

Success of Retrograde Filling Retreatments of Teeth with Intraradicular Restorations and Orthograde Restorations of Teeth with Periapical Lesions

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Abstract

Introduction: Endodontic treatment failure, primarily caused by persistent intracanal microorganisms, necessitates retreatment decisions between conservative orthograde approaches and surgical periapical interventions.

Objective: To compare the clinical and radiographic success rates of retrograde filling following apicectomy in teeth with intraradicular restorations versus orthograde retreatment in teeth with periapical lesions.

Materials and Methods: Forty-eight patients (27 males, 21 females) with endodontically treated teeth exhibiting periapical lesions were recruited at the Clinic for Oral Surgery, Tetovo. Participants were randomly allocated into two groups (n=24 each): Group 1 (control) received conventional apicectomy with orthograde filling material, while Group 2 (study) underwent surgical access with retrograde canal filling using amalgam or glass ionomer cement following 2.5-3 mm apical resection. Clinical and radiographic assessments were conducted at 6 and 12 months post-operatively

Results: At 6 months, Group 2 demonstrated superior healing patterns with 14 complete healings versus 4 in Group 1, though differences were not statistically significant (p=0.03). At 12 months, Group 2 maintained advantages with 14 complete healings compared to 8 in Group 1, with no significant statistical difference (p=0.59). Overall success rate excluding uncertain cases was 79.16%, consistent with literature reporting 72-92% success rates.

Conclusions: Retrograde filling with apicectomy represents a minimally invasive, effective approach for managing endodontic failures in teeth with intraradicular restorations, offering comparable or superior outcomes to conventional orthograde retreatment.

Keywords: retrograde filling, apicectomy, periapical surgery, endodontic retreatment,

Introduction

The most common reason for root canal treatment failure is the presence of microorganisms within the root canal system [1, 2]. When endodontic failure occurs, conservative retreatment is the preferred treatment option by endodontists. However, it's important to note that periapical surgical

intervention, a method most preferred by surgeons, has shown to be generally more successful and predictable in terms of retreatment type and conditions [3, 4, 5, 6, 7, 8]. This success should instill confidence in the effectiveness of this approach.

Retreatment of teeth with intraradicular restorations with periapical processes has aroused interest due to the difficulty of their removal without cracking, perforation, or fracturing the remaining root structures. The decision to perform periapical surgical interventions is based on factors determined by the clinical and symptomatic presentation of the tooth and the patient's needs.

Retreatment with orthograde filling and removal of the superstructure from the tooth potentially poses a risk of fracture during treatment. This risk is related to the management of non-surgical intervention. Surgical treatment of an endodontic failure also offers the opportunity to obtain tissue for histopathological analysis to intervene in

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the event of a periapical lesion.

The purpose of this study was to analyze the difference in the success of retreatment with retrograde filling of teeth with intraradicular restorations and orthograde of teeth with periapical processes.

Material and Methods

Forty-four patients (twenty-seven males and seventeen females) were selected at the Clinic for Oral Surgery - Tetovo. Patients included in this study were selected based on: a tooth for surgical treatment showing a periapical lesion of strictly endodontic origin, where endodontic retreatment was considered unfeasible. Previous endodontic therapy in these teeth had been completed 1-5 years previously. Previously, four teeth from four patients had been extracted from the procedure due to inappropriate and vertical root fractures. (Photos 1, 2, 3, and 4.)

From the total number of investigated patients, two groups were formed. Patients included in the first group (control group) underwent surgical intervention, apicotomy using ordinary orthograde filling material. (Photos 5, 6, 7)

Patients included in the second group (study group) underwent surgical access to the root, which was made

through the cortical bone using a carbide bur and a sufficient sterile physiological solution.

The periradicular lesion was removed with a sharp bone curette. After exposure of the root apex, the resection was performed at a right angle to the longitudinal axis of the root, 2.5-3 mm from the root apex, and then moved to a new position. After the removal of the resected part, an examination of the operative field was performed to remove the diseased tissues surrounding the root in or around the lateral region. Then, with the mininatural contra-angle (Photos 8 and 9), the root canal is penetrated in a retrograde manner, enabling precise sealing with amalgam or glass ionomer material (Photo 10).

Retrograde filling enables the hermetic closure of the root canal apex to prevent or reduce the spread of microorganisms in the periradicular tissues, providing a favorable environment for normal regeneration of the periodontium [16].

Clinical and radiological data from two groups of patients who underwent apicotomies are presented. The assessment was based on clinical and radiographic examination.

