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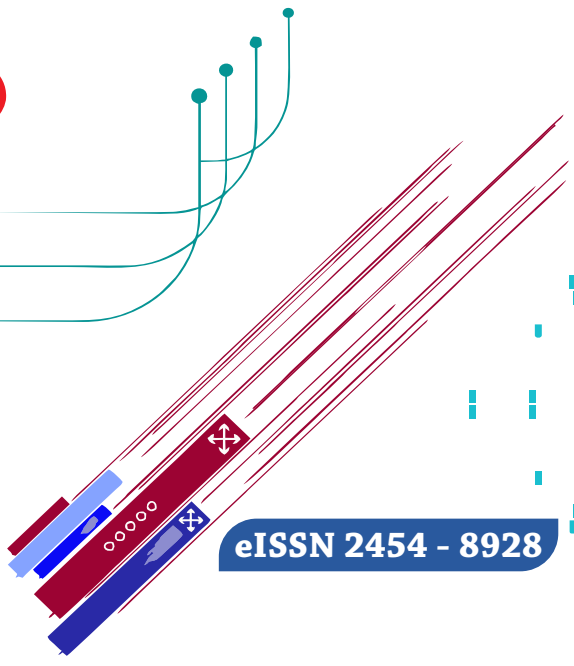

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President's Message

Dr. M.B.Aswath Narayanan
President
IDA Madras Branch

Dear Members,

In the last issue we dwelt with Urban Dentistry. When we say rural, even though the Government may have its own guidelines for the term rural, any area outside 50 kms of any large town or city immediately qualifies for this term as far as provision of Dental care is concerned.

Many undergraduates & postgraduates do not realize the huge potential that this population offers. This limited vision has been the cause of frustration for many.

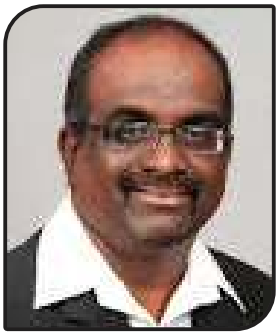
Under the National Oral Health Programme under the National Health Mission of the Government of India, Dental Surgeons are being posted in PHC's on a contract basis. Tamil Nadu has around 350 posts. They have a good outpatient number. Imagine with 29 Dental Colleges, 47 Medical Colleges with Dental Departments, 29 District Hospitals & 168 Taluk Hospitals with Dental Departments, and numerous others in Government sector (Corporation, Municipality, Railways, Defence, ESI etc.,) still demand for Oral Health care is high.

All the above except Dental Colleges provide limited care- Filling, Oral prophylaxis, Extraction of grossly decayed teeth, operculectomy / frenectomy only. (Trauma & tumour are a different league). But further management of other areas is unmet need.

I would urge the new Dental graduates to use this information to their advantage. Go forth & grow. In the next issue I shall talk about how preventive dentistry can be a rewarding experience.

Dr. M.B.Aswath Narayanan

Secretary's Message



Dr. H. Thamizhchelvan
Hon. Branch Secretary
IDA - Madras Branch

The Journal being the official publication of the organization aims at continuing the dental education and encouraging basic investing actions and clinical research and seeks to provide the dental professionals with an up to date reference for recent advancements. This is an essential approach to the future career challenges.

I am happy to say that the journal is steadily making a good progress in bringing good quality articles with the support of the editorial team and reviewers.

I, the Hon. Secretary take pleasure to congratulate and appreciate the efforts of the team under leadership of Dr. Dilip Kumar and wish good luck for such efforts to continue.

Warm regards.

Dr. H. Thamizhchelvan

Letter from the Editor

Dr. C.K. Dilip Kumar
Editor-in-Chief
IDA - Madras Branch

"Teamwork divides the task and multiplies the success" – Unknown

Warm Greetings! Welcome to the third issue of E-Midas Journal 2016.

Contributors and reviewers play an important role towards the quality of a journal. I am grateful to all the students, professors and researchers for their interest, enthusiasm and timely submission of their valuable work to our journal. Post the success of earlier issues it is now our duty as a team to publish scientific data with greater responsibility and passion. The aim of the present communication is to direct the focus of our prospective authors towards global oral health. The present issue includes articles from the importance of knowledge in handling medical emergencies, risk factors involved in impactions, blood grouping with its relevance to oral diseases to pathological reviews. As the editor of this journal, I anticipate that this issue would be of immense value to medical science especially to budding dentists. The collection will also offer new directions and perspectives to the readers.

Dr. C.K.Dilip Kumar

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Editorial

Elevating ourselves in the society…

With the mushrooming of countless dental clinics and ever increasing number of dentists, there is always a looming threat of dilution of principles and ethics in dental practice, for the sake of survival. Today, the profession is on the verge of losing its identity as an essential health care service. There has come a time when we have to "refine and define" our roles in the society through "standardization" of principles and practice of dentistry.

The concept of standardization in practice has many benefits. It not only creates a sense of security and trust amongst the public, regarding the profession but also improves the general image of a dentist and acceptance of his or her role in the society as a responsible and conscientious citizen. The next evil that the process of standardization may eliminate, is the practice of some individuals offering "discounts on services" explicitly, to solicit patients. A clinic with obviously good standards, would speak for itself and would negate the need for a noble profession such as ours, to go into a business mode.

