



## Comparative Analysis of the Effectiveness of Methods of Treatment with Apexification Ca (On) 2 and Rutdent Channel Filler in the Treatment of Periodontitis of Permanent Teeth without Root Formation

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**Abstract:** In recent times, new methods of modern endodontic treatment are increasing. Among endodontic treatments, uncomplicated treatment of permanent teeth with no root formation remains a problem. This article is devoted to a cross-comparative analysis of the effectiveness of treatment of periodontitis of permanent teeth without root formation using calcium hydroxide and MTA. In the results of the analysis, when filling with calcium hydroxide, root formation lasted from 3 to 18 months, after post-filling with a Rutdent stopper-from 2 to 12 months. An increase in Root Length was observed in 60% of all cases. Indications for apexification with calcium hydroxide are those that can be indicated in the teeth of stages III and IV of root formation, in the presence of signs of tooth root resorption, regardless of the stage of post - placental root formation of a Rutdent plug to 1/3 of the root canal.

**Keywords:** permanent tooth without root formation, periodontitis, calcium hydroxide, rutdent, apexification.

The development and formation of teeth is the longest-requiring process of organogenesis in the human body. Root formation begins shortly before the appearance of teeth in the postembryonic period and lasts another 2-3 years [1].

In addition to the absence of a wide cavity and anatomical apical narrowing of the apical hole, the initial stages of root growth are characterized by a small thickness and low strength of the walls of the root canal due to the low level of Root dentin mineralization [2, 6]. Therefore, in the case of pulp necrosis on teeth whose roots are not formed, the main task of the doctor is to bring artificial apexogenesis closer to the physiological one to the maximum. Optimally, if therapeutic measures stimulate the growth of the root length to ensure the stability of the organ in the tooth-jaw system and create optimal conditions if further orthopedic restoration is necessary, to ensure an increase in the thickness of the tooth root tissue mkumkin. However, it is also advisable to complete the treatment with the least number of visits in the shortest possible time.

For apexification (artificial formation of the apical part of the tooth root), several methods are used. The main procedure used is the classic method of apexification with calcium hydroxide, which involves long-term exposure to the root canal to stimulate the formation of a limed barrier in the root canal. This happens due to the activation of alkaline phosphatase and pyrophosphatase, which are directly involved in the mechanisms of mineralization of newly formed tissues [2, 5, 9]. Histologically, newly formed tissues are like cement or dentin-like tissue - osteodentin [7, 10]. According to the literature, it takes 6 to 24 months to create a solid woven hedge [8.11].

However, this technique has a number of disadvantages. The action of calcium hydroxide in the root canal for more than 180 days increases the risk of Root breakage and its desorption due to the drying out of the root dentin. After 12 months of calcium hydroxide in the root canal, the elasticity modulus

of the nuclear dentin decreases by two times, which also reduces fracture resistance [7, 12, 14]. In addition, due to the frequency of appointment and duration of treatment, high cooperation is required by patients, there is a high risk of re-infection due to the impossibility of temporary recovery, which further prolongs the treatment time and worsens its prognosis [4].

It was proposed to create an MTA plug up to 1/3 of the root height in the area of the open apical hole as an alternative to the method of calcium hydroxide apexification.

A relatively new, insufficiently studied and therefore less common method of treating permanent teeth without root formation is the use of regenerative endodontic, i.e. revascularization or a method of pulp-like tissue regeneration (rpt). According to the literature, in animal experiments, as well as according to the results of individual radiological studies, this method increases root dentin more in comparison with methods of creating apexification and apical barrier with calcium hydroxide. The newly formed apical part of the MTA and tooth is histologically closer to the physiological structure of the tooth root [11].

**Object of research** is to conduct a comparative analysis of the effectiveness of methods of treatment with apexification  $\text{Ca}(\text{OH})_2$  and Rut dent channel filler in the treatment of periodontitis of permanent teeth without root formation.

