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# From the desk of Editor-in-Chief

With immense pleasure I would like to announce that we are publishing the Volume 04 (Issue 01) of MIDS R Journal of Dental Research after the successful publication of three volumes. *“Everything is possible when you have right people to support”*, I would like to extend my heartfelt thanks to the authors and our management for their constant faith in me and their utter support.

The Volume 04 (Issue 01) has been created with the great efforts of providing the quality manuscripts rather than the quantity, the volume contains case reports on clinical approach in the root canal treatment of Radix entomolaris and Paramolaris, Gingival depigmentation by laser and electrosurgery, approach for regeneration of periodontal intrabony defect. Also, review articles on botulinum toxin, management of tobacco dependence, MiYO liquid ceramic and myths in endodontics.

I dedicate this issue to all the faculty members of MIDS R Dental College, Latur who immediately responded to the call for manuscripts and submitted their valuable work to the Journal.

**Dr. Suresh S. Kamble,  
Principal,  
MIDS R Dental College, Latur**

# The Radix Entomolaris and Paramolaris: Clinical Approach in Endodontics

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## Abstract:

Mandibular molars can have an additional root located lingually (the radix entomolaris) or buccally (the radix paramolaris). If present, awareness, and understanding of this unusual root and its root canal morphology can contribute to the successful outcome of root canal treatment. This report discusses the endodontic treatment of mandibular molars with a radix entomolaris or paramolaris, both of which are rare macrostructures in the Caucasian population. The prevalence, the external morphological variations, and the internal anatomy of the radix entomolaris and paramolaris are described.

**Keywords:** Anatomical variations, endodontic treatment, mandibular molar, radix entomolaris, radix paramolaris.

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## INTRODUCTION

Knowledge of the internal anatomy and possible variations in the morphology of the root canal system is essential for performing successful endodontic therapy. Professionals must be prepared to identify and perform endodontic treatment of teeth that exhibit unusual configurations, to ensure that the entire root canal system will be debrided and filled. Among the dental groups that may have variations are the permanent mandibular molars; however, in Caucasian populations, these teeth are generally two-rooted (one mesial root with two mesial root canals and one distal root with one distal root canal) [Vertucci et al. 1984]. The presence of a supernumerary root in the distal-lingual region of the first permanent mandibular molars was first described by Carabelli, who called it the radix entomolaris (RE). The prevalence of RE differs significantly depending on the ethnic group, ranging from 0 to 33.33% [Garg et al. 2010, Tu, 2009]. The high prevalence in Asian populations such as Chinese, Korean and Taiwanese individuals, with an

occurrence ranging from 24.5% to 33.3% [Tu et al. 2009, Kim, 2018], has led to this morphology being considered normal (eumorphic root morphology) [Kim et al. 2018]. In African, Eurasian, Caucasian, and Indian populations, this is considered dysmorphic root morphology, with a low prevalence of less than 5% (Culberson et al. 2007).

Regarding the clinical management of these root canals, the literature reports the importance of resources such as computed tomography for diagnosis [Abella et al. 2011, Rodrigues, 2016], microscopic magnification [Culberson et al. 2007], and the use of ultrasonic inserts [López-Rosales et al. 2015] to help with localization. In addition, preparation with automated NiTi systems is indicated, mainly due to the curvatures that may be present in these root canals [Abella et al., 2011, López Rosales, 2015]

Radix entomolaris can be found in first, second, and third mandibular molar teeth [Song et al. 2010, Ferraz, 1993]; however, the literature has reported a higher number of occurrences in case reports of first

molars [Calberson et al. 2007, Rozito,2014, Abella, 2011]

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Because of this, it is crucial for clinicians need to be able to diagnose and perform endodontic treatment in a safely and predictably. Therefore, this report aimed to present the diagnosis and endodontic management of a clinical case of permanent mandibular first molars with radix entomolaris with the use of contemporary technical resources.

### CASE REPORT

A 28-year-old Indian male patient reported with a chief complaint of pain in the lower- right posterior tooth region of the jaw for a few days. Clinically, the lower right first molar tooth had deep occlusal caries and was tender on vertical percussion. Mobility of the tooth was within physiologic limits. Radiographically, periapical radiolucency was seen with both mesial and distal roots (Figure 1a). The presence of third additional root was also revealed on the distal side. The extra root was relatively straight and originated from the distolingual aspect of the tooth. The tooth was unresponsive on electric pulp testing. A diagnosis of chronic apical periodontitis in relation to the lower right first molar was made because of pulpal necrosis. The tooth was anesthetized. An access opening was made, and two mesial canal orifices (mesiobuccal, mesiolingual) and one distal canal orifice (distobuccal) were initially located. Another orifice was located on the distolingual part of the pulpal floor on further exploration. The root canals orifices were enlarged using gates glidden drills ( Mani Inc., Japan) for straight line access, and shape of the access cavity was modified from a triangular form to a more

trapezoidal form to locate distolingual root better. The root canals were explored with a K-file ISO number 10 and 15, and the radiographic length of the root canals was determined (Figure 1b). Biomechanical preparation was carried out using the Neo endo flex rotary files (Orikam) in all the canals with intermittent irrigation using 3% sodium hypochlorite. Obturation of the root canals was performed using the gutta-percha points (Sure endo) (figure 1c) and AH plus sealer (Dentsply, Switzerland). The access open cavity was then sealed with temporary restoration (Cavit) (Figure 1d).

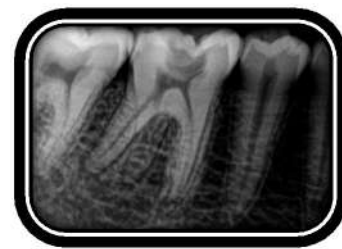


Figure 1a



Figure 1b



Figure 1c



Figure 1d

## DISCUSSION

### Radix Entomolaris (additional root located lingually)

#### Prevalence:

Anatomic variations in permanent mandibular first molars are documented in the literature. The majority of mandibular first molars are two rooted; mesial and distal. Sometimes, an extra distobuccal or distolingual root may be encountered. The etiology for radix entomolaris is still unknown; it can be because of external factors during tooth formation or can attributed to the atavic gene or polygenic system. It has also been suggested that “three-rooted molar” traits have a high degree of genetic predisposition as in Eskimos and in a mixture of Eskimos with Caucasians. The presence of radix entomolaris has been associated with ethnic groups of mongoloid origin (>30%), relatively low prevalence in white Caucasian, African, Eurasian and Indian populations. The radix entomolaris may also be present in the first, second and third molar, being less prevalent in the second molar. A bilateral occurrence of radix entomolaris has also been reported. The relationship between radix entomolaris (RE), gender predilection, and side distribution are unclear. Few studies have reported more male predilection for RE, while others reported no significant difference between gender and RE. Similarly, no significant difference was reported for side distribution, despite few studies reporting it to be more on the left side while others on the right side. Bilateral occurrences for RE has been reported to range from 37.14 – 67 %.

#### Classification:

Carlsen & Alexandersen (1990) classified radix entomolaris (RE) into four different types based on the location of its cervical part]: 1. Type A: the RE is located lingually to the distal root complex, which has two cone-shaped macrostructures. 2. Type B: the RE is located lingually to the distal root complex, with one cone-shaped macrostructure. 3. Type C: the RE is located lingually to the mesial root complex. 4. Type AC: the RE is located lingually between the mesial and distal root complexes.

De Moor et al. (2004) classified radix entomolaris based on the curvature of the root or root canal: 1. Type 1: a straight root or root canal. 2. Type 2: a

curved coronal third that becomes straighter in the middle and apical third. 3. Type 3: an initial curve in the coronal third with a second buccally oriented curve that begins in the middle or apical third. Song JS et al. (2010) further added two more newly defined variants of RE: 1. Small type: length shorter than half of the length of the distobuccal root. 2. Conical type: smaller than the small type and having no root canal within it.

#### Morphology:

The radix entomolaris is located distolingually, ranging from short, conical extension to average mature root length with its coronal third partially entirely fixed to the distal root. Generally, the radix entomolaris is smaller than mesio- and distobuccal roots and may contain pulpal tissue [22]. Externally, the distal furcation is slightly lower (1 mm) than the furcation between mesial and distal roots. Clinically, a tooth with an additional distolingual root may present a more bulbous crown outline, an additional cusp, a prominent distolingual lobe, or cervical prominence. These features can indicate the presence of additional root. Radiographically, third root is visible in 90% of cases. Occasionally it may be missed because of its slender dimension or overlapping with distal root. Radiographs should be carefully inspected to reveal the presence of hidden radix entomolaris which might present as unclear outline of distal root or root canal. Additional radiographs taken from different horizontal projections, 20 degree from mesial and 20 degree from distal reveals the basic information about the anatomy of additional third root. In addition to this, magnifying loupes, dental microscope or intraoral camera may also be useful. Recently, cone-beam computed tomography (CBCT) has emerged as a useful tool to aid in the diagnosis of teeth with complex root anatomies. However, cost and accessibility are the main limiting factors till now.

### Radix paramolaris (additional root located buccally)

#### Prevalence:

Bolk reported the occurrence of radix paramolaris. Radix paramolaris is very rare and occurs less frequently than radix entomolaris [12]. Visser reported the prevalence of radix paramolaris to be

0% for mandibular first molars, 0.5% for second molars and 2% for third molars.

Classification: Carlsen & Alexandersen (1991) classified radix paramolaris (RP) into two different types: 1. Type A: cervical part is located on the mesial root complex. 2. Type B: cervical part is located centrally, between the mesial and distal root complexes.

Morphology: The radix paramolaris (RP) is located mesiobuccally. The dimensions of RP may vary from short conical extension to a mature root which can be separate or fuse. Few observations can be made from various studies, i.e. an increased number of cusps is not necessarily related to an increased number of roots; however, an additional root is always associated with an increased number of cusps, and with an increased number of root canals

Clinical Implications

#### Endodontic Procedures:

The presence of radix entomolaris has clinical implications in root canal treatment. Accurate clinical and radiographic diagnosis can avoid failure of root canal treatment because of missed canal in distolingual root. Most important basic principle for successful root canal treatment is the principle of 'straight-line access'. Ultimate objective is to provide access to the apical foramen. As the orifice of radix entomolaris is distolingually located, the shape of access cavity should be modified from classical triangular form to trapezoidal or rectangular form in order to better locate the orifice of distolingual root. The root canal orifices follow the laws of symmetry which help in locating the radix entomolaris. Canal orifices are equidistant from a line drawn in a mesiodistal direction through the pulpal floor and lie perpendicular to this mesiodistal line across the centre. Straight line access is essential as majority of radices entomolaris are curved. Care must be taken to avoid excessive removal of dentin or gauging during access cavity preparation as this may weaken the tooth structure.

#### CONCLUSION

The high frequency of a fourth canal in mandibular first molars makes it essential to anticipate and find all canals during molar root canal treatment. The possibility of an extra root should also be considered and looked for carefully. Proper angulation and interpretation of radiographs help to identify chamber and root anatomy. In the case of an RE the conventional triangular opening cavity must be modified to a trapezoidal form in order to better locate and access the distolingually located orifice of the additional root. Straight-line access, in this respect, has to be emphasized as the majority of the radices entomolaris are curved.

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# Gingival Depigmentation by Laser and Electrosurgery - A Case Report

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## Abstract:

Gingival hyperpigmentation is one of the esthetic problems. It requires the removal of gingival melanin pigmentation by various methods such as gingivoplasty, gingivectomy with free gingival autograft, electrosurgery, cryosurgery, application of chemical agents like phenol and alcohol, abrasion with a diamond bur, Nd:YAG Laser, semiconductor diode laser. In this case hyperpigmentation is treated by a diode laser in the maxillary anterior sextant and by electrocautery in the mandibular anterior sextant.