Results Forty-eight patients (twenty-seven males and seventeen females), divided into two groups, were treated

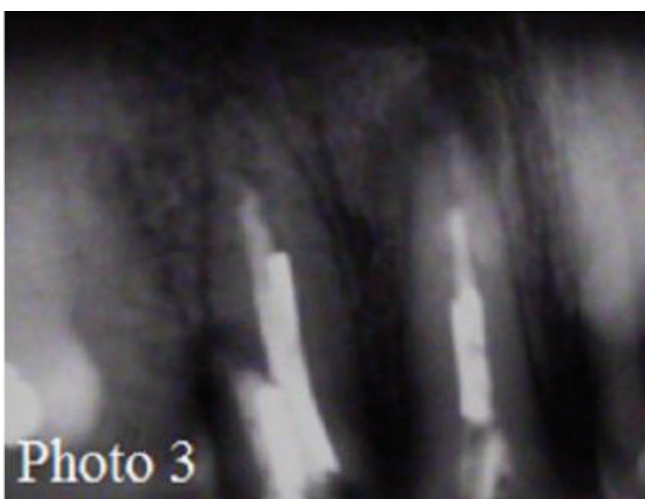


Photo 1,2,3, 4, Cases from four different patients with inappropriate, vertical fractures of tooth roots.

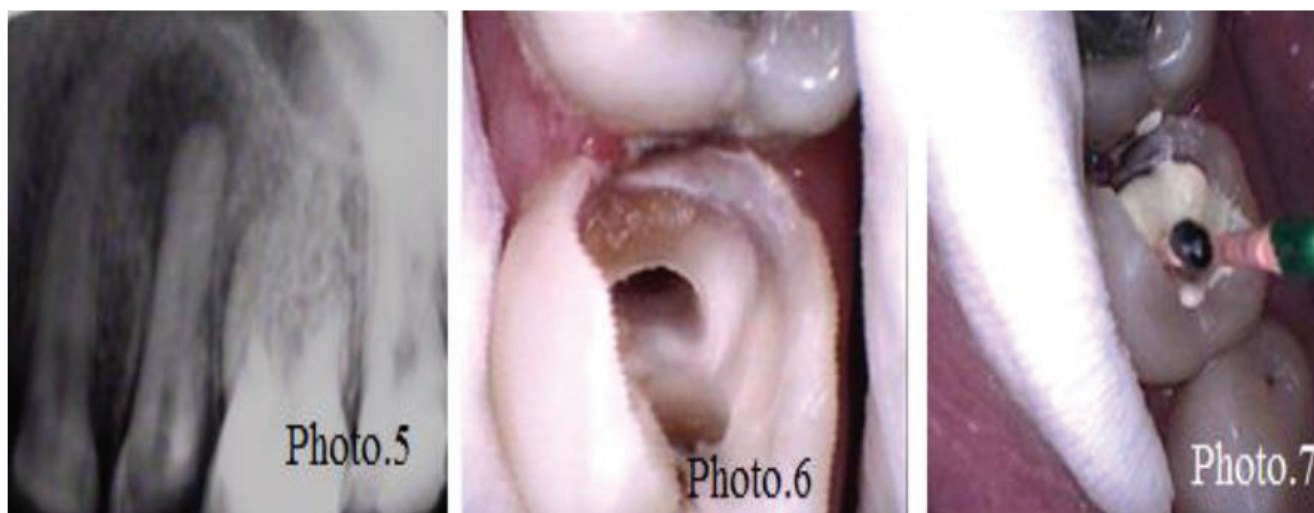


Photo 5, 6, 7 - Cases from four different patients who underwent surgical intervention, apicotomy using conventional orthograde filling material.

