The last decade has witnessed the most rapid advances in the field of oral and maxillofacial radiology. With the advent and acceptance of CBCT (3D) imaging in various fields of dentistry, the dentists today are taking more accurate and informed decisions regarding complicated patients and their treatment planning. However, today’s patients demand more and more comfort and less intraoperative time; even if it comes at a higher treatment cost. With ever increasing patient affordability as well as expectations, the least should be left to dental surgeon’s imaginations.

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Contents

EDITORIAL

FROM THE EDITOR'S DESK .......................................................................................................................................................63
DARSHANA SHAH

REVIEW ARTICLES

1) FAILURE OF PERIODONTAL THERAPY ..........................................................................................................................64
   SWATI SINGH*, SHILPI SHAH**, TEJAL SHETH***, MIHIR SHAH****

2) FACTS & FICTIONS ABOUT LOCAL ANAESTHETIC FAILURES – A LITERATURE REVIEW & SUGGESTED
   PROTOCOL TO COUNTERACT .......................................................................................................................................69
   CHETAN D. ZAWAR *, HARSHAL P. BAFNA **, NARENDRA B. SUPE ***, MOHIT SURVADE ****

ORIGINAL ARTICLE

3) ASSESSMENT OF AWARENESS & KNOWLEDGE ABOUT TOBACCO INDUCED ILL EFFECTS IN CLASS 3 AND 4
   WORKERS AT A LOCAL DENTAL HOSPITAL IN AHMEDABAD: A KAP STUDY .............................................................75
   KOMAL THAKkar*, PINAL PATEL**, SHAURYA GANDHI***, ARCHITA KIKANI****, MIHIR SHAH*****,
   HARSH SHAH******

CASE REPORT

4) MANAGEMENT OF C-SHAPED CANALS: 3 CASE REPORTS .......................................................................................79
   KINHA THAKkar*, DISHA MEHTA**, RUPAL VAI DYA***, SHRADDHA CHOKSHI****

5) RADIX ENTOMOLARIS: A CASE SERIES .......................................................................................................................86
   SHETUR SHAH*, PRIYAL SHAH**, RUPAL VAI DYA***, ZARNA SANGHVI ****

6) SEGMENTAL MECHANICS: EXTRUDING CANINE .........................................................................................................93
   RUCHA SHAH*, SONALI MAHADEVIA**, AATMAN JOSHIPURA***, NEHA ASSUDANI****

7) RADICULAR CYST MIMICKING UNICYSTIC AMELOBLASTOMA ...............................................................................96
   ABHISHEK BAROT*, DEVARSHI BHAVSAR**, VAISHALI DHADHAL***, EKTA SHAH****

8) ORTHODONTIC MANAGEMENT OF A MISSING MAXILLARY CENTRAL INCISOR WITH DILACERATED ROOT: A
   CASE REPORT ...............................................................................................................................................................100
   TULSI MAHADEVIA*, SONAL MAHADEVIA**, AATMAN JOSHIPURA***, ARTH PATEL ****

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Vivekanand Society, Bhadaj-Ranchhod Pura Road, Santej, Post: Rancharda, Ta: Kalol, Dist: Gandhinagar, Gujarat, India.
Dear friends,

Dentistry has witnessed tremendous advances in all its branches over the past three decades. With these advances, the need for more precise diagnostic tools, specially imaging methods, have become mandatory. Changing from Analogue to Digital Radiography has not only made the process simpler and faster but also made image storage, manipulation (brightness/contrast, image cropping, etc.) and retrieval easier. However, there are certain limitations of two-dimensional Radiography, which can be overcome by three-dimensional imaging techniques such as Cone Beam Computed Tomography, Magnetic Resonance Imaging etc. Cone Beam Computed Tomography uses a narrow fan-shaped X-ray beam and multiple exposures around an object with a high spatial resolution to reveal its internal structures especially bones and teeth, which helps the clinician to view morphologic features and pathology in three-dimensions. Magnetic Resonance Imaging is fast outpacing any other modality for in vivo viewing of soft tissues. The main dental applications of MRI is the investigation of soft-tissue lesions in salivary glands, TMJ and tumour staging etc. Recent advances in imaging technologies have revolutionized dental diagnostics and treatment planning. Correct use of appropriate imaging technology and their correct interpretation helps in detecting the pathologies in early stage and planning better treatment which in turn gives better future to the patient.
ABSTRACT

Periodontal treatment failures seem to arise relatively frequently, possibly because, among other reasons, the periodontist works in a field characterized by the presence of plaque, and the marginal periodontium remains more or less exposed to microorganisms—depending on the intensity and quality of oral hygiene — even after successful primary care. Studies have shown that modern periodontal therapies are effective in maintaining a healthy natural dentition as well as controlling periodontal disease. Numerous treatment strategies and various techniques have been designed & described to treat periodontal disease. Most of these procedures had drawbacks which were identified, leading to the modifications of the original techniques which lead to better treatment options, but still very less emphasis has been laid on failures. Without a regular program of clinical re-evaluation, plaque control, oral hygiene instructions, and reassessment of biomechanical factors the benefits of treatment are often lost and inflammatory disease in the form of recurrent periodontitis may result. So, this review describes the most common failures noticed in periodontal therapies and also discusses the possible solutions to reduce the incidence of failures in periodontal therapy.

KEYWORDS: Periodontal therapy, risk factors, failures.

Received: 02-07-2016; Review Completed: 13-08-2016; Accepted: 24-11-2016

INTRODUCTION:

Since then, numerous treatment strategies and various techniques have been designed & described to treat periodontal diseases. All these therapies ranging from scaling & root planing (SRP) to various flap surgeries have their own advantages & limitations. These procedures had failures which were identified leading to the modifications of the various techniques which lead to better treatment options, but very less emphasis has been laid on failures. So, this review describes most common failures noticed in various periodontal therapies and also discusses the possible solutions to reduce the incidence of failures in periodontal therapies. To discuss treatment failures, the concept of successful periodontal therapy must be defined first. In the past, treatment was only considered successful when there was radical elimination of pockets; today the concept of successful treatment has been defined more modestly with clinical parameters like absence of bleeding on probing, reduction in probing pocket depth, gain in clinical attachment level (CAL) and/or reduction in tooth mobility. After completion of comprehensive periodontal therapy, persistence of residual periodontal pockets, presence of bleeding and/or pus on probing, increase in loss of attachment or persistence of tooth mobility would be criterias to categorize a periodontal case as failure.

The causes for failure are manifold. In addition to the fact that periodontal therapy always takes place in regions exposed to plaque formation, failures may be ascribed to the following factors:

- Pre Therapeutic
- Therapeutic
- Post Therapeutic

PRE THERAPEUTIC

Improper Clinical diagnosis: The seriousness of the disease must be established exactly through the diagnostic procedures, not only for entire dentition, but also for each tooth individually and for each side of a tooth. Only the most careful probing of each tooth side, analysis of radiographs, and determination of tooth mobility will reveal the severity of the disease, which requires a correspondingly extensive treatment.

Morphology and restorative phase: Occasionally small resorptive regions (lacunae) are present on the root surface. These may be up to 80 μm deep and cannot be reached by curettes or other instruments, whether used in closed or open debridement procedures. Microorganisms that promote recurrences remain in these niches. Occasionally teeth have fused roots that often run together in a deep groove. Such grooves act as a "guide plane" for bacteria. They are largely inaccessible to curettes. It
The matter becomes even more complicated in the molar region. Cleaning the roots when open furcations exist is particularly difficult. The variety in macro morphology of these teeth is shown in. As a rule, furcations must be treated with open debridement procedures despite treatment, these sites remain as minor sites of resistance that can lead to failure. Only hemisection and apicoectomy of such teeth may lead to success.

**THERAPEUTIC**

Non-Surgical: Primary objective of SRP is to restore gingival health by completely removing elements that provoke inflammation (i.e. plaque, calculus, & necrotic cementum and endotoxin embedded on the root surface). Failures associated with SRP include:

1) Persistence of inflammation because of residual embedded calculus which in turn can be due to a wide variety of reasons, such as, inadequate accessibility & visibility seen in deep pockets & in complex anatomical areas of the tooth like the furcation areas, grooves & concavities present on the root surface. 2) Condition of the instruments: dull instruments frequently cause burnishing of the calculus instead of removing it in totality. So, regular sharpening of instruments is advised as it will improve both patient comfort/acceptance and operator performance. 3) Faulty techniques of instrumentation: decreased angulation (<45° to the long axis of the root surface) can lead to burnishing of the calculus & prevent it from being removed in total. Increased angulation (>90° to the long axis of the root surface) can lead to laceration and trauma to the gingival tissues. Abscess formation can also be noticed in situations wherein residual calculus is embedded in the tissues. Mechanical therapy which follows the principles of periodontal instrumentation will result in reduction in failures in periodontal therapy.

Oral irrigation is defined as targeted delivery of water or irrigant to a specific location (periodontal pocket) within the mouth. These clean the non-adherent bacteria and debris from the oral cavity. Failures associated with these procedures are due to i) Persistence of inflammation as the irrigant solution cannot be penetrated into deeper pockets. ii) The drug present in the irrigant gets thrown out of the gingival sulcus/periodontal pocket by the constantly oozing crevicular fluid (which is known as “wash-out effect”). iii) So, apart from the fact that, irrigation cannot be employed as a solo
therapy, it is weakly effective even as adjunctive therapy.  

**Surgical**: Failures of periodontal flap surgery can be due to i) Improper incision: the rationale of any periodontal flap surgery is to gain access to underlying root and bone surfaces. If incisions are not made up to the bone/root surface a mucosal flap is elevated which, hinders in gaining proper access to the underlying root surfaces. It can also cause increased amount of bone resorption. Therefore while giving incision the blade should hit the bone in order to elevate a full thickness flap. ii) Reflection of the flap: elevation of the periodontal flap should be such that only around 1 mm of marginal bone is exposed. Over reflection will result in bone resorption, whereas under reflection will result in limited access to the underlying root/bone surface. iii) Debridement of the root surfaces and the bone: complete debridement with removal of plaque and calculus from the root surface is essential for success of any periodontal flap surgery. iv) Suturing of the separated flaps should be done to closely adapt the flap to the tooth margins. Failure to properly place the sutures will lead to gaping of the wound and hence recurrence of the disease.