**Keywords:** Electrocautery, Gingival depigmentation, Hyperpigmented Gingiva, Dummett Oral Pigmentation Index, Laser Surgery

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## INTRODUCTION

The gingiva is the most pigmented intraoral tissue. The facial aspect of gingiva with hyperpigmentation is unsightly during smile and speech, this is the first & foremost indication for depigmentation as per the patient's demand<sup>1</sup>. Depending on gingival display and score of melanin pigmentation during smile decides the need for depigmentation procedure and decides the extent of site. Melanin, a non-hemoglobin brown pigment, is the most common natural pigment contributing to endogenous pigmentation of gingiva and is produced by melanocytes in the basal and supra basal cell layer of the gingival epithelium<sup>2</sup>. The gingiva is the most frequently pigmented tissue of the oral cavity. The physiologically ideal color of the gingiva is coral pink, which can vary depending upon the intensity and depth of melanin pigmentation that is more prominent in Asians and Africans than Caucasians. The pigmentation may be physiologic or pathologic. The physiological color of gingiva is due to a combination of different types of pigments like melanin, carotene, reduced hemoglobin, soft keratin, and oxyhemoglobin<sup>3</sup>. The

positive correlation of skin color and gingival pigmentation among the South Indian population is seen and pigmentation was more in attached gingiva and interdental gingiva<sup>4</sup>. Dummett oral pigmentation index (DOPI)<sup>5</sup> is the most commonly used index to score pigmentation of gingiva due to its simplicity and ease of use. The scores are as follows:

1. No clinical pigmentation (pink-colored gingiva)
2. Mild clinical pigmentation (mild light brown color)
3. Moderate clinical pigmentation (medium brown or mixed pink and brown color).
4. Heavy clinical pigmentation (deep brown or bluish black colour)

The pathologic pigmentation is seen as manifestations of systemic illness (e.g., Addison's disease) and malignant neoplasms (e.g., melanoma and Kaposi's sarcoma)<sup>6</sup>.



CASE REPORT

A 21- year- old young female reported to the Department of Periodontics with a chief complaint of –black gums. The patient’s history revealed blackish discoloration of the gingiva present since birth, suggestive of physiologic melanin pigmentation. According to Dummet - Gupta Oral Pigmentation Index (DOPI)<sup>5</sup> score was - 4 indicating heavy clinical pigmentation (deep brown or bluish black). Considering the patient’s concern about gingiva color, a depigmentation procedure was planned using a diode laser in the maxillary arch and electrosurgery in the mandibular arch. Adequate anesthesia was given. The patient and staff were protected from laser beams by wearing protective spectacles. A diode laser with settings of 810 nm, in pulsed mode was delivered through a 400µm fiber optic tip. The hyperpigmented gingival epithelium was ablated using direct contact mode in painting strokes<sup>7</sup>. The care was taken to scrape only the gingival epithelium between the tip of the interdental papilla on one end and the mucogingival junction on the other end. Two weeks later mandibular arch depigmentation was done by electrosurgery. Local anesthesia was infiltrated in the mandibular arch from the first molar to molar. A electrode loop was used for depigmentation of the gingiva. It was used in light brushing strokes & the loop was kept continuously in motion all the time to avoid excessive heat buildup and destruction of tissues. The periodontal dressing was applied after both procedures. The analgesics were prescribed and advised to take if any pain was there. A visual analog scale (VAS) was used to quantify pain levels and patient discomfort during the procedure. Each participant was asked to complete the VAS index cards—for two hours, twenty four hours, and one week after the procedure. The patient is recalled after seven days for follow-up.



Figure 1:Pre-operative photograph



Figure 2: Depigmentation by Laser



Figure 4: Depigmentation by electrosurgery



Figure 5: Ten months postoperative view

Table 1 Visual analog scale (VAS) Score

	2hours Post treatment	24hours Post treatment	1week post treatment
Maxillary arch(LASER)	1	1	0
Mandibular arch(Electro surgery))	3	2	1

RESULT

There was minimal pain and bleeding during both laser and electrocautery procedures. A burning smell and fumes comes where the suction tip is placed to avoid fumes. After 24 hours patient was called for follow-up in both procedures, very mild pain patient had after laser. The patient can tolerate pain no analgesic is required after 3rd day in laser procedure. The patient experienced pain till one week after electrosurgery, analgesic is given for days once a day. The periodontal dressing was removed after seven days healing was good. Re-epithelization was completed within four weeks and gingiva looks normal. The healing is fast after laser as compared to electrocautery.

## DISCUSSION

Laser beams are found to destroy the epithelial cells, including those at the basal layer & hence reducing repigmentation as compared to other techniques. The laser beam targets pigmented area and strikes melanocytes. Diode lasers are well absorbed by melanin, and light energy is leading to heat energy by photothermolysis. Diode lasers are absorbed in chromophores with specific target tissue and cause tissue-specific ablation layer by layer and cell by cell<sup>8</sup>. Moritz et al. showed in a study the bactericidal effect of laser. It creates locally sterile operating area that results in the reduction of bacteremia concomitant with the procedure<sup>9</sup>. Oringer (1975) has explained the superior efficacy of electrosurgery based on —exploding cell therapy. It is predicted that the electrical energy leads to molecular disintegration of melanin cells in basal and suprabasal layers of the operated and the surrounding sites. Thus electrosurgery too retards the migration of melanocytes from locally situated cells. Electrosurgery, however, causes prolonged or repeated application of current to tissue may lead the accumulation of heat and undesired tissue destruction<sup>8</sup>. Thus, one should avoid contact of electrode loop with periosteum or alveolar bone and vital teeth to produce undesired tissue destruction. We found that wound healing after laser therapy is fast as compared to electrosurgery. The inflammation and postoperative pain was minimal for first three days after the laser procedure and then later on no pain, and discomfort to patient. After electrosurgery, pain was moderate for first 24 hours and then patient had mild pain which lasted for three days. In this case, maxillary arch was treated with lasers & mandibular with electrosurgery. Patient was recalled after six months and months postoperatively to evaluate repigmentation of melanin. No repigmentation is seen in both arches.

## CONCLUSION

Both the methods, lasers & electrocautery for the depigmentation procedure are effective. The rising concern for esthetic demand of an individual requires the removal of hyperpigmented gingival

areas to create a confident and pleasing smile, which could be easily attained by using the laser. This case report concludes that the laser is an effective and fast tool that causes less pain, discomfort and faster healing. Ten-month follow-up showed no recurrence of melanin pigmentation was seen in both arches.

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# A Paralleling frenectomy technique for the Treatment of papilla penetrating frenum

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## Abstract:

A frenum is a fold of mucous membrane, usually with enclosed muscle fibers, that attaches the lips and cheeks to the alveolar mucosa and, or gingiva and underlying periosteum. Abnormal frenum and muscle pull have been considered detrimental to periodontal health by pulling away the gingival margin from the tooth and thus contributing to the accumulation of plaque and calculus, leading to inflammation and pocket formation. Frenectomy is the complete removal of the frenum including its attachment to the underlying bone. This article aims to report a case of paralleling technique frenectomy and its advantages.

**Keywords:** frenum, paralleling technique.

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## INTRODUCTION

A frenum is a fold of mucous membrane, usually with enclosed muscle fibers, that attaches the lips and cheeks to the alveolar mucosa and, or gingiva and underlying periosteum. The maxillary labial frenum develops as a post-eruptive remnant of the ectolabial bands, which connect the tubercle of the upper lip to the palatine papilla.<sup>1</sup> Sharma p et. Al<sup>2</sup> (2014) gave a review on frenectomy in which they stated that when the two central incisors erupt widely separated, no bone is deposited inferior to the frenum. A V-shaped bony cleft between the two central incisors and an abnormal frenum attachment result. Abnormal frenum and muscle pull have been considered detrimental to periodontal health by pulling away the gingival margin from the tooth and thus contributing to the accumulation of plaque and calculus, leading to inflammation and pocket formation. Abnormal or aberrant frena are detected visually, by applying tension over it to see the movement of the papillary tip or blanching produced

due to ischemia of the region. Frenectomy is the complete removal of the frenum, including its attachment to the underlying bone. There many techniques available for frenectomy, and each technique have its advantages and disadvantages. One of these is the conventional technique with scalpels and periodontal knives, which form a large surgical wound area to overcome this, a new surgical approach is used which is paralleling technique. Depending upon the extension of attachment of fibers, frena have been classified as Placek Mirko et. al (1974)<sup>3</sup>

1. **MUCOSAL:** When the frenal fibers are attached to the mucogingival junction
2. **GINGIVAL:** When fibers are inserted within the attached gingiva
3. **PAPILLARY:** When fibers are extended into the interdental papilla

4. **PAPILLA PENETRATING:** When the frenal fibers cross the alveolar process and extend up to the palatine papilla.

The frenectomy done with the help of needle holders or artery forceps in a diamond shape is usually considered a conventional procedure. It was the first procedure introduced way back which, was later modified in various forms. Compared to other surgical techniques, this technique may result in a large rhomboidal wound area where primary closure is not possible in the lower part and healing takes place by secondary intention. It also causes more pain and discomfort to the patient. To overcome these problems, primary closure techniques like Z plasty and V-Y plasty were also proposed. One of the techniques referred to as the 'paralleling technique' can be considered in between these two extremes and is performed for the case presented.

**CASE REPORT**

A male patient was reported to the department of periodontics of MIDSR Dental College, Latur, with the chief complaint of spacing in the upper front teeth region of the jaw, which was not present previously. After that detailed case history of the patient was recorded, and no relevant findings were seen. Patients' blood investigations report was also normal.

On clinical examinations, the patient had midline diastema between two maxillary central incisors. This diastema was associated with papilla penetrating frenal attachment and, a tension test was performed by applying tension over the frenum to see the movement of the papillary tip or the blanch, which is produced due to ischemia in the region which was positive. There was the presence of local factors, so ultrasonic scaling was done before the start of treatment.

**Surgical procedure:**

We report a case having papilla penetrating frenum using paralleling frenectomy technique. The need for treatment and the overall procedure was explained to the patient before performing it, as well as written

informed consent was also taken from the patient. Before the start, of the procedure, local anesthesia was given to the patient and a preoperative photograph was also taken.

For Paralleling technique labial frenectomy, the upper lip was pulled upward by the assistant, then, the frenum was tightened. The incision was started and two paralleling incisions were placed on each side of the base of the frenum with a number 15 blade (Figure 2) and a band of frenum separated through and through (figure 3). An incised frenum is held with tissue forceps and removed by giving releasing incision on the top and bottom of the frenum (Figure 4). After the excision of frenum, deep dissection of the muscle fibers was done to remove all the attachments present at that site (Figure 5). The wound approximation was done by giving simple interrupted sutures using a 3-0 silk Suture (Figure 6). No periodontal pack was applied after surgery. The patient was recalled after seven days for suture removal.

**Post-operative instructions:**

After surgery post-operative instructions and medication should be given to the patient and ask the patient, not to pull their lips, to maintain proper oral hygiene, to avoid brushing at the surgical site, avoid taking hot, spicy, citrus, and hard foods for a few days, take a soft diet, and use 0.2% CHX mouth wash twice daily and come after seven days for suture removal.



**FIG. 1 PREOPERATIVE VIEW**



FIG. 2 TWO VERTICAL PARALLEL INCISIONS  
GIVEN



FIG 6. SIMPLE INTERRUPTED  
SUTURES PLACED



FIG.3 AFTER INCISIONS GIVEN



FIG 7. 1 MONTH FOLLOW UP



FIG 4. FRENUM AFTER EXCISION



FIG.5 DEEP DISSECTION OF THE MUSCLE  
FIBERS

**DISCUSSION**

This case report showed postoperative subjective effects of paralleling techniques after frenectomy. In the era of periodontal plastic surgery, more conservative and precise techniques are being used to create more functional and aesthetic results. The management of aberrant frenum has traveled a long journey from Archer's<sup>4</sup> and, Kruger's<sup>5</sup> "classical techniques" of total frenectomy to Edward's<sup>6</sup> more conservative approach. Recent techniques added frenal relocation by Z-plasty,<sup>7</sup> frenectomies with soft-tissue graft<sup>8</sup>, and laser<sup>9</sup> applications to avoid typical diamond-shaped scars and facilitate healing. Each method has its advantages and disadvantages. Dr. Chandulal D. Dhalkari et al.<sup>10</sup> in 2017 gave a case report on frenectomy by paralleling techniques and reported that Paralleling technique provides better patient perception in terms of postoperative pain and speech. Shahabe Saquib Abullais et al (2018)<sup>11</sup> also give the same Statement. Dr. Rizwan Sanadi et al (2017)<sup>12</sup> compared conventional and paralleling frenectomy techniques and gave conclusion that

Paralleling technique provided better patient perception in terms of minimal postoperative pain and functional complication when compared with the conventional technique.

