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Review on Dental Cones in Treatment of Post Tooth Extraction Complications

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ABSTRACT: At global level at least 70% of the people suffer from dental problems. Some problems like severe periodontitis, tooth caries and injuries require tooth extraction. Post tooth extraction complications like bacterial infections, inflammation, pain, swelling, bleeding and so on. Dental cones are one of the innovative formulations for the post tooth extraction complications. Dental cones are more effective local therapeutic dosage form. Dental cones are used to reduce the bacterial infections, inflammatory response, bleeding, and pain. Currently the review article explains about problem of post tooth extraction complications, dimensions of cones, methods of preparation and its applications.

KEY WORDS: Dental cones, Post tooth extractions, Local drug delivery system.

I. INTRODUCTION

All over the world, dentists commonly perform dental extractions. Reports of the dental procedures that involve tooth extractions vary by nation and may be different across Western and non-Western nations.⁽¹⁾ The two most common causes that dentists and oral (and maxillofacial) surgeons perform dental extractions are caries and periodontitis.⁽²⁾ Other common causes include trauma, periapical illness, orthodontics etc.⁽¹⁾ Some of the complications that occur due to tooth extraction are as follows

Post-extraction complications.⁽³⁾

- a) **Bleeding:** The most frequent postoperative haemorrhage that a dental surgeon encounters is bleeding from an extraction socket. ⁽⁴⁾Bleeding could be a primary, reactionary, or secondary haemorrhage. ⁽⁵⁾Depending on the clinician's experience, numerous local and systemic techniques have been used to reduce this bleeding.⁽⁶⁾
- b) **Swelling:** The inflammatory response to tooth extraction includes swelling or oedema after surgery. Poor surgical technique, especially harsh handling of the tissues, pulling on flaps to get access, and insufficient drainage all contribute to it. Additionally, each person's response to trauma varies greatly and does not appear to be tied to any of these criteria⁽⁷⁾
- c) **Dry socket:** Dry socket is a common post-extraction complication. It is characterised by postoperative discomfort at the site of the extraction that worsens between one and three days after the extraction and is accompanied by a completely or partially disintegrating blood clot in the alveolar socket that may or may not have halitosis.⁽⁸⁾ Approximately 1 percent to 5 percent of all extractions and up to 38 percent of mandibular third molar extractions result in dry socket lesions.⁽⁹⁾
- d) **Pain:** Post-extraction discomfort can be caused by an inadequate extraction, laceration of the soft tissues, exposed bone, infected sockets, or nerve injury.⁽⁷⁾
- e) **Trismus:** This is inability to open the mouth normally, trismus may result from oedema and swelling, in which case mouth opening gets better as the swelling subsides. Excessive downward pressure or holding the patient's mouth open wide for an extended amount of time might harm the temporomandibular joint, which can result in a more chronic, painful condition with symptoms of the pain dysfunction syndrome.⁽⁷⁾
- f) **Paraesthesia:** Paraesthesia is an altered sensation of numbness, partial loss of local sensitivity, burning, or tingling.⁽¹⁰⁾ When alleviating incisions are overextended in the depth of the buccal sulcus, mental nerve is injured.⁽⁵⁾
- g) Post tooth extraction complications can be treated using systemic and local therapy, since usage of conventional therapy have shown several drawbacks including inadequate drug level at the periodontal pocket

site, a quick drop in plasma antibiotic concentration to below therapeutic levels, the increasing prevalence of microbial resistance, and high peak plasma antibiotic concentrations that could be related to adverse effects.⁽¹¹⁾ In local drug delivery agents introduced by subgingival irrigation into periodontal pockets are antibiotic solutions, gels quickly washed away by the gingival fluid⁽¹²⁾ and there are other local agents include biodegradable films or membranes, platelet-rich fibrin (PRF), bone graft materials these having major drawbacks such as difficulties in handling, inconsistent action, and costly.^(13,14)

So, to overcome the disadvantages of systemic and local drug delivery system and to provide an effective therapy at the site of extraction, administration of dental cones is preferred.⁽¹⁵⁾ Dental cones are compressed or moulded tablets in the shape of a cone⁽¹⁶⁾ that are intended to be inserted into the empty socket following tooth extraction in order to stop bacterial growth and provide sustained release of an antibacterial medication or an astringent to stop bleeding.⁽¹⁷⁾ The primary benefits of dental cone is to achieve the correct therapeutic dose and regulated drug release at the site, avoidance of an immunogenic response, and provision for the appropriate distribution of unstable GIT medicines or first-pass affected medications.⁽¹⁶⁾

II. DIMENSIONS OF DENTAL CONE

The size of the cavity determines the size of the dental cones. Below figure (figure no: 1) shows the dimensions of PARASORB® Cone which are used in reduction of alveolar ridge atrophy after tooth extractions.⁽¹⁸⁾ cones of these dimensions are used for molar tooth socket, based on the size of socket dimensions (table no: 1) are decided and designed.