**Materials and methods of research.** As a research material, in 2021-2022, 30 patients between the ages of 7 and 15 who applied to the Bukhara regional Pediatric Dentistry Polyclinic with periodontitis of permanent teeth without root formation were involved. Patients were divided into two groups by the various method. The main group (n=15) was treated with a Rut dent channel filler by creating a plug at the root end, and the comparison group (n=15) by the method of apexification with calcium hydroxide. The duration and characteristics of the formation of the apical barrier were estimated depending on the stage of root formation.

During the initial visit in all patients, an X-ray (OPTG) analysis was carried out in order to assess the condition of per apical tissues.

Treatment plan:

1-visit. Clinical and X-ray examination. Extirpation of necrotic pulp, minimum equipment (peripheral filling), irrigation of channels with 3% NaOCl, filling of root canals with calcium hydroxide-based paste (Metapasta).

2-visit. After 14 days. Replacing the root filler with an oil-based calcium hydroxide paste (Metapex).

3-visit. X-ray control after 3 months. Replacement of root filler (Metapex).

Subsequent flights were conducted at intervals of 2-3 months to control the formation of the apical barrier. After the calcified barrier is formed, the root canal is filled using the method of lateral condensation of Gutta-percha, followed by Restoration with a solidifying Composite filler material in constant light.

In Group 2, Rut dent filler was utilized. All children were examined in accordance with the standard instruction developed in the recommendations of the European Association of pediatric dentists and described in detail in our previous work [3].

The result of treatment was clinically and radiological evaluated after 3, 6, 12, 18 and 24 months. The healing dynamics of OPTG was assessed, and after the root growth was completed with X-rays, the condition of the root Apex was assessed.

### **Results and discussion of research.**

The average duration of apexification with calcium hydroxide, depending on the stage of formation of the Svekuro Root, is indicated in the form. 1. The duration of the formation of the apical barrier was from 5 to 21 months, in 56% of cases the duration of treatment exceeded 12 months.

Less than a year of treatment was carried out only at Stage III of root formation, respectively, the prognosis of this group is better in the long term in terms of the resistance of the root walls to cracks.

In a prospective study, data on the clinical and Radiological characteristics of patients, as well as the results of treatment and the growth of solid tissue of tooth roots, are presented in Table 1 and 2.

**Table №1. Root dentin growth after calcium hydroxide apexification technique**

Age of patient	Number of tooth	Stage of root formation	Approximate duration of the inflammatory process	Duration of apexification (months)	Crown length / Root Length ratio before treatment	Crown length / Root Length ratio after treatment	The ratio of the total root volume to the thickness of the root canal before treatment	The ratio of the total root volume to the thickness of the root canal after treatment
14	1.7	1	4	12	0,71	0,83	1,83	2
7	3.6	1	7	10	0,86	0,86	2,2	2,56
8	1.6	2	6	11	0,86	0,93	3	3,66
8	3.6	2	6	9	0,93	1,02	2,5	1,75
8	4.6	2	3	12	0,96	0,99	2,25	3,4
14	1.7	2	9	11	0,97	1,13	2,25	4
14	3.7	2	7	8	0,98	0,92	2,33	3,25
12	2.5	2	6	9	1,04	1,01	2,81	3,64
9	3.6	3	12	3	1,05	0,93	2,27	2,9
9	4.6	3	13	6	1,09	1,12	2,33	2,6
9	2.6	3	12	4	1,12	1,03	2,46	3,2
15	2.7	3	18	7	1,12	1,08	2,25	3
10	4.6	3	9	5	1,15	1,15	2,33	3,25
9	4.6	3	15	2	1,21	1,26	2,5	2,67
15	3.7	3	10	3	1,23	1,29	2,5	2