• **Endo – Perio**: Multirooted teeth offer unique & challenging problems for the periodontist. The furcation area, because of the interrelationships between the size & shape of the teeth, the roots & their alveolar housing, & the varied nature & pattern of periodontal destruction, creates situations in which routine periodontal procedures are somewhat limited & special procedures are generally required. Failures associated with furcation involved teeth are usually due to inability to maintain the furcal area free of plaque either by the patient or by the lack of access to the clinician.

• **Ortho – Perio**: Frenectomy procedures may fail due to i) Reattachment of the frenum as a result of improper incision design, & failure to sever the underlying periosteal attachment, therefore care should be taken to design the incision and to completely remove the muscle fibre attachment and ii) If sutures are not placed properly gaping of the wound may occur leading to hindrance in healing. In the changing era of perio surgeries one innovative remedy has ended the inconvenience of suturing and has allowed the clinician to meet growing expectations and demands of today’s dental patient, and the remedy is fibrin glue.

Swati Singh et. al. : Failure Of Periodontal Therapy
Prostho – Perio: Failures associated with this procedure are primarily due to i) Inflammation of the gingiva due to violation of the biological width (defined as the combined physiologic dimension of the junctional epithelium & the supracrestal connective tissue attachment which is approximately 2mm. So, the minimum distance between the bone crest & the gingival margin should be 3 mm or more to prevent impingement of the restoration on to the biologic width. ii) In cases of surgical crown lengthening, excessive removal of the bone can lead to down gradation of the prognosis of the tooth. Hence, optimum bone removal should be planned to maintain the biologic width as well as bone support of the tooth.

Soft tissue surgery: It is most widely used and predictable technique for increasing the width of the attached gingiva. Common failures associated with soft tissue autografts are:

- Mismatch between graft size and defect: if the denuded root defect is small enough, the collateral circulation will be adequate to support bridging. On the other hand, when prominent roots, with relatively wide areas of root exposure are grafted, two – point collateral circulation is insufficient for the graft support. As a result, the center of the graft thins and becomes necrotic; the graft splits and ultimately fails.

- Improper graft adaptation to the underlying periosteum. After suturing, slight pressure is applied to the soft tissue graft with gauze moistened in saline for 5 minutes to permit fibrin clot formation and prevent bleeding. Bleeding will result in hematoma under the graft with subsequent necrosis.

- To permit adequate transfusion of the graft, it has been recommended that all fat and glandular tissue be removed prior to suturing to prevent possible necrosis and/or inadequate take. Even though the need for this has been questioned, it is still generally accepted procedure.

- Graft movement as a result of inadequate or insufficient suturing will surely result in failure because no plasmatic diffusion will occur.

- The final failure is often seen only after the graft has healed. The clinical appearance is acceptable, but the graft is totally movable when probed. This is a failure of technique and results from not removing all loose connective tissue and muscle fibres from the periosteal bed prior to the placement and not making sure that the bed is firmly attached to the underlying bone.

POST THERAPEUTIC

Unsupervised healing and absence of maintenance therapy: Many failures arising soon after completion of treatment can be traced to the absence of supervision of the healing process. Maintenance therapy or supportive periodontal therapy is decisive for long term success and prevents recurrence of the disease. Without regular recall examinations of the patients which are tailored according to the needs of the individual case, recurrence of periodontal disease will occur over a period of time. The frequency of recall is based on variety of factors such as primary diagnosis, presence of systemic conditions (e.g. diabetes), presence of risk factors (e.g. smoking), success of primary treatment following a period of supervised healing and the extent to which, the patients can be motivated to cooperate. Depending on the needs of the individual case, recall visits can be between 2 months to one year.

CONCLUSION

Therapeutic failure appears to be more frequent in periodontology than in other fields of dentistry.
Such failure may be caused by errors in patient selection, incomplete diagnostic procedures, diagnostic or prognostic errors, treatment difficulties and obstacles, non-controlled healing, or the absence of maintenance therapy. Most failures can be avoided by instituting a regular recall system.

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ABSTRACT

The goal of today's modern dental practice is a painless procedure, however local anaesthetic failure is an unavoidable aspect of dental practice. A number of factors contribute to this, which may be related to either the patient or the operator. Patient-dependent factors may be anatomical, pathological, or psychological. This paper emphasizes on the failure of inferior alveolar nerve block and modalities to overcome the failure.

KEYWORDS: Inferior alveolar nerve block, causes of failure, effect of operator's experience

INTRODUCTION:

The inferior alveolar nerve (IANB) block is the most frequently used technique for mandibular treatment. Difficulty experienced in obtaining satisfactory anaesthesia after (IANB), remains a common clinical problem resulting in highest percentile failure. Following are different factors contribute to anaesthetic failure.

1. Operator dependent factors
   A) Choice of solution
   B) Choice of technique

2. Patient dependent factors
   A) Anatomical
   B) Pathological
   C) Psychological

1. Operator dependent factors
   A) Choice of solution
      a) Type of anaesthetic agent
      Lidocaine is the most frequently studied local anaesthetic, but with the increasing choice of newly developed anaesthetics, there is much to be learned about which anaesthetic is the most effective. For dental use, lidocaine is always combined with a vasoconstrictor; however, Mepivacaine, a more recent, anaesthetic agent, does not require the addition of a vasoconstrictor when used in dental anaesthesia. Cohen et al. showed that 3% Mepivacaine is as effective as 2% lidocaine (1:100,000 epinephrine) for IANB in healthy lower molars. Anaesthetic success occurred in 43% to 63% of the molars. No statistically significant differences in onset, success, or failure were found among the solutions. The effectiveness of the latest local anaesthetic agent, articain-hydrochloride, is poorly documented. Despite the increasing choice of newly developed anaesthetic agents, the failure rate seems to be unchanged.

b) Concentration of anaesthetic agent
   One of the earliest clinical investigations designed to establish the minimum effective concentration for dental use was performed with lidocaine. Swedish workers electrically stimulated healthy maxillary incisors, selected as free from caries or restorations, before and after the infiltration of various concentrations of lidocaine solutions. In this way, they identified that 2% solution is necessary to induce anaesthesia with almost complete success. They suggested that their results are applicable to infiltration injections. Vreeland et al. showed no significant difference in failure rate when lidocaine is doubled in concentration (2%-4%). This study does not support a higher concentration of lidocaine for achieving analgesia.

c) Concentration of vasoconstrictor in anaesthetic solution
   The degree of anaesthesia obtained with different concentrations of vasoconstrictors in anaesthetic solutions has been tested in several studies. Fink showed no significant difference in the degree of anaesthesia. There are many circumstances in which Mepivacaine was compared with 2% lidocaine (1:100,000 epinephrine) for IANB in healthy lower molars. Anaesthetic success occurred in 43% to 63% of the molars. No statistically significant differences in onset, success, or failure were found among the solutions. The effectiveness of the latest local anaesthetic agent, articain-hydrochloride, is poorly documented. Despite the increasing choice of newly developed anaesthetic agents, the failure rate seems to be unchanged.

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to epinephrine dose. He used an infraorbital nerve block model in rats and an epinephrine concentration varying from 1:50 000 to 1:400 000. In humans, Knoll-Kohier & Fortsch 11, reported success of anaesthesia proportional to the epinephrine concentration in a concentration range of 1:100 000 to 1:200 000. On the other hand, the results of this study failed to show a dose-dependent effect of epinephrine on anaesthesia when lidocaine with 1:50000 and 1:100 000 epinephrine are evaluated. Similarly, Handler & Albers 12 could not demonstrate a relationship between the concentrations of the vasoconstrictor in a 2% lidocaine solution and reliability of anaesthesia. It is suggested that solutions of 2% lidocaine with different doses of epinephrine (1:50 000; 1:80 000; 1:100 000) can be considered equivalent in IANB of 50 min duration 13.

d) Volume of anaesthetic solution
Franz & Perry 14 observed that small myelinated axons of cat saphenus nerve are blocked more quickly than large myelinated axons. They indicated that differential rates of blocking among myelinated axons by local anaesthetics (procaine) are attributable to differences in the critical length of axons that must be exposed to blocking concentration rather than to differences in minimal concentrations necessary to block axons of different sizes. To induce blockade of a whole nerve it is necessary to apply the anaesthetic agent along a distance of no less than three intermodal lengths of the largest fibres. The longest intermodal spans in the human inferior dental nerve have been found to be 1.8 mm 15. Thus, not less than 6 mm of nerve would need to be exposed to local anaesthetic

B) Choice of technique
The most likely defect in technique is faulty needle placement. Failure to aspirate before injection, which could lead to intravascular deposition of solution might also lead to failure of anaesthesia although this has never been proven. Success may be related to the speed at which the solution is deposited. It is easy to imagine the anaesthetic being directed away from a nerve trunk during forceful injection. There is evidence in the surgical literature that the success of some techniques is increased with slower injection speeds. 16 As far as conventional methods of local anaesthesia are concerned poor technique usually relates to mandibular anaesthesia, specifically failed inferior alveolar nerve block injections. The success rate for inferior alveolar block injections with lignocaine and adrenaline is more than 90%. 17,18 Practitioners who regularly fail with this method should reassess their technique. The best way to achieve success with the inferior alveolar nerve block is to use the direct technique where the dentist places the thumb intra-orally at the deepest concavity of the anterior ascending ramus and the index finger at the same height extra-orally on the posterior aspect of the ramus. The puncture point is half-way between the mid-point of the thumb nail and the pterygomandibular raphe and the needle is advanced through this point being delivered parallel to the occlusal plane from the premolar teeth of the opposite side. The properbony end point is reached between 15 and 25 mm of penetration. The common causes of failure are touching bone too soon on the anterior ascending ramus (rectified by swinging the syringe across the mandibular teeth on the same side, advancing 1 cm and then returning to the original angle of approach) or injecting inferior to the mandibular foramen (countered by injecting at a higher level).