### CONCLUSION

As the conventional frenectomy procedure results in the formation of a large wound area after the excision of the frenum at the base sometimes so the paralleling technique can be used as an alternative conservative procedure that creates a small wound area and, healing is occurred by primary intention.

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# Whale's Tail Technique- An approach for regeneration of periodontal intrabony defect

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## Abstract:

**Background:** Periodontal regeneration is the restoration of tooth-supporting tissue that was lost due to periodontal injury or inflammation. Bone graft with Guided tissue regeneration (GTR) is a common biomaterial used for the regeneration of periodontal apparatus. Bovine bone graft (BIO-OSS), a xenograft material, has provided better results than other bone graft materials for bone fill-in intrabony defects. Whale's tail technique is performed in midline diastema of  $\geq 4$ mm with intrabony defect for proper defect visualization and maintaining the vascular supply of the buccal flap.

**Conclusion:** Whale's technique with BIO-OSS bone graft and healiguide GTR membrane has resulted in the regeneration of alveolar bone within three months of follow-up.

**Keywords:** bovine bone, GTR, intrabony defect, papilla preservation, whale's tail.

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## INTRODUCTION

Periodontal regeneration is a challenge, and various surgical procedures are evolving for the same<sup>1</sup>. New attachment for periodontal regeneration is possible by the use of GTR<sup>2</sup>. It has been proven that GTR is more effective than open flap debridement in gaining clinical attachment level<sup>3</sup>. Various types of materials are in use for the regeneration of bony defects; among them are bone grafts. BIO-OSS is a bovine bone graft (Xenograft). The graft has been beneficial for alveolar bone regeneration<sup>4</sup>. Grafting with membrane has various complications in surgical procedures such as improper flap closure or post-operative recession may lead to exposure of grafting material. Membrane exposure may result in bacterial contamination. They are further complicating the surgical site. Based on these observations Takei et al. Introduced, the papilla preservation flap in 1985. Modifications in papilla preservation were made

with the understanding of defect morphology. The modifications are modified papilla preservation by Cortellini et al. 1995<sup>6</sup>, simplified papilla preservation by Cortellini et al. in 1997, and whale's tail technique<sup>8</sup>. Whale's tail technique was proposed by Bianchi et al. in 2009 for wide intrabony defects in the esthetic zone and to allow proper access and visualization of intrabony defects. This procedure is mainly performed with GTR while maintaining interdental tissue over the grafting material<sup>8</sup>.

## MATERIALS AND METHODS

**Pre-Operative:** The patient age 30 years, reported to the Department of Periodontology and Implantology, MIDSR dental college Latur with a chief complaint of swollen and bleeding gums for one month. He has a midline diastema of 4mm with papillary frenum attachment. Laboratory investigation reported that all blood counts were within normal limits. On OPG examination there was a vertical defect with #11. For

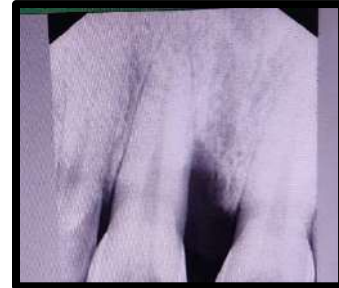
further evaluation, RVG was taken with #11. On RVG, vertical defect extending from coronal 1/3 rd with #21 to middle 1/3rd with #11 was recorded. (Fig 1) Pocket depth on mesio-buccal aspect and mesio-palatal wrt #11 was 6mm and 7mm. (Fig 2 & 3))

Initially, non-surgical therapy with Ultrasonic scaling and subgingival root planing was done. After initial therapy, it was decided to surgically access the area for the management of osseous defects. The patient was recalled after four weeks for follow-up. Oral hygiene status was good. With a midline diastema of 4mm and vertical defect wrt #11, a surgical procedure with the whale's technique was chosen. Before the intra-oral surgical procedure, one day prior to surgery, the procedure was tried on a study model with a wax sheet adapted to the cast.

Operative:- Initially, the surgical area was infiltrated buccally and palatal with 2% local anesthesia with 1:80,000 epinephrine wrt #11 and #21. Two vertically releasing incisions extending up to the mucogingival junction were given on the distal side of #11 and #21 on the buccal aspect with #15 no. Blade followed by intracrevicular incision on the buccal and palatal side with #12 no. Blade. (Fig 4) While placing the blade in an increvicular incision, there was an accidental slip of the blade, and a slit-shaped cut in the center of the gingival margin wrt #11. (Fig 4) Two semilunar incisions contacting the vertical incision were placed then the flap was slowly reflected on the palatal side with a periosteal elevator. Granulation tissue was removed for defect visualization. The defect was exposed, and the depth of the defect was 8mm. (fig 5) Healiguide membrane of size 15\*20 was trimmed to cover the defect and was adapted on the palatal side with a suture, then the membrane was passed buccally. With a slight reflection of the membrane, the BIO-OSS bone graft was packed into the defect, and the membrane was covered over the graft. (Fig 6 & 7). The flap was pushed back buccally and sutured with an interrupted suturing technique (fig8). Frenotomy was done to relocate the frenum. Post-operative instructions and antibiotics and analgesics were given.

Post-operative: Pt was recalled after 14 days for suture removal. (fig9) Recall appointments were

performed at 1-month intervals to assess postoperative healing and plaque control by the patient. RVG was taken after 3 months post-surgery. (Fig 10) Amount of complete bone fill was recorded.



**Fig 1: Pre-operative IOPA with vertical defect wrt #11**



**Fig 2: Mesio-buccal pocket depth of 6mm**



**Fig 3: Mesio-palatal pocket depth = 7mm**



**Fig 4: Two vertical releasing incisions with accidental slit**





**Fig5: Defect of 8mm wrt 11**



**Fig 6: Bio-OSS bone graft filled in defect**



**Fig 7: Healiguide GTR membrane adapted and placed over the bone graft**



**Fig 8: Interrupted suture with 3-0 Mersilk suture**



**Fig 9: 14 days after suture removal**



**Fig 10: 3month RVG**

**DISCUSSION**

Hagi et al. suggested four conditions for the successful regeneration of periodontal infrabony defect. These criteria are (1) toxins removal from the root surface, (2) by use of GTR membrane and bone graft, space provision should be established for coronal migration of pluripotent cells from intact periodontal ligament from root surface, (3) Optimal flap design and adequate suturing technique should be selected for stabilization of the wound to protect the blood coagulum (4) passive adaptation of flap, and complete wound healing is achieved for primary wound healing.<sup>9</sup> Whale's tail technique has achieved almost all the above-given criteria. Mrunal et al. in a case series with a similar technique with six months post-operative result showed that there was a regeneration of wide intrabony defect involving maxillary anterior teeth and a reduction of probing depth.<sup>10</sup> Bianchi and Bassetti used this technique to evaluate a mean probing attachment level gain of  $4.9 \pm 1.8$  mm and a probing pocket depth reduction of  $5.8 \pm 2.5$  mm.<sup>8</sup>

This case report utilized successful regeneration of intra-bony defect using the whale's tail procedure. The radiographic representation of intra-bony defect with three months follow-ups were documented. Whale's tail procedure is performed where interdental diastema is  $\geq 4$ mm for proper reflection of flap palatally and vertical intrabony defect wrt maxillary anterior. Soft tissue healing depends on incision technique, flap design, tissue manipulation, postsurgical follow-up, and patient cooperation<sup>11</sup>. The flap is reflected only around the content defect; this prevents overexposure as in open flap debridement. Proper visualization of the defect will allow for complete defect fill. The incision is away

from osseous defects and this will reduce the flap dehiscence.<sup>1</sup> Placement of suture away from defect minimizes the chance of bacterial contamination of healing osseous defect. The flap design will not only preserve the papillae but also maintain the vascularization of the buccal flap.<sup>1</sup> Once the flap is repositioned over the treated bone defect, only perimeter sutures of the margins are required to stabilize the flap, and no sutures are needed at the papilla level.<sup>8</sup> Patients maintaining proper oral hygiene after the surgical procedure also play an essential role in defect fill.

**Limitation of the case:** (1) IOPA of pre-operative and post-operative angulation should be the same for better evaluation of bony fill. (2) Pre-operative measurement of defect should have been carried out to get the amount of bone fill (3) for evaluation of regeneration of periodontal tissue reentry of the surgical site should be performed (4) a randomized-clinical trial needs to be done to confirm the importance of these techniques

## CONCLUSION

Whale's tail technique in the present case with midline diastema of  $\geq 4$ mm and intrabony defect has resulted in bone fill within three months follow up. Bio-oss bone graft with healiguide was used as periodontal regenerative material. After 14 days, follow-up healing occurred by primary intentional healing. The disadvantage of this procedure is that its technique sensitive.

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# MiYO liquid Ceramic: An Update to Current Knowledge – A Review Article

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## Abstract:

**Aim:** This paper aim to represent new approach in esthetics.

**Introduction:** MiYO Liquid Ceramic System gives the ability to easily create esthetic restorations that rival natural teeth in an ultra-thin layer. MiYO currently works with all zirconia and lithium disilicate materials and is easy to integrate with these materials. Simple and easy way to match shades and get the depth and translucency needed on monolithic or cutback crowns all in one firing. Quick and easy way to change a shade, raise or lower the brightness of crowns. Alternative to Costly Hand-layered Ceramics.

**Review:** Two MiYO Esthetic System Kits: MiYO Liquid Ceramic for teeth and MiYO Pink Liquid Ceramic gingival system for tissue. Both systems are comprised of MiYO Color; different types of self-glazing colors with varying levels of translucency, each uniquely formulated to replicate natural appearance, such as incisal translucency, mamelons, crack lines, halos, and gingival tissue, and MiYO Structure, used to create depth, vitality, and texture found in natural enamel and tissue, in unprecedented thicknesses of 0.1mm-0.2mm. Achieve highly esthetic monolithic restoration easier and faster. Because traditional stains and glaze cannot achieve depth and translucency.

**Conclusion:** Completely new and revolutionary colouring/staining system for zirconia or Lithium Disilicate restorations. Uniquely designed to create beautiful & detailed esthetic effects for monolithic restorations.

