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# Indian Journal of Dental Sciences

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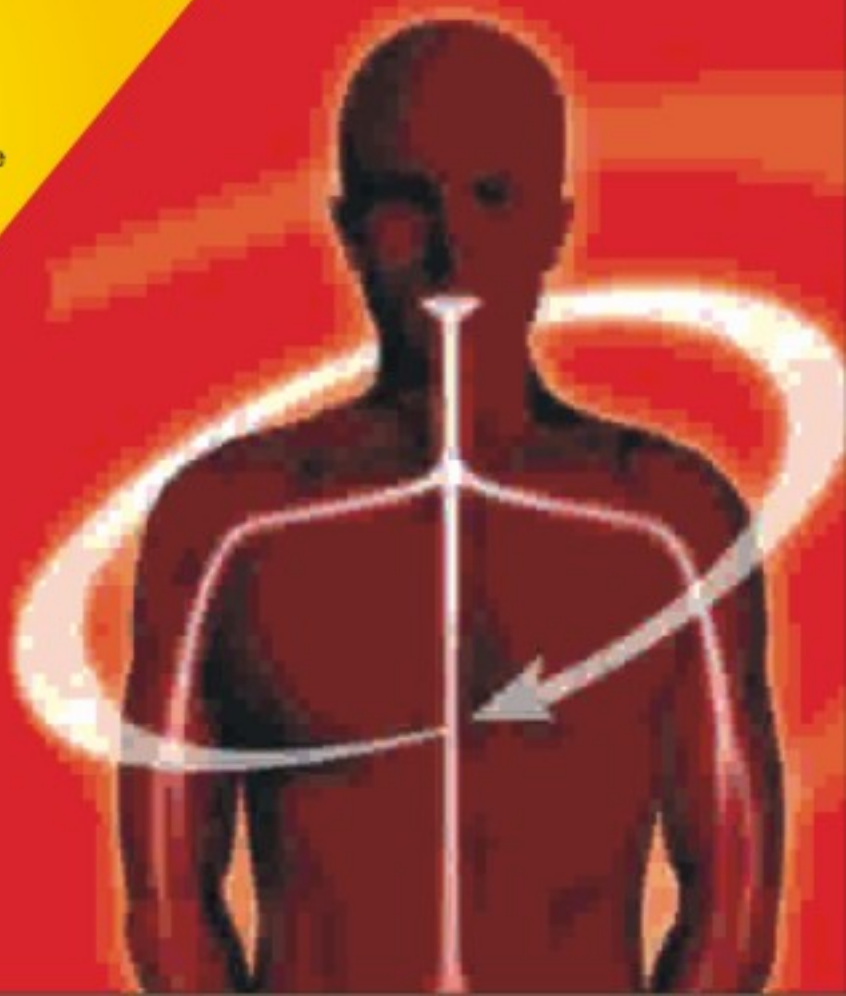

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# Indian Journal of Dental Sciences

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# EDITORIAL

With the examination season round the corner, I felt it adequate to scribe a few words for the examination going students.

Your mind has extremely ,large and huge capacity .Use it or lose it .Practice enables you to keep your knowledge at your fingertips .While doing something ,at times ,you will feel like not being able to recall what you already know. Why does it happen? Sometimes things come automatically to your mind and you are at your liberty to use them according to your requirement. Why does this happen?

You can use all your knowledge at your will, if you constantly practice it. However sharp a knife may be, if it is not use for long time, its edges gets rusted and knife becomes blunt. Your knowledge is just like that knife. Disuse keeps it far from your conscious mind. It slips into your subconscious mind and further into your unconscious mind which is like a lumber room where all your impressions lie in untidy heaps.

Continuity can do wonders .It can enable you to understand even the inexplicable aspects of everything. Your mind has immense power .All it needs is training .Training will empower it to solve intricate riddles effortlessly. Once you achieve this capacity, you will have easy access to all that you know.

You can draw upon your knowledge in a fraction of seconds. It is not enough to start doing something. You have to continue until you accomplish the task.

Yes, Yes u can.

Dr Vikas Jindal
Editor in chief

# ACKNOWLEDGMENT

We are grateful to our esteemed referees for having posed faith in us and for contributing positively for this journal. We appreciate the time they have taken out for refereeing the articles. It is our attempt to maintain the standard of journal and an attempt to make it reach the international standards.

Dr. Vikas Jindal

# An excellence towards a perfect ness, in the complete denture prosthesis - a clinical approach;

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## Introduction

As far as, a long life of a mega structure is concerned, a well-built, solid & durable base is essential.. Our best teacher it is always our best experience likewise, Posterior palatal seal in maxilla & anterior region seal in the mandible & balanced occlusion side by side are obligatory for the success, failure & perfect ness of complete denture and underlying tissue . Present review article deals only posterior palatal seal.

Definition; it is valve seal area of soft tissue , at or along the junction of hard & soft palates on which pressure within physiological limits can be applied by denture to aid in the retention & stability of prosthesis (Fig.-1).

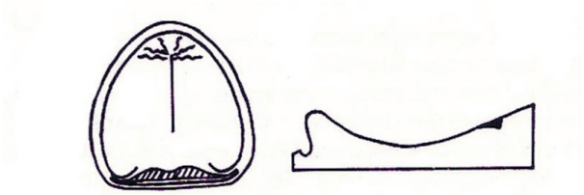

Fig-7; Butter fly shaped PPS with bead on dital margin

## Aims & objectives

it is a review type article on PPS & deals to its anatomical landmarks, different types of palate & different shapes of PPS seals. Current presentation also enumerates the importance, function & process of its clinical registration.

Anatomical land marks; it extends medially from one tuberosity to another known as post dam area. It also extends laterally across the hamular notch & it travels 3 to 4 mm anteriolaterally to end in muco-gingival junction of posterior part of maxillary ridge, k/A Pterygo-maxillary seal (Fig-2). At bony level, posterior palatal seal area encompass maxillary tuberosity & hamular process of medial pterygoid plate. Land marks also contain vibrating lines.

Vibrating lines à PPS area clinically determined by an imaginary vibrating line across posterior part of palate marking division between immovable & movable tissue of the hard & soft palate.

Two types of vibrating lines exist;

- Anterior vibrating line
- Posterior vibrating line

**Anterior vibrating line** : it is an imaginary line, lying between immovable tissue over hard palate & movable tissue of the soft palate . It is generally cupid bow-shaped (Fig.-3).

**Posterior vibrating line** : it is also an imaginary line, located at junction of soft tissue that show limited movement & the soft palate that show marked movement. It is usually straight & generally having slight curvature anteriorly (Fig.-4).

### Relationship of vibrating line with fovea palatine

Fovea palatine are two indentations à oval to round in shape & unique to human race located approximately1.3 mm anterior to anterior vibrating line

Importance of P.P.S;

It enhances stability & retention of prosthesis that enables the denture, to resist against, the forces of gravity, the adhesiveness of food, & the opening & closing of jaw movements. Retention is the resistance of prosthesis movement against the vertical axis. Whereas stability is the denture balance towards the horizontal axis. Retention is regulated & influenced by;

1. **Peripheral border seal** : It is obtained by performing border molding procedure or muscle trimming, in muco-labial and muco-buccal fold spaces so that soft tissue properly over drape to them.
2. **Posterior palatal seal** : Posterior border or valve seal area is completed in posterior palatal seal by border molding with the green stick compound.

Function of P.P.S; the role of PPS is related in fabrication of the special (custom) impression tray, slight displacement of palatal soft tissue, positive contact posteriorly & positioning of impression tray. The task are also enhances the quality of mastication, deglutition & phonetics. It also takes the job of food prevention under denture, eliminate gagging & sunken distal border, to counter act denture warpage & also creates a vacuum.

Fig-5; 'U' shaped hard palate

**TYPES OF PALATES** ; two type -
·Hard palate – Anterior part
·Soft palate - Posterior part
Classification of Hard Palates;
IClass A - broad, shallow, and flat palate, & least beneficial.
IClass B - v-shaped, medium vaulted palate. It gives intermediate quality of P.P.S.
Class C- high vaulted & U-shape, it gives best retention and stability so most helpful P.P.S (Fig.-5).
Classification of Soft Palates;
IClass I - it is horizontal & makes 10° angle to the hard palate & most advantageous (Fig.-6).
IClass II - soft palate makes a 45° angle to the hard palate.
IClass III -soft palate makes a 70° angle to the hard palate.

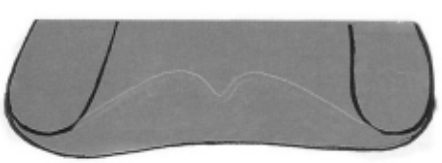

Fig-3; Anterior vibrating line

Categorization Of Palatal Seal ;
·According to shape - generally five shape recommended.
1.Single bead shape of posterior palatal seal
2.Double bead shape of P.P.S.
3.Butter-fly shaped of P.P.S.à best retentive effect (Fig. - 7).
4.Butter-fly shaped P.P.S, with bead on distal angle of dentures.
5.Butter- fly shaped of P.P.S, with widened on distal angle of dentures.
·ACCORDING TO AREA COVERED; It is according to palatal throat form between the hard and soft palatal area as follows,
Class I à large and normal in form, an immovable band of tissue 5 to 12 mm distal to across the line of maxillary tuberosity.
Class IIà immovable band of resilient tissue - 3 to 5 mm.
Class III à with small maxilla, curtain of soft tissue abruptly down 3 to 5 mm.
Choice Of P.P.S. Width; anterio-posteriorly - Enough wide à3 to 4 mm wide & while at Hamular notch à2 to 4 mm wide. The dept of P.P.S. is 1 to 1.5 mm in height and 1.5 mm at its base in case of a bead type.
Recording of P.P.S. clinically; it is performed by conventional method, fluid wax method & arbitrary scribing of master cast.
Conventional method; it is accomplished by marking with the indelible pencil, at pterygo-maxillry seal by using "t´burnisher. Recording of anterior vibrating line is performed by valsava manner & whereas posterior vibrating line by asking "ah' in vigorous manner. This is technique-sensitive method.
FLUID WAX METHOD; It is done by using Correcta wax no: 4, or adaptor wax and physiologic paste. It is physiologic & chair time consuming technique.
ARBITRARY SCRIBING OF MASTER CAST; this technique is inaccurate & non physiological.

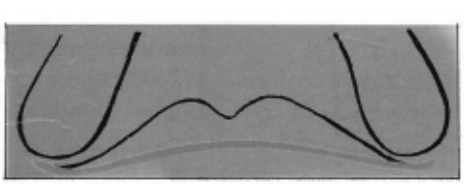

Fig-4; Posterior vibrating line

## Summary & Conclusion;

Perfection is achieved, not when there is nothing more to add but when there is nothing left to take away. Incorporation of posterior palatal seal is a paramount & extremely important. It provides state of art technology & enhances stability & retention of a maxillary RDP. A

butter-fly shaped P.P.S. posses maximum retentive effect; moreover its width varies from 2 to 5 m.m.

## References;

1.Hardy IR & Kapur kk: "posterior border seal & its rationale & importance". JPD 8; 386 – 7, 1958.
2.Hold HR: "variable denture limiting structure of the edentulous mouth". JPD 9:978, 1959.
3.Landa JS: "Trouble shooting in complete denture prosthesis." JPD 9:978, 987, 1964.
4.Milsap CH: "Posterior palatal seal area for complete denture. Den. Clin. N.AM 8:663, 673, 1964.
5.Kabcenell JI: "more retention of complete denture." JADA 80: 116 1970.
6.Silverman SJ: "Dimension & displacement patterns of PPS" JPD. 25:470, 488 1971.
7.Winland RD & Young JM: "Maxillary complete denture, Posterior palatal seal variations''. JPD 29:256, 261, 1973.
8.Avant WE: "A comparison of retention of complete denture bases having different type of posterior palatal seal." JPD 29: 484, 493 1973.
9.Lye TL." significance of fovea palitini in complete denture. JPD 33: 504 May 1975.
10.Ames WVB. Atmospheric pressure in retention of entire denture." BDJ 6: 601-604, 1985.
11.Glossary of prosthodontics terms(GPT) JPD 1977, May 2005 and article publication guide line - 2008.

# A New Dynamic Jaw Exerciser

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ABSTRACT

The bilateral ankylosis of the temporomandibular joint is treated surgically; the procedure adopted involves reshaping of the ankylosed bony chunk using a 1.5 mm fissure bur. The cavity thus created is then either lined with dermis or silastic implant is placed to avoid fibrous reunion resulting due to contact of the newly created raw surfaces. Post operatively, the mouth opening in such patient is around 0.5 to 1.0 cm which is gradually made to increase to 3.0 to 4.5 cm by the use of stent as passive jaw exerciser given to maintain the surgically created mouth opening which is subsequently replaced by the dynamic jaw excerciser which the patient has to wear for atleast 18 hours a day.

The existing conventional jaw excerciser has 2 long beaks attached anteriorly to both the jaws as shown and is a cumbersome appliance and hence has low acceptability to the patient leading to reunion/ and ankylosis of the joint, hence the need to modify the appliance was undertaken. The newly devised dynamic jaw excersiser acts mainly on the posterior segment of the jaws and is more esthetically design resulting in better acceptability, appreciation, and improved compliance of the patient.

Key words:-Passive jaw excerciser, bilateral joint ankylosis, dynamic jaw excerciser, posterior segment, acceptability, stent, increased mouth opening

## INTRODUCTION:

A method of exercise utilizing a jaw exercise device specifically configured to exercise the muscles of mastication including the temporal, masseter, external pterygoid and internal pterygoid[1].

The temporomandibular joint serves as a hinge for the lower jaw. The TM joint may become misaligned because of ankylosis, aging, arthritis, a blow to the jaw or head or yawning for prolonged periods with the mouth open too wide. Among the more common temporomandibular joint dysfunction symptoms are: earaches, tinnitus (ringing, tinkling, hissing), clicking, (Articular Crepitus), difficulty in opening the mouth (Trismus), headaches (particularly in the infratemporal region) and vertigo[2].

Most of the times muscle fatigue and spasm is present which is relieved with drugs like muscle relaxants and in post operative cases the use of TMJ excerciser is recommended [3].

## MATERIAL AND METHODS:

The present invention relates to a method of jaw exercise utilizing a jaw exerciser device specifically configured to exercise the muscles of mastication. The conventional appliance has 2 acrylic plates, attached to maxillary and mandibular ridges/teeth having 2 beaks attached anteriorly which are made to connect with an elastic band. Once in position, the user exercises or uses the jaw exerciser device by consciously moving or opening his/her jaw against the elastic resistance force of the elastic bands. By repetitive exercise and use, the user or patient may strengthen the muscles of mastication. But this is a cumbersome appliance and hence has low acceptability to the patient.