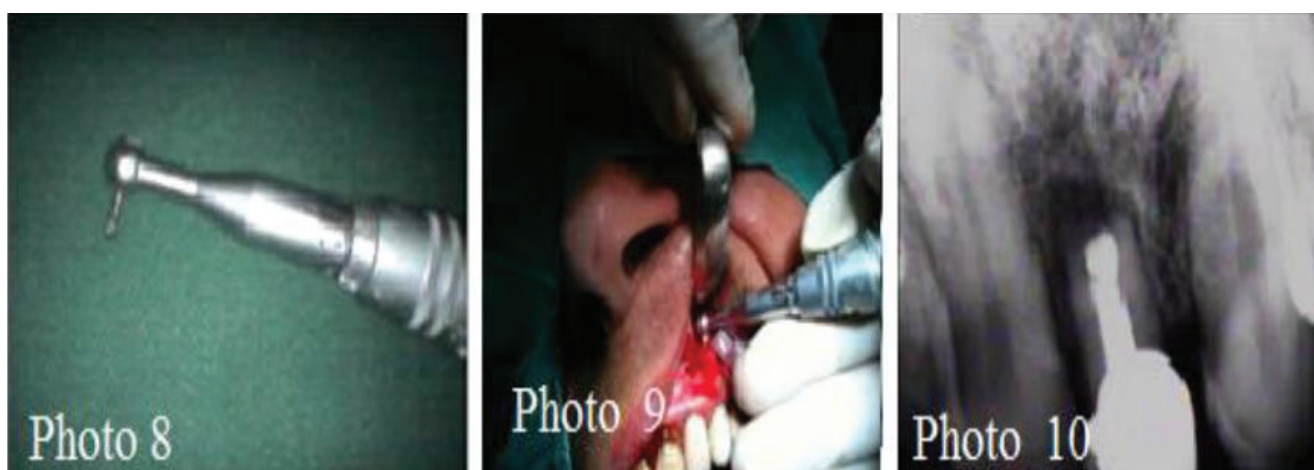
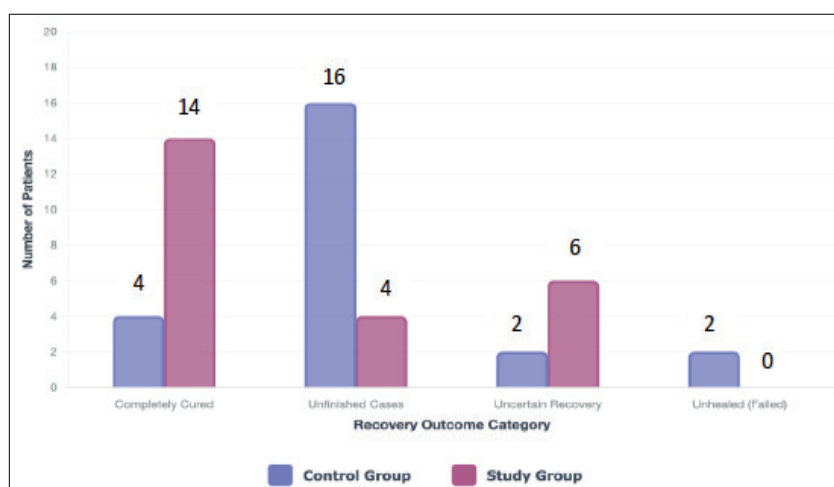


Photo 8, 9, 10 - In various patients with the mininatural contra-angle, the root canal is penetrated retrogradely, enabling precise obturation with amalgam or glass ionomer material.

surgically, they were divided into: - the first group (control group), consisted of twenty-four teeth with periapical lesions with orthograde filling and the second group (study group), also with 24 teeth re-treated and with canals filled retrogradely because they had intraradicular restorations or ceramic crowns. All patients in both groups underwent radiographic examinations to assess the degree of bone healing after six and twelve months.

After six months of examination of the patients of the first group (control group), 4 cases were evaluated with complete healing, 16 cases with incomplete healing, 2 cases with uncertain healing, and in 2 cases, failure was found. (Graph 1)



Graphic 1. Postoperative X-ray Recovery Comparison, 6-Month Follow-Up Results; Control Group vs Study Group

On the other hand, all patients of the second group (study group), based on the radiographic examination, also performed after six months, were evaluated; 14 cases with complete healing, 4 cases with incomplete healing, and 6 cases with uncertain healing (Graph 1).

Regarding the radiographic assessment of bone healing, there was no statistically significant difference between the two groups after six months ($p = 0.03$)

After twelve months, all patients underwent clinical and radiographic examination. In the first group (control group), 8 cases with complete recovery, 10 cases with incomplete recovery, 4 cases with uncertain recovery, and only two failed cases were assessed (Graph 2). In the second group (study group), 14 cases with complete recovery, 6 cases with incomplete recovery, and 4 cases with uncertain recovery were assessed (Graph 2). Regarding the healing of postoperative lesions on radiographs, there was no statistically significant difference between the two groups after twelve months ($p = 0.59$). (Graph 2)