**Keywords:** MiYO ceramic, MiYO colours, MiYO esthetic system kit, MiYO structure, monolithic zirconia, translucency.

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## INTRODUCTION

We have seen big revolution in our basic material, we have long relied all ceramic materials, have always given us best esthetic possible and zirconia as well has been evolving last several years that share very similar

properties as that of pressed ceramic, it feels like norm of being impossible is now possible with underlying material is evolving so much.<sup>1,2</sup> Transmitted light passing through one of high generation zirconia this is the basis on which esthetic of zirconia is moving forward.<sup>1,2</sup> Restoration made with early generation of zirconia

, colors aren't bad, very dense unartificial look. Restorations made with latest generation of zirconia, translucency in depth and light transmission is similar to that of natural tooth.<sup>1, 2</sup> A balance between strength and esthetics is important for the longevity of the definitive restoration. While monolithic restorations provide the benefit of strength, they have limitations in terms of esthetics. In the typical monolithic procedure, the restoration is fired after the addition of stains and again after glazing. Stains are a set of colors that are added to some areas, built in thickness, to achieve the saturation of color. Glaze is applied when color saturation is achieved, after which another firing cycle is required. Although these procedures improve the appearance of monolithic restorations, the inability to control the surface texture during staining procedures makes it difficult to mimic nature. Another option to improve esthetics is to cut back the monolithic restoration; however, this significantly decreases the overall strength of the final restoration. For these reasons, clinicians and technicians have been limited in their ability to achieve greater esthetics without using traditional ceramic materials overlaying zirconia substructure or lithium disilicate glass-ceramic materials.<sup>3</sup>

## LIQUID CERAMIC SYSTEM



**Fig 1 -Application of MIYO liquid ceramic<sup>3</sup>**

Recently an innovative self-glazing liquid ceramic (MiYO, Jensen Dental) was developed as an alternative to layered ceramics to improve the esthetics of monolithic CAD/CAM or pressed-ceramic restorations.<sup>3</sup> Based on glazing material, this

liquid ceramic allows tooth shade and shape modifications, accentuated character, and customization while simultaneously enhancing the surface texture of the monolithic restoration. The liquid ceramic creates an ultrathin ceramic layer that eliminates the need for framework cutback. This is an important factor, since the strength of the ceramics will not be modified through cutback techniques.<sup>3,4</sup> All staining and customization can be done down to 0.1 to 0.2 mm on the ceramic surface. Different color schemes with translucent, semi-translucent, and opaque self-glazing colors were created to improve the color, shade, and shape of zirconia-based and lithium disilicate ceramics (MiYO Liquid Ceramic Color), as follows<sup>3, 4, 5, 6</sup>:

**High Opacity:** Used for mamelons (Mamelon Wheat, Mamelon Coral, Mamelon Pumpkin), hypocalcifications (Snow), and pits, fissures, and stains (Fissure).

**Medium Opacity:** Used for incisal halo (Halo Spring, Halo Autumn) and crack lines (Linen)

**Translucent:** Used for modification or enhancement of hue (Shade A, B, C, and D), plus other colors for incisal translucency or cervical characterization (Sage, Straw, Lotus, Clementine, Smoke, Storm, Cobalt, and Slate); Lumin and Lumin Plus can raise value without adding opacity

- **Structure<sup>3,4,5,6</sup>:** Building materials with different translucency adding light-scattering properties to create and modify the restoration's shape, line angles, and surface texture detailing (Window, Enamel, Ghost, Ice, and Blush) Self-glazing liquid ceramic allows modification of a restoration's desired color and value without adding opacity. The final outcome can be visualized before firing, allowing predictability and improved control of the esthetics of a monolithic restoration. The characteristics of traditional ceramic (the ability to layer depth) and stains (the ability to see the outcome prior to firing) have been developed in this liquid ceramic system. Specific self-glazing liquid ceramic colors of different translucencies and opacities were also created to improve the esthetics of gingival tissues (MiYO Pink Liquid Ceramic for Tissue):

- High opacity (Flamingo, Crimson, Plum, Merlot, Sorbet, Salmon, Sable, Thistle).

- High translucency (Midnight, Raspberry, Copper).
- Structure (Orchid, Rouge, Frost)
- Glaze



Fig 2 –MIYO system for teeth<sup>4</sup>

### 3. Miyo benefits<sup>3, 4</sup>

Reliable results every time

Easy handling paste materials

Economical and time saving through fast working processes

MiYO Color with perfectly adjusted fluorescence and opacity for contrast and depth

MiYO Structure - unique structure pastes

Natural refractive index of MiYO Structure is visible on monolithic crowns from a layer thickness of 0.1 mm + High color stability

Minimal shrinkage

Detailed aesthetic results by controlling shape, surface and structure before the firing cycle

Ability to layer all in one application.

Able to create all kinds of contrast and colour very similar to that of layering ceramic material.

Dynamic 3D effect without reducing monolithic crowns.

Create colour and structure as thin as 0.1 - 0.2 mm.

What you see is what you get

### 4. MiYO is designed for<sup>5, 6</sup>

Monolithic Zirconia, Zircon dioxide, PFC (eg. InSync Zr), Press to Zirconia, Lithium Disilicate, PFM (eg. InSync MC)

### 5. MiYO pink is designed for<sup>5, 6</sup>

Monolithic Zirconia, Zircon dioxide, PFC (eg. InSync Zr), Lithium Disilicate, PFM (eg. InSync MC)

## 6. Conventional stains versus MiYO



Fig 3 - Picture demonstrating comparison between conventional and miyo liquid ceramic stain<sup>3</sup>.

True difference between the conventional stain system about 80% pigment and 20 % glaze medium. Pigments are 100 % opaque<sup>1, 2</sup>. In past typically stains were applied first reason behind pigments are not adhered by itself<sup>1, 2</sup>. Enough of ceramic is required, so that they grab and hold the pigment and bond it to the surface of the restoration. Highly pacified pigmented eggshell is formed. If there is need to increase saturation of colour, little bit stains are applied, so basically stains are applied first, then stains are set for fire, there is need to do another glaze cycle. Glaze is placed over the stains. Stains create an eggshell of fairly high opaque that does not allow light transmission through the restoration, it blocks light transmission because of this great deal of vitality and translucency is lost. Need to use brighter zirconia, brighter ingot to compensate and balance this effect<sup>1, 2</sup>.

In miyo, completely opposite ratio 20% pigment and 80% clear ceramic matrix. Miyo colours are self-glazing does not require additional glaze firing over it. Pigment is evenly dispersed within matrix. This allow light to pass through a through so right away getting a light going into a colour band which is that doesn't happen with conventional stain. They are reflected of the surface when light hits the pigment. Light scatter inside the glassy matrix and light bounces off<sup>3, 4</sup>.

## CONCLUSION

Monolithic restorations provide the benefit of strength but are known to fall short in terms of their esthetics. Past outcomes using “white gold” have biased dental professionals against the use of full-contour monolithic restorations because of their esthetic limitations. Materials today are rapidly evolving to manage light transmission similar to ceramic systems. Mimicking nature with full-contour restorations now appears to be possible with the liquid ceramic approach, offering a solution to achieve strength and esthetics without compromising the patient’s situation and esthetic demands. Completely new and revolutionary colouring/staining system for zirconia or Lithium Disilicate restorations. Uniquely designed to create beautiful and detailed esthetic effects for monolithic restorations. With Miyo we can: Achieve stunning results with no cutback or modification, Match the shade guide and get a beautiful glazed finish in one application & firing, alter shades up and down while adding translucency, Raise or lower value while adding translucency, create shape and fine surface detail with Miyo Structure, Bring monolithic to life.

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# ENDODONTIC TREATMENT: MYTH BUSTER

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## Abstract:

There are many misconceptions surrounding root canal (endodontic) treatment and the excruciating response during the procedure. The thought of a root-canal may make anybody, who is not familiar with the procedure fearful or uneasy. The pain, inconvenience and cost of endodontic treatment are some of the reasons to opt for tooth extraction. The wait-and-see approach can be avoided as the longer the treatment gets postponed the more risk is associated in saving the tooth.

**Keywords:** Antibiotics, Conservative access, disinfection of root canal, discolouration, endodontic lesion, Ni-Ti file system, single visit vs multi visit endodontics, strength of endodontically treated tooth.

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## INTRODUCTION

The effectiveness of root canal treatment is well-established since decades. Globally twenty-five million endodontic treatments are performed every year, safely and effectively. Evolution in medical science, techniques and technologies have made endodontic treatment more predictable and successful than ever before. Today, digital imaging, rubber dams, rotary instruments, powerful disinfectant techniques and medicated filling materials aid in successful root canal treatment. However, there are many misapprehensions surrounding root canal treatment and its painful episodes. This article enlightens on some common myths about the root canal treatment and credible facts to offset those myths.

### ENDODONTIC MYTH NO. 1

“Large Endodontic Lesions Extending the Length of Several Teeth Have a Diminished Capacity to Heal”

**FACT:** Predictable healing can be achieved by eliminating the focus of infection. The elimination of

bacteria is done by a combination of measures such as mechanical cleansing, irrigation with various medicaments and the deposition of antibacterial dressings in the canals.

Nonsurgical management of a wide periapical lesions have shown a higher success rate and should always be adopted before resorting to surgery. The various non-surgical approaches can be: the conservative root canal treatment, decompression technique, active nonsurgical decompression technique, aspiration-irrigation technique, method using intracranial medicament, Lesion Sterilization and Repair Therapy, and the Apexum procedure. The decompression and aspiration-irrigation techniques can be used for drainage of cystic fluid from the canals as it decreases the hydrostatic pressure within the periapical lesion. In contrary for non-draining canals, calcium hydroxide or the triple antibiotic paste can prove beneficial. Periodic follow-up are essential to monitor the healing of periapical lesions according to Fernandes M et al, 2010.

Among the intracanal medicaments, like Calcium hydroxide and triple antibiotic paste with its antimicrobial property create an environment more favorable for healing and encourage osseous repair by the release of hydroxyl ions, which are oxidant-free radicals resulting in damage to bacterial cytoplasmic membrane, protein denaturation, and damage to bacteria.

Triple antibiotic paste, Ledermix paste has been successfully used in the open apex cases with large periapical lesion to disinfect the canals and MTA, biodentin, bioceramic used to form a three-dimensional hermetic seal at apex and also promote healing of perapical lesion.

If the lesion is separate from the apex and with an intact epithelial lining (apical true cyst) it may develop into a resistant lesion which may not heal with non-surgical treatment. Lesions of non odontogenic origin and for cases refractory to nonsurgical treatment, in obstructed or nonnegotiable canals, the surgical approach can be adopted.

Del Fabbro M et al. 2007 Reported that there is no apparent advantage of using a surgical or non-surgical approach for the re-treatment of periapical lesions in terms of long-term outcome.

In conclusion, the choice between a surgical and a non-surgical procedure should rely upon factors other than the mere treatment outcome or the size of lesion: these factors should include patient's initial clinical situation, patient's preference, operator's experience and skill, complication risk, technical feasibility, and overall cost and time.

## ENDODONTIC MYTH NO. 2

“The Root Canal System is difficult To Disinfect”

FACT: Although the Root canal system has complicated apical anatomy with fins and isthmuses. It can be effectively and sufficiently cleaned if proper technique are practiced. Intracanal irrigants and medications are used to reach the natural complexities and remove the smear layer. Intracanal irrigants exert their effects mechanically and chemically. Mechanical effects of irrigants are generated by the back and forth flow of the irrigation solution during cleaning and shaping of the infected

root canals, significantly reducing the bacterial load and its byproducts.

The irrigants can be divided into antibacterial and decalcifying agents or their combinations. They include sodium hypochlorite (NaOCl), chlorhexidine, ethylenediaminetetraacetic acid (EDTA), and a mixture of tetracycline, an acid and a detergent (MTAD), Tetraclean, electrochemically activated solutions (ECA), Ozonated water, photon-activated disinfection, herbals.

Various techniques effective in removing debris and bacteria can be classified into two broad categories: manual and rotary agitation. The manual irrigation techniques include irrigation with needles, agitation with brushes, and manual dynamic agitation with files or gutta-percha points. The rotary irrigation techniques include rotary brushes, continuous irrigation during instrumentation, sonic and ultrasonic vibrations, and application of negative pressure and lasers. The use of these methods results in better canal cleanliness when compared with that of conventional syringe needle irrigation. New activation systems like Endovac system, are improving the effectiveness of the treatment.

Chatterjee et al, 2015 Manual dynamic agitation with well-fitting gutta-percha cone to the working length with gentle push-pull motion; 100 strokes/30 seconds Sonic agitation with EndoActivator at 10,000 cycles per minute. EndoActivator produces powerful hydrodynamic intracanal waves, which serve to detach the biofilm from root canal surfaces. Passive sonic agitation with EndoActivator has proven to be the best irrigating system followed by manual dynamic agitation and conventional needle irrigation.