The newly devised dynamic jaw excersicer acts mainly on the posterior segment of the jaws. Impressions of the upper and the lower jaws are made with irreversible

hydrocolloid material like alginate and acrylic plates are fabricated which are joined anteriorly. These plates mainly cover the posterior segments of the jaws. The patient can close or bite gently on the plates and the plates shall remain in a stable position. The elastic bands will keep the jaws open and the fatigue will force the patient to close the jaw against resistance. This will exercise the muscles and allow TM joint functioning (Fig.1). The basic purpose of the excerciser is to increase the opening of the mouth by moving of the jaws apart.

The conventional jaw excerciser makes the patient to exercise when the patient intentionally and forcibly closes the mouth. The jaws are pulled apart by reversal of elastic traction.

But in the newly deviced appliance, the traction created by the elastic bands results in automatic widening/ opening of the jaws. This action is passive resulting in prolonged opening of the muscles and the patient is forced to close the mouth against resistance (Fig.2).
This device is more esthetically designed resulting in better acceptability, more appreciation, and improves compliance of the patient.

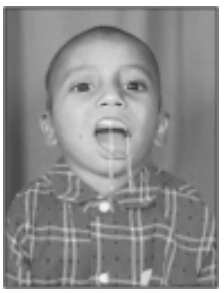
## DISCUSSION:

Mandibular hypomobility is a common sequela to many procedures performed by oral and maxillofacial surgeons.[4] This is especially true in the treatment of oral cancer in which rehabilitation after resection of the tumor is often complicated by fibromyositis
secondary to radiation therapy. [5] [6]Postoperative physical therapy is important to minimize mandibular hypomobility.[7]

One-piece jaw exerciser/strengthener, custom fit, aligned and retained on the teeth of the upper or lower jaws used to stimulate the jaw opening post operatively which is decreased as in cases of TMJ ankylosis (bilaterally) or bilateral fracture of the mandible at the condylar region, is used to stimulate the jaw opening and closing to avoid fibrous reunion of the joint post operatively.[8] The device is inexpensive, easy to use and has better acceptability with the patient.[9] Finally, because the opening force is controlled by the patients, they may believe that they are more in control of their treatment and may have less anxiety and increased compliance.[10] [11].

**LEGENDS (PHOTOGRAPHS)**

Increased mouth opening by moving the jaws apart



Increased mouth opening by forcing to close the mouth against resistance

## REFERENCES:

1. Darveniza M, Chapman PJ.A jaw exerciser for fibrous ankylosis of the temporomandibular joint. Australian Dental Journal, 1985 Dec; 30(6): 418-22.

2. Ross, John H. Jaw exercise device. United States Patent 4650182.

3. Gage JP. Jaw exerciser for fibrous ankylosis Aust Dent J. 1986 Jun;31(3):229-230.

4. Uriell P, Bertolucce L, Swaffer C: Physical therapy in the postoperative management of temporomandibular joint arthroscopic surgery. J Craniomandib Disorders 7:27, 1989

5.Rocabado M: Physical therapy for the post surgical TMJ patient. J Craniomandib Disorders 2:75, 1989

6.Hoffman D, Mannheimer J, Attanasio R, et al: Management of the temporomandibular joint surgical patient. Clin Prevent Dent 11:28, 1989

7.Zislis MW, Wand HA, Gottehrer NR: TMJ arthroscopy-A preoperative and postoperative rehabilitation protocol. J Craniomandib Disorders

3:218, 1989

8.Bell WH, Gonyea W, Finn RA, et al: Muscular rehabilitation after orthognathic surgery. J Oral Surg 56:229,1983

9.Poremba EP, Moffett BC: The effects of continuous passive motion on the temporomandibular joint after surgery. Oral Surg Oral Med Oral Path 67:490, 1989

10.Storum KA, Bell WH: The effect of physical rehabilitation on mandibular function after ramus osteotomies. J Oral Maxillofac Surg 44:94, 1986

11Braun LB: The effect of physical therapy intervention on incisal opening after temporomandibular joint surgery. Oral Surg Oral Med Oral Path 64:544, 1987.

# RESIDUAL RIDGE RESORPTION : A REVIEW

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## Introduction

Residual ridge is a term used to describe the shape of the clinical alveolar ridge after healing of bone and soft tissues following tooth extraction. Post tooth extraction, a cascade of inflammatory reactions is immediately activated, and the extraction socket is temporarily sealed by blood clotting. Epithelial tissues begin its proliferation and migration within the first week and the disrupted tissue integrity is quickly restored. Histologic evidence of active bone formation in the bottom of the socket is seen as early as 2 weeks after the extraction and the socket is progressively filled with newly formed bone in about 6 months. The most striking feature of the extraction wound healing is that even after the healing of wounds, the residual ridge alveolar bone undergoes a lifelong catabolic remodeling. The size of the residual ridge is reduced most rapidly in the first six months, but the bone resorption activity of the residual ridge continues throughout life at a slower rate, resulting in removal of a large amount of jaw structure. This unique phenomenon has been described as residual ridge reduction. The rate of RRR is different among persons and even at different times and sites in the same person. Residual ridge remodeling affects the function of removable prostheses, which rely greatly on the quantity and the architecture of jaw bones. Hence treatment of edentulous patients requires a maintenance phase that must be carried out throughout the life of a patient. Cost in economic and human term makes RRR a major oral disease.1

## Consequences of RRR

There is apparent loss of sulcus width and depth. Muscle attachments are displaced closer to the crest of the residual ridge.Due to loss of VDO lower face height is reduced and mandible is rotated anteriorly. Patient may develop habitual prognathic appearance.Inter-alveolar ridge relationship is altered. Morphological changes in residual ridge may appear such as sharp, spiny, uneven residual ridges. Resorption of the mandibular canal wall and exposure of the mandibular nerve.Location of the mental foramina close to the top of the mandibular residual ridge.This provides serious problems to the clinician on how to provide adequate support, stability and retention of the denture.1

## Pathology of RRR

Gross Pathology:A frequent lay expression for RRR is “My gums have shrunk”. Actually the basic change in RRR is a reduction in the size of the bony ridge under the mucoperiosteum. It is primarily a localized of bone structure. Sometimes it may leave the overlying mucoperiosteum excessive and redundant.There exists a wide variety of shapes and sizes of residual ridges. They are categorized into common residual ridge configuration in a system of six orders given by Atwood.2

Order I - Pre-extraction.
Order II- Post-extraction.
Order III- High, well rounded.
Order IV- Knife-edge.
Order V- low, well-rounded.
Order VI- depressed.

RRR does not stop with residual ridge, but may go well below where apices of teeth were, sometimes leaving only a thin cortical plate on the inferior border of the

mandible or virtually no maxillary alveolar process of the upper jaw.
In clinical examination usually one can visually judge the residual ridge form. However, sometimes a knife-edge ridge may be masked by redundant or inflamed soft tissues.

Microscopic Pathology: Microscopic studies have revealed osteoclastic activity on the external surface of the crest of residual ridges. The scalloped margins of Howship's lacunae sometimes contain visible osteoclasts which cause bone resorption. There exists a wide variation in the configuration, density and porosity of the residual ridges, sometimes even with evidence of osteoporosis. Studies have shown the presence of new bone and reversal lines inside the residual ridge and minute areas of bony repair on the periosteal side in some specimens.The mucoperiosteum shows varying degrees of keratinization, acanthosis, edema and architectural pattern of mucosal epithelium in the same mouth and between subjects.Similarly, varying degrees of inflammatory cells are found in areas that appear from clinically normal to frankly inflamed in edentulous patients or who were denture or non-denture wearers. Inflammatory cells include lymphocytes and plasma cells. There exists proximity of small blood vessels to area of bone resorption.2

## Pathogenesis of RRR

Immediately following the extraction (order II), any sharp edges remaining are rounded off by external osteoclastic resorption, leaving a high well rounded residual ridge (order III). As resorption continues from the labial and lingual aspects, the crest of the ridge becomes increasingly narrow ultimately becoming knife-edged (order IV). As the process continues, the knife-edge becomes shorter and even eventually disappears, leaving a low well rounded or flat ridge (order V). Eventually, this too resorbs, leaving a depressed ridge (order VI).
RRR is chronic, progressive, irreversible and cumulative. Usually, RRR proceeds slowly over a long period of time, flowing from one stage imperceptibly to the next. Autonomous regrowth has not been reported. Annual increments of bone loss have a cumulative effect, leaving less and less residual ridge.3 Tallgren4 has presented an interesting graph of mean rates of RRR of patients who were studied at various post-extraction time periods over a 25 year period.In separate studies in different parts of the world, Tallgren, Atwood and Coy found that the mean ratio of anterior maxillary RRR to anterior mandibular RRR was 1:4.Therefore, it is true that, on the average, RRR is greater is greater in the mandible than in the maxilla, the reverse may be true in any given patient who comes for treatment. One must treat the particular patient, not the “average” patient.

## Etiology of RRR:

RRR is a multi-factorial, biomechanical disease that results from a combination of anatomic, metabolic and mechanical determinants. Since all of these factors vary from one patient to the next, these different co-factors may combine in infinite variety of ways, thus explaining the variations in RRR between patients.1

## Anatomic Factors:

RRRAnatomic factors
i.e. amount of bone and quality of bone.

Amount of bone: It is not a good prognostic factor for the rate of RRR, because it has been seen that some large ridges resorb rapidly and some knife edge ridges may remain with little changes for long periods of time. Although the broad ridge may have a greater potential for bone loss, the rate of vertical bone loss may actually be slower than that of a small ridge because there is more bone to be resorbed per unit of time and because the rate of resorption also depends on the density of bone.

Quality of bone: On theoretic grounds, the denser the bone, the slower the rate of resorption because there is more bone to be resorbed per unit of time.5
Metabolic factors:

RRRBone resorption factors
Bone formation factors

General body metabolism is the net sum of all the

building up (anabolism) and the tearing down (catabolism) going on in the body. In equilibrium the two antagonistic actions (of osteoblasts and osteoclasts) are in balance. In growth, although resorption is constantly taking place in the remodeling of bones as they grow, increased osteoblastic activity more than makes up for the bone destruction. Whereas in osteoporosis, osteoblasts are hypoactive, and, in the resorption related to hyperparathyroidism, increased osteoblastic activity is unable to keep up with the increased osteoclastic activity. The normal equilibrium may be upset and pathologic bone loss may occur if either bone resorption is increased or bone formation is decreased, or if both occur. Since bone metabolism is dependent on cell metabolism, anything that influences cell metabolism of osteoblasts and osteoclasts is important.

- The thyroid hormone affects the rate of metabolism of cells in general and hence the activity of both, the osteoblasts and osteoclasts.
- Parathyroid hormone influences the excretion of phosphorous in the kidney and also directly influences osteoclasts.
- The degree of absorption of Ca, P and proteins determines the amount of building blocks available for the growth and maintenance of bone.
- Vit C aids in bone matrix formation.
- Vit D acts through its influence on the rate of absorption of calcium in the intestines and on the citric acid content of bone.
- Various members of Vit B complex are necessary for bone cell metabolism.6

In general terms, anabolism exceeds catabolism during growth and convalescence, levels off during most of adult life and is exceeded by catabolism during disease and old age. Bone has its own specific metabolism and undergoes equivalent changes. At no time during life is bone static, but rather it is constantly rebuilding, resorbing and remodeling subject to functional and metabolic stresses.

## Osteoporosis and residual ridge modeling

The clinical and pathophysicologic views of osteoporosis has been refined recently to the concept of Type I and II osteoporosis.

Type I osteoporosis is defined as the specific consequence of menopausal estrogen deprivation, and characteristically presents the bone mass loss, notably in the trabecular bone.

Type II osteoporosis reflects a composite of age related changed in intestinal, renal and hormonal function. Both cortical and trabecular bone are affected in Type II osteoporosis.

## Functional Factors:

Functional factors include the frequency, intensity, duration and direction of forces applied to bone which are translated into cellular activity, resulting in either bone formation or bone resorption, depending upon on the patient's individual resistance to these forces.

When force within certain physiologic limits is applied to living bone ,that force, whether compressive, tensile of shearing, brings about by some unknown mechanism the remodeling of bone through a combination of bone resorption and bone formation. Masticatory and non-matiscatory force is ordinarily transmitted to the dento-alveolar bone through the periodontal ligament. Once the teeth are removed, the residual ridge is subjected to entirely different types of forces. Some postulate that RRR is an inevitable “disuse atrophy”. Others postulate that RRR is an “abuse” bone resorption due to excessive forces transmitted through dentures. Perhaps there is truth in both the hypotheses.1

## Prosthetic Factors:

Ridge resorption may or may not occur in patients for whom dentures are not made. If resorption does occur, it is attributed either to disuse atrophy or as Lammie suggests, to an atrophying mucosa seeking a reduced area, thereby causing pressure resorption of the ridge. If resorption does not occur, this is attributed either to function by a patient who is able to “gum” food because of a small inter-ridge space or unknown factors. The prosthetic factors are extremely difficult to evaluate because of tremendous number of variables, including anatomic, metabolic and functional factors. The traditional design of dentures

includes many features whose goal is to reduce the amount of force to the ridge and to thereby reduce

RRR.7 These prosthetic factors include broad-area coverage (to reduce the force per unit area); decreased number of dental units, decreased buccolingual width of teeth, and improved tooth form (to decrease the amount of force required to penetrate a bolus of food); avoidance of inclined planes (to minimize dislodgement of dentures and shear forces); centralization of occlusal contacts (to increase stability of dentures and to maximize compressive forces); provision of adequate tongue room (to increase stability of denture in speech and mastication); adequate interocclusal distance during rest jaw relation (to decrease the frequency and duration of tooth contacts) etc.Various clinical studies have attempted to correlate one or more of these factors with the rate of RRR.8 Without exception, all of these studies have shown the same results, in regard to anyone factor, in a series of patients, some patients have RRR while others do not. Each group shows a wide range of RRR and an overlap with other groups.

TREATMENT AND PREVENTION OF RRR

The best way to manage the problem of residual ridge reorption is by using every means to prevent it.

Clinicians must try to retain residual roots whenever feasible.Overdentures help minimize ridge resorption and contribute to enhanced retention stability ,support of prosthesis along with preservation of proprrioception.

The introduction of dental implants has revoluitionized clinical practice.Use of implants for providing implant supported or implant assisted prosthesis also helps avert continuing residual ridge resorption.1

Impression technique

In patients with severely resorbed ridges, lack of ideal amount of supporting structures decreases support and the encroachment of the surrounding mobile tissues onto the denture border reduces both stability and retention.2 Thus the main aim of the impression procedure is to gain maximum area of coverage. For e.g., in mandibular ridge, obtaining a fairly long retromylohyoid flange helps to achieve a better border seal and retention.

• Selection of proper trays and the correct impression procedure is very essential for an accurate impression. Selective pressure technique is most widely advocated to manage RRR.It makes it possible to confine the forces acting on the denture to the stress bearing areas This helps in better withstanding the mechanical forces induced by denture wearing.

