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Original Article

Modern Approaches to Endodontic Obturation: A Review of Recent Innovations

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Abstract

The present study aimed to review the recent endodontics obturation techniques. In cases of denture infection, obturating the tooth's root is a tissue-saving technique. Obturation's advantages stem from its capacity to stop tooth cavity infections from spreading and worsening. Just cleaning, remodeling, and filling the cavity are the goals of the operation. There are numerous methods for obturating a root canal. Furthermore, this endodontic surgery has preventable and controllable consequences that are worth talking about to go over the various endodontic obturation approaches, postoperative issues, and technical advancement. Database in electronic form This review used PubMed and gathered information from observational studies, randomized controlled trials, and pertinent academic articles that contained the mesh's keyword “endodontic” [Mesh] AND “obturation” [Mesh] in the title or abstract. Obturation is necessary to stop dental decay and infections from getting worse. The periapical tissue is almost always protected from the transmission of infection when voids are sealed. Micro-leakage and postoperative discomfort are among the potential consequences of this surgery.

Key words: Endodontic, Obturation, Micro-leakage, Management

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Introduction

In cases of denture infection, obturating the tooth's root is a tissue-saving technique. Filling in any cavities in a tooth, sealing the opening, and preventing infection from spreading into the tissues are the primary goals of obturation [1, 2]. Gutta-percha is the traditional biomaterial for obturation; nevertheless, a variety of methods are emerging, and there is evidence in the literature regarding the applicability of novel materials for obturation. Obturation's advantages stem from its capacity to stop tooth cavity infections from spreading and worsening. Cleaning, remodeling, and filling the hollow are the only goals of the operation. Gutta-percha is one of the biomaterials utilized in this endodontic obturation process to fill cavities. To stop contaminated fluids from moving into the root canal areas, this substance fills the cavity and creates a seal. Once this is in place, healing may proceed in a conducive setting because persistent infection is a significant hindrance to healing, which is managed with obturation. The present study aimed to review the recent endodontics obturation techniques.

Materials and Methods

Electronic database PubMed was used in this review and data was collected from relevant journal articles, randomized controlled trials, and observational studies containing the term used in the mesh: “endodontic” [Mesh] AND “obturation”

[Mesh] within the title or abstract. English and translated English articles, documents, and controlled and randomized clinical trials that were published and met the needed criteria were included only.

Results and Discussion

Review

The dentist should explain to the patient that the procedure is relatively comfortable, and the risk of complication while present is controllable, including a mild pain post-procedure. Recent studies show reduced post-procedural pain with NaOCl gel during the chemomechanical preparation of root canals [3]. In severe cases of postoperative pain, surgical intervention may be necessary by removal of the contact area between the submucosal connective tissue and obturation material. Instrumentation should be appropriate to the size of the root canal, gutta-percha is inserted and condensed until the cavitation is closed, including any voids left over from the initial condensation.

Obturation techniques

There are many techniques for endodontic obturation, a discussion of these techniques is important as they have specific indications that lead to better clinical outcomes. These techniques include apical barriers, sectional or thermoplasticised carrier-based obturation, chemoplasticised technique, continuous wave, custom cone modeling, preheated or cold injections, thermomechanical obturation, lateral or vertical compaction, and warm lateral condensation.

Apical barrier technique

In patients with immature teething as in pre-school children, the obturation technique should aim to prevent leakage of the biomaterial into the periradicular area. For this to be correctly reached, the apical barrier technique could be used, where a cone of compatible biomaterial is placed [4]. The addition of an initial calcium hydroxide dressing could result in favorable outcomes in post-procedure with this technique [5].

Carrier-based technique

When using carriers, the options include sectional or warm gutta-percha which is used to fill the upper four millimeters of the root canal, the rest is filled with thermoplasticised gutta-percha through injections. A commonly used carrier is calcium silicate-based material, however, as they are higher in solubility they make for questionable candidates for long-term sealers [6].

Chemoplasticisation and custom cone techniques

Chloroform and eucalyptol are suitable solvents to be used on gutta-percha to soften it. This softened biomaterial is then placed upon previously fitted gutta-percha on the root canal. The softened biomaterial is laterally condensed with spreaders as it continues to fill the remaining voids. In the custom cone technique, the solvents are inserted into the apical root canal for molding, this shrinks with time and hardens, and when it is removed then the sealer is secured into the root canal.

Continuous wave

A combination of sealer and core material is vertically compacted down the apical area of the root canal after heating. This mixture is then guided to backfill any remaining voids with thermoplasticised material. While gutta percha heating could reach 200 degrees, the procedure has been deemed safe and efficient in root canal filling, with the preservation of periodontal tissue [7]. Vibration techniques are helpful in difficult cases where root canal filling is needed and periapical healing is important [8].

Injection techniques

There are two forms of injection obturation, these include preheated and cold injections. In both techniques, the sealer is injected directly into the root canal, obturating it using either preheating devices or cold material.

