

## Apexum – The Future of Minimally Invasive Endodontics.

\*Urvashi Keswani<sup>1</sup>Ajinkya Pawar<sup>2</sup>

<sup>1</sup>(Intern, Nair Hospital Dental College, Mumbai, Maharashtra, India)

<sup>2</sup>(Professor, Department of conservative Dentistry And Endodontics, Nair hospital Dental College, Mumbai, Maharashtra, India.)

Corresponding Author: \*Urvashi Keswani

---

**Abstract:** Apical periodontitis is a condition involving infection and inflammation of the tissues surrounding the apex of the tooth. This condition often results due to carious involvement of a tooth and the progression of these microbes from the pulp space extruding beyond the apex of the tooth. The most widely followed treatment of such lesions involves root canal therapy of the infected tooth, followed by a medicated dressing. However, complete healing in such cases often takes several months. The advent of the Apexum procedure has led to a more targeted approach to such problems. The procedure involves a controlled and minimally invasive technique of periapical tissue debridement through a root canal access. This results in an augment in the healing kinetics of periapical lesions. The Apexum procedure relies on two sequential rotary files that are designed in a manner that they extrude beyond the apex of the tooth, into the area of inflammation, and help in controlled debridement by mincing the infected tissue in a slow and effective manner. The debrided tissue is then washed out through various irrigating mediums. This novel procedure has revolutionized the field of minimally invasive endodontics providing more reliable treatment modalities.

**Keywords :** Minimum invasion, Apexum, periodontitis, endodontics, non-surgical.

---

Date of Submission: 16 -10-2017

Date of acceptance: 28-10-2017

---

### I. Introduction

Apical periodontitis is a widespread problem that usually occurs due to the presence of microorganisms in the pulp space and its progression through the canal systems into the periapical area beyond the anatomical apex of the tooth. Apical Periodontitis has two modes of treatment, surgical and non-surgical. Non surgical means usually follow treatment with a conventional root canal therapy and a medicated dressing. Though fairly reliable, healing of the lesion through this mode of treatment may take upto 24 months or even longer<sup>[1]</sup>. The prolonged healing time has been attributed to the presence of activated macrophages in the lesion that may maintain their state of activation long after their initial cause of activation has been eliminated by the root canal procedure. These cells often produce several bone-resorbing cytokines that persist for months after the commencement of the treatment.<sup>[1]</sup> Very often, the persistence of microorganisms in the root canal space augments the recuperation time thereby increasing patient discomfort. Surgical means involve various procedures such as apicoectomy. However, these surgical means result in an increase in patient trauma, discomfort, swelling and pain.<sup>[2]</sup> In order to provide the patient with a faster, more accurate and reliable treatment option, the Apexum procedure was introduced. This new procedure has shown promising results. It involves the use of two sequential rotary files attached to a slow speed handpiece that extrude beyond the apex of the tooth and help in mincing and debriding the inflamed tissue, all through the root canal access.<sup>[2]</sup>

It has been found to be useful in many other fields of dentistry like:

1. In cases of chronic apical periodontitis as a supplement to conventional root canal procedure.<sup>[3]</sup>
2. Application in clinical endodontics when surgery is contraindicated or not desired by the patient.<sup>[1]</sup>
3. As a valuable tool in hastening bone augmentation and implant placement in cases where large periapical pathologies have resulted in bone loss or compromised bone conditions.<sup>[2]</sup>
4. In oral surgery for treatment of cysts that show no drainage and no need of decompression or aspiration techniques.<sup>[4]</sup>

### II. Apexum Device

**Apexum device consists of the following:**

Two rotary files used in sequential order: The Apexum NiTi ablator and the Apexum PGA ablator.

-The Apexum NiTi ablator mainly consists of a preshaped NiTiNol wire. One end is precurved or bent in order to facilitate its entry into the periapical area. The other end has a latch type design in order to fit into the low speed contra-angle handpiece. The wire is first passed through a straight superelastic Nitinol tube that allows the entry and progress of the file through the root canal space. Once the file has reached the apex of the tooth post

negotiation of the canal, the file projects out of the tube and bends when pressed thus assuming its precurved shape owing to Nitinol's shape memory property. This precurving forms an arc which helps mince the inflamed tissue when the file rotates at a slow speed of 200 to 250 rpm.<sup>[2]</sup>

-The Apexum PGA ablator is built from a Nitinol shaft, equipped on one end with a Latch type arrangement to facilitate the use of the low speed contranagle handpiece. The other end has PGA (Poly Glycolic Acid) which is an absorbable suture material available as braided multifilament or monofilament form. This end helps turn the minced tissue into a thin suspension that may be flushed through the root canal. This file rotates at 5000 to 7000 rpm.<sup>[2]</sup>

### III. Method

#20 K file inserted through the apical foramen beyond the apex to verify patency

#30 K file inserted 1mm beyond apex to create passage of 330 micrometer diameter.