The system of accreditation is now an accepted practice in most fields – engineering, accounting and education. However, with health care services it is reserved mainly for hospitals and institutions. The National Accreditation Board for Hospitals & Health Care Providers is one such board which is empowered to inspect, advice and certify uniform standards in the structural process and working of hospitals. But these organizations do not encompass the entirety of the practice of dental services. ISO (International Organization for Standardization) accreditation, commonly acquired by dental clinics these days, mainly focuses on management standardization and uniformity of work-flow, which may not be adequate in ensuring the ideal quality of treatment delivered to patients.

The need of the hour may be in the constitution of an independent organization which not only supervises the process of management and work-flow but also establishment of optimal infrastructure, uniformity in training of health care providers, documentation of records, enforcement of "best practices in health care" including sterilization, waste disposal etc, and finally, scrutinizing practice ethics. Another remarkable benefit of accreditation and standardization is protection of the dentist from patients who are litigation friendly. Consumer redressal forums take negligence more seriously than ignorance and, it's worth remembering that standardization of patient care helps in eliminating negligence to a great extent.

Let's aim at standardization of our practice. Elevation is inevitable !!!

Dr. Elavenil Panneerselvam
Assistant Editor,
e-MIDAS Journal

Original

Comparative Analysis of Effective Decalcification of Tooth with Varying Concentrations of Decalcifying Agents

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Abstract

Slicing of a given tissue into thin sections is mandatory for microscopic examination. Sectioning of hard tissues like teeth and bone pose great challenge due to their rigidity. Making ground sections of hard tissues is tedious and time consuming. Decalcification is the only reliable method to remove the inorganic portion of these tissues. However the process of decalcification takes a considerable period of time thereby slowing down the process of reporting hard tissue pathologies. Aim: The study aimed at analyzing the rapidity of decalcification of tooth with varying concentrations of formic acid, nitric acid and EDTA. Materials and Methods: 70 freshly extracted human teeth were divided into 10 different groups and each was treated with varying concentrations of decalcification solution until they were completely decalcified. Results and conclusion: Teeth decalcified with nitric acid solution resulted in rapid decalcification compared to other acids. Teeth treated with EDTA showed very minimal removal of inorganic content over a very long period of time. In routine practice 30% nitric acid can be effectively used for rapid decalcification of teeth in the histopathology laboratory however best staining qualities were noted among the teeth decalcified with 10% nitric acid.

Introduction

Microscopic examination is mandatory to study the morphology and pathology of the given tissue. To obtain satisfactory paraffin sections for pathological examination the hard tissues like teeth and bone should be made flexible by removing the inorganic calcium ions[1]. Decalcification is a process of removal of calcium salts from hard tissues to make them amenable for microtomy and is a prerequisite for microscopic examination of any kind of hard tissue submitted to the histopathology laboratory[2]. Decalcifying agents are the chemicals that are used for the process of decalcification. Decalcification can be carried out by various means including demineralization of the teeth using acids (acid decalcification), ion exchange method, electrolytic method and by using chelating agents. Based on the chemical makeup the acids are further classified into strong inorganic acids and weaker organic acids[3].

Selection of a decalcifying agent depends upon the rate of decalcification, its effect on tissue integrity and staining characteristics[4].

Strong acids like hydrochloric acid and nitric acid produce rapid decalcification but macerate the tissues and decreases nuclear staining when used for a longer periods. Weaker acids like formic acid are less likely to interfere with nuclear staining but much slower in decalcification[3]. EDTA –a chelating agent usually binds to calcium and magnesium ions and removes it from the apatite crystals of the tooth without damaging the organic content. However this process is very slow and might require more than 6 weeks for complete decalcification[5].

The end point of decalcification of the teeth can be assessed by taking x-rays of the teeth, by evaluating the residual calcium in the decalcifying solution and by physically testing the teeth by bending and inserting a pin through the specimen[6]. Resistance to sectioning and effective staining determines the end quality of decalcification. Our study aimed at identifying an ideal decalcifying agent that is both time saving and tissue friendly.

Materials and Methods

The study sample comprised of 70 freshly extracted permanent human maxillary premolars that were extracted for the purpose of orthodontic treatment after obtaining informed consent. Ethical clearance for the study was obtained from the institutional ethics committee. The samples were divided into 10 different groups each with 7 teeth (Fig 1) and each were treated with varying concentrations of decalcification solution. (Table 1)