• Winkler describes a technique which uses tissue conditioners. An over extended primary impression of alginate is made. Occlusal wax rims are constructed and the borders are adjusted so that the lingual flange and sublingual crescent area are in harmony with the resting and acting phases of the floor of the mouth by an open and closed – mouth technique. 3 applications of conditioning material are used – each application approximately 3-10 minutes.9 The third and final wash is made with a light bodied material. This technique results in the impression that has tissue placing effect with relatively thick, buccal, lingual and sublingual crescent area borders. Miller used mouth-temperature waxes instead of tissue conditioners .

Correcting the occlusal vertical dimension:

Clinical studies have shown increased(excessive) OVD to be a common fault in many dentures.Guidelines suggest 2-5 mm of freeway space, but this may need to be increased in order patients or for those patients with atrophic mucosa verlying the residual ridges.

Reducing the forces required to drive the denture teeth through the bolus of food:

This may be achieved by either increasing the denture bearing area or reducing the size and altering the morphology of the occlusal table.

1) Increasing the denture bearing area:

Although prosthodontic norms recommend full use of the functional denture bearing area, this is rarely achieved. A consequence of this is that the smaller the size of the fitting surface of the denture, the greater are the loads applied to the underlying mucosa. In such cases, the denture bearing area may be increased using green stick impression compound before relining or by using a chairsid relining material prior to the denture being relined conventionally.1,2

2) Reducing the size and altering the morphology of the occlusal table:

Clinical experience indicates that many complete

lower dentures have posterior teeth set without consideration of possible support problems. In general, occlusal tables tend to be too large. This leads to problems of support and stability which singly and in combination, put too much pressure on the atrophic mucosa during function. The combination of reduced occlusal table and if necessary, increased denture bearing area can greatly reduce the load per unit area on the underlying mucosa and improve denture comfort, always assuming that the OVD is not excessive.10,1,2

- Eliminating disruptive occlusal contacts which lead to denture in stability:

Disruptive occlusal contacts may present in any border position and in 'normal' function as well as parafunction. Their detection and elimination must be carried out where changes in OVD and elimination of such disruptive forces are indicated, occlusal pivots can be of great benefit.

Summary and Conclusion

RRR is a multi-factorial, biomechanical disease that results from a combination of anatomic, metabolic and mechanical determinants. Since all of these factors vary from one patient to the next, these different co-factors may combine in infinite variety of ways, thus explaining the variations in RRR between patients.

RRR is chronic, progressive, irreversible and cumulative.

It is important to incorporate measures so as to minimize resorption of residual ridges in our treatment plan.

## References:

1) Atwood D.A. Reduction of residual ridges: A major oral disease entity. J Prosthet Dent 1971; 26: 266-279.

2) Atwood D.A. Some clinical factors related to resorption of residual ridge. J Prosthet Dent 1962; 12: 441-450.

3) Jahangiri L. Current prospective in residual ridge remodelling and its clinical implications: A review. J Prosthet Dent 1998; 80: 224-237.

4) Tallgren A. A continuing reduction of the residual alveolar ridges in complete denture wearer: A mixed-longitudinal study covering 25 years. J Prosthet Dent 1972; 27: 120-132.

5) Winkler: Essentials of complete denture prosthodontics IInd edition.

6) Wyatt C.C.L. Effects of prosthodontic treatment on alveolar bone loss: A review of literature. J. Prosthet Dent. 1998; 80: 362-366.

7) Atwood DA,Coy WA.Clinial ,cephalometric and densometric study of reduction of residual ridges .J Prosthet Dent 1971;26:280-95

8) Enlow DH.The remodeling of the edentulous mandible.J Prosthet Dent 1976;36:685-939)Mc Cord JF,Tysown KW.A conservative prosthodontic option for the treatment of edentulous patients with atrophic (flat)mandibular ridges.Brit Dent J 1997 ;186(12):469-72

10) Mc Cord JF,Tyson KW.Chairside Options for the treatment of complete denture problems associated with the atrophic mandibular ridge. Brit Dent J 2000;188(1):10-14

# Treatment Outcomes Of Implant Therapy For Partial Edentulism, Including Maxillary Anterior Tooth Replacement: A Review

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## PURPOSE

To document the literature regarding the outcomes of the implant restorations in the anterior maxilla or mandible to formulate consensus statements with regard to esthetics in implant dentistry, to provide guidelines to clinicians, and to articulate remaining questions in this area to be addressed in future research.

## MATERIAL AND METHODS

Treatment outcomes of implant therapy for partial edentulism ( including maxillary anterior tooth replacement); anterior maxillary anterior tooth replacement; effect of implant design; diameter, and the surface characteristics; soft tissue stability/contours around anterior implant restorations; ceramic abutments; influence of surgical techniques; and finally , evaluation of patient satisfaction—these are the areas of concern in this review article.

From a retrospective study comprising 1,920 IMZ implants (Interpore International, Irvine, CA), Haas and associates (12) reported a significantly lower cumulative survival rate for maxillary implants (37.9% at 100 months of follow-up) than for mandibular implants (90.4% at 100 months of follow-up). Implants placed in the anterior region of the maxilla failed significantly more often than those placed in the posterior region. Length and diameter of the implants had no significant influ- ence on the cumulative survival rate.

Strategies for the replacement of missing or nonrestorable teeth have changed significantly over the last few decades. To avoid traumatic and cost-intensive failure of already restored teeth, endosseous dental implants have become the treatment of choice in many clinical situations. Numerous clinical investigations with a large number of cases and longz-term follow-up have proven the clinical efficacy and safety of implant supported restorations.(1)The original protocol as described by Brånemark and coworkers has been modified and continues to evolve . The original guidelines for the achievement of osseointegration invariably called for a submerged implant placement into healed bone and a load-free healing period prior to second-stage surgery and abutment connection.(6) The development and successful use of one-stage transmucosal implant systems have

demonstrated that a submerged healing period is not necessary for the achieve- ment of histologic osseointegration.(9)

In numerous prospective long-term studies, implant survival rates comparable to those seen with two-stage protocols have been achieved. (12)

Eckert and Wollan (13) published a retrospective evaluation of up to 11 years of a total of 1,170 implants placed in partially edentulous patients and found no differences in survival rates related to the anatomic location of the implants. A meta-analysis concerning implants placed for the treatment of partial edentulism was carried out by Lindh and coworkers (14). The 6- to 7-year survival rate for single-implant crowns was 97.5%, while the survival rate of implant-supported

fixed partial dentures (FPDs) was 93.6%.

Davarpanah and coworkers(1) carried out a prospective controlled multicenter clinical trial comprising 1,583 3i implants (Implant Innovations, Palm Beach Gardens, FL) with a 1- to 5-year observation period. With a cumulative implant survival rate of 96.5%, their data confirmed the high overall degree of predictability of implant therapy in partially edentulous jaws. More specifically, they found a slightly higher survival rate in the maxilla (97.2%) than the mandible (95.8%), but a similar survival rate in anterior (96.7%) and posterior (96.5%) segments. In addition, this clinical study gives evidence of high success
rates using different threaded implant designs.

It is particularly important to consider the events that surround the healing of immediately loaded endosseous implants. Around implants placed with good primary stability, the surfaces in trabecular bone or bone marrow confront a process of woven bone formation, with new bone apposition observed within the first 2 weeks after implant placement.

The same implant's surfaces that are in contact with cortical bone confront the bone resorption process, evidenced at 3 to 4 weeks after implant placement. The early osteogenesis that occurs in the trabecular/medullary region contributes to implant stability and formation of an osseointegrated interface. However, the osteoclast- mediated resorption that occurs in cortical bone opposing the implant surface may reduce bone support at these early times. For the immediately loaded implant, incipient mechanical challenges are resisted by the implant's acquired primary stability. The implant's stability is changed as the combined result of bone formation in the trabecular/medullary compartment and bone resorption in the cortical compartment.

Another important factor in the immediate placement/provisionalization scenario is the choice of implant system. Considerable variations in implant surface and design (one-stage versus two-stage design) may also have a great impact on the definitive result.

The survival rates of immediately restored single tooth implants, placed either immediately in fresh extraction sockets or in healed sites, were studied by Chaushu and coworkers in a controlled clinical trial. Twenty-eight immediately loaded implants, 19 placed in extraction sockets and 9 in healed sites, were followed for 6 to 24 months. The respective survival rates were 82.4% (extraction sockets) and
100% (healed sites). While the reported radiographic marginal bone loss after 3 to 6 months did not extend beyond the implant-abutment junction, no information related to soft tissue stability was provided.

Within the limits of this study, it was concluded that immediate loading of single-tooth implants placed in healed sites is a possible treatment alternative, whereas immediate loading of single-tooth implants placed in fresh extraction sockets carried a risk of failure of approximately 20% in this patient population.
Soft Tissue Stability And Contours Around Anterior Implant Restorations
Scheller and associates addressed soft tissue stability in their 5-year prospective multicenter study of 99 implant-supported single-crown restorations. The authors reported overall cumulative success rates of 95.9% for implants and 91.1% for implant crowns. Soft tissue levels around implant restorations and adjacent teeth remained stable over the entire evaluation period.
Soft tissue stability around implant restorations and adjacent teeth is of paramount importance within the esthetic zone. In this context, in 1997 Jemt proposed a reproducible index to assess the size of the interproximal gingival papillae adjacent to single implant restorations. Preliminary testing of the index, performed retrospectively on 25 crowns in 21 patients, indicated a significant regeneration of
papillae after a mean follow-up period of 1.5 years.
It was concluded that this index allows objective assessment of the soft tissue contour adjacent to single-implant restorations. In a clinical report, Wheeler and coworkers addressed the various parameters likely to have an impact on tissue preservation and maintenance of optimum esthetics.

The authors pointed out that
recently developed tapered implants facilitate immediate implant placement, predictably preserving the osseous structure surrounding the extraction(1,3)

INFLUENCE OF SURGICAL TECHNIQUES
In a 5-year prospective study, Zitzmann and associates recently assessed whether guided bone augmentation performed simultaneously with implant placement had an adverse effect on long-term survival rates of the implants. The study involved 41 test implants (with GBR) and 112 control implants (without GBR). The
cumulative implant survival rates reported were 93% (test group) and 97%
(Control group). It was concluded that implants placed with or without GBR techniques have comparable survival rates after 5 years, but that bone resorption was more pronounced in GBR sites. Furthermore, the authors emphasized that the use of GBR was indicated when the initial defect size was larger than 2 mm in a vertical dimension.
CONCLUSION
The replacement of multiple adjacent missing teeth in the anterior maxilla with fixed implant restorations is poorly documented. In this context, restoring esthetics is not predictable, particularly regarding the contours of the inter implant soft tissue.
Controlled clinical trials show that the respective overall implant survival and success rates are similar to those reported for other segments of the jaws. However, most of these studies do not include well-defined esthetic parameters. With anterior single-tooth replacement in sites without tissue deficiencies, predictable treatment outcomes, including esthetics, can be achieved because of tissue support provided by adjacent teeth.

## References:

1. Urs C. Belser, DMD, Prof Dr Med Dent1/Bruno Schmid, DMD2/Frank Higginbottom, DMD3/ Daniel Buser, DMD, Prof Dr Med Dent4: Outcome
Analysis of Implant Restorations Located in the Anterior Maxilla: A Review of the Recent Literature. INT J ORAL MAXILLOFAC IMPLANTS 2004; 19 (SUPPL):30–42
2. José Luis Calvo-Guirado, DDS, PhD, MS1/Antonio José Ortiz-Ruiz, DDS, PhD,MS2/Laura López-Marí, DDS3: Immediate Maxillary Restoration of Single-Tooth Implants Using Platform Switching for Crestal Bone Preservation: A 12-Month Study: INT J ORAL MAXILLOFAC IMPLANTS 2009;24:275–281.
3. Onder Solakoglu, Dr Med Dent, MCD Lyndon F. Cooper, DDS, PhD: Immediate Implant Placement and Restoration in the Anterior Maxilla: A Tissue Related Approach. Observations at 12 Months After Loading. Int J Periodontics Restorative Dent 2006;26: 571–579
4. Brånemark P-I, Adell R, Beirne U, Hansson BO, Lindstrom J, Ohlsson A. Intra-osseous anchorage of dental prostheses: Experimental studies.Scand J Plast Reconstr Surg 1969;3:81–100.
5. Schroeder A, Pohler O, Sutter F. Tissue reaction to an implant of a hollow cylinder with a titanium surface spray layer. Schweiz Monatsschr Zahnheilkd 1976;86:713–727.
6. Brånemark P-I, Hansson BO, Adell R, et al. Osseointegrated implants in the treatment of the edentulous jaw. Experience from a 10-year period. Scand. J Plast Reconstr Surg 1977;16 (suppl):1–132.
7. Araújo MG,Lindhe J. Dimensional ridge alterations following tooth extraction. An experimental study in the dog. J Clin Periodontol
2005;32: 212–218.
8. Araújo MG,Sukekava F,Wennström JL, Lindhe J.Tissue modeling following implant placement in fresh extraction sockets. Clin Oral Implants Res 2006;17:615–624.
9. Chen ST, Darby IB,Reynolds EC. A prospective clinical study of non submerged immediate implants: Clinical outcomes and esthetic results.Clin Oral Implants Res 2007; 18:552–562.
10.Berglundh T, Lindhe J. Dimension of the periimplant mucosa. Biological width revisited. J Clin Periodontol 1996;23:971–973.
11.Belser UC, Bernard JP, Buser D. Implant placement in the esthetic zone.
In: Lindhe J, Karring T, Lang NP (eds). Clinical Periodontology and Implant Dentistry, ed 4. Oxford: Blackwell Munksgaard, 2003:915-944.
12. Haas R, Mensdorff-Pouilly N, Mailath G, Watzek G. Survival of 1,920 IMZ implants followed up to 100 months. Int J Oral Maxillofac Implants 1996;11:581–588.

13. Eckert SE, Wollan PC. Retrospective review of 1170 endosseous implants placed in partially edentulous jaws. JProsthet Dent 1998;79 :415 –421.
14. Lindh T, Gunne J, Tillberg A, Molin M. A meta-analysis of implants in partial edentulism. Clin Oral Implants Res 1998;9:80–90.
15. Wyatt CL, Zarb GA. Treatment outcomes of patients with implant supported fixed partial prostheses. Int J Oral Maxillofac Implants 1998;13:204–211.
16. Grunder U, Polizzi G, Goene R, et al. A 3-year prospective multicenter follow-up report on the immediate and delayed immediate placement of implants. Int J Oral Maxillofacial Implants 1999;14:210–216.
17. Moberg LE, Kondell PA, Kullman L, Heimdahl A, Gynther GW. Evaluation of single-tooth restorations on ITI dental implants. A prospective study of 29 patients. Clin Oral Implants Res 1999;10:45-53.
18. Noack N, Willer J, Hoffmann J. Long-term results after placement of dental implants: Longitudinal study of 1,964 implants over 16 years. Int J Oral Maxillofac Implants 1999;14:748–755.