In most cases the dentist who experiences the odd failure rectifies the problem with a repeat injection, perhaps at a slightly higher level. An orthopantomogram may help in locating the position of the mandibular foramen. In those cases where a second injection has not overcome the failure, an alternative approach to the inferior alveolar nerve should be considered.
2. Patient dependent factors

A) Anatomical

a) Accessory Innervations
Judging from clinical and anatomical studies, the mylohyoid nerve is the accessory nerve most often cited as a cause for failure with mandibular anesthesia. Clark et al compared the inferior alveolar nerve block alone to a combination injection of the inferior alveolar nerve block plus the mylohyoid nerve block, which was aided by the use of a peripheral nerve stimulator. The investigators found that the mylohyoid injection did not significantly enhance pulpal anesthesia of the inferior alveolar nerve block. Therefore, the result of the study does not lend much credibility to the notion that the mylohyoid nerve is a major factor in failure with the inferior alveolar nerve block.

b) Cross Innervation
Cross innervation from the contralateral inferior alveolar nerve has been implicated in failure to achieve anesthesia in anterior teeth after an inferior alveolar injection. Experimentally, cross innervation occurs in incisors, but plays a very small role in failure with the inferior alveolar nerve block.

c) Individual variations in the position of nerves and foramina
The foramina of importance in regional block anesthesia in dentistry do not have a consistent location between patients. Many of the methods described above to surmount poor technique will overcome any problems resulting from anatomical variations. Available radiographs may be helpful in

<table>
<thead>
<tr>
<th>TOOTH</th>
<th>MAIN SUPPLY</th>
<th>ACCESSORY SUPPLY</th>
<th>ACCESSORY SUPPLY COUNTERED BY</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAXILLARY</td>
<td>SUPERIOR ALVEOLAR NERVE</td>
<td>GRETER PALATINE</td>
<td>PALATAL BLOCK</td>
</tr>
<tr>
<td>MANDIBULAR</td>
<td>INFERIOR ALVEOLAR NERVE</td>
<td>LONG BUCCAL NERVE</td>
<td>LONG BUCCAL BLOCK</td>
</tr>
<tr>
<td></td>
<td></td>
<td>LINGUAL NERVE</td>
<td>LINGUAL NERVE BLOCK</td>
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<td></td>
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<td>MYLOHYOID NERVE</td>
<td>HIGH BLOCK</td>
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<td>AURICULO TEMPORAL NERVE</td>
<td>HIGH BLOCK</td>
</tr>
<tr>
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<td></td>
<td>UPPAR CERVICAL NERVES</td>
<td>BUCCAL AND LINGUAL INFILTRATION</td>
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anticipating this situation.

d) **Morphological variations of mandible**

Depending upon the shape of mandibular parabola position of the mandibular foramina varies significantly. If the mandible is V in shape as in vertical growers the foramina is posteriorly placed thus, sulcus mandibularis which is target area for inferior alveolar nerve block is located posteriorly so the direction and depth of needle insertion should be modified; direction of insertion should be changed to more posteriorly i.e. rather than inserting needle from opposite side premolar we have to insert it from opposite side molar and more depth than normal.

If mandible is 'U' shape as in horizontal growers the position of sulcus mandibularis is more anteriorly placed so direction of insertion should be changed to more anteriorly i.e. rather than inserting needle from opposite side premolar we have to insert it from opposite side canine-premolar region to a lesser depth than normal.

**B) Pathological**

a) **Inflammation**

It is apparent to all practitioners that area with inflammation can be difficult to anaesthetise. A number of suggestions have been proposed to explain this finding. The classic explanation for this is that the low tissue pH in areas of inflammation affects the activity of the local anaesthetic solution by decreasing the concentration of the un-ionised (lipophilic) fraction which diffuses through nerve sheaths. Similarly areas of inflammation have an increased blood supply due to vasodilatation and this might increase anaesthetic 'wash-out'. However, these answers do not explain the failure of regional block techniques where the solution may be deposited 4 or 5 cm from the area of inflammation. The most plausible explanation is that inflammation makes nerves hyperalgesic. Minimal stimulation results in conduction. However, no tooth is resistant to local anaesthesia. The practitioner therefore has to decide on the maximum volume of local anaesthetic he is willing to inject for that patient and be prepared to use up to that maximum to anaesthetise that tooth. This may mean limiting treatment to only one tooth but if it takes the maximum safe dose — so be it. On no account should the predetermined safe maximum dose be exceeded. In healthy patients there is usually sufficient room for manoeuvre to administer a dose sufficient to halt conduction in the tooth without producing generalised central nervous system effects. The use of higher concentrations of local anaesthetic solutions (such as 5% lignocaine), although effective, is not a viable option in practice. The answer is to inject more solution. This does not have to be at the same site, eg the combination of infiltration and regional block anaesthesia can be used in the maxilla (eg infiltration at the apex of an upper lateral incisor plus an infraorbital nerve block). This can be supplemented with intraligimentary or introsseous injections if required.

Anomalous anatomical variants and anatomical relations constitute the principal cause of inferior alveolar nerve anaesthesia failure. A double or bifid inferior alveolar nerve represents a possible cause of failure in inferior alveolar nerve block. In 0.4% of cases the inferior alveolar nerve presents two or even three trajectories through accessory foramina containing small sensory nerve fibres. Some patients, particularly those of advanced age, present an increased bone density in the mandibular teeth, thus leading to deficient anaesthesia when using periapical infiltration techniques. The mylohyoid nerve may possess a sensory component, thereby providing accessory innervation and causing inferior alveolar nerve block failure. Contra lateral innervation of the anterior teeth can cause anesthetic failure in upper jaw and mandible. Inflammation is also a cause of anesthetic failure, particularly in situations of pulpitis or apical periodontitis. Anxious patients pose a challenge for dental treatment. Anxiety and fear can cause a patient to refer pain once anesthesia has been achieved. Early identification of this problem, a meticulous technique, and sedation can help in such situations. This problem can be resolved by discussing with the patient his or her fear of injections. The orientation of the needle bevel (away or toward the mandibular ramus) for an inferior alveolar nerve block did not affect anesthetic success or failure.

b) **Factors precluding access**

Factors which can preclude access include trismus (because of a number of causes) and anatomical changes because of trauma or surgery. Trismus is
the most likely factor in practice and this is often because of an infective cause. Buccal infiltrations in the maxilla are still possible with the mouth closed. A way to anaesthetise the palatal tissues in the patient with trismus is to inject while advancing a needle toward the palate through the mesial and distal gingival papillae from the buccal side.

C) Psychological
There are undoubtedly patients who do not do well with local anaesthesia but in whom the local anaesthetic appears to have been effective. This may be because of fear and apprehension. In such patients the use of sedative techniques can be helpful as successful anaesthesia is easier to achieve in the relaxed patient. Benzodiazepines offer the added bonus of reducing local anaesthetic toxicity which is useful when multiple injections are being administered.

Conclusions:
Failed local anaesthesia is a feature of dental practice. Most practitioners will experience it less often than they achieve success. The answers offered above, based on an understanding of the reasons for failure, should help overcome most cases encountered in practice.

SUMMARY

<table>
<thead>
<tr>
<th>CAUSE FOR FAILURE</th>
<th>METHOED TO COUNTER</th>
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<tbody>
<tr>
<td>Operator dependent</td>
<td></td>
</tr>
<tr>
<td>Choice of solution</td>
<td>As per surgical prerequisite</td>
</tr>
<tr>
<td>Choice of technique</td>
<td>As per surgeons dexterity</td>
</tr>
<tr>
<td>Patient dependent</td>
<td></td>
</tr>
<tr>
<td>Anatomical</td>
<td>Comprehensive knowledge of applied surgical neuroanatomy</td>
</tr>
<tr>
<td>Pathological</td>
<td>Counteract pH changes</td>
</tr>
<tr>
<td>Psychological</td>
<td>Stress reduction protocol</td>
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09. Vreeland DL, Reader A, Beck M, Meyers W, Weaver J. Anevaluation of volumes and


ABSTRACT

BACKGROUND: With less knowledge & concern about the oral health & periodontium the workers tend to feel stress free with their addictive habits.

MATERIAL METHOD: The study was undertaken to know the knowledge, attitude & practice over the awareness of tobacco consumption & its adverse effect on Oral Cavity. Total 80 workers were selected for survey who were working in hospital environment. A survey was done with a self-administered structured questionnaire which had questions on to knowledge & Attitude of workers for tobacco & its effect on periodontium.

RESULTS: All subjects completed the questionnaire in whole. The results showed that the majority of the sample included smokeless tobacco using subjects out of which most of them were ready to quit but were unaware of ill effects, this variation in the result can be attributed to the low educational level of our study population.

CONCLUSION: The present study indicated that the subjects were not well aware of the knowledge about the tobacco and its ill effects and were in favor of quitting habit which needed to be improved.

KEYWORDS: oral health, tobacco, consumption, awareness, smokeless tobacco

INTRODUCTION:

Globally the tobacco consumption has increased. We live in a country where it shares about 40% of the population consuming tobacco. According to NFHS-III, In India, we have about 55.8% male, 10.8% female in the age group of 12 to 60 years have been found to be consuming tobacco. Among males, 32.7% smokers while 36.5% tobacco chewers are reported, while among females; it is reported to be 1.4 and 8.4%, respectively. In the developing nation like India the consumption of tobacco is prevalent. In state like Gujarat chewing tobacco is widely prevalent, unfortunately, not much data is available pertaining to prevalence and quitting patterns for chewing form of tobacco in western part of India. Awareness towards hazardous health effects of tobacco has increased with time but its role alone towards attainment of tobacco cessation is questionable.

Basically, these Pan masala is a mixture of nuts, seeds, herbs and spices, which is served after meals in India while in state like Gujarat, where the study is carried out, it is customary to add tobacco in pan masala and hence it is a common form of tobacco chewing. Another form, Gutka, is a preparation of crushed betel nut, tobacco, catechu, lime and sweet or savory flavorings.

As per India's Cigarette and Other Tobacco Product Act 2003 (COTPA), selling tobacco to minors or selling of tobacco by minors (under the age of 18) is legally forbidden and violation of the same is a punishable offence. Same rule applies to selling of tobacco containing items within 100 yards radius of any educational premise. From 31st May, 2009, as per the amendment in COTPA 2003, the pictorial as well as text warning covering at least 40% of the total area of advertisement is mandatory in India.