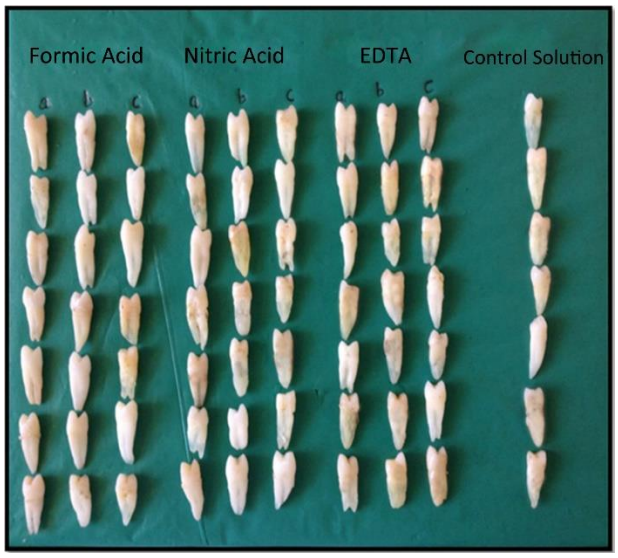

Figure 1: Photomicrograph showing the teeth samples used for the study

S. No	Group	Decalcifying Agent
1.	Group I	10% Formic acid
2.	Group II	20% Formic acid
3.	Group III	30% Formic acid
4.	Group IV	10% Nitric acid
5.	Group V	20% Nitric acid
6.	Group VI	30% Nitric acid
7.	Group VII	10% EDTA
8.	Group VIII	20% EDTA
9.	Group IX	30% EDTA
10.	Group X	Commercial decalcification solution (Osteomal)

Table 1: Depicting the various study groups and their corresponding decalcifying agents.

Decalcification Procedure

The pulp tissue of the extracted teeth were fixed by injecting 10% formalin solution through the apical foramen. A radiograph of each group of the teeth was taken using an occlusal radiograph before the decalcification procedure started.(Fig 2) Each group of teeth was placed in a separate appropriately labelled Plastic container and the concerned decalcification solution was added to each bottle until all the teeth were submerged. The teeth were allowed to decalcify for 8 hours (8.00 am to 4.00 pm). The decalcification solution was discarded at the end of the day; teeth were thoroughly washed with running tap water and were placed in formalin overnight. The teeth were removed from formalin, thoroughly washed and placed in the respective decalcification solution at 8.00am the following day. The procedure was repeated routinely every day until the teeth were completely decalcified. Every evening the teeth were evaluated for decalcification endpoint by using needling (by piercing a needle into the tooth and looking for the resistance) and bending method (by trying to bend the tooth and check its plasticity). The procedure was recorded everyday using a decalcification chart. After decalcification a radiograph was taken for a single tooth of a group using an Intra oral periapical radiograph film. (Fig 3)

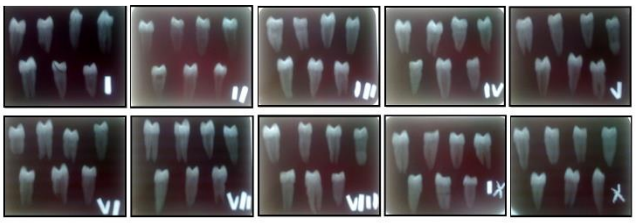

Figure 2: Photomicrograph depicting the X-ray of the teeth before decalcification.

Figure 3: Photomicrograph depicting the X-ray of the teeth after decalcification.

Upon completion of decalcification all the teeth were routinely processed manually using graded alcohol and xylene, embedded in paraffin wax and 4µm sections were taken and stained with hematoxylin and eosin. The teeth decalcified with EDTA were not processed as the decalcification was not completed within 30 days.

Results

The teeth that were decalcified with 10% formic acid (Group I) was completely decalcified in 11 days. 20% formic acid solution (Group II) took 10 days and 30% formic acid (Group III) took 9 days respectively. The teeth in Group IV solution (10% nitric acid) underwent complete decalcification in 3 days. Group V solution (20% nitric acid) took 2 days and group VI (30% nitric acid) solution took only one day for complete decalcification.

All the teeth that were decalcified using EDTA (Group VII, VIII & XI) showed very slow decalcification and did not complete decalcification after one month. The control solution which consists of commercial decalcification solution took 5 days for completing decalcification. (Fig - 4)

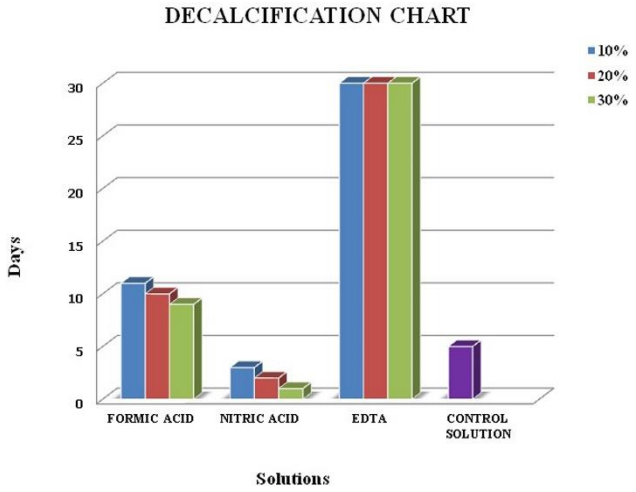

Figure 4: Bar diagram depicting the duration taken by the different decalcifying solutions for complete decalcification

Certain amount of yellowish tooth discoloration was noted among the groups which were decalcified with nitric acid solution. Teeth that were treated with formic acid, EDTA and control solution did not show any discoloration.

The staining quality of the tooth section was best in 10% nitric acid compared to other decalcifying agents.(Fig 5) The tooth decalcified with EDTA were not further processed and stained and thus the staining quality of this group was not evaluated. The staining quality of sections of teeth decalcified with osteomol (control solution) were at par with the sections of Teeth decalcified with 10% nitric acid (Fig 6).