# Vestibular Extension By Edlan-Mejchar Technique Followed By Permanent Fibre Splinting - A Case Report

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ABSTRACT : Background: A 23 year old female patient presented with the complaint of loose lower front teeth and a missing lower front incisor. An extremely shallow vestibule was observed with marginal gingival recession in 31 and 41.

Methods: The mandibular labial vestibule was extended using the lip switch procedure or the Edlan-Mejchar technique. After adequate healing, the mobile mandibular anterior teeth were splinted with a fibre splint material. The missing 42 was replaced by bonding a prosthetic acrylic tooth to the splint.

Results: The procedure yielded a considerable gain in the width of the attached gingiva, which maintained itself even one year after the surgical procedure. Complete resolution of mobility was seen, leading to improved function of the mandibular anterior teeth.

Conclusions: Edlan-Mejchar technique leads to a consistent and predictable increase in the width of the attached gingiva and may be successfully used in the treatment of a shallow vestibule.

## INTRODUCTION

One of the main objectives of periodontal therapy is to achieve an area which permits an optimal level of oral hygiene. A shallow labial vestibule hampers the proper placement of a tooth brush. As a result, a decreased depth of the vestibule is often associated with plaque accumulation and consequently marginal gingival inflammation.

Such a situation is frequently encountered on the labial aspect of the mandibular anterior teeth. Many procedures have been advocated for the correction of this defect. The “denudation techniques” include the removal of all soft tissue within an area extending from the gingival margin to a level apical to the mucogingival junction, leaving the alveolar bone completely exposed1,5,11. Exposure of the alveolar bone often leads to its resorption10 and in some cases, severe postoperative pain. Due to these complications, the use of denudation techniques can hardly be justified.

With the “split flap” procedure, only the superficial portion of the oral mucosa within the wound area is removed, leaving the bone covered by periosteum6,7,8,12. Although the preservation of the periosteum implies that less severe bone resorption will occur than following the “denudation techniques”, loss of crestal bone height has been observed following this type of operation too unless a relatively thick layer of connective tissue is retained on the bone surface2.

In 1963, Edlan and Mejchar3 described a method for deepening the vestibule, which appeared to be particularly applicable to cases with little or no attached gingiva remaining, thus making apical positioning of the gingival tissues impracticable.

This paper describes the case report of a patient in whom vestibular extension was carried out by the technique described by Edlan and Mejchar to correct a shallow vestibule.

## METHODS

A 23 year-old female reported to the Department of Periodontology at Punjab Government Dental College and Hospital, Amritsar, complaining of two loose lower

front teeth and a missing lower incisor. The problem had developed gradually over a period of two years. Clinical examination revealed grade II mobility of 41 and grade I mobility of 31. Both of these teeth also had Miller's class III recession. In addition, 42 had been extracted around three months prior to presentation owing to severe mobility. The width of the attached gingiva was severely reduced, measuring just 2 mm (Figures 1a and 1b). After thoroughly reviewing the patient's clinical history and carrying out a detailed examination, a diagnosis of chronic generalised gingivitis with localised periodontitis in the region of the mandibular incisors was made. It was decided to carry out extension of the patient's mandibular labial vestibule to increase the width of attached gingiva. This would be followed by splinting of the lower anterior teeth and replacement of the missing 42.

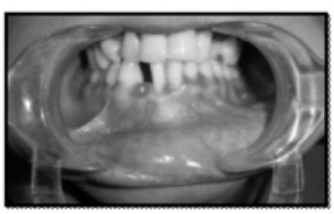


Fig. 1a

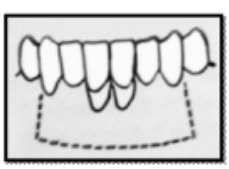


Fig. 1b

Preoperative view showing severely reduced width of attached gingiva

Initial therapy included patient education and motivation for adoption of stringent home plaque care measures, thorough scaling and root planing and occlusal correction. Routine blood investigations (blood glucose- fasting and post-prandial, haemoglobin, bleeding and clotting times, total and differential leukocyte counts, HIV and HBs antigen assays), and urine analyses were carried out.

## VESTIBULAR EXTENSION PROCEDURE:

Prior to the surgical procedure, a calibrated periodontal probe was placed on the labial aspect of the mandibular central incisors to measure the distance between the gingival margin and mucogingival junction. This measurement was recorded and repeated at various intervals postoperatively. The surgical procedure is described below:

Incision: Mesial to one of the mandibular canines and starting at the junction of the attached and free gingiva, an incision was made for a distance of 10 to 12 mm extending on to the lower lip. A similar incision was made corresponding to the other mandibular canine. These two incisions were joined by a horizontal incision across the midline (Figures 2a and 2b).

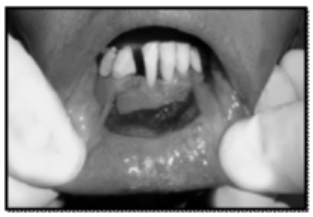


Fig. 2a

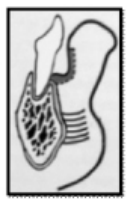


Fig. 2b

Two vertical incisions from mucogingival junction at both mandibular canines extending 10 to 12 mm on to lip mucosa. Vertical incisions were joined by a horizontal incision

Loose labial mucosa separated from underlying muscle: The mucosa included within this incision was reflected from the underlying muscular tissue using sharp dissection. This resulted in a loose flap of labial mucosa with its base on the gingiva (Figures 3a and 3b).

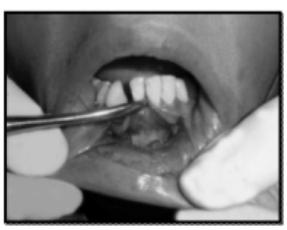


Fig. 3a

Figs. 3b, 3c

Lip mucosa separated from underlying muscle; Periosteum incised and separated from bone

Incision and reflection of the periosteum: The loose flap of labial mucosa was folded upward and a horizontal incision was made on the periosteum, which had now become visible. This incision was made so that it extended between the two initial vertical incisions mesial to the canines. The incision of the periosteum was extended in a vertical direction at its ends. The periosteum was then separated from the bone, forming a second flap with its base on the apical portion of the mandible (Figures 3a and 3c).

Transposition of the two flaps: The loose flap of labial mucosa was folded back and placed on the bone from which the periosteum had been removed. It was fixed with interrupted sutures to the inner surface of the

periosteum, which had been removed from the bone. The upper edge of the periosteum was also sutured to the mucous membrane of the lip to cover the area denuded by the reflection of the first (labial mucosal) flap (Figures 4a and 4b).

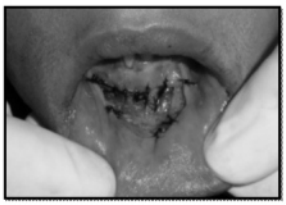


Fig. 4a

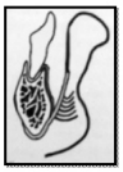


Fig. 4b

Periosteum placed over denuded area of lip and sutured;
Lip mucosa placed over bone and sutured to base of new vestibule

Placement of periodontal dressing and postsurgical management: A periodontal dressing was placed to protect the operated area. An antibiotic and anti-inflammatory were prescribed to the patient in addition to chlorhexidine rinses. Other postsurgical instructions included intermittent cold fomentation on the first postoperative day, soft/liquid diet for one week, and maintenance of good oral hygiene. The patient was asked to return after one week for review.

Postoperative recall: The one week postoperative examination revealed excellent healing (by first intention) and a considerable gain in the width of the attached gingiva and depth of the vestibule (up to 7 mm) (Figure 5a). The patient was subsequently placed on a recall programme and her periodontal condition was periodically reviewed. No loss of width of the attached gingiva was observed throughout the recall programme (Figures 5b, 6a, and 6b).

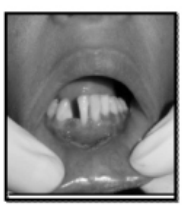
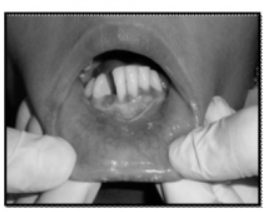
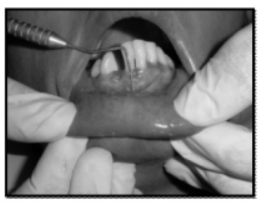


Fig. 5a: ONE WEEK POST-SURGERY

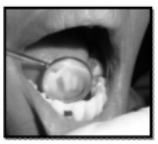
Fig. 5b: TWO WEEKS POST-SURGERY

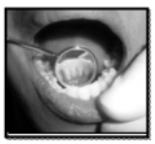


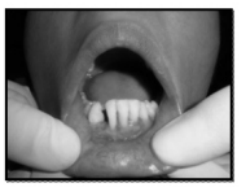


Figs. 6a and 6b: FOUR MONTHS POSTOPERATIVE

MANAGEMENT OF MOBILE MANDIBULAR INCISORS: The mobile lower incisors were stabilized using a permanent fibre splint (RibbondTM). A 1 mm deep recess was prepared with a high speed bur on the lingual aspects of the lower anterior teeth extending from just distal to the midline of one canine to the other. After appropriate etching and application of a bonding agent, composite resin and fibre splinting material were placed in the recess and light curing was done. This completed the process of stabilization of the patient's mobile teeth (Figures 7a to c).







Figs. 7a, b, and c: After splinting of mandibular incisors-labial and lingual views

## REPLACEMENT OF MISSING 42

In order to replace the missing 42 and at the same time achieve desirable aesthetics and function, it was decided to bond a prosthetic acrylic pontic of the appropriate shade and size to the fibre splint. For this purpose a recess was prepared on the lingual aspect of an acrylic tooth. The recess was also extended on to the proximal surfaces of the prosthetic tooth. Some light cured composite resin was placed in this recess. The tooth was then placed against the fibre splint so as to align it with the rest of the teeth in the arch. Excess composite resin was removed. The remaining resin was light-cured. Thus an aesthetically acceptable replacement of the missing mandibular incisor was accomplished (Figure 8).

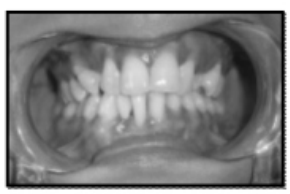


Fig. 8: 42 replaced by bonding prosthetic tooth to splint with light cured resin

## DISCUSSION

The technique of vestibular extension used for the present case may be described as a modification of that described by Kazanjian in 19244 for deepening the mandibular labial vestibule in preparation for a complete denture prosthesis. The advantage of this technique is that healing occurs by first intention and no bone is left exposed, thereby minimizing the chances of bone resorption and further recession. In the present case, an excellent clinical result was obtained which was maintained even one year after surgery. A peculiar feature observed during healing was the formation of two fibrous bands on the inner aspect of the lower lip. However, these bands did not lead to contraction of the lip or any functional impediment of the patient. This finding is consistent with the observations of Wade (1969)9. The author performed this technique in 25 patients and observed the events of healing clinically. In the present case, as also seen in the series of Wade, the fibrous bands began to resolve by the sixth postoperative month and were almost completely absent at the one year recall appointment.

Thus, based on the findings of the present case it can be concluded that in cases with a shallow vestibule and a reduced width of attached gingiva on the labial aspect of the mandibular anterior teeth, the technique advocated by Edlan and Mejchar provides a predictable way in which gingival health can be achieved and maintained.

## REFERENCES

1. Corn H: Periosteal separation – its clinical significance, J Periodontol 33: 140–152, 1962.
2. Costich ER, Ramfjord SF: Healing after partial denudation of the alveolar process, Journal of Periodontology 39, 5–12, 1968.

3. Edlan A and Mejchar B: Plastic surgery of the vestibulum in periodontal therapy, Int Dent J 13: 593-596, 1963.

4. Kazanjian VH: Surgical operations as related to satisfactory dentures, Dent Cosmos 66: 387-395, 1924.

5. Ochsenbein C: Newer concept of mucogingival surgery, J Periodontol 31: 175–185, 1960.

6. Pfeifer JS: The reaction of alveolar bone to flap procedures in man, Periodontics 3: 135–140, 1965.

7. Staffileno H, Levy S, Gargiulo A: Histologic study of cellular mobilization and repair following a periosteal retention operation via split thickness mucogingival surgery, J Periodontol 37: 117–131, 1966.

8. Staffileno H, Wentz F, Orban BJ: Histologic study of healing of split thickness flap surgery in dogs, J Periodontol 33: 56–69, 1962.

9. Wade AB: Vestibular deepening by the technique of Edlan and Mejchar, J Periodont Res 4: 300-313, 1969.

10.Wilderman MN, Wentz FM, Orban BJ: Histogenesis of repair following mucogingival surgery, J Periodontol 31: 283-299, 1961.

11.Wilderman MN: Exposure of bone in periodontal surgery, Dent Clin North Am March: 23–26, 1964.

12 Wilderman MN: Repair after a periosteal retention procedure, J Periodontol 34: 484–503, 1963.

# DENTAL CARE FOR SENIOR CITIZENS

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ABSTRACT

Throughout the world, the number of senior citizens which is synonymous with older adults above the age of 65 years is increasing, and these individuals are retaining natural teeth for longer period. This population has unique problems that necessitate alteration in their treatment plan. Thus, it has proportionately increased the challenge of dental profession for maintaining oral health of this ageing population. Longer they live more dental and periodontal diseases they accumulate and seek dental care. The ageing dental patients have particular dental and general health conditions that the dentist must be familiar with for proper diagnosis and treatment. The reduced manual dexterity of this group of population makes it difficult for him to perform regular oral hygiene practices efficiently. Many systemic factors are also responsible for this reduced efficiency. The importance of medical and dental history cannot be ignored. Many medical diseases that occur more often with age may require modifications to dental preventive as well as curative treatment planning.

## INTRODUCTION

The purpose of this article is to provide readers with information on the interrelationship between ageing and oral health. The term senior citizen is synonymous with older adults above the age of 65 years and is used by many in the literature. Ageing does not cause disease; however, age is associated with more disease. Jim Beck stated this association during 1996 World Workshop on Periodontics: saying “It may be that risk factors do change as people age, or at least the relative importance of risk factors change.” The growth in the older population is result of the dramatic increase in life expectancy during the past century.

Despite advances in modern medicine that have increased life expectancy, the number of senior citizens with acute and chronic diseases also continues to increase. Visual impairment, cataract, glaucoma, and hearing impairments etc. increase in frequency with advancing age. Hypertension, heart diseases, diabetes, arthritis, sinusitis etc. also affect a large population of senior citizens. Advancing age puts many senior citizens at risk for a number of oral health problems also. Some of them are:

Darkened teeth. These are caused to some extent by changes in dentin, that underlies the tooth enamel and by having consumed stain causing foods and beverages throughout lifetime.