Inspite of which there is a wide range of use of tobacco in different countries. The smoking form of tobacco, has been used in several forms, like hukka (water pipe), chilam (clay pipe), cigarettes, rolled tobacco in the form of bidees, Chchuta (reverse smoking), etc., whereas the nonsmoking or chewable tobacco is in the form of snuff/naswar (roasted and finely powdered for inhalation), mawa, qiwam, gutkha, kheni (mixture of dry raw tobacco with lime), zarda, betel quid with tobacco, paan-masala, etc.. In Indonesia, tobacco is mixed with clove and dipped in the oral cavity. Despite increasing public awareness of risks associated with tobacco use and education programs to discourage its use, cigarettes and alcohol are both considered as significant risk factors for a multitude of health consequences from the long-term use of either of these two.
There is a direct or an indirect influence of culture on tobacco use as some individuals having an inherited factor later become nicotine dependent. Boys see their grandfathers or fathers consuming tobacco, so they think tobacco consumption is seen as part of being a man and a sign of his male authority. In any society, at large, it is not considered good for women to smoke any form of tobacco but its seems to be fine for men. The man is the boss and his such action seems to be a symbol of that authority, and if a woman undertakes such habits, it is seen as a threat to the man and his manhood. Also, if a woman smokes or consume tobacco, she is assumed to be indecent both morally and sexually.

Smoking and paan chewing can be part of a social event, confirming hospitality and binding friendships. Hookah, chilam (clay pipe with tobacco), and shisha are used in a social setting specifically in the rural culture. To attract youngsters, now a day some restaurants have started providing shisha clubs. Havana cigar is smoked in celebrations and is recognized as a status symbol. Seen the trends in India & observing the lower society of people highly affected by the same. The following survey was carried out to assess the knowledge & awareness amongst the class IV/III workers at local dental hospital at Ahmedabad.

METHODS

The objective of the study was to check to access the aptitude, knowledge and practice amongst the Class III & IV worker of local dental hospital in Ahmedabad which were selected through convenient sampling procedure. Number of subjects selected were 80subjects who were scaled over a self-administered questionnaire which contained 20 questions. There were 5 questions about knowledge and 15 questions about aptitude which were accessed. The name of the participant, age, and sex were noted. Experts from Department of Periodontology and Department of Preventive and Oral medicine, Ahmedabad Dental College, Ahmedabad checked for face and content validity of the surveying instrument (questionnaire). Based on the content validity ratio, the items in the questionnaire were modified or deleted. Pilot testing was done on 10 subjects selected through random sampling. Pilot study was conducted to check the adaptability of the questionnaire amongst the study group in respect to wording, clarity and comprehension. The pilot also helped to interpret the meaning of every question included in the questionnaire in an appropriate manner and the participant perception about it. The questions were objective questions or had multiple choices and participants had to select from the options. The study was undertaken after approval from ethical committee of Ahmedabad Dental College and Hospital. The answered questionnaire was converted to binary data and the data was analyzed using SPSS (21). Number and percentage distribution of the participants' responses were calculated.

RESULTS

The study was done in a local dental hospital for assessing the knowledge, Attitude & practice of tobacco consumption & ill effects on oral cavity amongst the class III and Class IV workers. The participants for study were selected irrespective of them undertaking the habit or not, Study also included quitters too. Local dental hospital workers were selected at it was observe that they were the most prone workers affected by the habit of tobacco chewing but being in the dental hospital environment they are partly aware of the ill effects.

About 95% of participants were exposed to chewing either in past or in present. 6 % had quit tobacco chewing habit from which 42% were male and 68 % female in the past one year.

About 34% of the participants knew the ill effect of their addiction on periodontium

About 97% were willing to quit but were unaware of the treatment modality while 24% had quit once but failed. Approximately 79 % of quitters and 19% of current-chewers who showed willingness to quit had not consumed tobacco for more than five years. Among those who were not willing to quit tobacco, 81% had chewed tobacco for more than five years.

About 69% of current-tobacco-chewers had a family member consuming tobacco in any form, while 54% of quitters had a history of any family member consuming tobacco. Among the successful quitters, major reasons for quitting were found to be initiation of health problems, which included respiratory problems like coughing, breathlessness, short breathing and wheezing; reduced widening of
mouth, weight loss and decreased working capacity cumulatively. Vows which were self-offered or resulted from positive preaching from the local religious leaders towards quitting of tobacco played a role in 11% of cases, while the reason was familial pressure either by spouse or by other family member(s) in 55% of the cases.

Approximately 45% of quitters did not have a specific reason to quit, while among the current-tobacco-chewers, who were willing to quit, had social pressure 16% and religious vows 39% as the major reasons behind their willingness to quit.

Out of those who quit after initiation of health problems, 68% already knew about health hazards of tobacco but did not bother until any health disturbance occurred to them.

DISCUSSION

The study assesses knowledge attitude & practice of class III & IV workers in Local dental hospital regarding the ill effects of smokeless tobacco usage. The workers at the private dental hospital were included as sample size. These subjects included all workers in spite of their habit. The sample included present and past tobacco users along with subjects without habit. This sample size came from a population which were less educated and not socioeconomically stable. The data was collected by means of a close end well-structured questionnaire. The questionnaires were made in remote language which was well understood by the workers & questions were formed with simple format & they were free to approach the investigators for any query or clarifications.

Data analysis suggested that very low level of subjects had through knowledge about the ill effects of tobacco. The lower level of education significantly could be associated with tobacco habit & their level of oral hygiene maintenance. Based on the obtained results the 95% subjects seem to be fully aware of the adverse effects of tobacco on periodontium. While female subjects were well worse with ill effects as well as the quitting measures and 75% of the female subjects were ready to quit, but were not aware of quitting programs, while only 53% of the Male subjects wanted to adapt quitting habit & were well aware the programs. 47% of the male subjects were aware of the ill effects of tobacco & had clear idea about quitting programs but were unable to do so.

The current study suggested that the majority of subjects were aware of tobacco & its ill effects but knowledge was limited regarding the initial oral health problems with tobacco consumption. Several studies have been done regarding the tobacco and its ill effects on periodontium case-control studies have examined the risk of smokeless tobacco on periodontitis. Kerdvongbundit et al. 7,8 performed a case-control study of 60 smokers and 60 nonsmokers who had regular dental appointments and similar gingival health and oral hygiene. They demonstrated that smoking was significantly associated with poor periodontal health in terms of probing depth, clinical attachment level and gingival recession. In an age- and sex-matched case control study of dental patients,9,10 smokeless tobacco gave odds of 3.08 for periodontitis. The odds increased to 4.95 when the data were controlled for plaque and age. From the current study it is arguable that the awareness of the ill effect of tobacco was below average and needed to be improve. Amongst all subject evaluated a settle variation was noted in regard to knowledge and understanding of ill effects of tobacco. The study being original did not had any similar kind of it for the final comparison. The results were in accordance with our hypothesis that a KAP of the subjects towards the ill effect of smokeless tobacco was limited and this can be attributed to the community as a whole. Our hypothesis must be validated with further study with larger sample size. Moreover, the current study revolves around a single institution. Hence a cross sectional study consisting of similar sample utilizing multiple institutional participants are required for authentication of the hypothesis.

LIMITATION OF THE STUDY

Current study is limited to the local dental hospital this could be done at a broader end, with increase in sample size & with follow up rehabilitation programs which this study did not include. The study had only considered the smokeless tobacco usage as a habit in the subjects; which could have been extended to smoking and smokeless tobacco.

CONCLUSION

The results & the subsequent analysis of the data show very high prevalence of tobacco usage amongst class III & IV workers. Smokeless tobacco usage is one of the major risk factors & causal agent
of oral cancer, cardiovascular diseases, hypertension, adverse pregnancy outcomes, various premalignant and mucosal lesions. The prevalence rates of smokeless tobacco use presented in the study is alarming & calls for urgent corrective measures by the authority.

**RECOMMENDATION**

The prevalence of tobacco chewing especially gutkha, zarda, sopari, masala is alarming in class III & IV workers at this local dental hospital in Ahmedabad. This institution should bring in the legislation banning tobacco and other products in the hospital environment in accordance with the government.

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2. National Health and Family Survey III. India:
MANAGEMENT OF C-SHAPED CANALS: 3 CASE REPORTS

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ABSTRACT

Introduction: Thorough knowledge of the root canal morphology is essential for a successful endodontic therapy. Unusual root canal anatomy always presents a challenge for the clinicians. Identification of such variation is important for the success of the root canal treatment outcome. The C-shaped root canal configuration is one of the aberrant morphology of molar teeth, commonly the mandibular second molar. In this configuration, the canals are connected by slit or web. The presence of such fins, slits and web are an obstacle for the clinician to negotiate, debride and obturate because of the high incidence of anastomoses, lateral canals, and apical deltas. Inability to detect and debride C-shaped canal anatomy thoroughly can lead to endodontic failure.

Case Report: This article highlights the management of three case reports of three different types of C-shaped canal configurations using thermoplasticised gutta-percha technique.

Conclusion: Complex intricacies and diverse morphology of C shaped canals can be managed with advanced irrigation and obturation techniques.

Keywords: C-shaped canal, mandibular second molar, root canal configuration, thermoplasticised gutta-percha.

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INTRODUCTION

A thorough knowledge of the root canal anatomy and its variations is required for achieving success in root canal therapy, along with diagnosis, treatment planning and clinical expertise. One such variation of the root canal system is the C-shaped canal configuration. It is termed so because of the C-shaped cross-sectional anatomical configuration of the root and root canal. This condition was described for the first time in literature by Cooke and Cox in 1979. This canal configuration has a high prevalence in mandibular second molars (2.7%-45.5%).

C-shaped canal configuration results from the failure of the Hertwig's epithelial sheath to fuse or its inadequate development during the root embryologic stage. Failure of the Hertwig's epithelial sheath to fuse on the buccal side will result in the formation of a lingual groove, and failure to fuse on the lingual would result in a buccal groove. Failure of the sheath to fuse on both the buccal and lingual sides will result in the formation of a conical root.

The presence of thin fin, slit and web create difficulty in the canal shaping, through debride and obturation. It is uncertain whether a C-shaped orifice found on the floor of the pulp chamber may continue to the apical third of the root. Irregular areas in a C-shaped canal that may house soft-tissue remnants or infected debris may escape thorough cleaning or filling and may be a source of bleeding and severe pain. Due to the presence of canal irregularities, it is important to select the proper obturation system. Thermoplasticised obturation technique is successful enough to fill the canal irregularities so, it is mandatory to use that in such cases.