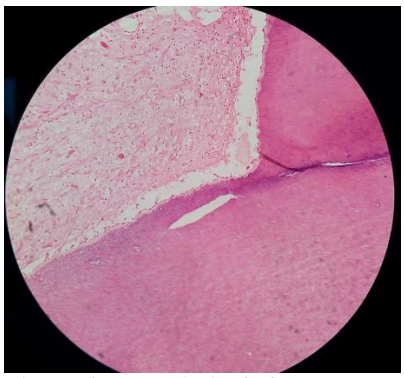

Figure 5: Photomicrograph depicting Hematoxylin and eosin section of a tooth decalcified with 10% nitric acid.

Figure 6: Photomicrograph depicting Hematoxylin and eosin section of a tooth decalcified with

Discussion

The study aimed to evaluate the efficacy and rapidity of various decalcifying agents on human premolar teeth. 30% nitric acid solution produced rapid decalcification within a day, but the staining quality of these teeth was inferior to the staining quality produced by 10% nitric acid which decalcified the teeth in 3 days. Similar study conducted by Prathiba P et al also proved that 10% formal nitric acid produced rapid decalcification in 1.7 days and preneyi's solution took 2.5 days for the same in rat teeth.10% formic acid took 11 days to complete decalcification in our study in contrary to 16.3 days in their study[7]. This observation proves that strong inorganic acids quickly remove the calcium ions but cause severe damage to the organic portions of the teeth.

The teeth decalcified with EDTA showed very minimal changes till 30 days of decalcification. Sanjay.k and Prathiba et al has also proved that EDTA is a very slow decalcifying agent. However with respect to tissue integrity, staining quality and molecular element preservation EDTA produces the best results and can be used for specific techniques like PCR, FISH and ISH[7,8]. Various studies have demonstrated that microwave assisted decalcification of teeth in EDTA solution produced better results compared to decalcification with EDTA alone[9].

Conclusion

Decalcification is a prerequisite for hard tissue studies. 10% nitric acid is an ideal decalcification agent with respect to both quality and time. EDTA is very slow decalcifying agent and it cannot be considered for urgent specimens, however it is the agent of choice for morphology preservation and molecular studies.

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Acknowledgements

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All that Glitters is Gold

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Abstract

This article aims at rekindling the lost lustre from the age old gold restoration, recreating wonderful restorations lasting over many decades in the oral cavity and rehashing the unique importance of using gold foils and EZ gold as a restorative material in general dental practice as a feasible option.

Key words: Gold foil restorations, Gold foil, Gold sheets, EZ gold, Minimal cavity preparation, Everlasting restorations, Minimal marginal leakage.

Introduction

Mayans, as early as 2500 BC were creative in handling precious metals like gold and silver. Gold has been used for thousands of years to adorn and restore teeth in royal families interspersed with other precious gems studded on the teeth. Romans are credited with the skilled usage of restoring large cavities with gold crowns and restorations.

Gold, a noble metal with unique properties of being ductile and malleable can be easily used to fill cavities. The biocompatibility of gold is another advantage as it has least interference with any other metal along with being oral cavity friendly. Various dentists' credited with the usage of gold as a restorative material and inventing instruments exclusively for the clinical works are as follows:

Dr. W.I. Ferrier – who developed a number of hand instruments, various modifications in cavity designs and operational procedures

Gregory E. Smith – who developed direct gold restorations

Dr. Gerald D. Stibbs – who developed advanced gold foil techniques

Dr. Bruce Brownfield Smith – who was the Founder and President of American Academy of Gold Foil Operators

In recent times aesthetic dentistry has gained immense importance with major focus on tooth coloured restorations. Keeping the trend of quality dental care and value for money, gold restorations still score over amalgam restorations and composite resins with major focus on the various advantages such as

- Biocompatibility
- Does not discolor the teeth
- Sterile and antibacterial restoration
- Finest margins without any micro-leakage
- Conserves and protects the dental tissues
- Has good compatibility with enamel and dentine thereby expanding and contracting with the tooth

The various indications where direct gold restorations are the first option for consideration are

- Class I direct gold restorations
- Small carious lesions in pits and fissures of posterior teeth
- Lingual surfaces of anterior teeth
- Small, cavitated Class V carious lesions
- Abraded, eroded, or abfraction areas on the facial surfaces of teeth
- Class III direct gold restorations on the proximal surfaces of anterior teeth where the lesions are small enough to be treated with esthetically pleasing results
- Class II direct gold restorations are an option for restoration of small cavitated proximal surface carious lesions in posterior teeth in which marginal ridges are not subjected to heavy occlusal forces (eg: the mesial or distal surfaces of mandibular first premolars and the mesial surface of some maxillary premolars)
- Class VI direct gold restorations especially on the incisal edges or cusp tips
- A defective margin of an otherwise acceptable cast gold restoration also may be repaired with direct gold.