Dry mouth. Dry mouth is caused by reduced salivary flow with advancing age which can even be a result of cancer treatment that use radiation to the head and neck area. Certain diseases, such as Sjögren's syndrome and other medications also lead to reduced salivary flow and cause dry mouth.

Diminished sense of taste. While advancing age impairs the sense of taste, some diseases, medications and artificial dentures also contribute to this sensory loss.

Root caries. This is caused by exposure of the roots of teeth to decay causing acids. These roots of teeth become exposed as gingival tissue recedes apically.

Gingival disease. These are caused by plaque and made worse by food particles left in and around teeth. Use of tobacco products, poor-fitting bridges and partial dentures, poor diet, and certain diseases such as anemia, cancer, hypertension and diabetes are often a problem for senior citizens.

Tooth loss. Besides dental caries, Gingival and periodontal diseases are leading cause of tooth loss among senior citizens.

Uneven alveolar bone. This is caused by untimely loss

of teeth in various quadrants of maxilla and mandible.

Denture-induced stomatitis. Ill-fitting dentures, poor oral hygiene, or a buildup of the fungus cause this condition which is inflammation of the tissue underlying a denture.

Thrush. Diseases or drugs that affect the immune system can trigger the overgrowth of the fungus Candida albicans in the mouth and cause thrush.

Age in itself is not a dominant or sole factor in determining oral health. However, certain medical conditions such as arthritis in the hands and fingers may make brushing or flossing teeth difficult or impossible to perform. Medications which are taken on regular basis can also affect oral health and make a change in his dental treatment plan necessary.

## ORAL HYGIENE TIPS FOR SENIOR CITIZENS

Dental plaque causes most common dental diseases such as dental caries and periodontal disease. Daily brushing and flossing of natural teeth is essential to keeping them in good oral health. Plaque can build up quickly on the teeth of seniors, especially if oral hygiene is neglected leading to tooth decay, gingival and periodontal disease. Anti plaque agents in the form of mouthwashes can be used as adjunct to mechanical plaque control methods. For evaluation of self administered plaque control measures, disclosing agents can be used periodically, may be weekly or fortnightly. To maintain good oral health, it is important for all individuals regardless of age to:

Brush at least twice a day with a fluoride-containing toothpaste

Floss all inter dental areas at least once a day

Visit dentist on a regular basis at least once in 6 months for an oral examination as well as oral prophylaxis

What Senior Citizens Can Expect During An Oral Examination

A senior citizen reporting to the dentist for an oral checkup examination should be seated comfortably to conduct a thorough medical/ dental history and clinical examination. It should include past restorative, other dental and periodontal treatment; head and neck cancer and its treatment; allergies, oral hygiene technics and frequency; use of tobacco and alcohol etc. The questions asked during dental history should also include:

When he last visited dentist and for what ailment?

Has he noticed any recent changes in his mouth?

Has he noticed any loose or sensitive teeth?

Has he noticed any difficulty in tasting, chewing, or swallowing?

Has he any pain, discomfort, sores, or bleeding in his mouth?

Has he noticed any lumps, bumps, or swellings in his mouth?

During oral examination, the dentist should check the following:

Face and neck for skin discoloration, moles, sores etc.

Bite for any problems while teeth come together.

Jaws for signs of clicking in the temporo-mandibular joint.

Lymph nodes and salivary glands for any sign of swelling or lumps.

Cheeks mucosa for infections, ulcers, traumatic injuries.

Tongue, floor of the mouth, soft and hard palate for any ulcer/growth .

Gingival tissue for signs of infection or enlargement.

Teeth for wear and tear, decay, condition of

If dentures or other appliances are worn, the dentist should ask

about when he wears and takes out denture, if removable.

He will also look for any irritation or problems in any area in the mouth that the appliance touches, and examine the denture or appliance itself looking for any worn out or broken areas.

## MAINTENANCE OF ORAL HEALTH IN SENIOR CITIZENS

The most important factor determining a successful outcome of dental treatment is plaque control and frequency of oral examination and professional oral prophylaxis. Advancing age does not decrease

requirement of plaque control; however senior citizens may have difficulty in performing adequate oral hygiene because of compromised health and mental status, medication, or altered mobility and manual dexterity. They may change tooth brushing habits due to disabilities such as hemiplegia secondary to CVA, visual difficulties, dementia, and arthritis etc. In this situation, lightweight electric-powered toothbrushes may be more beneficial than manual toothbrush. To compensate for the impairment of motor skills secondary to disease or injury, interproximal brushes or wooden toothpicks can be of immense help instead of flossing.

Those persons who are unable to adequately remove plaque secondly to disease or disability may benefit from anti plaque agents such as chlorhexidine and Listerine etc. 0.2% concentration of chlorhexidine has been used for many years as a preventive and therapeutic agent. Chlorhexidine binding to oral structures results in substantivity. It is either bacteriostatic or bactericidal depending upon its dose. Some adverse effects of chlorhexidine include; increase in calculus formation, dysgeusia and staining of teeth. Therefore, it should be used for shorter periods. It is particularly useful in persons taking phenytoin, calcium channel blockers, or cyclosporine and are at risk of gingival hyperplasia. Those who do not tolerate taste of chlorhexidine may use Listerine comfortably.

Fluoride is another cavity fighter used universally. Fluoride's effects are:

Reduced enamel solubility.
Promotion of remineralisation of early carious lesions.
Bactericidal property affects metabolic process of bacterial plaque.

Topical fluorides are recommended for the prevention and treatment of dental caries. Most of the commercially available tooth pastes contain 1000-1250 ppm fluoride ions. Professionally applied fluoride gels, foam, and varnish products contain between 9050 to 22,600 ppm fluoride ions.

## CONCLUSION

Future oral health care trends will see increased number of senior citizens seeking dental treatment. Dental practitioners of twenty-first century should be comfortable providing comprehensive dental care for this segment of population. Aging dental patients have particular oral and general health conditions that dentists should be familiar with detecting, consulting and treating. Medical diseases which occur more often with age may require modification to dental preventive tools as well as for planning and treatment phase of dental care.

## REFERRENCES

1.Beck JD: Periodontal implications: Older adults. Ann Periodontol 1996;1;322
2. Burt BA, Eklund SA: Dentistry, Dental practice, and the Community. Philadelphia, Saunders, 1999.
3. Fedele DJ, Jones JA, Niessen LC: Oral cancer screening in the elderly. J Am Geriatric Soc 1991; 39(9):920
4.ADA Guide to Dental Therapeutics, Ed 2. American Dental Association. Chicago, ADA Publishing, 2000.
5. Wennstrom JL: Treatment of periodontal disease in older adults. Periodontology 2000 1998; 16: 106.
6. Gupta SC: Biochemistry of plaque. Library thesis submitted in University of Lucknow, 1975
7. Wells LM, Kolavic S, Niessen LC, et al: Caring for older adults: maintaining oral health for lifetime. In: Hardin JF: Clark's Clinical Dentistry, Vol 1Philadelphia, JB Lippincot, 1996
8. Carrenza FA: Clinical Periodontology. Ed. 10, Saunders 2006

# Plasma Cell Gingivitis - A Case Report

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## Introduction

Plasma Cell Gingivitis is a rare benign inflammatory condition of unknown etiology, clinically characterized by sharply demarcated erythematous and edematous gingiva extending to mucogingival junction. Plaque control and conventional periodontal therapy are not of much help1.

Plasma Cell Gingivitis is a hypersensitivity reaction to some antigen, often flavoring agents or spices1. Over the years, case reports of plasma cell gingivitis have appeared in the dental literature. In the 1940s and 1950s, several cases of mucosal hypersensitivity and cheilitis secondary to the use of chewing gum were described. 2,3

Kerr et al.4 reported a case of Plasma Cell Gingivitis in 1971 resulting from an allergic reaction to one of the flavoring agents cinnamon in chewing gums. Hypersensitivity reactions to cinnamonaldehyde component of toothpaste has also been reported.5

Plasma Cell Gingivitis mimics lesions associated with discoid lupus, lichen planus, cicatricial pemphigoid, leukemia and myeloma, thus an early diagnosis in such cases is vital in patient's interest4,5 The diagnosis of Plasma Cell Gingivitis requires hematological screening in addition to clinical and histopathological examinations.

Histological picture shows stratified squamous epithelium showing an edematous pseudo hyperplasia. The underlying connective tissue is replaced by a population of cells predominantly made up of plasma cells which are identified by the eccentric nuclei (cartwheel appearance)2.Hence Plasma Cell Gingivitis gets its name.

Plasma Cell Gingivitis is known by a variety of other names such as atypical gingivostomatitis, plasmacytosis, idiopathic gingivostomatitis, and allergic gingivostomatitis3.

This case report outlines a case of Plasma Cell Gingivitis which was brought on by the use of herbal tooth paste.

## Case Report

A 15-year old female was presented to the department of Periodontology and Oral Implantology, at ITS-CDSR, Ghaziabad (U.P) with a chief complaint of red, swollen gums. Clinically, patient presented with severe inflammation of the gingival tissues from the free gingival margin to the mucogingival junction in both the maxillary and mandibular arches (Fig 1&2). Heavy plaque accumulation was present around the teeth, and gingival bleeding occurred with the slightest provocation. There was a negative Nikolsky sign (blister formation) with no cutaneous lesion.

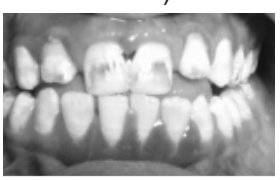

Fig 1

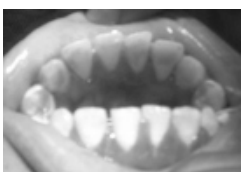

Fig:2

The patient exhibited a slight loss of clinical attachment with respect to maxillary and mandibular incisors. Patient had neither any medical history nor reported a history of mouth breathing or the use of chewing gum. Only relevant history patient gave was a recent change to new herbal toothpaste. Provisional Diagnosis of chronic generalized gingivitis was given. Initial Periodontal therapy comprising of scaling and root planing and oral hygiene instructions were given. Patient was also instructed to rinse with 0.2% chlorhexidine twice daily.

The appearance of the gingiva improved in the second sitting after 7 days, but the gingiva was still severely erythematous. The erythema was disproportionate to the amount of plaque and calculus remaining on the dentition. (Fig. 3&4)

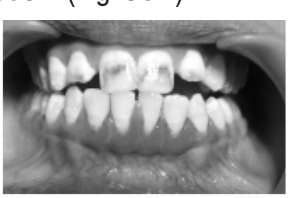

Fig:3

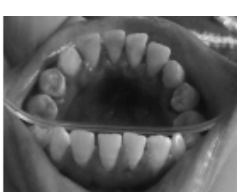

Fig:4

Since the removal of local etiologic factors did not resolve the gingivitis, a decision was made to biopsy the affected tissue and to get the hematological tests done. Gingival tissue was removed from the interdental papilla between the mandibular right lateral incisor and canine and processed for histopathologic examination. A blood specimen was obtained in order to rule out leukemia or other blood dyscrasias. Till the report was awaited patient was asked to change the tooth paste in her daily regimen for a period of 2 weeks. The histopathological report disclosed stratified squamous epithelium showing an edematous pseudo hyperplasia. The surface of this epithelium shows in some areas discontinuities with pooling of RBCs. The underlying connective tissue was replaced by a population of cells predominantly made up of plasma cells which are identified by the eccentric nuclei (cartwheel appearance). These plasma cells were concentrated around tiny blood vessels and were also layered in a pattern of sheets and nests.(Fig:5&6).

A minute, presence of other inflammatory cells were seen juxtaposing the peripheries of lesion. The blood investigation report was within normal range. Thus, confirming the diagnosis as Plasma Cell Gingivitis.

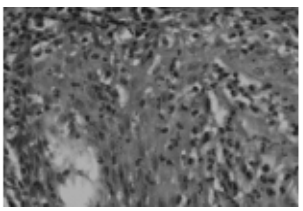

Fig:5

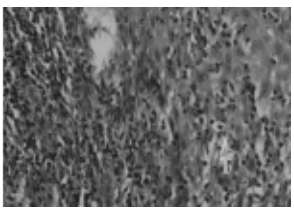

Fig:6

Eventualy in the third sitting scaling and root planing were done for the patient again Patient was adviced to discontinue the herbal tooth paste. Strict oral hygiene instructions were given along with it patient was adviced topical application of Fucibet atleast three times a day for two weeks. After two weeks the lesion had regressed.(Fig :7).

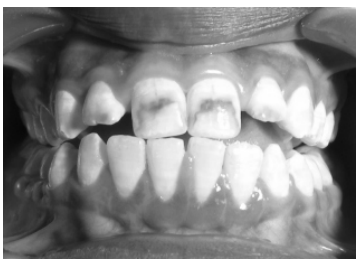

Fig:7

Allergen in this case was herbal tooth paste which was confirmed when patient came back after three months, with erythematus gingiva, and giving a history of re use of the same tooth paste since a month. Patient was adviced to discontinue its use. In next follow up after two weeks lesion had subsided.

## Discussion

Plasma Cell Gingivitis is a rare condition characterized by diffuse and massive infiltration of plasma cells into the connective tissue. 5 Clinically, the condition presents as a diffuse reddening together with edematous swelling of the gingiva, with sharp demarcation along the muco-gingival border. The etiology of Plasma Cell Gingivitis is not clear, but due to the presence of plasma cells many authors are of the opinion that it is an immunological reaction to allergens.5,6

The case presented here highlights the adverse effects and irrational use of herbal dentifrices. This case also illustrates the need to explore patient's individual background and habits when several possible etiologic agents have been eliminated and the desired clinical result is not obtained with conventional therapy.3 The differential diagnosis of the condition is very important because of its similarity other aggressive conditions.4

Most cutaneous disorders were eliminated from consideration by the lack of skin lesions and a negative Nikolsky sign. However, the patient's failure to respond appropriately to initial periodontal therapy necessitated a biopsy of the involved tissue. The histopathological picture revealed replacement of underlying connective tissue by a population of cells predominantly made up of plasma cells thus indicating the diagnosis7, 8. Once the diagnosis of Plasma Cell Gingivitis is made the screening for the various antigenic substances should be done. In this case the only relevant history patient gave was the use of a herbal toothpaste (allergen in this case).

The case presented here highlights the adverse effects and irrational use of herbal agents in dentifrices. Thus, emphasizing the need for comprehensive history taking, examination, and appropriate diagnostic tests in order to arrive at a definitive diagnosis and treatment plan for gingival conditions which are refractory to conventional therapy.