CASE REPORTS

Case 1

A 28-year old female reported to the Department of Conservative Dentistry and Endodontics, with a chief complaint of pain on eating food in lower left back tooth region. The patient was asymptomatic before 6 months. The pain was of dull and continuous type and aggravated on taking food and relieved on medication. The medical history was non-contributory. Past dental history suggested a tooth-coloured restoration done in respect to the lower left back tooth region. Extra-oral examination and intra-oral soft tissue examination revealed no detectable abnormalities. Clinically, tooth no. 37 was examined to have secondary caries and peripherally open margins of the previously done Class II GIC restoration. The patient gave a positive response to vertical percussion. The tooth was not responsive to the cold test performed with

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79
an ice-stick or the electric pulp test (EPT) performed with a vitalometer. (Digitest Pulp Vitality Tester, Parkell, U.S.A.). So, the tooth was diagnosed as a non-vital tooth. Radiographically, it was seen that the previously done restoration approached the pulp and radiolucency in the periapical region. A single fused root with a wide canal suggestive of a C-shaped canal anatomy was predicted. (Figure 1 a). Endodontic treatment was planned for tooth no. 37 and explained to the patient. After profound anesthesia and rubber dam isolation, the previous restoration was removed and a pre-endodontic composite build-up was done on the distal margin of the tooth. An access opening was then made with the help of an Endo-Z bur (Dentsply, Maillefer, Switzerland). Two separate canals were located in the pulp chamber floor (Melton et al C2 type anatomy) (Figure 1b). The canals were negotiated with 10 No. K files (Mani, Japan). Working length was determined with an apex locator (Root Zx II, J. Morita, U.S.A.) using 15 No. K files (Mani, Japan) and then confirmed with an IOPA. (Figure 1c). Cleaning & shaping was carried out using Protaper hand file system (Dentsply, Maillefer, Switzerland) and K files (Mani, Japan) along with copious irrigation of 17% EDTA (RC Prep, Prime Dental Products, India) and 5.25% Sodium Hypochlorite (Vishal Dentcare, India), which was activated with Endo activator (Dentsply Maillefer, Switzerland). Canals were prepared up to ProTaper file F2. Calcium hydroxide (RC Cal Prime Dental Products, India) was placed as an intracanal medicament in both the canals and temporary restoration (Kalzinol) was placed. After 1 week, the temporary restoration and the intracanal medicament was removed and the size of the master cones was checked with radiographs taken at various angulations to confirm the apical fit of the master cones (Figure 1d). Obturation was done using vertical compaction technique with a thermoplasticised gutta-percha system. (Calamus, Dentsply Maillefer, Switzerland). Canals were seen joining in the apical third in the post obturation radiograph. Post endodontic composite restoration was carried out then (Figure 1e).

Case 2

Figure 1 a: Pre-operative radiograph
1 b: Access cavity.
1 c: Working length radiograph
A 31-year old female patient reported to the Department of Conservative Dentistry and Endodontics with a chief complaint of pain in lower right back tooth region. The pain was sharp, shooting, continuous in nature, which got aggravated on eating hot and cold food. The medical history was non-contributory. Past dental history revealed silver filling in the lower right back tooth region. Extra-oral examination and intra-oral soft tissue examination revealed no detectable abnormalities. Intraoral hard-tissue examination showed extensive defective silver amalgam restoration with proximal caries on the distal side along with a distal pocket with the impingement of 48. There was a slight tenderness to vertical percussion in tooth no 47. Cold test with the help of an ice stick revealed prolonged sensitivity even after removal of stimulus. Heat test with the help of hot burnisher revealed sharp pain on application of stimulus. Electric pulp testing revealed early response, however that was due to presence of extensive metallic restoration giving false positive result. Radiographically, a defective restoration was seen with disto-proximal caries. The mesial inclination of the partially impacted 48 suggested of traumatic resorption on the distal side of 47. There was an evident PDL widening in tooth no. 47 and radiolucency in the periapical area. The IOPA radiograph also showed a single conical root and predictive presence of a C-shaped canal. (Figure 2a, b). Local anaesthesia was administered and proper isolation was maintained with rubber dam. The old defective restoration was removed along with the caries on the distal side with the help of a large round bur no.6 (S. S. White, U. S.A.). The access cavity was then made with the help of an Endo-Z bur and Melton et al C3 type canal anatomy was found on the pulpal floor. The canals were negotiated with 10 No. K files. Working length determination using 15 No. K file was done with the help of an apex locator and different angulation radiographs (Figure 2c). The canals were shaped with ProTaper rotary files (Dentsply Maillefer, Switzerland) and cleaned with copious irrigation of 5.25% Sodium hypochlorite & 17% EDTA. The circumferential filing was carried out with hand K files (Figure 1b). 5.25% sodium hypochlorite was activated with Endo activator for thorough cleaning. The sizes of the master cones were checked (Figure 2 d) by again taking radiographs from different angulations. Obturation was completed with vertical compaction technique using thermoplasticised gutta-percha system (Figure 2e, f).
Case 3

A 36-year-old male patient reported to our Department of Conservative Dentistry and Endodontics with a chief complaint of pain of his lower left back tooth region. The pain was localized, intermittent, dull and aching in nature, which increased in intensity over a period of time. The pain was relieved by medications. The medical history was non-contributory. Intra oral examination revealed tooth no. 37 having deep dental caries. The tooth showed slight pain on vertical percussion. Cold test with the help of an ice stick revealed prolonged sensitivity on application of the stimulus.
Heat test with the help of hot ball burnisher revealed sharp pain on application of stimulus. Electric pulp vitality test revealed delayed response in comparison to the contralateral and adjacent teeth. The tooth was diagnosed of chronic irreversible pulpitis with symptomatic apical periodontitis. Radiographically, the tooth showed deep dental caries involving enamel, dentin and pulp. The tooth was conical in shape with fused mesial and distal root, suggestive of a C-shaped canal (Figure 3a). Endodontic treatment was planned for tooth no. 37 and explained to the patient. The access cavity was made under local anesthesia (LA) and a single semicircle shape orifice (Figure 3b), indicating Melton et al C1 configuration was found. The canal was negotiated with 15 No. K file. Working length was determined with 20 No. K file using an apex locator and confirmed with a radiograph (Figure 3c). The cleaning and shaping of the canal was carried out with hand K files and ProTaper rotary files up to F3. Copious amount of 5.25% sodium hypochlorite & 17% EDTA was used for irrigation along with Endo Activator for the activation of the irrigant solution. The obturation was performed with thermoplasticised gutta-percha using vertical compaction technique after checking the final master cone fit through various angulation radiographs. (Figure 3c, d). Post-endodontic restoration with composite was done (Figure 3 e).
DISCUSSION

The reason for C-shaped morphology is the failure of the Hertwig's epithelial root sheath to fuse on the lingual or buccal root surface. The C-shaped root may also be formed by coalescence in course of deposition of the cementum with time. The prevalence of C-shaped configuration is highest in mandibular second molar and the bilateral occurrence was over 70%. According to Fan et al. indicated that a majority of teeth with C-shaped canal system showed an orifice with an uninterrupted "C" configuration. The teeth that qualified as having a C-shaped canal system had to exhibit all the following three features: Fused roots, a longitudinal groove on the lingual or buccal surfaces of the root, and at least one cross-section of the canal belongs to the C1, C2, or C3 configuration.

Preoperative radiographs show close fused roots or images of two distinct roots. Additional 20° mesial or the distal angulation is useful to deduct this configuration. Clinically, when a C-shaped canal orifice is observed under the operating microscope, one cannot assume that such a shape continues throughout its length.

Deep orifice preparation (isthmus) should not be done with files larger than no. 25; otherwise, strip perforation is likely. Also, Gates-Glidden or rotary orifice openers should not be used to prepare the orifices and isthmus areas. An increased volume of irrigant and deeper penetration with small instruments using sonics or ultrasonics may allow for better cleansibility in fan-shaped areas of the C-shaped canal.

Obturation of 'C' shaped canal requires technique modification. The usually used cold lateral compaction is ineffective in filling the canals as well as the isthmus or the fan shaped regions. Hence thermoplasticized gutta percha obturation seems to be capable of filling multiple foramina, other irregular configurations of the root canal system and ensures better homogeneity.

CONCLUSION

It is evident that, for endodontic treatment of teeth with C-shaped canal systems to be successful, there must be modification of procedures at all stages of the treatment, and new resources must be used. The magnification provided by the Dental Operating Microscope is a great aid in the interpretation of the anatomy of the floor of the pulp chamber, and thus facilitating effective access to the canal system. Ultrasonic instrumentation and devices for thermoplasticisation of gutta-percha assist greatly with debridement and obturation respectively. This case report shows management of three different C-shaped canal anatomies performed successfully with the help of these advanced aids.
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RADIX ENTOMOLARIS: A CASE SERIES

ABSTRACT

Introduction: Mandibular molars may have an additional root located lingually (radix entomolaris) or buccally (radix paramolaris), which, if not diagnosed, can lead to failure of endodontic treatment. The prevalence of this anatomic variation is 4.5-11.5% in Indian populations. Awareness and understanding of the presence of unusual external and internal root canal morphology contributes to the successful outcome of the root canal treatment.

Objective and case reports: The purpose of this study was to report 2 clinical cases of endodontic treatment in mandibular molars with extra roots. Also mentioned are the modifications in the canal preparation, problems encountered during the treatment, common iatrogenic errors which occur during the treatment and factors which affect the prognosis.

Conclusion: A better understanding of the root canal morphology is essential for endodontic treatment success, as well as the use of technologic advancements including computed tomography, ultrasonic tips and the operating microscope.

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INTRODUCTION:

The main objectives of root canal treatment are thorough debridement and complete three dimensional obturation with inert material and a fluid-tight apical seal and coronal seal. An awareness and understanding of the presence of unusual root canal morphology can thus contribute to the successful outcome of root canal treatment.

The majority of first molars are two-rooted with two mesial and one distal canal. In most cases the mesial root has two root canals, ending in two distinct apical foramina. Or, sometimes, these merge together at the root tip to end in one foramen. The distal root typically has one kidney-shaped root canal, although if the orifice is particularly narrow and round, a second distal canal may be present. A number of anatomical variations have been described in the mandibular first molar: Fabracampo and Bond reported the presence of three mesial canals and Stroner noted the presence of three distal canals.