The various contraindications to be considered before suggesting a direct gold restoration for the patient are

- Teeth with extensive caries and weakened walls
- Very young patients with incomplete root formation
- Periodontal membranes are too thick
- Extensive alveolar bone recession
- Non-vital teeth as they are brittle and can't handle the malleting force
- Psychological temperament of patients not conducive to malleting
- Very large pulp chambers especially in newly erupted teeth or deciduous dentition
- Severely periodontally weakened teeth with questionable prognosis
- Economics is a severely limiting factor
- Handicapped patients who are unable to sit for the long dental appointments required for this procedure.
- Root canal–filled teeth are generally not restored with direct gold because these teeth are brittle, although in some cases gold may be the material of choice to close access preparations (for root canal therapy) in cast gold restorations
- Tooth where rubber dam placement is difficult
- Patients who are unwilling to sit or spare time for relatively long appointments

Gold foil material when carefully manipulated, placed as a restoration, finished and polished can be as close to the tooth minimizing the marginal gap between the tooth and the restoration, thus preventing secondary decay, leak of body fluids into the restoration, staining of teeth and further degradation of the healthy tooth tissue. The clinical technique of gold placement requires addition training and protocol based restoration using cavity preparation guidelines, usage of rubber dam, and manipulation of gold, proper storage of the gold pellets, with proper case selection.

Conclusion

Gold restorations definitely do have an honorable place in restorative dentistry. A revival of the art of handling gold in everyday clinical setup will provide a lifelong maintenance free oral cavity for the patient and value for the money spent in having direct gold restorations. The dentist can be rest assured of an intact leak free restoration promising a stress free dentistry.

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Case Report

Impacted Third Molars - A Risk Factor in Isolated Bilateral Angle Fracture of the Mandible – A Case Report

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Abstract

The incidence of maxillofacial trauma has increased manifold in the past two decades due to increase in road traffic accidents, with higher prevalence in the younger age group. Mandible is more vulnerable to fracture in the maxillofacial skeleton due to its mobility, presence of impacted third molars and muscular attachments. It is imperative for the general dental practitioner to be mindful about, the most common maxillofacial fractures, clinical findings, elementary management techniques, principles on fracture management and the referral to a specialist for definitive management. This is a case report of a bilateral angle fracture of the mandible, with bilateral impacted mandibular molars, a rare clinical entity, treated by open reduction and internal fixation.

Introduction

Maxillofacial trauma though seldom life threatening is a serious concern in terms of facial disfigurement and loss of function for an individual. Increased number of vehicles, geographical location, culture, socioeconomic status, gender, and many other factors are attributed to the aetiology of maxillofacial trauma. The most common causes include road traffic accidents, interpersonal violence, fall, sports and occupation related injuries. (Subhashraj, 2007)

Mandible is the most commonly fractured facial bone [24-80%], next to nasal fractures, despite being the strongest and longest in the maxillofacial skeleton (Subhashraj, 2008).The dynamics influencing mandibular fractures include the site, direction, magnitude and severity of the force of impact, mouth opening, impacted M3 molars, muscle pull exerted on fracture segments and intrinsic bony characteristics (Zhou, 2016).

Mandible is a horseshoe shaped bone with potentially vulnerable areas prone for fracture following trauma. The junction of alveolar and basal bone, symphysis, lateral to parasymphysis, impacted mandibular teeth near angle region, slender neck of the mandibular condyle, all which serves as a protective mechanism preventing injury to the middle cranial fossa.

Mandibular fractures can be classified as simple or closed, compound or open, comminuted, complex, impacted, greenstick, and pathological fractures. Anatomically mandibular fractures can be classified according to the location and frequency of occurrence as fractures of the Parasymphysis (35%), Condyle (22%), Angle (12%), Dentoalveolar (11%), Symphysis (10%), Ramus (3%) and Coronoid (1%).

Clinically, the fracture mandible presents with pain, swelling, step deformity, deranged occlusion due to premature contact, facial asymmetry, paresthesia, if involving the inferior alveolar nerve, sublingual ecchymosis [Coleman's sign]. The fracture segments in turn are influenced by the muscular attachments, direction of the fracture line and teeth in line of fracture which determines the favourability of fracture reduction and fixation.

Case Report

A 19 year old female reported, with history of road traffic accident, she jerked on the floor with her chin, hit by a heavy vehicle from behind while riding a motor cycle, There was no associated head injury, loss of consciousness, lucid interval, and incidence of vomiting, ear or nasal bleed.

Clinically, bilateral edema was present at the angle region of the mandible, contusion in the chin without any skin laceration and lower facial third appeared elongated. Mouth opening was severely restricted with anterior open bite due to premature occlusal contact in the posterior region and no accompanying dentoalveolar fractures.

Thorough extra oral examination revealed a step deformity at the bilateral angle region with tenderness of the bony segment. The PA view skull revealed unfavourable fracture of both the left and right angle of the mandible and impacted tooth in line of fracture bilaterally. The patient required a definitive surgical intervention without any delay to avoid malunion of the fracture segment.

Under General anesthesia, both the fracture sites were exposed through a modified ward's incision placed distal to the second molar. The deep seated mesioangular impacted tooth (Pederson's Class I position B) was removed with minimal bone loss. A prefabricated acrylic splint was used to aid in intermaxillary fixation (IMF) and restoring occlusion. The proximal segment was manipulated using a coronoid retractor. The reduced segment was stabilized and plated using a 2mm four hole miniplate along the external oblique ridge according to champy's line of osteosynthesis. Patient followed up at regular intervals with no specific complaints.