Insert Apexum NiTi Ablator with sheath till Working length.

Stabalize sheath to occlusal surface with glass ionomer cement.

Nitinol filament pushed manually through the enlarged apical foramen into periapical tissue.

Rotate at 200-250 rpm for 30 seconds. This results in mincing of the periapical inflamed tissue.

Remove the stabilizing Glass Ionomer Cement and withdraw the ablator

Rinse the canal with sterile saline

Insert the Apexum PGA Ablator and rotate for 30 seconds at 5000 to 7000 rpm to turn minced tissue into a thin suspension.

Wash out suspension with sterile saline solution.

The cross sectional area between the enlarged Apical Foramen and outer surface of needle is 3.4 times larger than that of the needle lumen. This allows adequate backflow during irrigation.<sup>[2]</sup>

Special attention is given to visually monitor the backflow of the bloody suspension that oozes out through the root canal access on flushing saline through the apical foramen. This continuous oozing indicates that there is no pressure building up within the peri-apical space.<sup>[2]</sup>

To allow for continuous monitoring, aspiration is performed at a distance from the access cavity so that the operator could visually evaluate the inflow and outflow rates.<sup>[2]</sup>

Eventually once all the tissue has been flushed out, the suspension will become pale and then progress to a clear solution. At this moment the irrigating needle is withdrawn and the canals are dried with paper points. Regular obturation is performed as in conventional root canal procedres.<sup>[2]</sup>

### IV. Advantages

- 1.Non-surgical method for debriding periapical lesions causing lesser trauma and patient discomfort.
- 2.Minimal invasive technique.
- 3.Procedure can be performed through root canal access.
- 4.Increased healing kinetics of periapical lesions.<sup>[5]</sup>
- 5.Decreased chances of post operative sensitivity or pain.
- 6.Gentle procedure.
- 7.Surgical skills not required.
- 8.Elimination of bacterial biofilm.

### V. Disadvantages

- 1.Some authors have their reservations regarding the procedure as it is well known that insertion of any instrument beyond the apex often results in a flare-up causing post operative pain and sensitivity.<sup>[1]</sup> 2.Widening the apical diameter to 330 micrometer diameter may result in extrusion of the soft gutta percha beyond the apex.<sup>[2]</sup>

3.Management of procedural errors is a matter of concern.

## **VI. Conclusion**

Apexum has proved to be a promising alternative to the conventional surgical means of treatment. It has provided significantly lesser post operative sensitivity and pain along with debridement and debulking of the inflamed periapical tissues that enhance the healing kinetics of periapical lesions. Although some authors have their reservations regarding the procedure, the only real concern that may pose a problem is the management of procedural errors like instrument separation so this issue needs to be addressed for future use.

## **Acknowledgements**

“The authors deny any conflict of interests”

## **References**

- [1]. Raisingani, D. (2011). Apexum: A Minimum Invasive Procedure. *International Journal of Clinical Pediatric Dentistry*, 4(3), 224–227.
- [2]. Prakash, Dr.Prem & Sinha, Dakshita & Prabha Tyagi, Dr.Shashi & Udai Pratap Singh, Dr. (2016). Apexum: The magic wand in Endodontics. *International Journal of Current Research*. 8. 27527-27531.
- [3]. David Shamah. 2008. Apexum goes to the root of the problem. Israel.<http://israel21c.org>
- [4]. Bansal, R., Khurshed, I. and Bansal, T. 2013. Endodontic Management of a Periapical Cyst- A Review. *J Adv Med Dent Scie.*, 1(1);7-16.
- [5]. Metzger Z, Huber R, Slavescu D, Dragomirescu D, Tobis I, Better H. Healing kinetics of periapical lesions enhanced by the apexum procedure: A clinical trial. *J Endod.* 2009 Feb;35(2):153–159.
- [6]. Figdor D. Apical periodontitis: A very prevalent problem. *Oral Surg Oral Med Oral Pathol Endod.* 2002 Dec;94(6):651–652. *Dent Scie.*, 1(1);7-16.

\*Urvashi Keswani. "Apexum – The Future of Minimally Invasive Endodontics." *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)* 16.10 (2017): 90-92