Like the number of root canals, the number of roots may also vary. An additional third root, first mentioned in the literature by Carabelli, is called the radix entomolaris (RE). This supernumerary root is located disto-lingually in mandibular molars, mainly first molars (Fig. 1A, B). An additional root at the mesiobuccal side is called the radix paramolaris (RP) (Fig. 1C, D). The identification and external morphology of these root complexes, containing a lingual or buccal supernumerary root, are described by Carlsen and Alexandersen.

Although both macrostructures are rare, knowledge of their occurrence and location are important. In this report two such cases are presented. The prevalence, external morphological variations and internal anatomy of the radix entomolaris and paramolaris are described. The clinical approach to diagnosis and endodontic treatment are also discussed and illustrated.

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Case Report 1
A 25 year old male patient reported to the Department of Conservative Dentistry and Endodontics with complaint of pain in the left lower back teeth. The patient reported a history of dull and continuous pain for the past one month, which increased in intensity on eating food and was relieved on taking medication. The extra-oral and intra-oral soft tissue examination was normal. On intra-oral hard tissue examination, the left mandibular first molar displayed deep dental carious lesion with tenderness on percussion. Thermal test was done including cold test with ice-stick, which gave a lingering response and heat test with hot burnisher, which elicited immediate sharp pain. Electrical pulp testing of the tooth elicited a delayed response. The pre-operative radiograph showed an extensive carious lesion involving the pulp and an additional root between the mesial and distal roots. CBCT was advised to confirm that the additional root was located distolingual to the mesial root. The CBCT scan slices confirmed the presence of bilateral radix entomolaris. A diagnosis of chronic symptomatic irreversible pulpitis with chronic symptomatic apical periodontitis was made and endodontic treatment was planned after eliciting a non-contributory medical history.

In the next visit, left mandibular first molar was anesthetized using 2 ml of 2% lidocaine containing 1:80,000 epinephrine and isolated under rubber dam. Access opening was done and two mesial orifices and two distal orifices were located using DG 16 explorer. To obtain a straight line access the preparation was modified to a more trapezoidal form, from the conventional triangular form. The root canals were explored with precurved K-file ISO number 15 (Dentsply Maillefer, Ballaigues, Switzerland). Working length was determined using apex locator (ProPex PiXi, Dentsply) and confirmed using radiographic method. All the canals, except the disto-ligual canal, were shaped up till the ProTaper F2 rotary files (Dentsply Maillefer, Ballaigues, Switzerland). Apical patency was maintained with #20 K file. Disto-ligual canal, being curved and narrow, was shaped with #25 K file, in order to avoid any procedural errors like separation of endodontic file, ledge formation or strip perforation. During instrumentation adequate irrigation was performed using 5.25% sodium hypochlorite and EDTA (Glyde, Dentsply Maillefer, Ballaigues, Switzerland). These solutions were activated by EndoActivator (Dentsply, Maillefer, Ballaigues, Switzerland). Intra-canal calcium hydroxide medication was placed and Kalzinol temporary restoration was given. The patient was recalled after 1 week.

At the next appointment, the patient was asymptomatic. So, after removing the temporary restoration and calcium hydroxide intra-canal medicament, final irrigation was done with normal saline. The canals were dried with paper points. Master cone radiograph was taken. Obturation was done using AH plus sealer (Dentsply, Maillefer, Ballaigues, Switzerland) and warm vertical technique (Calamus, Dentsply, Tulsa). Post endodontic restoration was done with composite resin after 4 days and the patient was sent for crown fabrication.
Fig 2: A- Preoperative radiograph showing extensive carious lesion and radix root; B- CBCT showing clear radix entomolaris; C- Access opening showing 4 distinct canal orifices; D- Working length radiograph; E- Master cone radiograph; F- Post-operative radiograph

Case Report 2

A 35-year-old male patient was referred for endodontic treatment of the mandibular left first molar. History revealed that an initial opening of the pulp chamber had already been performed by the referring dentist to relieve acute throbbing pain before 2 months. Clinical examination of extra-oral and intra-oral soft tissues revealed non-contributory findings. Intra-oral hard tissue examination confirmed an opened mandibular left first molar. Heat test, cold test and electric pulp test gave negative response. Radiographic examination showed a distinct distal root, thus suspecting radix entomolaris. A provisional diagnosis of pulpal necrosis was done and treatment was started after confirming a non-remarkable medical history.

Access opening was done and four distinct canal orifices were found with DG-16 explorer. Initial negotiation of the root canals was performed with a K-file ISO 15 followed by coronal enlargement with ProTaper SX canal opener file.

The lengths of these canals were measured electronically and confirmed radiographically. All
canals, except the radix were shaped upto ProTaper F2 instruments. The disto-lingual canal was shaped upto #25 K-file. The canals were cleaned with sodium hypochlorite solution (5.25%) and EDTA (Glyde, Dentsply, Maillefer, Ballaigues, Switzerland), EndoActivator was used for their activation. Intra-canal calcium hydroxide medicament was given, followed by Kalzinol temporary restoration.

In the next appointment, after 5 days, the temporary

![Image](51x487 to 561x592)

restoration and intra-canal calcium hydroxide were removed. A final rinse of normal saline was done followed by drying of canals by paper points. The master cone selection was confirmed radiographically, with 30 degrees angulation from the mesial. All canals were filled with warm vertical technique (Calamus, Dentsply) and AH26 sealer. Post endodontic restoration of silver amalgam was given. The patient was then referred for crown fabrication.

![Figure 3](51x487 to 561x592)

Fig 3: A- Access opening showing 4 distinct canal orifices; B- Working length radiograph; C- Master cone radiograph; D- Postoperative radiograph

**Discussion**

The presence of a separate RE in the first mandibular molar is associated with certain ethnic groups. In African populations a maximum frequency of 3% is found\textsuperscript{12,13}, while in Eurasian populations the frequency is less than 5%\textsuperscript{14}. In Chinese populations, reports have noted that the RE occurs with a frequency that ranges from 5% to more than 30%\textsuperscript{14-20}. Because of its high frequency in these populations, the RE is considered to be a normal morphological variant (eumorphic root morphology). In Caucasians the RE is not very common and, with a maximum frequency of 3.4 to 4.2%\textsuperscript{21,22}, is considered to be an unusual or dysmorphic root morphology. In Indians, it has been reported in 4.5-11.5% of the population\textsuperscript{23}.

The etiology behind the formation of the RE is still unclear. In dysmorphic, supernumerary roots, its formation could be related to external factors during odontogenesis, or to penetrance of an atavistic gene or polygenetic system (atavim is the reappearance of a trait after several generations of absence). In eumorphic roots, racial genetic factors influence the more profound expression of a particular gene that results in the more pronounced phenotypic manifestation\textsuperscript{19,24}. Curzon suggested that the 'three-rooted molar' trait has a high degree of genetic penetrance as its dominance was reflected in the fact that the prevalence of the trait was similar in both, pure Eskimo and Eskimo/ Caucasian mixes\textsuperscript{22}.

An RE can be found on the first, second and third mandibular molar, occurring least frequently on the second molar\textsuperscript{26}. Some studies report a bilateral occurrence of the RE from 50 to 67%\textsuperscript{27,28}. Bolk\textsuperscript{28} reported the occurrence of a buccally located additional root: the RP. This macrostructure is very rare and occurs less frequently than the RE. The prevalence of RP, as observed by Visser\textsuperscript{26}, was found to be 0% for the first mandibular molar, 0.5% for the second and 2% for the third molar. Other studies have, however, reported RP in first mandibular molars\textsuperscript{11,13}.

In general, the RE is smaller than the distobuccal and mesial roots and can be separate from, or partially fused with, the other roots. A classification by Carlsen and Alexandersen\textsuperscript{10} (Fig. 5) describes four different types of RE according to the location of the cervical part of the RE: types A, B, C and AC. Types A and B refer to a distally located cervical part of the RE with two normal and one normal distal root components, respectively. Type C refers to a mesially located cervical part, while type AC refers to a central location, between the distal and mesial root components. This classification allows for the identification of separate and nonseparate RE.
According to the classification of De Moor et al.\(^9\), based on the curvature of the separate RE variants in bucco-lingual orientation, three types can be identified. Type I refers to a straight root/root canal, while type II refers to an initially curved entrance which continues as a straight root/root canal. Type III refers to an initial curve in the coronal third of the root canal and a second curve beginning in the middle and continuing to the apical third.

The RP is located (mesio) buccally. This additional root can be separate or non-separate (Fig. 1C, D). Carlsen and Alexandersen\(^11\) (Fig. 6) describe two different types: types A and B. Type A refers to an RP in which the cervical part is located on the mesial root complex; type B refers to an RP in which the cervical part is located centrally, between the mesial and distal root complexes. An additional cusp was present on the buccal side. A similar observation has been made in other reports, i.e. an increased number of cusps is not necessarily related to an increased number of roots; however, an additional root is nearly always associated with an increased number of cusps, and with an increased number of root canals\(^11,30,31\).

The presence of an RE or an RP has clinical implications in endodontic treatment. An accurate diagnosis of these supernumerary roots can avoid complications or a 'missed canal' during root canal treatment. A superimposition of both roots can appear on the preoperative radiograph, resulting in an inaccurate diagnosis. A thorough inspection of the preoperative radiograph can indicate the presence of a 'hidden' RE. To reveal the RE, a second radiograph should be taken from a more mesial or distal angle (30 degrees). This way an accurate diagnosis can be made in the majority of cases.

Apart from a radiographical diagnosis, clinical inspection of the tooth crown and analysis of the cervical morphology of the roots by means of periodontal probing can facilitate identification of an additional root. An extra cusp (tuberculum paramolare) or more prominent occlusal distal or distolingual lobe, in combination with a cervical prominence or convexity, can indicate the presence of an additional root.