Discussion

Mandibular angle fractures have been commonly attributed in dentate rather than edentate patients due to the presence of impacted mandibular third molars. Bone density and mass, severity, direction and point of impact influences the fracture site.

Variations in standard fractures occur due to two general reasons;
1. Firstly, due to wide range in magnitude and direction of the impact and shape of the object delivering the impact.
2. Secondly, the presence of dentition, position of the mandible and influence of associated soft tissues.

The irregularities in the anatomy due to the oblique ridges, sharp bends, foramens and regions of reduced cross sectional dimension results in greater absorption of force and increased concentration in tensile strain. Impacted third molars when present changes the concentration and stress transmission favouring angle fracture. The angle region is influenced by strong masticatory forces and the thinner cross section area tends to receive more force distribution than the neighbouring areas.

The presence of impacted third molar is known to absorb substantial amount of force creating an inherent zone of weakness thus minimizing the fracture at the condylar level. Usually when a direct blow occurs in the symphysis region, the force is distributed directly along the arch of the mandible and fracture occurs bilaterally in the area of least stability, the condylar neck and in the symphysis region due the tension from the blow. The impacted molar further interferes with the fracture reduction by decreasing the bony contact, alters the vascularity of the region and acts as a source of pathogenic organisms.

Statistically significant association have been found between the impacted third molars and angle fractures and mandibles with missing third molars are more susceptible for fracture condyle. Finite element analysis (S. Antic, 2016), biomechanical and varied literature evidences have shown that angle with impacted third molars remains as areas of weakness susceptible to fracture.

The biomechanical studies done by Meisami et al have shown that the cortical, not medullary integrity of the mandible is a major determinant in the transmission of stresses upon impact, making it susceptible to fracture. This explains the fact that superficially placed impacted third molars commonly, causes break in the cortical integrity than deep seated impacted tooth, jeopardising the angle of the mandible.
On the contrary, studies also advocates (S. Antic, 2016) against the removal of mandibular third molars as a preventive measure against angle fracture. Surgical removal of mandibular third molars by itself poses risk of angle fracture and its absence transmits the stresses to the condyle making it more vulnerable to fracture and carries its own complications like facial nerve damage.

As practitioners we must be aware and every patient should be properly evaluated and removal should be advocated if necessary which may act as a line of weakness making the mandible prone for fracture following maxillofacial trauma

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Understanding Implant Overdentures: A Review

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Abstract

Aim: The aim of this literature review is to evaluate the various studies and systemic reviews conducted on maxillary and mandibular implant-supported overdentures. Background: Conventional complete dentures were the common treatment modality for edentulous patients. However, the advent of implant-supported overdentures has replaced conventional dentures as a better standard for rehabilitation. Due to increased patient satisfaction and quality of life, implant-supported overdentures is gaining a wider acceptance than conventional protocols. Review results: Mandibular implant-supported overdentures have a higher success rate than maxillary implant-supported overdentures. Maxillary implant-supported overdentures tend to be a form of "rescue treatment," than being the first modality of treatment for edentulous patients. Conclusion: To improve the success rate of implant-supported overdentures, careful case selection is an important criteria. Further research needs to be conducted to improve the success for maxillary implant-supported overdentures. Clinical Significance: Implant-supported overdenture have improved the masticatory efficiency and the quality of life of patients. Therefore, this treatment modality should be considered as a primary treatment option for edentulousness in future.

Key words: Review, overdenture, implant, retention, residual ridge resorption, prosthodonitcs.

Background

Conventional complete dentures were the common treatment modality for edentulism. However, they present with unavoidable complications, including residual ridge resorption and intrinsic loss of retention. Factors leading to residual ridge resorption vary greatly between individuals, and can include age, gender, facial morphology, nutrition and general health, medications, systemic diseases and oral hygiene.

The implant-supported overdenture can overcome these disadvantages, and as a result are gaining wider acceptance due to positive patient satisfaction. Patients with implant-supported prosthesis show less bone loss than patients with conventional dentures, probably due to more adequate functional stimulus to the bone. Thus, the addition of implant support for complete dentures, especially for the mandible, helps to improve patients' overall health and quality of life.

Review Results

Mandibular implant-supported overdenture:

Sadowsky[1] as early as 2001 reviewed studies published by multiple authors, which stated a 100% success for implant-supported overdentures after 5 years.[1] He found that the anterior mandibular bone under an implant ovedenture may resorb as little as 0.5 mm over a 5-year period, and long-term resorption may remain at 0.1 mm annually.[1] There is a lack of evidence concerning the impact of mandibular implant overdentures on perceived general health; this criteria must be further researched.[2]

Two implants to support the mandibular overdenture has been regarded as the gold standard (**Figure 1**); furthermore, to gain a mechanical advantage and distribute forces across multiple implants, dentures can be splinted using an interconnecting bar and a retentive clip.[3]

Figure 1: Implant placement with ball attachment

Maxillary implant-supported overdenture:

Maxillary overdenture implant survival rates have been reported as low as 71% at five years.[4] The mean implant loss in maxillary implant overdentures was 19% (206 of 1103 implants), and the mean mandibular implant loss was 4% (242 of 5643 implants).[5] Systematic reviews concluded that maxillary overdentures on 4 or more implants in a splinted construction provided high survival (> 95% for the first year) both for implants and overdenture.[6]

In relation to implant placement, Cavallaro and Tarnow[7] proclaimed one- to three-year success with five cases of partial palatal coverage maxillary overdentures retained by a minimum of four implants with unsplinted attachments. Narhi et al[8] reported a 90% cumulative implant survival rate for maxillary overdentures over 6 years, when placing implants at least 12 mm long, and Engquist et al[9] documented 2 to 3 times the failure rate when shorter implants of 7 and 10 mm were placed. Moreover, when bone quantity and quality were satisfactory, overdenture and fixed prostheses both achieved a 92% implant survival over 5 years.[10]

Discussion

Implant-supported overdentures for the mandible:

Mandibular implant-supported over-dentures is gaining a wider acceptance, due to positive patient satisfaction.[11] The addition of implant support for mandibular dentures have also been proven to improve the patients' overall health quality of life.[2] For these reasons, mandibular implant overdentures are a more effective treatment for edentulous individuals than conventional dentures.

Bone loss which occurs due to mandibular implant-supported overdentures can potentially be reduced by avoiding extraction of all the teeth, and using the roots to support the overdentures. A systematic review by Schimmel et al[12] concluded that although immediate, early and conventional protocols provide high implant survival rates, early and conventional loading protocols provide fewer implant failures. According to the systematic reviews done by Alsheeba[13], mandibular implants which are conventionally placed showed a lower risk of implant failure than those implants which were early loading, but the difference in failures was not statistically significant. Factors influencing survival and success of early loaded implants are: careful case selection, bone quality, implant dimensions and surface, proper treatment plan, meticulous surgery and proper design of prosthesis.

Splinting is also done to provide cross-arch stabilization and avoid potential overloading of single implants.[6] Retention systems are also available using ball attachments, bars and magnets (**Figure 2**). There is no strong evidence for the superiority of one system over the others regarding patient satisfaction, survival, peri-implant bone loss and relevant clinical factors. A systematic literature review found no significant difference in implant survival between a variety of splinted and unsplinted mandibular prosthesis designs even though different attachment types, numbers of implants, implant types and implant lengths were compared.[14]

Figure 2: Overdenture with metal housing.

The primary disadvantage in implant-supported overdentures is the higher cost of treatment; in order to reduce this cost, a treatment alternative using a single implant placed in the midline to retain a mandibular overdenture has been proposed, but long-term observations are required for definitive conclusions regarding the clinical efficacy of this option.[15]

Conventional dentures are still a good choice for patients who can adapt to these devices; thus, implant overdentures may be more beneficial to patients who have advanced alveolar bone resorption and those with several denture problems.[16] Therefore, implant supported dentures should be given as a priority to those patients with whom conventional denture therapy has failed.

Implant-supported overdentures for the maxilla:

Implant overdentures in the maxilla have in general not been as successful as in the mandible, but this might be because maxillary implants are often placed as a "rescue treatment" upon the failure of a fixed prosthesis.[3] The benefits of maxillary implant overdentures compared with traditional mucosa-borne prostheses have been established.[6] In the maxilla, the most important factors include the degrees of jaw atrophy, bone quality, potential implant locations, aesthetics, function and phonetics. Survival rate of implant overdentures is higher in the mandible than the maxilla, which serves as an important factor when planning the treatment.[17]

Maxillary implant overdentures (MIOs) have been documented with a high implant loss relative to other endosseous implant treatment modalities.[18] In comparison to the edentulous mandible, implant overdenture therapy for the maxilla is often compromised by reduced bone quality.[19] Unlike the hinge-like mandible, with its shock absorbing effect and buttressing lingual bone, the thin buccal bone of the rigid maxilla may not tolerate the applied forces as well.[20] Since there are limitations relating to implant placement in the maxilla, owing to potentially destructive forces, and resorptive patterns, planning and design considerations may be vital for maxillary implant overdenture success.[21]

Palatal coverage also improves implant prognosis when there are risk factors such as compromised quality/quantity of bone, off-ridge relations, or high applied forces.[22] Slot et al.[6] reported in a systemic review that maxillary overdentures supported by six connected implants resulted in the greatest implant and overdenture success, followed by four connected implants. The total length of supporting implants has not been related to implant loss during overdenture function.[19] In order to overcome compromised maxillary jaw volume limitations, grafting procedures have been done.[23] If grafting procedures are not feasible, then placement of implants in an angulated position has been proposed, given that the implants are splinted.[24] The use of the zygomatic[25] or

pterygomaxillary implants[26] has also been reported with favorable results in the atrophied maxilla with the use of fixed restorations. Palatal placement of zygomatic implants may cause bulky contours and unorthodox substructure designs for overdenture patients, possibly necessitating the use of angled abutments and/or placing the connecting bar the buccal side of the abutment.[27]