Dioguardi M et al , 2018 For an ideal irrigation protocol, it is essential to use of 2.5ml of 5.25% concentrated NaOCl solution for a suitable time during both the shaping the final irrigation phases, alternating the use of NaOCl with EDTA.

According to IOSR Journal of dental and medical science, 2019 for vital teeth- 2ml of NaOCl (5.25%)



**ENDODONTIC MYTH NO. 3**

“Conservative access cavity preparation is the New Endodontic Benchmark.

In the last decade, several access cavity designs involving minimal removal of tooth tissue have been described for gaining entry to pulp chambers during root canal treatment. The premise behind this concept assumes that maximum preservation of as much of the pulp chamber roof as possible during access preparation would maintain the fracture resistance of teeth following root canal treatment. However, the smaller the access cavity, the more difficult it may be to visualize and debride the pulp chamber as well as locate, shape, clean and fill the canals. At the same time, a small access cavity may increase the risk of iatrogenic complications as a result of poor visibility, which may have an impact on treatment outcome, generate a potentially dangerous limited view of the pulp chamber, reduced lighting, and magnification

Although the purpose of MIA cavities is to reflect clinicians' interest in retaining a greater amount of the dental substance, traditional cavities are the safer method for effective instrument operation and the prevention of iatrogenic complications.

Recently, Clark and Khademi modified the endodontic cavity design to minimize tooth structure removal. It preserves some of the chamber roof and pericervical dentin. Its confined outlines restrict cleaning, shaping, and filling of the root canals, increase the risks of inefficient canal instrumentation and the occurrence of procedural errors like ‘mouse whole effect’.

Kapetanaki I et al, 2021 the effectiveness of MIA cavities has not yet been well established by research data and that MIA cavities cannot replace the traditional straight-line access design. There is no scientific evidence that supports the use of MIA cavities over TECs. Although in vitro studies offer initial significant information about new types of access cavities, they have limitations in clinical practice.

**ENDODONTIC MYTH NO. 4**

“Short Endodontic Fillings Have a Better Prognosis than Long Endodontic Fillings”

FACT :

The outcome of endodontic treatments does not rely on a proper disinfection process only, but also on tight-sealed fillings of the canals as barriers to prevent re-infection. Therefore, root filling material is necessary to obturate the root canal in fluid tight seal 3-dimensionally on the main canal as well as the accessory canals

The only way to achieve the 3- D endodontic seal is to create the 3-D endodontic seal , i.e filling up to the apical constriction. Kuttler, 1955 recommended that all obturation should be terminated 0.5 mm from the apical foramen, because it is considered as nearest to the apical constriction and where the deposition of calcified tissues is most desirable. Seltzer et al, 1973 suggested that reaction to tissues were milder when instrumenting short of the apex as compared to instrumentation beyond the apex. Ingle,1957 suggested that obturation should terminate at 0.5mm short from radiographic apex. Obturation when extended upto the radiographic terminus of root results in overfilling.

Obturation extent seems to influence the RCT outcome. Overextended and underextended obturation showed a higher chance of association with less favorable outcome than adequate obturation. However, this influence could not be categorically supported due to other factors which are crucial and may affect proper shaping and cleaning of the root canal system

Ronaldo et al 2018, apical limit of obturation seems to have no influence in the repair of periapical lesions. Our results point towards the notion that root canal preparation appears to be the determinant factor for periapical lesion repair

According to ADA, 2016 In order to obtain the highest endodontic success rate and least amount of postoperative complications, the obturation material should be placed anywhere between the constriction and the anatomic apex

**ENDODONTIC MYTH NO. 5**

“Multivisit Endodontic Treatment Is More Successful Than Single-Visit Endodontic Treatment”

FACT: Multivisit and Single visit treatments should be viewed as part of a total endodontic treatment spectrum, with the choice of one over the other being determined by the circumstances surrounding each individual case.

Briefly, in cases of vital pulp, a single-visit treatment should be used, based on the fact that the pulp is only superficially infected and the root canal is free of bacteria, which provide the aseptic chain to be maintained during the intracanal procedure. Cases with fracture anterior teeth, non-vital teeth with sinus tract, nonsurgical retreatment cases, medically compromised patient who require prophylaxis, patient requiring sedation every time are indicated for single visit endodontics.

Conversely, if the pulp is necrotic and/or associated with a periradicular disease, there is ample evidence that the root canal system is infected. In these cases, the root canal system should ideally be cleaned and shaped, an intracanal medication placed, and the canal filled at a second appointment. Also in case of calcified and curved canal, asymptomatic non vital teeth with periapical pathology and no sinus tract, acute alveolar abscess, acute apical periodontitis, patient with allergy or previous flare up, patient who are unable to open mouth for long duration such as TMJ disorders.

Case selection for multivisit and single visit endodontics should be done carefully and the best time to obturate the canal is when the cone fits asymptotomatically.

J Conserv Endod, 2020 with the initiation of technological developments and advent of new gadgets, evidence-based dentistry and more scientific discussions, has directed single visit endodontic treatment to become more predictable. Single visit endodontics has presented to be an effective treatment aspect for both dentist and patient when compared with multiple visit treatment by decreasing the number of appointments and patient discomfort.

M Manfredi 2016 There is no evidence to suggest that one treatment regimen is better than the other.

Neither can prevent 100% of short- and long-term complications. It is likely that the benefit of a single-visit treatment, in terms of time and convenience, for both patient and dentist, has the cost of a higher frequency of late postoperative pain and swelling.

**ENDODONTIC MYTH NO. 6**

“Previous Endodontics Has One or Two Strikes against It and, Therefore, the Tooth Should Be Removed and Typically Replaced With an Implant”

FACT: Endodontic failures can be attributable to inadequacies in cleaning and shaping, obturation, iatrogenic errors like separated instruments, canal blockage and ledge formation, perforations, missed canal, or re-infection of the root canal system when the coronal seal is lost after completion of root canal treatment.

Straight root canals combined with apical root resorption might prevent satisfactory technical outcomes. Large periapical lesions and poor root filling quality in primary endodontic treatment appeared to predispose to treatment failure.

The new generation of endodontic instruments, magnification, materials and technology with the basic principles of endodontic retreatment have helped in retention of the patients natural tooth structure to form and function decreasing the need for extensively expensive prosthetic replacement in the area of implant dentistry. Surgical approach can be adopted in obstructed, calcified or non-negotiable canals.

Nonsurgical endodontic retreatment procedures have enormous potential for success if the guidelines for case selection are respected and the most relevant technologies are used.

Meandros Med Dent J 2020 providing the proper working length may help to eliminate residual bacteria in the untouched regions and improve the quality of the new treatment for tooth survival in regard to better disinfection.

Retreatment required in cases of missed canal include various methods for identifying missed canal canals which include: radiographic analysis, magnification and lighting (microscopes), complete

access, firm explorer pressure, ultrasonics, Micro-Openers, dyes, sodium hypochlorite test. The removal techniques for gutta percha, silver points include rotary retreatment files like Protaper retreatment files, M2 retreatment files, ultrasonic instruments, hand files with heat or chemicals, and paper points with chemicals.

The Post Removal System (PRS) is a reliable method to remove a post when ultrasonic efforts using the "10-Minute Rule" prove unsuccessful. In combination, microscopes and ultrasonics have driven "microsonic" techniques that have improved the potential, predictability and safety for removal of broken instruments. When ultrasonic techniques fail, the fall-back option is to use the Instrument Removal System (iRS)

Hence, with the advent of this new rotary systems and retrieval instruments; endodontic treatment including re-treatment has success levels comparable to implants.

The capacity for successful endodontic retreatment is the same as the capacity for endodontic nonsurgical treatment: 100% capacity. The only difference is the technical skill.

#### ENDODONTIC MYTH NO. 7

"I AM GOING TO PRESCRIBE ANTIBIOTICS, JUST IN CASE"

FACT: The routine use of antibiotics during the course of endodontic treatment is not supported by the principles of evidence-based dentistry in accordance with publications supported by the American Association of Endodontists and the American Dental Association.

Odontogenic infections, including endodontic infections, are polymicrobial, and in most cases, the prescription of antibiotics is empirical. This has led to the increasing use of broad-spectrum antibiotics even in cases where antibiotics are not indicated, such as symptomatic irreversible pulpitis, necrotic pulps and localized acute apical abscesses. In case of discrete and localized swelling, the primary aim is to achieve drainage without additional antibiotics. Adjunctive antibiotic treatment may be necessary in the prevention of the spread of infection, in acute apical

abscesses with systemic involvement and in progressive and persistent infections.

When using adjunctive antibiotics in addition to adequate debridement and surgical drainage, such as in cases with spreading infections, the practitioner should use the shortest effective course of antibiotics, minimize the use of broad spectrum antibiotics and monitor the patient closely

Ng YL, Mann V et al, 2011 A more recent endodontic prospective cohort study showed no association between the use of long-term antibiotics and nonsurgical treatment or retreatment outcome.

It has been proven that antibiotics do not relieve painful pulpitis and do not resolve localized periapical inflammation. Furthermore, prescribing antibiotics prophylactically, does not prevent flare-ups or reduce pain.

Antibiotics are indicated when there are systemic signs of an infection, such as fever and malaise, an infection that is spreading, or cellulitis is present. Unsupported use of antibiotics also contributes to the development of antibiotic-resistant bacteria, which is a serious global health threat.

#### ENDODONTIC MYTH NO. 8

"Endodontically Treated Teeth Discolor in the Aesthetic Zone"

FACT: Discoloration of a single tooth is a demanding clinical issue especially if present in the aesthetic zone. It can be due to either calcification of the pulp chamber, pulp necrosis and/or iatrogenic mishaps during various stages of the endodontic treatment or final restoration.

The main causes of tooth discoloration in both vital and

endodontically treated teeth are briefly described as extrinsic (e.g. dental plaque, smoking, foods that contain stains, chlorhexidine based rinses etc.) and intrinsic, acting either (a) on odontogenesis and (b) following tooth formation.

The discolouration of teeth following severe trauma causes subsequent intrapulpal hemorrhage, haemolysis of the red blood cells and release of the haem group to combine with the putrefying pulpal tissue to form black iron sulphide.

Discoloration is also due to insufficient coronal seal, failure to properly remove necrotic tissue, or the failure to clean sealer and/or obturation material from the pulp chamber and the use of triple antibiotic paste.

Grey MTA (GMTA) if used in coronal portion causes tooth discoloration as well as discoloration of the adjacent gingiva. Hence we can use white MTA (WMTA) through the exclusion of iron compounds to reduce discoloration. Also, Biodentine can replace MTA in esthetic sensitive areas.

Inadequate removal of coronal pulp tissue as a result of inappropriate access cavity design and/or preparation, especially when the cavity does not include the mesial and distal pulp horns. The erythrocytes, either in the remaining pulp tissue or in dentinal tubules regardless of the presence of a smear layer (Davis et al. 2002), will degrade into haemosiderin, haemin, haematin and haematoidin, which release iron during haemolysis (Attin et al. 2003). The iron can be converted to black ferric sulphide with hydrogen sulphide produced by bacteria, and this may cause grey discoloration of the tooth crown.

#### **ENDODONTIC MYTH NO. 9**

“Endodontically Treated Teeth Are Weaker”

FACT: The endodontic access definitely influence on the strength of the structure but; is almost insignificant when compared with the damage occurring during restorative procedures as a result of removal of carious tooth structures.

According to Larson et al occlusal cavities significantly weaken the tooth and wider isthmus preparations result in the largest decrease of tooth resistance to fracture. Weakness of teeth actually occurs before endodontic therapy due to caries, subsequent restorative cavity preparations followed by the restoration itself and not because of endodontic treatment. The microscope-designed endodontic access cavity and root canal radicular preparations do not cause a tooth to be weaker post endodontic treatment.

The similarity between the biomechanical properties of endodontically treated teeth and their contralateral

vital pairs indicates that teeth do not become more brittle following endodontic treatment. Other factors may be more critical to failure of endodontically treated teeth.

