The coronal part of the tooth was restored with composite material.

Outcome: The patient was discharged with a recommendation for biannual dental check-ups to monitor radiological parameters and tooth condition.

Figure 2: Acute Apical Periodontitis of Tooth 36 in a 12-Year-Old Girl

Patient: A 12-year-old girl.

Complaints: Severe pain in the left mandibular region and a feeling of pressure in the gum.

Diagnosis: Acute apical periodontitis of tooth 36.

Radiograph: Blurred bone structure at the apex of the roots of tooth 36, with

signs of inflammation.

Treatment:

- Under local anesthesia, purulent contents were evacuated through the root canal.
- The canals were irrigated with sodium hypochlorite and chlorhexidine solutions.

• A temporary antiseptic paste based on calcium hydroxide was applied.
• After 10 days, the canals were filled, and the tooth was restored.
• To control inflammation, a course of antibiotics (Amoxicillin 250 mg, three times daily for 7 days) was prescribed.

Outcome: Symptoms were completely resolved, and the patient was discharged. A follow-up was recommended in 3 months.

Radiological Results

Radiological studies confirmed the success of the treatment: the first signs of bone tissue restoration were observed after 6 months. Complete restoration of bone tissue structure was noted in **110 patients (88.7%)** within 2 to 4 years.

• In children with fully formed roots, **94.1%** showed faster recovery compared to those with immature roots (**87.0%**).
• In the group of patients with pathological resorption of the apical third of the root (23 cases), regenerative processes were slower. However, **78.3% (18 out of 23)** cases resulted in successful outcomes.

Figure 3. Chronic Apical Periodontitis of Tooth 26 in a 9-Year-Old Boy

Patient: A 9-year-old boy.

Complaints: Mild pain in the left maxillary region, exacerbated by chewing.

Diagnosis: Chronic apical periodontitis of tooth 26.

Radiograph: Areas of osteolysis in the periapical zone of tooth 26; irregular bone contours.

Treatment:

• Revision of previously filled canals of tooth 26 was performed.
• The canals were thoroughly cleaned of old material and irrigated with antiseptics.
• Temporary filling with calcium-containing paste was applied.
• Two weeks later, the canals were permanently sealed, and the tooth crown was aesthetically restored.

• **Outcome:** The patient was discharged with a recommendation for annual radiological monitoring.

Figure 4. Exacerbation of Chronic Apical Periodontitis of Tooth 47 in an 11 Year-Old Girl

Patient: An 11-year-old girl.

Complaints: Swelling and pain in the right mandibular region, fever up to 38.0°C.

Diagnosis: Exacerbation of chronic apical periodontitis of tooth 47.

Radiograph: Significant widening of the periodontal ligament space, extensive osteolysis in the apical region.

Treatment:

• Surgical intervention was performed under local anesthesia.

• An incision of the mucosa and drainage of the purulent focus were conducted.

• After inflammation subsided, endodontic treatment of tooth 47 was carried out: mechanical preparation of the root canals, antiseptic treatment, and temporary filling.

• Fourteen days later, permanent root canal filling and tooth restoration were performed.

Outcome: The inflammatory process was fully resolved. The patient was discharged with recommendations to avoid excessive mechanical load on the tooth and return for a follow-up in one month.

CONCLUSION

The results of this study confirm the high effectiveness of a comprehensive approach in the treatment of destructive forms of apical periodontitis in permanent teeth among children aged 7 to 18 years. This approach ensures stable clinical and radiological outcomes, making it promising for use in pediatric dentistry.

During the follow-up, it was observed that the vast majority of patients had complete resolution of clinical signs of inflammation, such as pain,

discomfort, and pathological changes in the gingival mucosa. The absence of recurrences in **92.7%** of children underscores the high efficacy of the proposed treatment. For patients who exhibited residual symptoms, repeat interventions yielded satisfactory results.

Radiological analysis demonstrated that bone tissue structure restoration in the affected areas occurred within 2 to 4 years. Complete recovery was noted in **88.7%** of patients. Faster regeneration rates were observed in children with fully developed roots, while patients with immature roots and pathological resorption experienced slower recovery processes, although most cases concluded successfully.

The clinical examples provided in this work illustrate the importance of a comprehensive approach that incorporates modern endodontic and surgical methods. The use of antiseptic solutions, calcium-containing pastes, and mineral trioxide aggregate (MTA) contributes to effective root canal sealing, inflammation resolution, and bone tissue regeneration.

An individualized approach, considering age, root development stage, and the nature of destructive changes, minimized the risk of complications and improved treatment quality. The findings of this study substantiate the feasibility of employing a comprehensive approach to treat apical periodontitis in children in widespread clinical practice and emphasize the necessity of regular monitoring to prevent potential recurrences.

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