Review Article

AN OVERVIEW ON RECENT ENDODONTICS OBTURATION TECHNIQUES, LITERATURE REVIEW

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ABSTRACT

Obturating the root of the tooth is done as tissue saving procedure in infections of the denture. The benefits of obturation lie in its ability to prevent the continuation and progression of tooth cavity infection. The procedure is simply done to cleanse, remodel, and fill in the cavity. There are many techniques for root canal obturation. Moreover, there are avoidable and manageable complications for this endodontic procedure that warrants discussion. To review the different techniques of endodontic obturation, postoperative complications, and technique improvement. 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. Obturation is essential for preventing the progression of dental infection and decay. The sealing of voids nearly guarantees protection of periapical tissue from infection spread. There are complications of this procedure that may occur, including micro-leakage and postoperative pain.

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

Introduction

Obturating the root of the tooth is done as tissue saving procedure in infections of the denture. The main objective of obturation is to fill in any voids within a tooth, seal the opening and, thereafter prevent infection from spreading into the tissues [1, 2]. The standard biomaterial for obturation is gutta-percha, but many techniques are arising and evidence is published in the literature on the suitability of new material for obturation. The benefits of obturation lie in its ability to prevent the continuation and progression of tooth cavity infection. The procedure is simply done to cleanse, remodel, and fill in the cavity. Certain biomaterials are used to fill cavities in this endodontic obturation procedure, this includes gutta-percha. This material fills the cavity and forms a seal to prevent the movement of infected fluids into the root canal areas. Once this is set in place, healing could occur in a favorable environment as the ongoing infection is a major disruptor of healing, and with obturation, this is controlled and healing progresses.

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, controlled and randomized clinical trials that are published and met with the needed criteria were included only.

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 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]. 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 that 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 for injection obturation, these include preheated and cold injections. In both techniques, the sealer is injected directly into the root canal, obturate it using either preheating devices or cold material.

Compaction techniques
There are two methods for compaction obturation techniques, these include lateral and vertical compaction. 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 of 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 a potential of occurring, 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 thermoplasticized 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 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 biomaterial used, there are still voids within root canals post-procedure [11].

Conclusion

Endodontic obturation is an important procedure for filling voids in the root canal of teeth. This procedure is important as it helps in preventing the progression of infection, and recurrence of microbes. The different techniques help secure and seal voids in root canals. As methods are practiced and evidence procured, better techniques and biomaterial would be available for endodontic obturation and, thereafter, better clinical care is given to patients. Obturation is essential for preventing the progression of dental infection and decay. The sealing of voids nearly guarantees protection of periapical tissue from infection spread. There are complications of this procedure that may occur, including micro-leakage and postoperative pain.

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