#### **ENDODONTIC MYTH NO. 10**

“The Ni-Ti System That I Use Makes the Biggest Difference”

FACT: There is plethora of different systems available, various proprietary methods and treatments have been introduced to enhance the cutting ability and file design. Files with the austenite phase have super elastic properties and are recommended for straight or mildly curved canals, whereas in the martensite phase possess high flexibility and increased resistance to cyclic fatigue so are recommended to be used in canals with complex curvatures. Heat-treated and controlled memory NiTi alloys are being used widely as they have increased flexibility and reduced shape memory property. These instruments can better penetrate the entrance of the canals as they can be pre-bent to maintain the flexed shape.

Yet an experienced endodontist is the foremost formula for success, the material being used is only a secondary factor. Prudent use of contemporary devices along with the basics of anatomy will lead to a predictable higher quality of root canal treatment on a broader basis.

#### **ENDODONTIC MYTH NO. 11**

“Every root canal treated tooth require crown”

FACT- A successful endodontic treatment does not depend only on a good root canal therapy, but good restorative treatment is crucial (Gillen et al., 2011). Failure is inevitable in an improperly restored tooth. The tooth needs to be restored back to normal function, form, and aesthetic. The quality of the final restoration has its effect on the survival and success rate of endodontically treated tooth. Well-sealed coronal restoration will prevent the ingress of microorganisms.

Full coverage crown with or without post was found to be the best choice as it protects the tooth from fracture, but crown restoration needs a preparation which leads to decrease the strength of the remaining tooth structure (Gupta et al., 2014; Alshiddi and

Aljinbaz, 2016; Wang et al, 2016; Alaki et al., 2021; Alserhan et al., 2021)

The additional procedure of the placement of an intraorifice barrier following obturation has been proposed to minimize these risks in case of unforeseen delays in obtaining a definitive coronal restoration. The procedure for the intraorifice barrier involves the placement of a flowable composite, resin-modified glass ionomer cement or bioceramic restorative material directly over the canal obturation material within the canal orifice followed by a temporary restoration, to allow for a bonded seal.

According to AAE, The type of final restoration recommended for an anterior tooth after endodontic therapy is determined by the amount of remaining tooth structure. If the only loss of tooth structure results from a conservative access preparation, a bonded composite is adequate. If the tooth is weakened by a large or misdirected access preparation or proximal caries and/or restoration, a crown should be considered as the final restoration. A post is necessary when the remaining tooth structure (after crown preparation) will not retain the core. A post should be avoided whenever possible in order to reduce the possibility of root fracture.

Cusps of posterior teeth must be protected against vertical fracture.

The main goal of conservative dentistry is to preserve the healthy tooth structure. In a retrospective study by Aquilino and Caplan (2002) it was found that crowning the endodontically treated teeth promote higher longevity for posterior teeth.

Although treatment recommendations should be made on an individual basis, the association between crowns and the survival of root canal treated teeth should be recognized during the treatment planning if long-term tooth survival is the primary criteria for success in endodontics.

## CONCLUSION

Successful endodontics depend upon straight-line access preparation, proper debridement by biomechanical preparation and irrigation and optimum obturation of root canal system. Just like technology gets upgraded, so does the root canal

treatment. However, care should be taken while implementing new techniques to preserve the golden ideology and rationale of olden times.

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# A BOTULINUM TOXIN- THE POISON THAT HEALS - A REVIEW ARTICLE

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## Abstract:

Botulinum toxin (Botox) is an exotoxin produced from *Clostridium botulinum*. It blocks the release of acetylcholine from the cholinergic nerve end plates and leads to inactivity of the muscles or glands innervated. It is best known for its beneficial role in facial aesthetics, but recent literature has highlighted its usage in multiple non-cosmetic medical and surgical conditions. The application of Botox in oral and maxillofacial surgery began in 1982. It was used by Jan Carruthers for reducing muscle mass and smoothing skin. Each specialty approaches Botox with its medical indications.

This article reviews the evidence related to Botox used in the head, neck, and face region. A literature review was conducted using PubMed, Medline, Cochrane Controlled Trials Register, and EMBASE databases limited to English Language articles published from 1980 to 2020. The findings suggested that there is level 1 evidence supporting the efficacy of Botox in the treatment of headache, bruxism, masticatory myalgia, sialorrhoea, temporomandibular joint disorders, blepharospasm, hemifacial spasm, and rhinitis. For chronic neck pain, there is level 1 evidence to show that Botox is ineffective. Level 2 evidence exists for vocal tics, trigeminal neuralgia, dysphagia, and post-laryngectomy oesophageal speech. For facial nerve paresis, stuttering, 'first bite syndrome', Frey's syndrome, oromandibular dystonia, and palatal/stapedial myoclonus the evidence is level 4.

**Keywords:** BOTOX, NON-COSMETIC USES.

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## INTRODUCTION

Botulinum neurotoxin is proving to be one of the most versatile therapies in all of medicine. It is a protease exotoxin produced by a Gram-positive, anaerobic, rod-shaped, spore-forming, motile bacterium called *Clostridium botulinum*. When released, it causes the inactivity of muscles or glands by blocking the release of acetylcholine from cholinergic nerve endings. Well known as a potent poison, and still responsible for many deaths from botulism worldwide each year, botulinum neurotoxin is very safe when used by a physician in carefully controlled circumstances. Since its

introduction in plastic surgery for cosmetic use in the 1980s, it has been widely used in various fields, including dentistry, dermatology, ophthalmology, plastic surgery, and medicine. Ophthalmologist Alan B. Scott first identified the therapeutic potential of botulinum neurotoxin with his studies of strabismus, and since then the therapeutic areas have exploded. Dr. Andrew Blitzer is the pioneer who first used botulinum neurotoxin to treat focal dystonia of the laryngeal muscles and spasmodic dysphonia. Subsequently, it became clear that botulinum neurotoxin could also block the release of other neurotransmitters, which could be helpful in

autonomic disorders such as hyperhidrosis and pain disorders such as migraine headaches. The therapeutic uses of Botox have extended exponentially to incorporate various medical and surgical conditions. This review evaluates the evidence on Botox used in therapeutic conditions of the head and neck.

**MATERIALS AND METHODS**

**Search strategy and data collection**

The PubMed, Cochrane Controlled Trials Register, Medline, and EMBASE databases were searched from 1980 to 2020. The medical subject heading search terms were 'botox' and 'larynx' or 'dystonia' or 'dysphonia' or 'tremor' or 'oral' or 'myoclonus' or 'esophagus' or 'temporomandibular' or 'sialorrhoea' or 'bruxism' or 'dysphagia' or 'speech' or 'face' or 'autonomic nervous system' or 'sweating' or 'torticollis' or 'pain' or 'migraine' or 'headache' or 'myalgia' or 'neuralgia' or 'nose' or 'rhinitis'. A total of 997 English language abstracts were reviewed and 88 relevant articles were identified. Further references were obtained through their bibliographies. Evidence levels, based on those suggested by the Oxford Centre for Evidence-Based Medicine (Table 1), are shown in the text inside [ ].

Table 1- Levels of evidence based on the Oxford Centre for Evidence-Based Medicine Level of evidence

Level of evidence	Type of study
1a	Systematic review with homogeneity <sup>a</sup> of randomized control trials
1b	Individual randomized control trial with a narrow confidence interval
1c	All or none related outcome <sup>b</sup>
2a	Systematic review with homogeneity of cohort studies
2c	Individual cohort study (including low-quality randomized control trials e.g., <80% follow-up)
3a	“Outcomes” Research; Ecological studies
3b	Individual case-control study

4	Case-series (and poor-quality cohort and case-control studies <sup>c</sup> )
5	Expert opinion without explicit critical appraisal, or based on physiology, bench research or “first principles”

a -Refers to a systematic review that is free of worrisome variations in the directions and degree of results between individual studies.

b -when all patients died before the treatment became available, but some now survive on it, or when some patients died before the treatment became available, but none now die on it.

c -a cohort study that failed to clearly define comparison groups and/or failed to measure exposures and outcomes in the same (preferably blinded), the objective way in both exposed and non-exposed individuals and, or failed to identify or appropriately control known confounders and, or failed to carry out a sufficiently long and complete follow-up of patients.

Table 2- Levels of evidence for the role of Botox in various non-cosmetic head, neck, and face conditions.

Conditions	Highest level of evidence
Laryngeal condition	
Laryngeal dystonia	1a
Stuttering or stammering	4
Vocal tics	2b
Pain	
Headache	1a
Cervical dystonia	1a
Masticatory myalgia	1b
Chronic neck pain	1a
Trigeminal neuralgia	2b
Oral conditions	
Sialorrhoea	1b
Temporomandibular joint disorders	1b
Bruxism	1b
Oromandibular dystonia	4



Facial conditions	
Blepharospasm	1b
Hemifacial spasm	1b
Facial nerve paresis	4
Nasal condition	
Rhinitis	1b
Autonomic conditions	
Frey's syndrome	4

## RESULT

The initial search yielded a total of 997 English language studies. After a review of the titles and abstracts, 88 studies were found relevant and are presented in this review. Evidence levels, based on those suggested by the Oxford Centre for Evidence-Based Medicine (Table 1), are shown in the text inside [ ]. The highest level of evidence about Botox treatment for each of the head, neck, and face conditions is presented in Table 2.

## DISCUSSION

### 1. Laryngeal conditions

#### a. Laryngeal Dystonia-

It is caused by a spasm of intrinsic laryngeal muscles resulting in unseemly closure or opening of the glottis. Its symptoms include hypophonia and breathy voice (abductor type) or hoarseness and strangled speech breaks (adductor type) 3. A meta-analysis of 30 randomized controlled trials involving Botox therapy in adductor spasmodic dysphonia revealed an improvement to about one standard deviation across the dependent voice-related Quality of Life (QoL) variables studied [1a].4,5 It also confirmed the beneficial effects of Botox in spasmodic dysphonia, with the greatest improvements present in those patients who were most profoundly impaired [1b].6

#### b. Essential voice tremor-

It is characterized by rhythmic activation of mainly the intrinsic laryngeal muscles. The voice is affected by breaks in pitch, diminished fluency, and arrests. Electromyography (EMG)-guided Botox injection into the thyroarytenoid muscles has shown to have a beneficial effect in an RCT (n=13) [1b], 8in a prospective crossover study (n=10) [3b] 9 and a case report [4].10

### c. Stuttering or stammering

This refers to a disorder of speech-motor control in which the flow of speech is disrupted by involuntary repetitions and prolongations of sounds, syllables, words, or phrases, with occasional involuntary silent pauses, collectively caused by poor coordination between lingual, labial, laryngeal and respiratory muscles. There is only one case series that has shown that intralaryngeal Botox injection improves fluency in speech therapy failures hence, its value in treating this disorder is questionable and requires further research [4].11 Vocal tics (Gille de la Tourette syndrome) Repetitive dyskinetic movements of the laryngeal musculature lead to the production of embarrassing speech known as vocal tics. There is one RCT showing that Botox injections into the thyroarytenoid muscles are efficacious in reducing the frequency and urge of vocal and motor tics(n=18) [2b], however, the patients did not report an overall benefit from the treatment.12Again, further research is mandated to assess the efficacy of Botox for vocal tics.