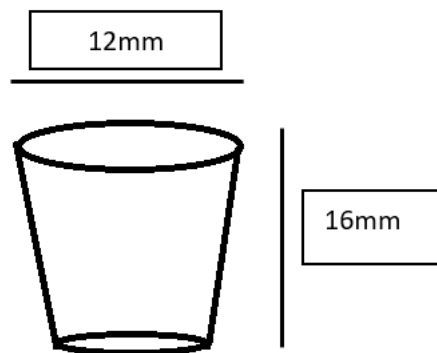


Figure no: 1

Table no: 1⁽¹⁹⁾

Molar	Crown width (M-D)	Root width at CEJ (M-D)	Root width at CEJ (B-L)	Root length	Trunk length
Max first	10.4 mm	7.9 mm	10.7 mm	13 mm	4.1 mm
Max second	9.8 mm	7.6 mm	10.7 mm	12.8 mm	4.2 mm
Mand first	11.4 mm	9.2 mm	9.0 mm	13.5 mm	3.27 mm
Mand second	10.8 mm	9.1 mm	8.8 mm	13.5 mm	3.28 mm

M-D = mesiodistal; B-L = buccolingual; max = maxillary; mand = mandibular.

III. METHODS OF PREPARATION

a) **Compression method:** Dental cones were made using an anti-bacterial compound or to reduce bleeding by containing an astringent or coagulant. The usual vehicle of these tablets is sodium bicarbonate, sodium chloride, or an amino acid⁽¹⁷⁾ by compression method these cones were prepared.⁽¹⁶⁾

b) **By mould filling method:** Dental cones were made using natural biodegradable polymers, in which weighed amounts of gelatin were dissolved in enough distilled water and left to hydrate for 30 minutes. After hydration, it was continuously stirred in a water bath set at 60°C until the gelatin was completely dissolved. Using the aforementioned remedy, co-polymer, sodium alginate, and PEG 400 were added with constant stirring as solubility enhancers and stabilisers. For proper mixing, the drug was separately dissolved in a small amount of ethanol and added to the polymeric solution. The solution was progressively poured into the mould after fully mixing for around 15 minutes. After that, the solution is given a five-minute period of uninterrupted standing. After that, the mould was left to set for 30 minutes in an ice bath. The prepared dental cones were kept in the refrigerator at 4°C until usage.⁽¹⁵⁾

IV. CHARACTERIZATION OF DENTAL CONES⁽¹⁵⁾

Physical characterization

- a. Physical appearance and texture
- b. Surface pH
- c. Compressibility
- d. Tensile strength

Physiochemical characterization

- a. Swelling Index.
- b. Drug Content Estimation.
- c. *In vitro* Drug Release.
- d. Antibacterial Study.
- e. Stability study.

V. APPLICATIONS

- 1) Effective in reducing post extraction infection.⁽²⁰⁾
- 2) Reducing the loss of alveolar ridge tissue following tooth extraction (socket preservation)
- 3) Local tamponade and hemostasis to control bleeding in different levels of contaminated wound cavities.
- 4) Post-oral surgery or oral and maxillofacial hematoma after tooth extraction.⁽¹⁸⁾
- 5) These cones can also be useful in dry socket condition.⁽¹⁵⁾

VI. ADVANTAGES

- 1) The ability to achieve the correct drug level at the site of action.
- 2) The ability to locally modify tissue permeability.
- 3) Inhibition of protease activity.
- 4) Prevention of an immunogenic reaction, as well as provision for the appropriate distribution of first-pass metabolised medicines or unstable GIT medications.⁽¹⁶⁾
- 5) Quick and easy application.
- 6) Painless no further action is necessary
- 7) Secure and rapid hemostasis -No risk of secondary bleeding after tooth extraction
- 8) Superior tissue tolerability
- 9) Option for local antibiotic protection, reducing the need for systemic antibiotics
- 10) Excellent price/performance ratio.⁽¹⁸⁾

VII. LIMITATIONS

The main drawback of dental cones is that they are difficult for patients to apply, which results in low patient compliance.

- 1) Another drawback is that dental cones antibacterial components are ineffective against infections that live in nearby gingival connective tissues, which puts patients at danger of reinfection.^(16,20)
- 2) The shape of the dental cones tablet must fit into the socket to remain in place.

VIII. MARKETED DENTAL CONES

- 1) ParasorbCone.
- 2) ParasorbConeGenta.
- 3) Parasorb HD Cone.
- 4) Parasorb Sombrero.

IX. CONCLUSION

These discussions have made delightfully evident that currently pharmaceutical industries introducing most of the innovative formulations in the market. The dental cones are administered locally for the treatment of post tooth extraction complications. Dental cones are effective therapeutic dosage form. They provide continuous or regulated drug release, posttooth extraction in order to avoid bacterial growth and provide prolonged release of an antibiotic or an astringent to cease bleeding. We believe there is opportunity for further development in the usage of dental cones and pharmaceutical research.

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