Maxillary implant overdentures have a high number of complications and may require more post-insertion maintenance than implant-supported fixed prosthesis.[21] The major complications of implants are divided into surgical complications, implant loss, bone loss, peri-implant soft tissue complications, mechanical complications, and esthetic/phonetic complications. Surgical complications include hemorrhage, neurosensory disturbance, adjacent tooth damage and devitalization, mandibular fractures, implant displacement into the mandibular canal. Smoking, radiation therapy, and diabetes are systemic factors that are associated with implant loss. Soft tissue complications associated with implants include fenestration and dehiscence, gingival inflammation and proliferation and fistulas. The mechanical complications include overdenture retention and adjustment, resin veneer fracture, need for relining, attachment fracture, fracture of opposing prosthesis, prosthesis screw loosening, metal framework fracture, and abutment screw fracture.[5]

Conclusion

Mandibular implant-supported overdentures have a greater success rate than maxillary implant-supported overdentures (**Figure 3**). To improve patient quality of life, careful case selection should be incorporated for the success of both maxillary and mandibular implant-supported overdentures. Further research needs to be conducted to improve the success for maxillary implant-supported overdentures.

Figure 3: Intra-oral picture of overdenture

Clinial Signature

Implant-supported overdenture have improved the masticatory efficiency and the quality of life of patients. Therefore, this treatment modality should be considered as a primary treatment option for edentulousness in future

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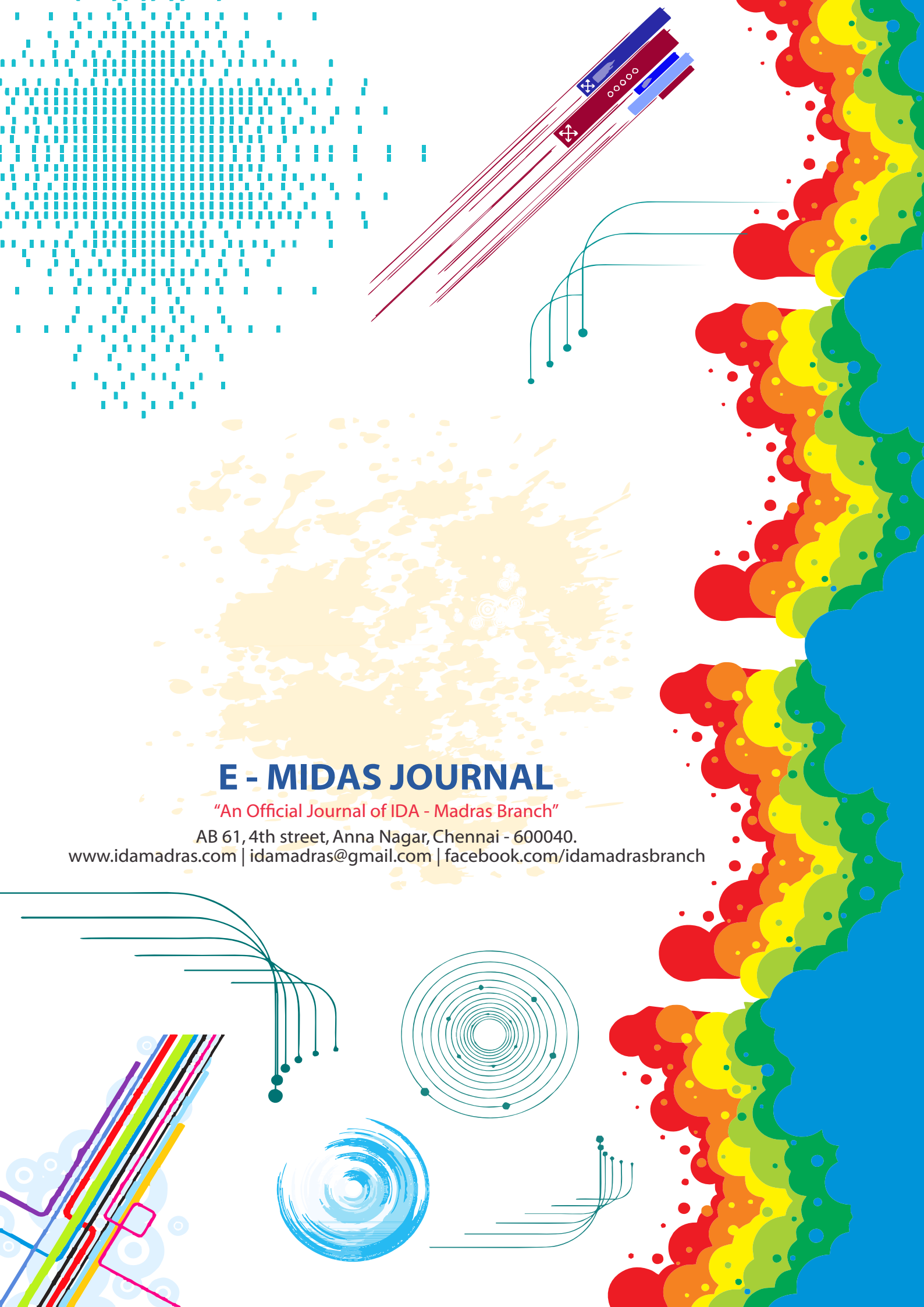

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