### 2. Pain

#### a. Headache

Numerous multicenter, double-blind placebo-controlled trials support the use of Botox as prophylactic therapy for migraine [1a].13-15 The technique involves injections into muscles innervated by the facial or trigeminal nerves (e.g, procerus, corrugator, frontalis, temporalis, and suboccipital), specific sites of pain distribution, or a combination of both.1 Significant reduction from baseline was observed in patients in the Botox trial arm about headache and migraine days, cumulative hours of headache, and frequency of moderate/severe headache days. A recent meta-analysis confirmed these beneficial effects of Botox but only in the treatment of chronic daily headaches and chronic migraines (>15 episodes per month) [1a]. Adverse effects, including blepharoptosis, muscle weakness, skin tightness, paresthesia, neck stiffness, and neck pain, can occur at injection sites, but these are minimal and transient.16

#### b. Cervical dystonia or spasmodic torticollis

This refers to sustained neck muscle contraction resulting in involuntary movements of the head and

neck along with significant cervical pain and abnormal cervical postures. The evidence supporting the use of Botox in the treatment of cervical dystonia consists of 2 Cochrane systematic reviews of 13 (677 participants for Botox A) and 3 (308 participants for Botox B) high-quality RCTs, respectively [1a].<sup>17, 18</sup> these meta-analyses showed that a single injection of Botox is effective and can be safely repeated if necessary. After that, there have been further RCTs confirming the efficacy and safety of Botox in the treatment of cervical dystonia in both previously treated as well as Botox-naive patients [1b].<sup>19</sup> It said that Botox reduces abnormal movements, and contractures and can also prevent secondary degenerative changes of the cervical spine and associated radiculopathy.<sup>1</sup>

### c. Masticatory myalgia

It is a chronic nociceptive irritation of the tendons and fascias of the masseter, temporalis, and medial pterygoid muscles.<sup>1</sup> there

Are 3 RCTs

showing Botox to be more effective than placebo (saline) in reducing masticatory myalgia [1b].<sup>20-22</sup> The most recent of these 3 RCTs also evaluated with EMG the action potentials of the masseter and temporalis muscles and showed that these decreased by nearly 80% on day 14 and by 25% on day 28 following Botox injection.<sup>21</sup> Botox causes disuse atrophy of the affected muscle, which relieves tension, improves aerobic metabolism, and enables decompression of afferent nociceptive neurons through the reduction of substance P-mediated neurogenic inflammation.<sup>22</sup>

### d. Chronic neck pain (no benefit with Botox)

Several studies have assessed the role of intramuscular Botox injections in chronic neck pain; however, no significant beneficial effect has been demonstrated.

### e. Trigeminal neuralgia

The role of Botox in the treatment of drug-refractory trigeminal neuralgia has been evaluated in three studies (n=15, n=12, n=8, respectively).<sup>23-25</sup> All 3 studies (including a low-quality RCT) found Botox to be an effective treatment with the majority of the patients reporting a reduction or even disappearance of the pain [2b].<sup>23-25</sup> Botox was found to be effective

in combination with pharmacotherapy, before considering more invasive therapies such as surgery or gamma knife radiosurgery.<sup>23</sup>

### f. First bite syndrome

This is the development of facial pain after the first bite of each meal and is seen after surgery in the parapharyngeal space, especially deep lobe parotidectomy.<sup>26</sup> It is probably due to autonomic dysfunction of salivary myoepithelial cells. Intra-parotid Botox injection was found to significantly decrease symptom severity and improve the patient's QoL in a case series of five patients and a case report [4].<sup>27,28</sup>

## Oesophageal conditions

### 1. Oesophageal speech post-laryngectomy

Tracheoesophageal puncture in laryngectomy patients allows excellent quality speech development in most cases. The procedure involves cricopharyngeal myotomy and valve placement. However, postoperative pharyngeal-oesophageal spasms can cause the failure of tracheoesophageal speech and dysphagia.<sup>29</sup> Traditionally, this was treated with dilation of the pharynx-oesophageal segment (POS), pharyngeal myotomy, and/or oropharyngeal neurectomy.<sup>30</sup> More recently, and EMG-guided Botox administration that chemically denervates the cricopharyngeal muscle facilitating tracheoesophageal speech and relieving dysphagia has been reported. There are several prospective<sup>31-34</sup> and retrospective outcomes research studies<sup>35</sup> assessing the efficacy of Botox using both subjective (videotaped recordings) and objective (video stroboscope) outcome measures [2c]. In corroboration, the most extensive and most recent prospective study consisting of 34 laryngectomy patients showed Botox therapy to be effective in POS voice restoration, especially when combined with speech therapy [2c].<sup>34</sup>

### 2. Dysphagia

Incoordination of cricopharyngeal contractions at the initiation of swallowing can result in dysphagia, especially in the elderly population. EMG-guided Botox injections either percutaneously<sup>35</sup> or endoscopically<sup>36</sup> to the

cricopharyngeal muscle were found to be effective in the treatment of dysphagia in several prospective and retrospective outcomes research studies [2c].<sup>37-41</sup> These results are promising but further, higher-quality studies are needed before the actual value of Botox in dysphagia is determined.

### Oral conditions

#### 1. Sialorrhoea

Sialorrhoea may occur in neurological and other akinetic disorders such as Parkinson's disease and cerebral palsy. There are several RCTs where the efficacy of Botox injections to the parotid and/or submandibular glands in such patients has been demonstrated [1b].<sup>42-44</sup> The effects last 3–6 months and can be repeated. Injections can also be used for sialorrhoea caused by salivary fistulas and sialadenitis.<sup>45</sup>

#### 2. Temporomandibular joint disorders

Spasms of the lateral pterygoid muscles may cause temporomandibular joint (TMJ) disc displacement anteriorly resulting in exquisite pain and clicking. This evidence supporting the use of Botox in the treatment of such TMJ disorders includes multiple RCTs [1b].<sup>20, 22</sup> However, injection of Botox into the lateral pterygoid muscle may cause a 'fixed' smile due to diffusion into the superficial facial muscles.<sup>45</sup>

#### 3. Bruxism

This is characterized by non-functional contact of the mandibular and maxillary teeth resulting in clenching or tooth grinding due to repetitive, unconscious contraction of the masseter and temporalis muscles. There is one RCT (n=30) that has shown Botox to be efficacious in reducing myofascial pain symptoms in bruxers compared, with control patients receiving saline placebo injections with a second one currently underway [1b].<sup>46</sup>

#### 4. Oromandibular dystonia

It is a disorder characterized by involuntary, action-induced, tonic, or clonic spasms of the masticatory, lingual and pharyngeal musculature. Symptoms include dysphagia, dysarthria, bruxism and temporomandibular joint subluxation. Case series and case reports are showing favorable effects of Botox injections into

the lateral pterygoid, anterior belly of digastric, masseter, and temporalis muscles.<sup>47, 48</sup>

#### e. Palatal and stapedius myoclonus

Palatal myoclonus is characterized by involuntary palatal contractions, causing clicking tinnitus due to the action of soft palate muscles on the membranous Eustachian tube. Similarly, stapedius myoclonus can cause clicking tinnitus due to the contractions of the stapedius muscle. There are two case reports, one for each type of myoclonus where the use of Botox is beneficial in relieving the patient's symptoms [4]. For palatal myoclonus, Botox was injected in the soft palate under EMG guidance,<sup>49</sup> while for stapedius myoclonus, Botox was placed transtympanically into the middle ear on a piece of gel foam.<sup>50</sup> In the latter case, the beneficial effects of Botox lasted for four months.

### Facial conditions

#### 1. Blepharospasm

Involuntary contraction of the eyelid muscles typically occurs bilaterally and in patients over 60 years. The orbicularis oculi muscle is most commonly implicated, but upper facial muscles can also be affected. The therapeutic use of Botox in blepharospasm was first described in 1985 and it has since become the treatment of choice.<sup>1 3</sup> RCTs are demonstrating the superiority of Botox over placebo [1b].<sup>50-52</sup>

#### b. Hemifacial spasm

This is characterized by unilateral, recurrent, involuntary movements of the muscles innervated by the facial nerve. It occurs due to compression of the facial nerve near its origin by an aberrant branch of the posterior inferior cerebellar artery. The first study to assess Botox in hemifacial spasm was in 1986.<sup>53</sup> Since then, there have been several studies, including one RCT which showed Botox to be an effective and safe treatment.<sup>54</sup> This RCT

Involved 11 patients

And demonstrated the beneficial effect of Botox over the placebo [1b].

#### 1. Facial nerve paresis

Botox may be used to induce therapeutic ptosis, thereby protecting the cornea during the acute phase of facial nerve paresis. This is achieved by transcutaneous injection into Mueller's muscle and the levator palpebrae superioris. There are 2 case

series of therapeutic chemo-denervation with Botox of these muscles comprising 3 and 10 patients, respectively.<sup>55,56</sup> Both showed that Botox administration is beneficial in preventing damage as well as healing of the cornea [4]. There is also one case series of 30 patients showing Botox to reduce synkinesis in aberrant facial nerve regeneration following facial nerve paresis.<sup>57</sup> In that study, Botox was injected into several synkinetic muscles of patients with facial nerve paresis and all 30 patients experienced improvement after treatment [4].

#### Nasal conditions

##### 1. Rhinitis

In an RCT of 39 patients with allergic rhinitis, Botox therapy provided better symptomatic control than steroid injections into each inferior turbinate, both in terms of the duration and degree of symptoms [1b].<sup>58</sup> In another RCT of 20 patients with idiopathic (vasomotor) rhinitis, topical application of Botox on a sponge significantly reduced rhinorrhea compared with placebo (saline) but nasal congestion remained unchanged.<sup>59</sup> Middle and inferior turbinate injections of Botox were shown to be a highly effective, safe, and simple intervention in an RCT of 30 patients with vasomotor rhinitis [1b].<sup>60</sup> Hence, the role of Botox seems promising in

The treatment of

Allergic and idiopathic rhinitis though several limiting factors prevent its widespread use.

#### Autonomic conditions

##### 1. Frey's syndrome

This typically occurs after parotid surgery and is caused by aberrant regeneration of postganglionic parasympathetic fibers innervating sympathetic cholinergic sweat glands. The result is sweating, flushing, and piloerection while eating (gustatory sweating). Several case series have demonstrated the efficacy of Botox in Frey's syndrome [4].<sup>61-63</sup> The procedure involves injecting the areas of gustatory sweating identified by an iodine starch test. Further research is needed to assess the efficacy of Botox as a treatment for Frey's syndrome.

#### CONCLUSION

This literature highlighted the therapeutic role of Botox in a wide range of non-cosmetic conditions about Otorhinolaryngology and Head & Neck

Surgery. With ongoing research, the spectrum of clinical applications and the number of people receiving Botox will no doubt increase. Botox appears to justify its title as 'the poison that heals.'

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# MANAGEMENT OF TOBACCO DEPENDENCE IN A CLINICAL PRACTICE - A REVIEW

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## Abstract:

Tobacco use is a major preventable cause of premature death and disease in India and over 1 million people die due to tobacco use in India. Oral health professionals play an important role in encouraging tobacco-free- lifestyles. Oral health professionals should counsel their patients not to use tobacco in any form. They should also emphasize the anti-tobacco message and refer the patients to smoking cessation services. Dentists are responsible to motivate and educate patients concerning the hazards of tobacco to their oral and systemic health. The different approaches like 5A's and 5 R's and pharmacotherapy are various strategies for tobacco cessation. Tobacco cessation is necessary to decrease morbidity and mortality related to tobacco use. This paper focuses on the management of tobacco dependence in clinical practice.

It can be concluded that patient who decides to quit can benefit from their doctors' support. Physicians should be taught about tobacco dependency and how to treat it as part of their medical education, residency training, and continuing medical education.

**Keywords:** TOBACCO DEPENDANCE, PHARMACOTHERAPY, NICOTINE

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## INTRODUCTION

Portuguese introduced tobacco to India 400 years ago. Since then, Indians have used tobacco in various forms. About 33% of all women and 65% of all men use tobacco in some form<sup>1</sup>.

Christopher Columbus introduced tobacco to the world in 1492. Later the followers of Columbus, the Portuguese and the Spanish sailors carried it to all the parts of the world in the late century.