Compaction techniques

There are two methods for compaction obturation techniques, these include lateral and vertical compaction. The Gutta-percha point is cut to fit the root canal's length and coated accordingly with a sealer before insertion into the root canal. Thereafter, the point is either laterally spread or vertical pluggers and warm points could readily fill any remaining voids. Moreover, cold lateral condensation has shown favorable outcomes in sealing voids with fewer amounts of gutta-percha [9].

Post-procedural complications

Complications of endodontic obturation occur, this involves percolation or leakage of debris, fluids, and infective organisms in the spaces between the seal and the teeth walls. Leaking occurs at the apical part of the seal and is recognizably an important cause of procedural failure. While no technique could completely obliterate the root canal, this means that leakage has the potential to occur, which could be compounded or lessened by the skill of the dentist or operator. Furthermore, some procedures may have a better complication rate than others. For instance, the thermoplasticised gutta-percha technique has fewer root canal voids when compared to cold lateral condensation techniques [10].

To prevent such a common problem as micro-leakage from occurring, the dentist should pursue adequate imaging of the tooth cavity by dye traces or imaging isotopes. Dye tracing might be the preferred cost-effective route in many cases. Multiple modalities could be used in assessing post-procedural leakage, these include imaging, fluid filtration method, dye penetration test, and bacterial leakage technique. Imaging techniques include different types of computed tomography scans such as micro-CT and cone-beam scans, other imaging includes radiography and scanning electron microscopy.

Technique improvement

Studies have investigated different techniques used in endodontic obturation. The recommended improvements include portability of endodontic obturation devices, compatibility with other biomaterials, simpler instructions, and a user-friendly interface as well as the structural redesign of the device so that it may reach further areas in the root canal. While compatibility of the device with different biomaterials is important, there is little evidence that regardless of the biomaterial used, there are still voids within root canals post-procedure [11].

Conclusion

An essential technique for filling holes in tooth root canals is endodontic obturation. This process is crucial because it stops the infection from getting worse and the bacteria from coming back. The various methods aid in stabilizing and sealing root canal voids. Better endodontic obturation procedures and biomaterials will become available when techniques are refined and data is gathered, leading to improved patient care. Obturation is necessary to stop dental decay and infections from getting worse. The periapical tissue is almost always protected from the transmission of infection when voids are sealed. This technique has potential side effects, such as postoperative discomfort and micro-leakage.

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References

1. Kharalampos M, Put VA, Tarasenko SV, Reshetov IV. Comprehensive patient rehabilitation while performing immediate dental implant placement with the use of information-wave therapy (literature overview). J Adv Pharm Educ Res. 2020;10(2):11-4.

2. Asgari I, Soltani S, Sadeghi SM. Effects of iron products on decay, tooth microhardness, and dental discoloration: a systematic review. Arch Pharm Pract. 2020;11(1):60-82.
3. Ozlek E, Gunduz H, Kadi G, Taşan A, Akkol E. The effect of solution and gel forms of sodium hypochlorite on postoperative pain: a randomized clinical trial. J Appl Oral Sci. 2021;29:e20200998.
4. Floratos SG, Tsatsoulis IN, Kontakiotis EG. Apical barrier formation after incomplete orthograde MTA apical plug placement in teeth with open apex--report of two cases. Braz Dent J. 2013;24(2):163-6.
5. Moore A, Howley MF, O'Connell AC. Treatment of open apex teeth using two types of white mineral trioxide aggregate after initial dressing with calcium hydroxide in children. Dent Traumatol. 2011;27(3):166-73.
6. Sfeir G, Zogheib C, Patel S, Giraud T, Nagendrababu V, Bukiet F. Calcium silicate-based root canal sealers: A narrative review and clinical perspectives. Materials (Basel). 2021;14(14):3965.
7. Zhang JG, Liu J, Cen R, Hu FL. Finite element analysis of the effects of periodontal tissue temperature by continuous-wave technique. Hua Xi Kou Qiang Yi Xue Za Zhi. 2021;39(4):447-52.
8. Cho YS. Ultrasonic vibration and thermo-hydrodynamic technique for filling root canals: Technical overview and a case series. Int Endod J. 2021;54(9):1668-76.
9. Suciu I, Dimitriu B, Ciocardel M, Chirila M, Amza O, Scarlatescu S, et al. Evaluation of the sealer/gutta-percha ratio on sets of root section surfaces of some extracted teeth sealed using the cold lateral condensation technique. J Med Life. 2021;14(3):337-46.
10. Sezgin GP, Kaplan SS, Kaplan T, Olcay EO. Effect of prosthetic restorations and root canal fillings on periapical health in a selected patient group. Br Dent J. 2021;231(2):127-32.
11. Orhan AI, Tatli EC. Evaluation of root canal obturation quality in deciduous molars with different obturation materials: an in vitro micro-computed tomography study. Biomed Res Int. 2021;2021(1):6567161.