## References :

1.Francis G. Serio, Michael A. Siegel, Brenda E. Slade. Plasma Cell Gingivitis of Unusual Origin. A Case Report. JP,1991 Jun (390 - 393).
2.Newcomb GM, Seymour GJ, AdkinsKF: An unusual form of chronic gingivitis: an ultrastructural, histochemical and immunologic investigation. Oral Surg 53:488,1982.
3.Bhaskar SN, Levin MP, Frisch J: Plasma cell granuloma of periodontal tissues: report of 45 cases, Periodontics 6:272,1988.
4.Kerr DA, Mc Clatchey KD, Regezi JA. Idiopathic gingivostomatitis Cheilitis glossitis, gingivitis syndrome: atypical gingivostomatis, plasma cell gingivitis,plasmacytosis of gingival. Oral Surg Oral Med Oral Pathol 1971; 32(3): 402-423.
5.Allen CM, Blozis, GG. Oral mucosal reactions to cinnamon-flavored chewing gum. J Am Dent Assoc 1988;116:664-667.
6.Owings JR. An atypical gingivostomatitis: A report of four cases. J Periodontol 1969;40:538-542.
7.Macleod R I, Ellis J E. Plasma cell gingivitis related to the use of herbal tooth-paste. Br Dent J 1989; 166: 375-376.
8.Lubow RM, Cooley RL, Hartman KS, McDaniel RK. Plasma-cell gingivitis. Report of a case. J Periodontol 1984;55:235-241.

# Treatment of Mandibular First Premolar with Type IV Root Canal : A Case Report

* Dr. N.P. Gupta, ** Dr. Rajinder Bansal, *** Dr. Manu Bansal

## Introduction

Root canal therapy requires a thorough knowledge of root canal morphology to adequately clean and shape the canal system. It is generally recognized that the incomplete instrumentation and cleaning of root canals will lead to endodontic failure. Frequently root canals are left untreated because the clinicians fail to identify their presence, particularly in teeth that have anatomical variations or additional root canals (Slowey 1979), before the root canal treatment is performed. Therefore, the clinician should be aware of the configuration of the pulp space of the tooth that is to be treated.

As a group, the mandibular premolars are very difficult to treat; they have a high flareup and failure rate. A possible explanation may be the extreme variations in root canal morphology in these teeth i.e. frequent existence of an extra canal. The bifurcation of second canal may occur in the mesiodistal dimension or the buccolingual dimension and in different levels of the roots. Sudden narrowing or disappearance of the root canal indicates the presence of bifurcation in the main canal in the buccolingual direction.

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## CASE REPORT

A 22 year old girl reported to the Department of Conservative Dentistry & Endodontics, Guru Nanak Dev Dental College, Sunam with complaint of pain and swelling in the mandibular right posterior region. Extra oral examination showed diffuse swelling on lower right side of the face, while intra oral examination revealed diffuse swelling obliterating the sulcus and presence of sinus in 44 region. The tooth was tender on percussion and exhibited grade 1 mobility. IOPA radiograph of 44 revealed a radiolucent area periapically, a large single canal upto the middle third of root, and suddenly bifurcating into two fine canals one mesially and one distally. (Figure 1)

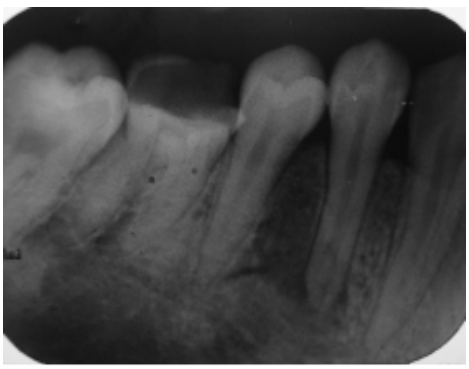

Figure 1

Vitality test showed that the tooth was non vital. Access was gained without giving any local anaesthesia. The orifice of canal was explored with no.15 K file. Once one canal was located, the file was left in the canal and another file number 10 K file was used to locate the other canal. The working length radiograph was taken (Figure 2) and the tooth was left open for drainage. Patient was advised to take antibiotics and warm saline rinses.

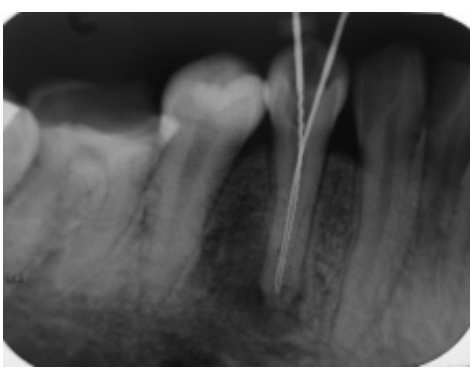

Figure 2

Patient was recalled after 2 days. Patient returned without pain and swelling. Biomechanical preparation was done and canals were prepared upto size 30. The canals were irrigated with saline and 0.2% chlorhexidiene. The canals were then dried with

sterilized paper points, and calcium hydroxide dressing was given in the canals and the access was closed with Cavit. Patient was recalled after 3 weeks. When patient returned she was totally comfortable and sinus was healed. So Cavit was removed and canals were irrigated and dried. The root canals were then obturated with zinc oxide eugenol sealer and laterally condensed gutta percha. Both the canals were filled simultaneously. (Figure 3)

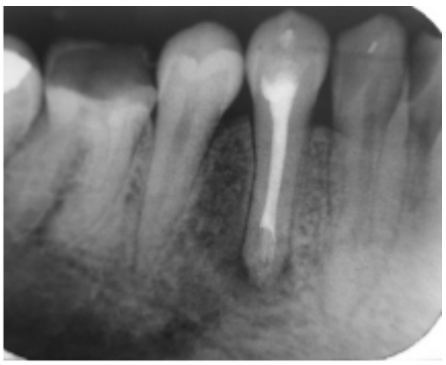

Figure 3

## DISCUSSION

Brescia considered that morphology of first mandibular premolar was the most variable in the entire dentition. Vertucci (1978) reported that mandibular first premolar having type I canal in 70% cases, type II canal in 4% cases and type III in 1.5% cases while type IV canal present in 24.0% of the cases. In type IV canal, root canal bifurcated in the apical third region and thus showed two foramina.

Hence, it is recommended that clinicians should consider a thorough assessment of radiographs before treatment of mandibular premolars and have a true concept of the number of root(s) and canal(s). Special attention must be given to the preparation of a correct access cavity that is the key to finding all orifices and a successful treatment. The concept of mandibular premolars with one canal should not be considered as a rule.

## References:-

1.Bellizzi, R. And Hartwell, G. : Evaluating the maxillary premolar with three canals for endodontic therapy. J.Endo: 7, 521-7, 1981.

2.Brescia, N.J., Applied Dental Anatomy, S.T.Louis, C.V.Mosby, pp.48,1961.

3.Bystrom, A., Claesson, R. And Sundqvist, G.: The antibacterial effect of camphorated phenol and calcium hydroxide in the treatment of infected root canals. Endodontics and dental Traumatology: 1, 170-5, 1985.

4.Stabholz, A., Zach, A. And Freidman, S.: Endodontic treatment of bifuracated mandibular premolars. Quint. Int.:4,301-302,1985.

5.Trope, M., Elfenbein, L.& Tronstad, L.: Mandibular premolars with more than one root canal in different race groups. J Endo.:12,343-345,1986.

6.Vertucci, F.J.: Root canal morphology of mandibular premolars. J.Am.Dent.Assoc.: 97,47-50, 1978.

# Dentine Hypersensitivity – A new vision on an old problem

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## Introduction

Dental hypersensitivity may be defined as pain arising from exposed dentine, typically in response to tactile, thermal, chemical, or osmotic stimuli that can not be explained as arising form any other form of dental defect or pathology. Numerous desensitising agents have been tried and used in the history of dentistry to alleviate the pain from hypersensitive dentine.

There are various desensitizing agents and techniques used for the treatment of dentinal hypersensitivity. The mode of delivery of these desensitizing agents on to the tooth surfaces can be in various forms such as dentifrices, gel, varnishes, tooth mousse, and solutions which taken longer time to act and reduce the hyper sensitivity only after multiple applications. Hence, search of medicament or the technique which can give an immediate and long lasting relief is necessary.

## What is dentin hypersensitivity?

Dentin hypersensitivity is often described as "short, sharp pain arising from exposed dentin in response to stimuli, typically thermal, evaporative, tactile, osmotic, or chemical and which cannot be ascribed to any other form of dental defect or pathology."[1]

Ruling out other possible causes of tooth pain is essential before making a diagnosis of dentine hypersensitivity. The short, sharp pain of hypersensitivity generally disappears when the stimulus is removed and can be differentiated from the other sources of pain described as severe, intermittent, throbbing, and elicited by chewing, or occurring without provocation. A thorough assessment of symptoms and clinical findings assisted by diagnostic aids and tests can, by ruling out the presence of other conditions, confirm a diagnosis of hypersensitivity.

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## Aetiology & pathology of dentin hypersensitivity: [1]

Except for sensitivity associated with tooth bleaching or other tooth pathology, the cause of dentin hypersensitivity is exposed dentinal tubules as a result of gingival recession and subsequent loss of cementum on root surfaces. The dentinal tubules contain the protoplasmic projections of cells called odontoblasts within the pulp chamber. These cells contain nerve endings and when disturbed, depolarize giving neural discharge which is interrupted as pain. The pain has a rapid onset and is usually of short duration, but it can persist as a dull ache. The most widely accepted theory of how pain occurs is "Brannstrom's hydrodynamic theory of dentine hypersensitivity" which postulates that pain results from indirect neural stimulation caused by dentinal fluid movement in odontoblast.

## Which teeth are affected?

Most oral health professionals know intuitively which teeth are most often sensitive. Canine and first premolar seems to exhibit sensitivity most frequently, followed by incisors, second premolars, and then by molar teeth.[2,3] The area most often affected is the buccal aspect of the tooth.4 Recession is primarily a buccal phenomenon since brushing is usually more vigorous at bucco – gingival surfaces.5 Recession, hypersensitivity and tooth brushing are linked, although the relationship is still not clearly established.

Requirement for an ideal desensitizing agent

Grossman (1935)6 suggested the following requirements for an ideal desensitizing agent or technique: 1) it should be non irritant to the pulp, 2) relatively painless on application, 3) easily applied, 4) rapid in action, 5) effective for a long period, 6) without staining effects and 7) consistently effective.

## Management of dentine hypersensitivity:

Therapies employed to relieve this condition have been classified into: a) anti-inflammatory drugs like corticosteroids, b) protein precipitant – formaldehyde (formalin), silver nitrate and strontium chloride hexahydrate, c) tubular occluding agents like aluminium lactate, brushing with sodium fluoride, kaolin and glycerine paste, ferric and aluminium oxalate, fluoride iontophoresis, sodium monofluorophosphate, stannus fluoride, nicomethanol hydrochloride, potassium nitrate, potassium chloride and potassium oxalate, cyanoacrylate, d) tubular sealants e.g. Resins and adhesive bonds and e) miscellaneous like lasers, prosthodontic rehabilitation etc.

After making proper diagnosis of hypersensitivity the following treatment options can be tried –

1. home care
2. professional care
3. Combination of 1 &2
4. Home care:

Home care procedure should be emphasised as a primary factor when initiating treatment of sensitivity. Discuss diet with the patient if necessary to eliminate foods that are acidic or sour and fermentable carbohydrate which can produce acids in plaque. Gedelia et al. (1978) indicated tooth sensitivity can improve with a change in oral hygiene procedures.
A number of desensitising tooth paste, tooth mousse or cream and oral rinses are available.

Tooth pastes are made of 5% potassium nitrate, 10% strontium chloride & sodium nitrate or multi ingredient tooth paste made up of by a combination of more than two components. They are used twice daily. (Fig. 1)


FIG 1: DESENSITISING TOOTH PASTE & TOOTH MOUSSE

Tooth Mousse is water based, sugar free cream containing Recaldent, CPP-ACP (Casein phosphopeptide – Amorphous Calcium Phosphate). When CPP-ACP is applied to the tooth surface for 15 days, it exerts a rapid desensitizing effect on the teeth. (Fig. 1)

Mouth rinses are sodium fluoride based, available in two concentrations.
0.2% NaF(900ppm) are usually recommended for 1 or 2 times weekly while 0.5%NaF(220-250ppm) rinses are recommended for use 1 or 2 times daily. (Fig. 2)

FIG 2: DESENSITISING ORAL RINSES

## Professional Methods & Products:

Initial preparation of teeth must be done before any desensitising agent is professionally applied. Teeth must be free of hard and soft deposits, dried and isolated prior to treatment.

Formalin (40%): It is claimed to precipitate albumin or denature tome' s fibres. A cotton pellet is rubbed into the sensitive area. A Porte polisher is used to continue rubbing for a defined time period. The agent should not touch the mucosa, since a reaction (precipitation of protein with the tissues) will occur resulting in soft tissue irritation.

Silver nitrate: It is a powerful protein precipitant and denatures Tome' s fibres. This solution is applied directly to the sensitive area alone or in combination with formaline/eugenol with the precipitation of elemental silver. However, silver salts can diffuse trough the dentine and pulp leading to minor pulpal inflammation and tooth discoloration.

Potassium nitrate: It desensitises the nerve. The potassium nitrate molecule penetrates through the dentinal tubule to the nerve and then depolarizes, thereby, preventing it from sending pain signals to the brain.7

Solution of 40% zinc chloride and 20% potassium

ferrocynide: They are used in a two step process resulting in protein precipitation and desensitisation of Tome's fibres.

Method of application: The solution of zinc chloride is applied with moist cotton pellets or Porte polisher with the use of unwaxed floss or tape. Zinc chloride is rubbed vigorously on the interproximal surfaces and allowed to remain on the tooth for one minute excess solution is removed from the gingival margin while the tooth is still moist. The second solution of potassium ferrocynide is applied. This solution is rubbed vigorously until a white precipitate forms. Again dental floss is worked interproximaly. One minute is allowed for the reaction to occur and then the excess is removed from the gingival margin.

Fluoride gels and solution: The teeth should be scaled and stains removed prior to fluoride treatment. If a specific tooth is sensitive fluoride can be burnished into the area with a Porte polisher.

1) Sodium silico fluoride: Saturated solution containing 0.7% in cold water. The preparation is rubbed into sensitive areas for 5 minutes. A calcium gel is formed and stated to be improved insulating barrier. 8, 9

2)Stannous fluoride: containing 8.9% stannous ion is used, during prophylaxis the paste is being rubbed into sensitive areas preferably with a Porte polisher.

In all fluoride treatment the suggested regimen is to apply the material at weekly intervals at least three times to obtain optimum results.10

Multi-Ingredient toothpaste: New desensitising toothpaste is available that contains the following ingredients-

a) 5%Poassium nitrate
b) 0.7%Sodium monoflourophosphate
c) 0.3%Triclosan

Potassium nitrate works on the principle of Nerve Desensitization. It is the only product approved by ADA and FDA. It is theorized that potassium nitrate penetrate through the dentinal tubules to depolarize the nerve and prevents it from repolarizing, thereby, preventing it from sending pain signals to the brain.

Sodium monoflourophosphate acts by occluding open tubules and thus preventing the fluid shift in the dentinal tubules and thus reducing sensitivity.