At first Europeans heralded it as a medical marvel. Later tobacco smoking was recognized as a health hazard. King James I of England issued the first

official condemnation of tobacco, "A counterblast to tobacco" in 1604, in which he warned his subjects that the "habit of smoking tobacco is disgusting to sight, repulsive to smell, dangerous to brain and noxious to the lung"<sup>1</sup>

Tobacco use is a major preventable cause of premature death and disease.<sup>2</sup> there are two basic types of tobacco: Smoked and unsmoked. Smoked tobacco is available in various forms like cigarettes, pipes, cigars, clove cigarettes, and bidis. Bidis are small, brown, hand-rolled cigarettes imported primarily from India and other Southeast Asian countries. In Asian countries they used a temburni



leaf to wrap tobacco. The temburni leaf has low combustibility due to which bidis must be puffed constantly to remain lit. Consequently, bidi smokers inhale more deeply and more frequently, increasing the delivery of tar and other toxins.<sup>3</sup>

Unsmoked tobacco also known as spit tobacco and by the industry coined term “smokeless” tobacco includes chewing tobacco and moist oral snuff. Chewing tobacco is nothing but a cut tobacco leaf. It is marketed as either loose-leaf, plug, or twist. It is chewed and then held in place in the mouth. Moist oral snuff is a finely ground tobacco leaf also known as “dip”. It is available as either loose or packaged in sachets and is placed in the labial or buccal vestibule without chewing for about thirty minutes. Nicotine present in tobacco products gets absorbed through the oral mucosa.<sup>3</sup>

When a person stops using tobacco the nicotine level in the brain drops. This decreased level of nicotine in the brain triggers processes that contribute to the cycle of cravings and urges that helps in maintaining addiction. Prolonged nicotine exposure in the brain causes nicotine dependence and attempts to stop cause withdrawal symptoms that are relieved with renewed tobacco use.

Management of tobacco dependence is nothing but management of tobacco addiction or nicotine addiction. Tobacco dependence involves physical and pathological factors that make it difficult to stop using tobacco, even if the person wants to quit. Nicotine releases a chemical called dopamine in the brain as other addictive drugs.<sup>4,5</sup> Release of dopamine causes mood-altering changes that make the person temporarily feel good. Chewing or smoking tobacco delivers nicotine to the brain within 20 seconds, which makes it very addictive-comparable to opioids, alcohol, and cocaine. This “rush” is a principle part of the addiction.

## DISCUSSION

Identifying tobacco users is the initial step in the management of tobacco dependence. One-third of tobacco users see a dentist. Tobacco users also see physician assistants, nurses, nurse practitioners, respiratory, counselors, physical and occupational therapists. Virtually all clinicians are in a position to intervene with patients who use tobacco. About 70%

of tobacco users want to quit. For such cases, physician’s advice to quit could be an important motivator to stop smoking. Effective identification of tobacco use status not only opens the door for successful intervention but also it guides clinicians to identify appropriate interventions based on patient’s tobacco use status and willingness.

The 5A’s approach is a model that presents the five major steps in providing a brief intervention in the primary care setting. Following are the steps

1. Ask the patient if he or she uses tobacco
2. Advise him or her to quit.
3. Assess willingness to make a quit attempt.
4. Assist those who are willing to make a quit attempt.
5. Arrange for follow-up contact to prevent relapse.

These strategies required 3 minutes or less of direct clinician time.<sup>6</sup>

### Diagnostic evaluation

The Fagerstrom Test for Nicotine Dependence

Please answer the following questions and add up the total score as indicated

1. How soon after waking up you smoke your first cigarette?

1	Within 5 minutes	3 points
2	6 to 30 minutes	2 points
3	31 to 60 minutes	1 point
4	After 60 minutes	0 points

2. Do you find it difficult to refrain from smoking in places where it is forbidden, e.g., in church, library, and in the cinema etc.?

1	Yes	1 point
2	No	0 points

3. Which cigarette would you hate most to give up?

1	The first one in the morning	1 point
2	All others	0 points

## 4. How many cigarettes do you smoke per day?

1	31 or more	3 points
2	21-30	2 points
3	11-20	1 point
4	10 or less	0 points

## 5. Do you smoke more frequently during the first hours after waking than during the rest of the day?

1	Yes	1 point
2	No	0 points

## 6. Do you smoke if you are so ill that you are in bed most of the day?

1	Yes	1 point
2	No	0 point

Modified from: Heatherton et al., 1991; Characterization of the degree of dependence, according to (12): 0-2 very low; 3-4 low; 5 medium; 6-7 high; 8-10 very high.

Maximum possible score is 10 points.<sup>7,8</sup>

## Various management for tobacco dependence

### Psychotherapy

Motivation is one of the important factors to quit smoking. A person addicted to smoking should try to quit smoking. If the person is not able to quit smoking on their own in such cases, they should go for extensive methods such as psychotherapy. Psychotherapy is derived from behavioral therapy, smoking cessation programs are based on the premise that psychological dependency arises from operant and classical conditioning, and that cognitive processes, personal values, and the functionality of tobacco consumption play an important role in maintaining smoking behavior. Such programs combine psychoeducation and motivational techniques with behavioral-therapeutic elements. Other important factors are the addition of external social aids, techniques to prevent the continuation of smoking, and ways of dealing with short-term relapse.<sup>8</sup>

### 1) Individual behavioral counseling

This type of counseling involves scheduled face-to-face appointments with a trained smoking

cessation counselor. In addition to other behavior change techniques, motivation therapy is also included in this individual behavior counseling which is designed to improve a person's impetus to change their behavior. This type of behavior counseling is patient-centered with motivation for change. It also helps the patient to observe positive behavior change through self-examination. The session of psychotherapy is usually conducted weekly after the quit of tobacco use for 4 weeks and these sessions are combined with pharmacotherapy. Longer and multiple sessions seem to be more effective.

### 2) Telephone counseling

Telephone counseling also known as quitlines encourages and support the people who want to quit smoking or who have recently quit. Increased number of calls for counseling by an individual to the quitline increases the chances of a person quitting smoking in comparison with less intensive interventions such as pharmacotherapy, self-help material, and brief advice alone. More than three calls showed better results compare to 1 or 2 calls. People who have 1 or more additional phone calls after an initial contact increases their chance of quitting by 25% to 50%. This is a better way of access for people who have busy schedule and limited financial resources. Telephone smoking cessation counseling is effective in clinical trials of the service, it has subsequently been integrated into routine health care.<sup>9</sup>

The "Five R's" counseling algorithm

1. Demonstrate the Relevance of the problem
2. Name the Risks of smoking
3. Explain the Rewards of cessation
4. Discuss the Roadblocks to cessation
5. Repeat all of the above at each session<sup>7</sup>

### Pharmacotherapies for treating tobacco dependence

To avoid withdrawal symptoms after cessation of smoking nicotine replacement therapy (NRT) is common uses as it provides some blood concentration of nicotine. This reduction in withdrawal symptoms allows the client to focus on the psychological and behavioral changes necessary for successful tobacco cessation. High blood nicotine

concentrations are achieved more rapidly when nicotine is delivered by a cigarette compared to the available NRT products. Compared to tobacco products, nicotine replacement products deliver nicotine more slowly and at lower levels (30-75 percent of those achieved by smoking) and are less likely to be associated with dependence.<sup>10</sup> Nicotine replacement therapy provides nicotine to address physical dependence without exposure to toxic combustion products.<sup>11</sup>

### 1) Nicotine patch-

A graded approach to initial nicotine patch dosing. The nicotine patch dose should be same or slightly more than the total number of cigarettes a person smokes per day. This therapy should be given as per the patient's need and based on withdrawal symptoms. If patient continue to smoke during the first 2 weeks of patch therapy, the treatment plan must be altered. The nicotine patch dose should be increased for patients who experience substantial withdrawal symptoms, such as irritability, anxiety, frustration, loss of concentration, craving, or frequent use of short-acting nicotine-replacement products. There could be patients who did not get the success with the nicotine patch due to an inadequate dose of NRT. In such cases we have to assure the patient that symptoms could be because of inadequate doses of nicotine through the patch and that it is not an adverse effect of nicotine-replacement products. The primary adverse effect of too much nicotine is nausea. Patients should receive four weeks of treatment with an initial patch dose; after that, the dose can be "stepped down by 7 to 14 mg every two weeks. Patients are asked to contact us if they feel uncomfortable about stepping down the dose; in such cases, the current dose is maintained and no further stepping down occurs for 1 or 2 weeks.<sup>12</sup>

### 2) Nicotine Gum-

Nicotine gum is available in both 2 mg and 4 mg doses. Nicotine gum is used as monotherapy rarely, usually recommending either the 2 mg or 4 mg gum in combination with nicotine patch therapy.

Patients should be instructed on how to use nicotine gum properly. Patient should chew the nicotine gum until they feel a mild tingling or peppery taste which indicate nicotine release and then hold the gum in the vestibule for several

minutes before resuming chewing. Repeated cycles of chewing and taking the break will allow gradual nicotine absorption and this cycle should be continued for approximately 30 minutes for every gum.<sup>12</sup>

### 3) Nicotine Lozenge-

Nicotine lozenge delivers nicotine through the oral mucosa and provides active self-dosing in response to craving. Compared to nicotine gum, the nicotine lozenge is easier to use. Patients whose first cigarette is within 30 minutes of waking, the 4 mg is indicated, and smokers whose first cigarette is more than 30 minutes after waking, the 2 mg strength is suggested. Nicotine lozenge should be placed between the cheek and gum.<sup>12</sup>

### 4) Nicotine Nasal Spray-

The nicotine nasal spray delivers nicotine more quickly than any of the nicotine replacement delivery systems which help to reduce nicotine withdrawal symptoms. Single dose is one spray in each nostril and each spray contains 0.5 mg of nicotine (total of 1 mg). A clinician should guide the patient to use this spray as 1 spray of nicotine in each nostril can deliver nicotine in a similar amount as 1 cigarette. The clinician should instruct the patient to spray it against the lower nasal mucosa and not to sniff it up into the upper nasal passages. Most patients will use 12 to 16 doses per day if the spray is used as monotherapy.<sup>12</sup>

### 5) Nicotine Inhaler-

The nicotine inhaler is available only on prescription. The nicotine inhaler delivers the nicotine in oral mucosa where it gets absorbed. The 20-minute period needs a total of 80 puffs from an inhaler to obtain 2 mg of nicotine. The inhaler resembles to cigarette rod so we use it with patients for whom the behavioral and tactile aspects of smoking act as trigger. Frequent adverse effects are mouth or throat irritation and occasional coughing.<sup>12</sup>

### 6) Bupropion SR-

Bupropion SR is a monocyclic antidepressant. It inhibits the reuptake of dopamine and norepinephrine. It also has a direct competitive inhibitory effect on the nicotine acetylcholine receptor. Patients begin taking Bupropion SR 1 week before their quit smoking date, at an initial dose of 150 mg/d for three days followed by 150 mg twice

daily for approximately 6 to 2 weeks, although it can safely be used longer. Bupropion SR can be stopped directly without tapering the dose. Bupropion SR can be used in combination with NRT and with varenicline.<sup>12</sup>

### 7) Varenicline-

Varenicline is a partial nicotine agonist of the  $\alpha 4\beta 2$  subtype of the nicotinic acetylcholine receptor. Partial agonist activity relieves nicotine withdrawal symptoms and craving, while the antagonist activity blocks the reinforcement effects of continued cigarette smoking. Dose through first week of treatment with varenicline is 0.5 mg once daily for 3 days and then twice daily for four days, dosage is then ramped up to 1 mg twice daily for one week.<sup>12</sup>

### CONCLUSION

Nicotine sustains tobacco addiction by acting on nicotinic cholinergic receptors in the brain to trigger the release of dopamine and other neurotransmitters is a major cause of disability and premature death. Addiction occurs when tobacco consumers begin to rely upon tobacco to modulate mood and relieve withdrawal symptoms or arousal. Tobacco dependence is an addictive disorder characterized by vulnerability to relapse and requiring ongoing rather than just acute care. The development of other drugs that act on nicotinic receptors and other mediators of nicotine addiction is likely to further enhance the effectiveness of smoking-cessation pharmacotherapy.

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