The location of the orifice of the root canal of an RE has implications on the access cavity shape. The orifice of the RE is located disto- to mesiolingually from the main canal or canals in the distal root, so, modification of the triangular access cavity to the (disto) lingual results in a more rectangular or trapezoidal outline form. Visual aids such as a dental operating microscope (DOM) or an intra-oral camera can be useful for locating this canal. A dark line on the pulp chamber floor can indicate the precise location of the RE canal orifice. The distal and lingual pulp chamber wall can be explored with an angled probe to reveal overlying dentin or pulp.
roof remnants masking the root canal entrance. The calcification, which is often situated above the orifice of the RE, has to be removed for a better view and access to the RE. An initial relocation of the orifice to the lingual is indicated to achieve straight-line access. However, to avoid perforation or stripping in the coronal third of a severe curved root, care should be taken not to remove an excessive amount of dentin on the lingual side of the cavity and orifice of the RE.

A severe root inclination or canal curvature, particularly in the apical third of the root (as in a type III RE), can cause shaping aberrations such as straightening of the root canal or a ledge, with root canal transportation and loss of working length resulting. Unexpected complications such as instrument separation do occur, and are more likely to happen in an RE with severe curvature or narrow root canals. Therefore, after relocation and enlargement of the orifice of the RE, initial root canal exploration with small files (size 10 or less) and curvature determination, and the creation of a glide path before preparation, are step-by-step actions that should be taken to avoid procedural errors.

Conclusion
Clinicians should be aware of these unusual root morphologies in the mandibular first molars in Caucasian people. The initial diagnosis of a radix entomolaris or paramolaris before root canal treatment is important to facilitate the endodontic procedure, and to avoid 'missed' canals. Preoperative periapical radiographs exposed at two different horizontal angles are required to identify these additional roots. Knowledge of the location of the additional root and its root canal orifice will result in a modified opening cavity with extension to the distolingual.

The morphological variations of the RE in terms of root inclination and root canal curvature demand a careful and adapted clinical approach to avoid or overcome procedural errors during endodontic therapy.

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A Case Report

SEGMENTAL MECHANICS: EXTRUDING CANINE

Rucha Shah*, Sonali Mahadevia**, Aatman Joshipura***, Neha Assudani****

ABSTRACT
Amongst all permanent teeth, canine has longest path of eruption. Canine tooth germ develops near the orbit, it has to travel long for the eruption in the arch. So canine is the tooth which is frequently involved in impaction or highly placed or out of the arch. The ectopic eruption and impaction of maxillary permanent canines is a frequently encountered clinical problem.

Here two case reports are presented with highly placed canine, which is treated by segmental mechanics with T-loops for extrusion and retraction of canine. It took around 6 months for alignment of canine.

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INTRODUCTION:
Canine plays an important role in esthetics. Being corner tooth of mouth and its function deserves special attention for its impaction to be properly diagnosed and managed.

According to Shafer, Hine and Levy, impacted teeth are those which are prevented from erupting by some physical barrier in the eruption path. Of all patients with maxillary impacted canines, it is estimated that 8% have bilateral impactions.

Impacted canines are settled in the arch by different ways. with the use of different loops, extrusion mechanics with traction which includes surgical opening also, sometimes.

CASE REPORTS

Case 1
22 year old male patient came with chief complain of irregularly placed upper and lower front teeth. On clinical examination it was found that highly placed canine on both the sides.

Treatment plan
Extraction of 14 24 34 was decided & getting canine in the arch with the T-loop. asymmetric extraction plan was there because of class I on one side & class II on other side.

Treatment progress
For highly placed canine segmental mechanics was used. T loop was given both the sides. After retraction and extrusion of canine full arch bonding started. T loop was made from 19*25 TMA wire & six pre activation bends were given before insertion of T-loop.

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Case 2
20 year old female patient came with the chief complain of irregularly placed upper front teeth. On clinical examination highly placed canine on right side was found.

Treatment plan
Patient came after her deciduous canine extracted. So non extraction plan was decided to get canine in the arch with T-loop.

Treatment progress
Segmental mechanics was used for highly placed canine. T loop was used for extrusion and retraction of canine. T loop was made from 19*25 TMA wire & six pre activation bends were given before insertion of T-loop.

DISCUSSION
Till date, continuous arch-wire sliding mechanic remains the most often used and most popular form of mechanics. The advantages of this approach may not apply to many complex dentally and periodontally compromised cases.

The most common alternative approach is segmented arch mechanic proposed by Charles Burstone et al. The underlying principle of hybrid segmental mechanics includes simplifying treatment by “segmenting” posterior and anterior region of the arch.

A single continuous wire is placed in brackets from second molar or first molar up to canines but bypassing the incisors. The primary reason for this segmentation is that it eliminates the early engagement and round tripping of the incisors, potentially eliminating or minimizing its adverse consequences. This allows the retraction of the canine in earlier stage of treatment. T-loop has been recognized as an effective means to achieve desired tooth movement by differential moments between the anterior and posterior segments. Relatively constant force produced in segmental mechanism while as in continuous arch, inconsistent force is produced.

In segmental technique the reactive forces are not transferred to the other teeth, minimizing side-effects. A continuous arch takes the adjacent teeth as anchor tooth causing side effects on all the adjacent teeth, which are bracketed.
- When canine is unfavourable, root tipped mesially. When canine is out of the arch or highly placed, it can be used for retraction as well as extrusion without side effects like canting of the arch. 
- Only canine is retracted rather than whole anterior segment, less stress on the anchor molars. 
- We have not to wait for the insertion of SS wire & then retract canine. In initial phase we can retract canine & sometimes anterior crowding is somewhat solved by driftodontics, so less time in leveling & aligning phase.

**CONCLUSION**

As canines are corner stones of mouth, it is important to align them properly in the arch to improve esthetics as well as for function. Sometimes it requires multidisciplinary approach. If proper diagnosis and biomechanics is used, the goal is not difficult to achieve.

**REFERENCES:**


RADICULAR CYST MIMICKING UNICYSTIC AMELOBLASTOMA

Abhishek Barot*, Devarshi Bhavsar**, Vaishali Dhadhal ***, Ekta Shah****

ABSTRACT

Radicular cysts are the most common of all jaw cysts and comprise about 52% to 68% of all the cysts affecting the human jaws. They are most commonly found at the apices of the involved teeth. Radiographically, most radicular cysts appear as round or pear shaped unilocular radiolucent lesions in the periapical region. Most of the radicular cysts are asymptomatic and are discovered when a periapical radiograph is taken of non-vital teeth. Rarely cysts can cause expansion and may displace adjacent teeth or cause mild root resorption which mimic tumor like ameloblastoma. This is a rare case of radicular cyst of mandibular anterior teeth region in a 15 year old male patient mimicking unicystic ameloblastoma.

KEYWORDS: Radicular cyst, Unicystic ameloblastoma, periapical cyst, tumors, odontogenic tumors

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INTRODUCTION:

Many benign lesions cause mandibular swellings, whose origin can be attributed to odontogenic or nonodontogenic causes. The most commonly encountered are odontogenic lesions like ameloblastomas, radicular cysts, dentigerous cysts, odontogenic keratocysts, central giant cell granulomas, fibro-osseous lesions and osteomas. Most of the time such diverse group of periapical lesions are asymptomatic and are first seen on routine radiographs of non-vital teeth.

This diversity reflects the complex development of the dental structures, since all these lesions originate through some alteration from the normal pattern of odontogenesis.

One such odontogenic lesion is radicular cyst of inflammatory origin preceded by a chronic periapical granuloma and stimulation of cell rests of Malassez found in the periodontal membrane. Most of the radicular cysts are asymptomatic and are discovered accidentally when periapical radiograph is taken of teeth with non-vital teeth. The cysts may displace adjacent teeth or cause mild root resorption. Radiographically most radicular cysts appear as round or pear shaped, unilocular radiolucent lesions in the periapical region.

However, the occurrence of noninflammatory pathosis such as developmental odontogenic cysts, lymphomas, periapical cementoosseous dysplasias, central giant cell lesions and ameloblastomas has also been described as having a well-defined periapical radiolucent lesions in the jaw. This can present the clinician with difficulties in the differential diagnosis and in determining the treatment strategies.

Ameloblastoma is one of the most common tumors of the oral cavity. One such most common odontogenic tumor of the oral cavity is ameloblastoma. It is defined as a slow-growing, persistent, and locally aggressive neoplasm of epithelial origin. Based on the behavioral pattern, anatomical location, histological features and radiographic appearance of ameloblastoma, Leon Barnes has categorized the tumor into solid (multicystic), unicystic, desmoplastic and peripheral varieties. The first three are intraosseous/central, while the peripheral variety is extraosseous.

The unicystic variety refers to those cystic lesions that show clinical, radiographic, or gross features of a cyst, but on histologic examination show a typical ameloblastomatous epithelium lining of the cyst cavity, with or without luminal and/or mural tumor growth.

A significant number of such odontogenic origin lesions like cysts and tumors similar clinical and radiographic, their diagnosis usually requires a detailed analysis of clinical, radiographical, and histopathological findings.

Here is a case report of a rare case of radicular cyst mimicking unicystic ameloblastoma.

CASE REPORT

A 15 year old male patient came to outpatient
department of Ahmedabad Dental College and Hospital (ADCH) with complaint of pain and swelling on the chin since last 1 month. The patient was asymptomatic before 1 month, then he noticed pain and swelling on the chin. Pain was dull aching, continuous in nature, which aggravated on pressing the swelling. The assessment of the previous medical history was noncontributory.

Extra oral examination revealed facial asymmetry of lower one third of face at the chin region where a swelling was present on the right side. (Figure-1) A single swelling measuring 3 x 3 cm in size was present at the chin region extending superoinferiorly from 1 cm below vermilion border of lower lip to 1 cm below lower border of mandible and medially from the chin to the right parasymphysis region, with shiny and stretched overlying skin. Swelling was tender, non-warm, non-compressible, non-fluctuant and firm in consistency. Submandibular and submental lymphnodes on the right side were palpable, mobile and non-tender.