**Table №2. Root dentin growth after fixing the root canals by forming a Rutdent plug**

Age of patient	Number of tooth	Stage of root formation	Approximate duration of the inflammatory process	Duration of apexification (months)	Crown length / Root Length ratio before treatment	Crown length / Root Length ratio after treatment	The ratio of the total root volume to the thickness of the root canal before treatment	The ratio of the total root volume to the thickness of the root canal after treatment
13	1.7	1	3	12	0,88	1,06	1,88	2,23
7	3.6	1	6	10	0,86	0,98	2,16	3,04
14	1.7	2	9	11	0,97	1,12	2,35	3,7
15	2.7	3	18	7	1,12	1,08	2,33	3,2
9	3.6	3	12	3	1,05	1,03	2,27	2,86
15	3.7	3	9	8	1,18	1,13	2,33	2,85
8	2.6	2	7	4	1,02	1,04	2,4	2,96
9	3.6	3	11	9	1,13	1,02	2,2	2,75
8	4.6	2	8	2	0,96	0,93	2,16	2,77
15	2.7	3	9	2	1,23	1,25	2,4	2,56
9	1.6	3	9	4	1,16	1,16	2,3	3,66
8	2.6	2	5	7	0,98	1,06	2,25	2,84
9	4.6	3	13	6	1,09	0,9	2,3	2,65
10	1.6	3	9	5	1,15	1,05	2,4	3,25
12	3.5	1	3	12	0,86	1,23	1,96	2,64

In all patients, OPTG was performed both after apexification and after post-Rutdent plugging. In the comparison group, root formation lasted from 3 to 18 months, in the main group; root formation lasted from 2 to 12 months. An increase in Root Length was observed in 60% of all cases, but differences were observed in groups. While in the main group, it was 53.3%, in the comparison group it was observed in 66.7% of patients. Differences were also observed in the nature of the growth of Root dentin in groups. In the main group, an increase in the thickness of the root dentin was clearly manifested in the apical 1/3 of the root canal and was observed in 100% of cases. While in the comparison group the thickness of the dentin was found to be near the middle third of the root, an increase in solid tissue in the apical 1/3 of the group apexification was observed in 86.7% of patients. At the same time, in some cases, we are faced with the fact that in the presence of a clinically determined rigid tissue barrier, it is impossible to carry out continuous filling of the root canal along the entire length in an even way after the process of apexification with calcium hydroxide.

This can be explained by the "quality" of the apical barrier that occurs during apexification with calcium hydroxide. Histological examination of Maha M.F Mounir and others (2018) represented the newly formed compound after calcium hydroxide by mineralized calcified tissue similar to dentin of the apical part of the tooth root. However, it was also revealed after 6 months of observations that a layer of granulation tissue was formed from the root canal, periodontal cavity and bone tissue [13]. We explain this by the proliferation of connective tissue under the influence of the body's protective reaction of the cavities after calcium hydroxide.

After post-filling of the rut dent plug, a solid tissue barrier is formed at the point of contact of the root cover with adjacent tissues, which leads to a change in The Shape of the root canal, the formation of calcification of the root canal. Although no sharp difference in Channel length growth was observed, a significant difference was observed in the ratio of the total root volume to the thickness of the root canal. This is explained by an increase in hypersementosis, which forms on the sidewalls of the root.

According to the literature, apexification with CA (OH) 2 ensures the formation of a barrier in the apical part of the tooth root, but the complete closure of the root apex can only be achieved in 10.8% of cases [13], in which we also consider it only when the root is in the III and IV level stage of formation. In the course of our study, X-ray data after apexification procedure in comparison groups showed that the tooth Apex was not completely closed during the formation of the apical barrier.

Thus, both methods showed different effectiveness over the entire period of root growth. The apical third of the root canal after post-filling with a rutdent allows you to achieve a more accurate increase in the thickness of the root dentin, while the more complete the growth of the root, the higher the efficiency. It can also be noted that root development at all stages has given positive results in existing teeth.

Each of these methods has a number of limitations and possible complications. Based on the data obtained, as well as on the data of the literature, we have compiled the following instructions for choosing one or another method of treatment.

1. Indications for apexification with calcium hydroxide are in teeth of stages III and IV of root formation, in which the approximate duration of apexification is 3-6 months, in which the patient's high cooperativeness and the possibility of hermetic recovery are preserved.
2. Post - rutdent plugging of 1/3 of the root canal can be indicated in cases of periodontitis of teeth even at stages I, II and III of root formation, as well as in the presence of signs of tooth root desorption, regardless of the stage of root formation. However, it should be taken into account that the chances of re-treatment are reduced in cases of severe withdrawal. In this case, the possibility of maintaining the rigidity of the restoration in the post-treatment period is an indication against apexification by any method of re-treatment.

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