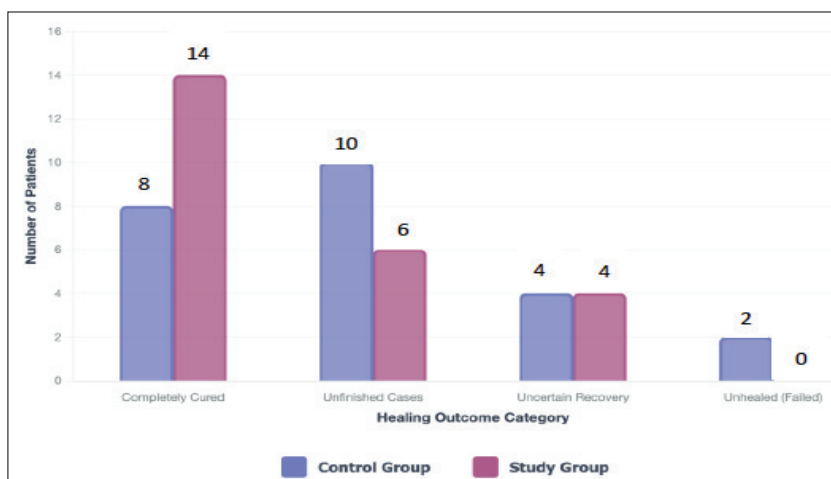
Discussion

Intraradicular restorations in endodontically treated teeth with decayed crowns are frequently used to retain ceramic crowns. Removal of intraradicular restorations from root canals with periapical lesions is often a tedious and challenging procedure, as well as a risk to the root due to fracture or perforation.

When a periapical lesion is present in a tooth requiring retreatment, a dilemma often arises as to what type of treatment procedure is necessary in the appropriate case and which one is most likely to be successful. There is little information in the dental literature to indicate how often the need for removal of intraradicular restorations arises. Abbott concluded that in 66% of failed endodontic cases, removal of intraradicular restorations is preferred. In comparison, in 27% of cases, surgical intervention with retrograde filling is considered necessary, while in 45% of cases, a fracture occurred during removal of the restoration, but this is represented in less than 0.002% of all restorations scheduled for removal.[9]

In the early 1990s, ultrasound devices became available, and they have shown great potential in periapical surgery, becoming increasingly effective [4, 5, 10]. This should make the audience feel optimistic about the future advancements in the field.

According to some authors, Lin C, Chou H, Carr G., who in their studies show that the results of using ultrasound



Graphic 2. Postoperative X-ray Recovery Comparison, 12-Month Follow-Up Results; Control Group vs Study Group

devices produce, on average, much greater strains than those generated by micro-contrast systems. [11, 12]

The main reason for performing surgical intervention in periapical lesions is the elimination of periradicular disease, where this cannot be achieved by non-surgical means. The objective of the surgical approach is to remove the diseased tissue, seal the canal system as much as possible, and prevent or reduce the spread of microorganisms in the periradicular tissues, thus providing a favorable environment for the regeneration of the standard periodontal apparatus. The advantages of this surgical approach are the speed of treatment, with less risk to the root, ensuring easier and better sealing of the canal.

Retrograde filling aims to fill the space communicating with the periodontium with materials that have been proposed, including amalgam, Gutta-Percha, eugenol zinc oxide, cement, GIC, gold foil pellets, composite resins, and MTA.[13]

The overall success rate is 79.16% with no statistically significant difference between the results in anterior teeth, premolars, or molars. Our overall results for both groups, excluding uncertain cases, are consistent with the numerous results in the literature, with success rates ranging from 72% to 92%.[21]

In particular, in cases of surgical retreatment, our success rate is also consistent with the results in the literature, 75% recorded by Bergenholtz et al. [14]

When preventive technical retreatments were excluded, Mehlhaff DS et al. reported a success rate of 48% [15] or 62%.[16], An essential advantage of surgical intervention is that it provides immediate access to the root apex. Furthermore, it involves curettage of periradicular tissue granulomas and removal of 3 mm of the problematic root apex, which often contains infected canals that result in recurrences. [17, 18]

This may be important, given the pressures to replace “failures” of endodontic-surgical treatment of teeth with implants.

Conclusion

From this study, the application of a retrograde filling with apicotomy surgical intervention can be considered a minimally invasive procedure that has a positive effect on postoperative clinical outcomes.

Retrograde periapical surgery should be considered a “retreat”, a revision of a negative endodontic-surgical result. In contrast, retreatment with surgery may have a better outcome because all potential sites of infection have been eliminated.

Dental implants are an extraordinary service and have opened up possibilities that were previously dreamed of. However, a natural tooth is still the best implant.

Author Contributions:

SM - Study design, surgical procedures, manuscript preparation; JAJ - Data collection, radiographic analysis; AD - Statistical analysis, manuscript review; AC - Patient recruitment, clinical follow-up

All authors have read and approved the final manuscript.

COI Statement: This paper has yet to be submitted in parallel, presented fully or partially at a meeting, podium, or congress, published, or submitted for consideration beforehand.

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