On intra oral examination, there was obliteration of labial vestibule from 32 to 43 region. Egg shell crackling was present at the level of labial vestibule in lower anterior teeth region. Class I malocclusion with edge to edge bite present in anterior teeth and midline of mandibular anterior teeth was shifted towards left side. Tooth numbers 43, 42, 41, 31, 32, 33 were unresponsive to electric pulp vitality tester. Occlusal radiograph showed expansion of labial cortical plate in 32 to 43 region. (Figure-2) Panoramic radiograph showed well defined radiolucency at apices of mandibular anterior teeth, which was approximately 3x2 cm in size with a corticated border. It also showed tilting of mandibular anterior teeth with mesially shifted crowns and distally shifted roots. (Figure-3)

A 3DCT SCAN revealed a 28x19x16 mm sized well defined radiolucent lesion in symphysis menti region. The lesion had caused thinning and erosion of outer cortex of mandible with adjacent soft tissue thickening. There was no evidence of calcification within the radiolucency. (Figure-4)
Based on history, clinical and radiographic features, a clinicoradiological diagnosis of unicystic ameloblastoma was derived. The differential diagnosis of radicular cyst, periapical cemental dysplasia (first stage) and eosinophilic granuloma were considered.

The patient was referred to the department of oral and maxillofacial surgery where FANC was done which showed large no of RBCs with some inflammatory cells. Surgical enucleation of the lesion under general anesthesia was planned. A full thickness mucoperiosteal flap was raised and after bony access, the entire lesion was enucleated (Figure-5) and cavity was irrigated. Bony edges were filed and closure of cavity with sutures was done. The excised specimen was then submitted for histopathological examination.

Histopathological examination revealed cystic lumen lined by epithelium. Epithelium was stratified squamous exhibiting arcading pattern. Connective tissue capsule showed large no of inflammatory cells, collagen fibers and blood vessels filled with RBCs. (Figure-6) Based on these findings, a final diagnosis of radicular cyst was established. After 10 days sutures removal was done. After a month endodontic treatment was done in relation to 31, 32, 33, 41, 42 and 43.

DISCUSSION

Radicular cyst is the most common inflammatory odontogenic cyst of the jaws. The common age of presentation for radicular cyst is 3rd to 6th decade of life. Radicular cyst most commonly occurs in maxillary anterior region. Clinically patients presenting with radicular cyst are usually asymptomatic. The classic description of the radiological appearance of radicular cysts is that they are round or ovoid radiolucency surrounded by a narrow radiopaque margin. Generally size of radicular cyst is more than 1 cm.\(^{(10)}\)

The common age of presentation for unicystic ameloblastoma, it is 2nd and 3rd decade of life.\(^{(11)}\) However in my case patient's age was 15 years which is in favor of unicystic ameloblastoma. However in my case painless swelling was present in anterior mandibular region. The panoramic radiograph showed well defined radiolucency at apices of mandibular anterior teeth with a corticated border. It also showed tilting of mandibular anterior teeth with mesially shifted crowns and distally shifted roots. Occlusal radiograph showed expansion of labial cortical plate in lower anterior teeth region. These all features are in favor of our provisional diagnosis of unicystic ameloblastoma. Thus based on history, clinical and radiological features we put a provisional diagnosis as unicystic ameloblastoma. Radicular cyst was included in the differential diagnosis because of favorable sex presentation, history of trauma from occlusion and
presence of non-vital tooth. Other differential diagnosis include periapical cemental dysplasia (first stage) and eosinophilic granuloma. Histopathological examination being the gold standard for such lesions we decided to enucleate the lesion and to send the specimens for histopathological examination.

Histopathological examination revealed cystic lumen lined by epithelium. Epithelium was stratified squamous exhibiting arcading pattern. Connective tissue capsule showed large no of inflammatory cells, collagen fibers and blood vessels filled with RBCs. Based on these findings, a final diagnosis of radicular cyst was established. Thus the lesion which was histopathologically diagnosed as a radicular cyst, was initially mimicking a unicystic ameloblastoma based on history, clinical features and radiological findings.

**CONCLUSION**

Oral cavity may sometimes present with lesions which may challenge the diagnosis and acumen of the clinician. A specialized oral physician should be aware of such pathologies and work towards solving the mystery as the exact diagnosis is necessary to render proper management and complications can be minimized. The present case highlights one such diagnostic dilemma which was attempted to be solved with the available resources.

**REFERENCES:**


ORTHODONTIC MANAGEMENT OF A MISSING MAXILLARY CENTRAL INCISOR WITH DILACERATED ROOT:
A CASE REPORT

Tulsi Mahadevia*, Sonal Mahadevia**, Aatman Joshipura***, Arth Patel****

ABSTRACT

Dilaceration is a dental deformity characterized by an angulation between crown and root causing non-eruption of the tooth. It generally occurs following trauma to the deciduous dentition the apices of which lie close to the permanent tooth buds. Surgical extraction used to be the first choice in treating the severely dilacerated teeth. In this case report, it is described how a dilacerated central incisor was successfully moved into alignment in a young patient with proper surgical and orthodontic management avoiding use of prosthetic/implant devices. The panoramic radiograph after the traumatic injury is compared with the one at the end of treatment.

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INTRODUCTION:

Determining prognosis and designing a treatment plan for a dilacerated impacted tooth are often difficult tasks.

Dilaceration is defined as a distorted root form and it can occur from any distortion of the crown relative to the root1-5. This sort of lesion in a permanent tooth is caused by some trauma to the corresponding deciduous tooth (usually upper and lower incisors)5.

The severity of the lesion on a permanent tooth depends on the developmental stage of the tooth, the force of impaction and the direction the force of the trauma was applied with respect to the permanent tooth6-7. The trauma usually responsible for this type of lesion is frequent traumatic intrusion or avulsion during childhood. If the trauma occurs while the crown of the permanent tooth is forming, enamel formation will be disturbed and there will be a defect in the crown of the permanent tooth1. If the trauma occurs after the crown is complete, the crown may be displaced relative to the root. Root formation may stop, leaving a permanently shortened root. More frequently, however, root formation continues, but the remaining portion of the root then forms at an angle to the traumatically displaced crown. If distortion of root position is severe enough, it is almost impossible for the crown to assume its proper position1,8. The crown is usually dislocated forward with the palatal surface facing the vestibular site, the incisor border is turned up towards the anterior nasal bone; the root remains in its normal position.

It is often possible to save dilacerated impacted teeth with a multidisciplinary approach. The factor determining prognosis is whether the tooth is already ankylosed or if excessive or inter-mittent orthodontic forces lead to external resorption of the roots9,10. In this case report, it is described how a dilacerated upper central incisor was moved into its proper position with surgical exposure and orthodontic traction avoiding prosthetic/implants replacement.

CASE REPORT:

A patient named Govind Thakur, aged 17, (fig 1, fig 2) came to the department of orthodontics at Ahmedabad Dental College with chief complaint of missing central incisor due to trauma during childhood. The OPG and CBCT scans showed dilaceration of the root.
TREATMENT OBJECTIVES AND TREATMENT PLANNING:

Treatment alternatives for an impacted central incisor include extraction and restoration with a bridge or an implant later when growth has ceased; extraction and closure of the space by substituting the lateral incisor for the central incisor with subsequent prosthetic restoration; and surgical exposure, orthodontic space opening, and traction of the impacted central incisor into its proper position. Clinicians should consider treatment goals that minimize injuries to the dentition and the periodontium.

The following treatment objectives were established:

1. create a stable functional occlusion
2. establish adequate attached gingiva and symmetric gingival margins for both maxillary central incisors.

TREATMENT ALTERNATIVES:

1. Extraction of the impacted central incisor and future restoration with a bridge or an implant when growth had ceased.
2. Extraction of the impacted central incisor and closure of the space, bringing the lateral incisor into the place of the central incisor, and subsequent prosthetic restoration.
3. Surgical exposure, and traction of the impacted dilacerated central incisor into its proper position.

The patient chose the 3rd alternative as he was young and wanted a natural option.

TREATMENT PROGRESS:

After surgical exposure of the crown MBT PEA bracket was bonded on the visible palatal surface of the maxillary right central incisor (fig 3). Upper arch was bonded and 0.018 SS wire was used as the main arch wire force in the form of elastic traction was given in the form of a bracket of main arch wire. The right and left arches segments of the arch were consolidated. At each subsequent appointment direction of force was changed as it eased the extrusion of a tooth with dilacerated root this was done with help of lingual buttons placed mesially and distally on the palatal surface and continued elastic traction (fig 4). Once the tooth was sufficiently visible in the oral cavity the piggy-back method was used for further extrusion by bonding two beg brackets on the buccal surface of the central incisor.

Surgically Exposed incisor

Bracet bonded & elastic traction given

TREATMENT RESULTS:

Within 2 months of surgical exposure the central incisor for sufficiently extruded to place a bracket on the buccal surface. (periodontal procedure if required)

DISCUSSION:

An impacted maxillary central incisor in a child poses a disturbing esthetic dilemma because of its prominent location. However, it is important to properly inform the patient and the parents of the possibility of failure before extensive measures are undertaken to save a severely impacted tooth.

We first determined whether the impacted tooth could be successfully aligned in its proper position on the basis of its position and orientation, the amount of root formation, and the degree of root dilaceration. It is important to plan when and how the impacted tooth will be moved to its proper position, as well as the positions of adjacent teeth and the intermaxillary relationships. In this patient, there was sufficient space for the maxillary right central incisor to be moved into the arch.

Movement of an impacted central incisor could be impossible because of ankylosis and external root resorption. Furthermore, even successfully treated patients can have irregular root formation or an unesthetic gingival margin after alignment. However, these complications did not occur in this patient.

Although the closed-eruption technique usually provides the most esthetically pleasing result, we
did not use this surgical technique\textsuperscript{17,18}. The position of the impacted maxillary central incisor meant that direct removal of the oral mucosa was the only way to expose the tooth and attach the wire. This procedure, although more direct, has the disadvantage of producing a nonkeratinized vestibular gingival margin.\textsuperscript{16} This was corrected with an apically positioned flap during the traction to provide adequate width of the attached gingiva and result in a more esthetic gingival margin. Because of the relatively high prevalence of gingival defects in some studies, adjunctive post-orthodontic periodontal surgery might be required in many patients treated with this method to achieve an esthetic gingival margin contour over the central incisors and provide the teeth with an adequate zone of attached gingiva.\textsuperscript{16}

**CONCLUSION:**

Use of light and constant orthodontic forces (30–40 g); and the favourable crown–root angle allowed the crown to be aligned without excessive dislocation of the root.

This final aspect can only be evaluated with precision during treatment. This orthodontic-surgical option is a possible technique guaranteeing sustainable results after attaining functional esthetic goals.

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