Triclosan (2, 4, 4-trichloro-2-hydroxydiphenylether) is a broad spectrum non-ionic antimicrobial agent which is effective against most types of oral cavity bacteria. Thus triclosan inhibits plaque formation thereby maintaining oral hygiene.

Tooth mousse or cream: It was introduced in 2002. It has quickly become a favourite with the dental professionals as a topical coating for the teeth. It reduces the sensitivity remarkably. It is available in different flavours.

Tooth Mousse is water based, sugar free cream containing Recaldent, CPP-ACP (Casein phosphopeptide – Amorphous Calcium Phosphate). When CPP-ACP is applied to the tooth surface, it binds to bio films, plaque, bacteria, hydroxyapatite and surrounding soft tissue localizing bio available calcium and phosphate. Saliva enhances the effectiveness of CPP-ACP and the flavour helps stimulate salivary flow.

Tooth mousse exerts a rapid desensitizing effect through immediate protein binding followed by deposition of calcium and phosphate compounds within the exposed tubules.

Method of application:

1)Remove excess saliva on the surface with a cotton pellet.
2)Apply a generous layer of Tooth Mousse to the tooth surfaces with an applicator swab or gloved finger. In difficult interproximal places, use an interproximal tooth cleaning brush.
3)Leave it undisturbed for 3 minutes. Avoid expectoration or swallowing.
4)Ask the patient to gently rinse after 3 minutes. Alternatively, it is safe to swallow the paste.

Total duration of treatment is two weeks.

Glucocorticoids: Steroid (prednisolone) was successful in reducing thermal sensitivity (Mosteller, 1962). Steroid application to dentine increases peritubular dentine mineralization; lumen would be

decreased resulting in less dentine tubule fluid movement (Mjor, 1967).

Resin impregnation: Fine particle hybrid resin composites or compomers are used.

## Method of application -

Tooth is isolated..The area is dried with a continuous air spray for 20 seconds. Surrounding enamel is acid etch with 45% orthophosphoric acid for 45 seconds. The tooth is washed and dried. The dentine bonding agent is applied and light cure for 10 sec. which enters into the tubules through capillary and reactive forces. The hybrid composite resin is applied incrementally to close the defect and light cure until it hardens (40 sec). (Fig. 3)

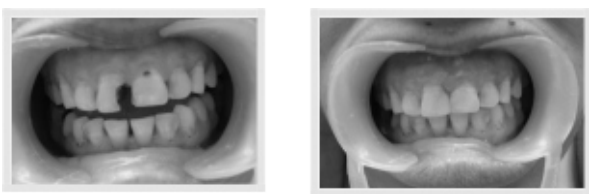


FIG 3: HYPERSENSITIVITY TREATED WITH LIGHT CURE

## Mouthguards

The use of a mouthguard type appliance to deliver potassium nitrate desensitising agent was first reported by Reinhart et al. in1990.11 A vacuum formed mouthguard appliance is made and the patient is instructed to place small amount of a desensitizing dentifrice containing 5% potassium nitrate, casein derived products or fluorides. These treatments are usually done overnight for six weeks. No controlled clinical trials have been done to confirm the efficacy of this technique. (Fig 4).

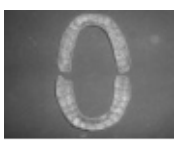


FIG 4: MOUTHGUARDS

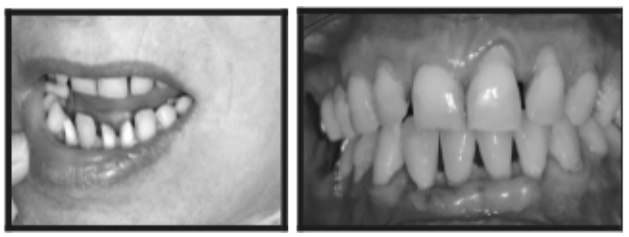
## Iontophoresis

The in office use of iontophoresis of sodium fluoride to treat hypersensitive dentine has been advocated by Gangarosa (1983, 1994)12 and others (kerns et al. 1989, Christiansen 1998). It is a technique sensitive method that requires the purchase of an apparatus. Reports of lack of efficacy (Brough et al. 1985)13 may be due to inadvertent passage of current through adjacent gingival tissue rather than through cervical dentine. However, clinicians skilled in iontophoresis are strong advocates of its use for this purpose.

## Lasers

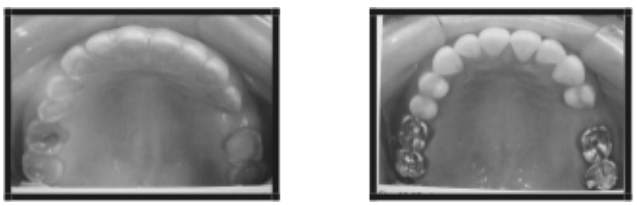
Studies are very less using laser for treatment of sensitive dentine.14 Nd:YAG laser was used to treat the patients with cervical sensitivity to cold air. Laser treatment was done on exposed roots for 2 min at 10 pulses at increasing power levels until the patient detected the laser energy or until a maximum of 100 mJ was reached. Treated teeth were found less sensitive after laser treatment. The clinical results obtained in the use of lasers to treat hypersensitive dentine do not seem to justify their very high purchase price. It is extremely difficult to treat irregularly shaped cervical regions using a hand held light- guide, especially if the laser operates in a pulsing mode. (Fig 5)

FIG 5: LASERS



Hypersensitivity treated with All Ceramic Crowns

Prosthodontic rehabilitation: It depends upon the severity of tooth structure loss. If the vertical dimension of occlusion is not disturbed, the line of treatment for anterior teeth should be all porcelain or metal fused to porcelain full veneer crowns, for posterior teeth it should be all metal or porcelain fused to metal crowns. In case of loss of vertical dimension than treated the patient for full mouth rehabilitation by fixed prosthesis. (Fig 6)



Hypersensitivity treated with Full mouth rehabilitation
FIG 6: PROSTHODONTIC REHABILITATION

## Conclusion

The ideal desensitizing agent is yet not known. Study results are variable and certain agents work best in certain circumstances and with certain individuals. The use of restorative materials is more effective than the use of topical agents. Consequently, clinicians must use a systemic trial and error approach based on the available evidence and professional experience. It is often necessary to use a hierarchy of products in succession until the most beneficial is identified. The strong placebo effect suggests that the combination of management strategy, treatment agents, and positive reinforcement can create a successful outcome, regardless of whether an ideal strategy or agent is utilized.

## References:

1.Addy M. Etiology and clinical implications of dentine hypersensitivity. Dent Clin North Am 1990 34:503-14.
2.Addy M. Dentine hypersensitivity: New perspectives on an old problem. Int Dent J 2002: 20: 272-76.
3.Ficher C, FicherRG, Wennberg A. Prevalence and distribution of cervical dentine hypersensitivity in a population in Rio de Janeiro, Brazil. J Dent. 1992;20:272-76
4.Bissada NF. Symptomatology and clinical features of hypersensitive teeth. Arch Oral Biol; 1994; 39:315S-332S.
5.Addy M, Mostafa P, Newcombe RG. Dentine hypersensitivity: the distribution of recession, sensitivity and plaque. J Dent.1987; 15:242-248.
6.Grossman LI. A systemic method for the treatment of hypersensitive dentine. J Am Dent Asso. 1935. 22:592.
7.kanapa JA. Current treatment for dentinal hypersensitiviyty: A new agent. Compend Contin Educ Dent 1982; (suppl 3):S118-20.
8.Hoyt WH, Bibby BG. Use of sodium fluoride for desensitizing dentine, J Am Dent Asso 1943, 30:1372-76.
9.Minokov B., Marmari I., The effectiveness of sodium fluoride treatment with and without iontophoresis on reduction of hypersensitive dentinal pain. J Periodontal 1975: 46:246-49.
10.Tharsh WJ, Jones DL, DoddsWJ. Effect of a fluoride solution on dentinal hypersensitivity. Am J Dent 1992; 5:299-302.
11.Reinhart TC, Killoy WJ, Love J et al. The effectiveness of a patient - applied tooth desensitizing gel: a pilot study. J Clin Periodontol 1990;17:123-2.7
12.Orchardson R, Gangarosa LP, Holla et al. Dentine hypersensitivity into the 21st century. Arch Oral Biol. 1994; 39:113S-119S.
13.Brough KM, Anderson DM, Love J, Overman PR. The effectiveness of iontophoresis in reducing dentine hypersensitivity. J Am Dent Assoc.1985; 111:761-65.
14.Renton-Harper P, Midda M. Nd:YAG laser treatment of dentinal hypersensitivity. Br dent J 1992; 172:13-16.

# Denture base materials: From past to future

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Abstract

There is evidence that Dentistry was practised as far back as 3000 B.C. in Egypt. Dentures are believed to have surfaced as a mode of treatment for replacing missing teeth around 700 B.C. Thereafter, a process began towards improvement in the quality of materials used for fabricating dentures, as the patients demanded better aesthetics, function and comfort. This review tracks the history of materials used as a denture base to the present stage and points towards the areas of research and development in the future.

Keywords

Denture base material, Vulcanite, Acrylic resin, Methyl methacrylate, Flexible denture, Fibre-reinforced resin

Dentistry as a speciality is believed to have begun about 3000 BC. Egypt was the medical centre of ancient world. The first dental prosthesis was believed to have been constructed in Egypt about 2500 BC. Skilfully designed dentures were made as early as 700 BC. During medieval times, dentures were seldom considered as a treatment option. They were hand carved and tied in place with silk threads and had to be removed before eating.

## WOOD:

For years, dentures were designed from wood because it was readily available, relatively inexpensive and could be carved to desired shape. However, it warped and cracked in moisture, lacked aesthetics and got degraded in the oral environment.

## BONE:

Dentures made from bone became very popular due to its availability, reasonable cost and carvability. It is reported that Fauchard fabricated dentures by measuring individual arches with a compass and cutting bone to fit the arches. It had better dimensional stability than wood, however, esthetic and hygienic concerns remained.

## IVORY:

Ivory denture bases and prosthetic teeth were fashioned by carving this material to desired shape. These were relatively stable in the oral environment, offered esthetic and hygienic advantages compared to wood or bone. However, ivory was not readily available and was relatively expensive.

## PORCELAIN:

Alexis Duchateau (1774) was the first to fabricate porcelain dentures. In 1788 AD, a French dentist, Nicholas Dubois de Chemant, made a baked-porcelain complete denture in a single block. The advantages were that it could be shaped easily, ensured intimate contact with the underlying tissues, was stable, had minimal water sorption, smooth surfaces after glazing, less porosity, low solubility and could be tinted but its drawbacks were brittleness and difficulty in grinding and polishing. Loomis (1854), Charles H Land (1890) and Alexander Gutowski (1962) experimented with different types of porcelain dentures.

## GOLD:

In 1794 AD, John Greenwood began to swage gold bases for dentures. He also made dentures for George Washington. Usually 18 to 20 carat gold was alloyed with silver and teeth were riveted to it.

## VULCANITE DENTURES:

Charles Goodyear, in 1839, discovered the process of dry-heat vulcanization of rubber by heating caoutchouc, sulphur and white lead together. In 1851, Goodyear used this technique to produce a highly cross-linked hard rubber named Vulcanite after the Roman god. The fit of these vulcanite bases allowed self retaining dentures, making earlier spring type dentures obsolete. These were the first functional, durable and affordable dentures, marking a great

advancement in dental treatment. The main disadvantage of these denture bases was their dark red colour, which was difficult to pigment, and absorption of saliva making it unhygienic. Vulcanite dentures were very popular until the 1940s, until acrylic (pink plastic) denture bases replaced them.

## TORTOISE SHELL:

CF Harrington (1850) introduced the first thermoplastic denture material, the tortoise shell base.

## GUTTA PERCHA:

Edwin Truman (1851) used Gutta percha as a denture base but it was unstable.

## CHEOPLASTIC:

Alfred A Blandy (1856) made dentures from a low fusing alloy of silver, bismuth and antimony but it was never accepted.

## ALUMINIUM:

Dr. Bean (1867) invented the casting machine and did the first casting of a denture base in aluminium.

## CELLULOID:

J. Smith Hyatt (1869) introduced celluloid that was later used as a denture base material because of its translucency and pink colour. However, this material did not gain much popularity because of distortion and discolouration.

## BAKELITE:

Dr. Leo Bakeland (1909) introduced this phenol formaldehyde resin which was easily available but lacked colour quality.

## STAINLESS STEEL and BASE METAL ALLOYS:

Ni-Cr and Co-Cr were obtained by E. Haynes (1907) but they gained popularity after 1937 because of their low density, low material cost, higher resistance to tarnish and corrosion and high modulus of elasticity. Allergy to Nickel and difficulty in adjustment posed a practical problem.

## VINYL RESIN:

Mixtures of polymerized vinyl chloride and vinyl acetate were under experimentation during 1930 due to their pleasing colour but had difficult processing methods.

## POLYMETHYL METHACRYLATE:

Rohm and Hass (1936) introduced PMMA in sheet form and Nemours (1937) in powder form. Dr. Walter Wright (1937) introduced Polymethyl methacrylate as a denture base material which became the major polymer to be used in the next ten years.

This material has been divided into two types based on the method of activation.

## 1) Heat-activated PMMA:

These are supplied in powder-liquid form. The powder contains Polymethyl methacrylate beads along with Benzoyl peroxide (Initiator), Dibutyl phthalate (plasticizer), pigments and opacifiers. The liquid contains Methyl methacrylate monomer with Hydroquinone (inhibitor), Glycol dimethacrylate (cross-linking agent) and plasticizers.

Currently, almost all denture materials are radiolucent and concerns exist about the difficulty of removing fragments of fractured dentures aspirated during accidents. Addition of Bismuth (10-15%) or uranyl salts provides adequate radiodensity, but at the cost of increased transverse deflection and water sorption.

## Modifications

a) High-impact strength resin

These polymers are similar to heat-accelerated methyl methacrylate materials but are reinforced with butadiene-styrene rubber. The rubber particles are grafted to methyl methacrylate to bond to the acrylic matrix. These materials are supplied in powder-liquid form and are conventionally processed.

b) Rapid heat-polymerized resin

These are hybrid acrylics, with both chemical and heat-activated initiators, to allow rapid polymerization without the porosity that might be expected. These are polymerized in boiling water for 20 minutes immediately after being packed into a denture flask.

After bench cooling to room temperature, the denture is deflasked, trimmed and polished in the conventional manner.

Heat-activated PMMA can be processed by
nCompression technique
nInjection moulding technique

c) Microwave-activated PMMA:
Nishii (1968) first used microwave energy to polymerize denture base resin in a 400 watt microwave oven for 2.5minutes. This research was later carried on by Kimura et al (1983) and De Clerk.

Types:
a) Compression moulding technique
b) Injection moulding technique

## Composition

Supplied in Powder liquid system. Special polycarbonate or fibre-reinforced plastic flasks (1985) are used instead of metallic flasks as microwaves will reflect from the surface.

## Technique

Microwaves are a form of electromagnetic radiation produced by a generator called a magnetron, which can be used to generate heat inside the resin. Methylmethacrylate molecules are able to orient themselves in the electromagnetic field and at a frequency of 2450MHz, their direction changes nearly 5 billion times a second. Consequently, numerous intermolecular collisions occur causing rapid heating. As the heat required to break the benzoyl peroxide molecule into free radicals is created inside the resin, the temperature outside the flask remains cool. The polymerization heat is dispersed more efficiently and the polymerization is rapid with less risk of porosity. In addition, this technique eliminates the time needed to transfer the heat of the oven or the hot water, through the various structures, such as the flask, investment and stone cast to the resin itself. Microwaves act only on the monomer, which decreases in the same proportion as the polymerization degree increases. Therefore, the same amount of energy is absorbed by less and less monomer, making the molecules increasingly active. This self regulatory curing programme leads to complete polymerization of the resin.

The latest microwave-polymerized polymer with the injecton moulding system for denture construction claims to have the advantages of both the injection –processing and microwave-curing methods. The one-component paste form resin is packaged in a disposable plastic cartridge that elimintates mixing and direct handling. It is a polyurethane-based polymer and is biologically compatible.

Advantages: greatly reduced curing time (3 min.), shortened dough-forming time, minimal colour changes, less fracture of artificial teeth and resin bases and superior denture base adaptability, lower residual monomer ratio, most stable.

Disadvantages: Microwave polymerized acrylic resins exhibit less bond strength to the denture teeth. The occurrence of increased porosity is due to heat entrapment in the nonmetallic flasks used for the purpose. The plastic flasks and polycarbon bolts are relatively expensive and have a tendency to break down on exceeding packing pressure (1200psi) and after processing several dentures.

## 2) Chemically activated PMMA:

In1947, chemical activators were used to induce denture base polymerization at room temperature. These were also referred to as cold-curing, self-curing or autopolymerizing resins. Chemical activation is accomplished through the addition of a tertiary amine, such as dimethyl-para-toluidine, to the monomer, which upon mixing causes decomposition of benzoyl peroxide. This releases free radicals to initiate polymerization.

Advantage: Greater dimensional accuracy due to reduced polymerization shrinkage.

Disadvantages: Incomplete polymerization leads to greater amount of unreacted monomer in the denture base causing decreased transverse strength and is a potential tissue irritant. Water storage reduces the level

of residual monomer. The colour stability is generally inferior.

## Modifications:

a) Pour type (fluid resins)

The Austenal company (1955) introduced this technique. The principal difference is in the size of the polymer powder or beads. Small particle size results in a fluid mix. The mix is quickly poured into the mould and allowed to polymerize under pressure at 0.14MPa. Centrifugal casting may also be used to inject the slurry into the mould. These offered improved adaptation, dimensional stability, reduced cost and simple procedure but had low strength, higher solubility and high residual monomer levels.

## VINYL ACRYLIC COPOLYMER (GEL TYPES):

Denture base plastics such as vinyl acrylic copolymer (1942) were supplied in gel form. These gels have the same components as the powder-liquid type, except that the liquid and powder have been mixed to form a gel and have been shaped into a thick sheet. Chemical accelerators cannot be used in a gel because the initiator, accelerator and monomer would be in intimate contact. Accuracy of proportioning and thoroughness of mixing are the advantages claimed for the gel types.

## POLYSULPHONES:

Introduced in1981, processed by injection molding, they had very high impact strength.

LIGHT ACTIVATED DENTURE BASE RESINS: (1986)

## Composition –

It consists of urethane dimethacrylate matrix with an acrylic copolymer, microfine silica fillers, and high molecular weight acrylic resin monomers, acrylic resin beads as organic fillers, a photoinitiator system and Camphoroquinone as initiator. Visible light is the activator.

Available as a single-component denture base resin as premixed sheets having a claylike consistency or rope forms and is packed in light-proof pouches to prevent inadvertent polymerization .

Technique - Opaque investing media prevents the passage of light, therefore light-activated resins cannot be flasked in a conventional manner. The denture base is moulded on an accurate cast while it is still pliable and is polymerized in a light chamber without teeth and is used as a base plate. The teeth are then processed to the base with additional material and the anatomy is sculptured while the material is still plastic. Photons from a light source activate the initiator to generate free radicals that, in turn, initiate the polymerization process. Initially, ultraviolet light was used, however, because of its effect on the retina and unpigmented oral tissues, limited penetration depth, and the loss in intensity of the ultraviolet light source over time, initiator systems activated by visible light were introduced. In the visible light-cured material, camphorquinone and an organic amine (e.g. dimethylaminoethyl methacrylate) generate free radicals when irradiated by light in the blue to violet region. Light with a wavelength of about 400-500nm is needed to trigger this reaction. Then the denture base is exposed to a high-intensity visible light source for an appropriate period. The denture is rotated on a table in the chamber to provide uniform exposure to the light source. Then the denture base is finished and polished in a conventional manner. An argon laser has also been used to polymerize composite resins and physical and mechanical properties were found to be improved.

Advantages – These resins display less porosity than chemically activated denture base resins, facilitate fabrication and final adjustment in mouth, are 25% lighter, free of methyl methacrylate, show decreased polymerization shrinkage and are non toxic.

Disadvantages –They cannot be flasked in a conventional manner, as opaque investing media prevents the passage of light. Depth of cure, shrinkage and appearance of long life free radicals are areas of concern. Factors such as light intensity, angle of illumination, and distance of resin from the light source can significantly affect the number of free radicals that are formed, thereby making this system technique sensitive.

## COMMERCIALLY PURE TITANIUM:

It has the advantage of light-weight, strength and biocompatibility but requires an inert casting environment and casting defects can be a problem.

### FLEXIBLE DENTURE BASE MATERIAL:

Polymerization shrinkage encountered in conventionally cured PMMA led to the development of a special injection moulding technique. Initially developed as a fluoropolymer (1962), acetal began to be used in 1971.The material used nowadays is nylon based plastic (Polyamide). Elastomeric resins can be added to resin polymer formulas to create greater flexibility and can be strengthened with glass fibres.

Unique features - The semi-crystalline nylon composition provides strength, flexibility, transparency, high impact resistance, colour stability, high creep resistance, high fatigue endurance, excellent wear characteristics, good solvent resistance, no porosity, no biological material build up or odours or stains, low water sorption and good dimensional stability, monomer and metal free and the microcrystalline structure is easy to finish and polish like acrylic.

Advantages - It is nearly unbreakable, pink coloured like the gums, can be built quite thin, and can form both the denture base and the clasps as well. The clasps are built to curl around the necks of the teeth and they are practically indistinguishable from the gums that normally surround the teeth. This type of partial denture is extremely stable and retentive, and the elasticity of the flexible plastic clasps keeps them that way indefinitely. It has superior esthetics, no metallic taste and is non allergic. Free movement is allowed by the overall flexibility and can, therefore, be referred to as “a built in stress breaker”. Long term health of tissues and teeth is maintained due to their gentle massaging action without adversely loading abutments.

Indications: Full dentures, Partial dentures, Bases and relines, in cases with bilateral inoperable undercuts when preprosthetic surgery is contraindicated.
Special applications: - For TMJ splints, for the patients allergic to acrylic monomers, as cosmetic veneers /gum veneers to mask gingival recession, in periodontally involved teeth, sensitive teeth, cancerous mouths, or other conditions in which the teeth are compromised, treatments involving high torus or cleft palate conditions, as Mouth guards in sports, Bruxism splints/Night guards, Bite splints, Space maintainer, Paediatric cases, Obturators, Speech therapy appliances and Orthodontic retainers.

The Flexible dentures in combination with Cast Partial framework–
A good alternative to the all flexible partial denture is one made with a combination cast metal framework with flexible dentures clasps. The clasps and the saddle are flexible and the rest of the components are in metal.

Advantages: This combination eliminates most of the difficulty of recurrent sore spots, since the framework resists movement and pressure from the clasps, while having the benefit of nearly invisible, gum coloured clasps. It also has the advantage of being tooth supported.

Disadvantages: Flexibility is not an advantage in complete dentures as the retentive peripheral seal can be broken in function. It is difficult to use where inter-ridge space is less as bulk of tooth is needed for mechanical retention.

Insertion: Denture is placed in very hot water (150 degrees F) for a minute prior to insertion and allowed to cool to tolerable temperature. This makes the partial as flexible as it would be at body temperature. Adjustment of clasps is done by heating in very hot water and bending it severely. Grinding is done as a last resort.

FIBER-REINFORCED DENTURE BASE RESINS:
To improve the physical and mechanical properties of acrylic resin, it was reinforced with
·EMBEDDED METAL FORMS
·FIBRES -- Fibres have been used in three forms, namely, continuous parallel, chopped and woven.

Carbon fibres
The use of Carbon fibres as denture base strengthners have been investigated by Larson et al and Sonit (1991) . Carbon fibres have been shown to improve flexural and impact strength, prevent fatigue fracture and increased fatigue resistance on treating with silane coupling agent(Yazdanie-1985). However, carbon fibres have an undesirable dark color.

Kevlar fibres (synthetic aramid fibres)
Aramid is a generic term for wholly aromatic fibres. These fibres are resistant to chemicals, are thermally stable, and have a high mechanical stability, melting point, and glass transitional temperature. They also have pleated structure that makes aramid weak as far as flexural, compression, and abrasion behaviour are concerned. This explains why aramid fibre-reinforced demonstrate a lower flexural strength than PMMA reinforced with glass fibre. Studies conducted by Berrong et al(1990) have shown to significantly increase the impact strength and the modulus of elasticity of the resin but they are also unesthetic and their use is limited to certain intraoral applications.

Glass fibres
Glass is an inorganic substance that has been cooled to a rigid condition without crystallization. Different types of glass fibres are produced commercially; these include E-glass, S-glass, R-glass, V-glass, and Cemfil. Of these, E-glass fibre, which has high alumina and low alkali and borosilicate, is claimed to be superior in flexural strength. Because the modulus of elasticity of glass fibres is very high, most of the stresses are received by them without deformation.

Polyethylene fibres
Have also been observed to increase the impact strength. Polyethylene fibres increase modulus of elasticity and flexural strength and they are almost invisible in denture base acrylic resins. Polyethylene fibres in woven form are more effective than carbon fibres in enhancing impact strength and flexural strength.
--- Polyester fiber
--- Organophilic montmorillonite.
--- Methacrylated polyhedralsilsesquioxanes.
--- Silica-glass fiber reinforced polymeric materials.
--- Nylon fibres --- are polyamide fibres and are based primarily on aliphatic chains. The chief advantage of nylon lies in its resistance to shock and repeated stressing. However, water absorption affects the mechanical properties of nylon. Nylon-reinforced bases display higher fracture resistance than PMMA.

Compared with conventional polymer materials, fibre-reinforced polymers are successful in their application primarily because of their high specific modulus and specific strength.
Alternative polymers, such as polyamide and polycarbonate have also been tested to overcome some of the mechanical deficiencies of PMMA. However, the tests have not resulted in the breakthrough of totally new denture base polymers.

## Bibliography:

1. Anusance KJ. Phillips' science of dental materials. 10th ed. Philadelphia (PA):WB
Saunders; 1996. p. 237-71.
2. Barron DJ, Schuster GS, Caughman GB, Lefebvre CA. Biocompatibility of visible light-polymerized denture base resins. Int J Prosthodont 1993;6:495-501.
3. Lefebvre CA, Schuster GS. Biocompatibility of visible light-cured resin systems in prosthodontics. J Prosthet Dent 1994;71:178-85.
4. Blagojevic V, Murphy VM. Microwave polymerization of denture base materials. A comparative study. J Oral Rehabil 1999;26:804-8.
5. De Clerck JP. Microwave polymerization of acrylic resins used in dental prostheses. J Prosthet Dent 1987;57:650-8.
6.Ogle RE, Sorensen SE, Lewis EA. A new visible light-cured resin system applied to removable prosthodontics. J Prosthet Dent 1986;56:497-506.
7. Gulay Uzun, Nur Hersek, Teoman Tincer. Effect of five woven fiber reinforcements on the impact and transverse strength of a denture base resin. J Prosthet Dent 1999;81:616-20.
8. Wallace PW, Graser GN, Myers ML, Proskin HM. Dimensional accuracy of denture resin cured by

 

microwave energy. J Prosthet Dent 1991;66:403-9.
9. Levin B, Sanders JL, Reitz PV. The use of microwave energy for processing acrylic resins. J Prosthet Dent 1989;61:381-3.
10. Mohammed Sohail Memon, Norsiah Yunus, Abdul Aziz Abdul Razak. Some mechanical properties of a highly cross-linked, microwave-polymerized,Injection-molded denture base polymer. Int J Prosthodont 2001;14:214-218.
11. William J. O'Brien. Dental materials and their selection. Third edition, Quintessence Publishing co. 2002.
12. Eiichi Nagai, Kenji Otani et al. Repair of denture base resin using woven metal and glass fibre. Effect of methylene chloride pre-treatment. J Prosthet Dent 2001;85:496-500.
13. FA Peyton, DH Anthony. Evolution of dentures processed by different techniques. J Prosthet Dent 1963;13:269-282.
14. Daryl Jaggar, Alan Harrison. Effect of the addition of polymethylacrylate beads on some properties of acrylic resin. Int J Prosthodont 2000;13-378-382.
15.Phillip LJ, Keenan, David R. Radford, and Robert KF Clark. Dimensional change in complete dentures fabricated by injection moulding and microwave processing. J Prosthet Dent 2003;89:37-44.

# Effect of Non-surgical Therapy on GCF Aspartate Aminotransferase levels in Chronic Periodontitis patients

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ABSTRACT

During inflammation and cell death, Aspartate Aminotransferase (AST) gets liberated in the extracellular fluid such as Gingival Crevicular Fluid (GCF). Its concentration is increased in periodontitis; and after nonsurgical therapy, when the inflammation is reduced, AST levels will be decreased. So a study was planned to analyze the level of AST in GCF at baseline and 3 months after non-surgical therapy in patients with chronic periodontitis. Statistical correlations were calculated to determine the relationship between AST and periodontal parameters like probing pocket depth (PPD), clinical attachment level (CAL), gingival index (GI) and plaque index (PI). There was a statistically significant difference in AST levels between baseline and 3 months after therapy. Improvement in clinical parameters was observed and there was a corresponding reduction in AST levels. It was thus concluded that AST level may be a useful adjunct as a biomarker in the assessment of periodontal disease as evident by its reduction in GCF levels.

Keywords: Biomarker, Aspartate Aminotransferase, Gingival Crevicular Fluid

## INTRODUCTION

The advance diagnostic measures have shown that pathogenesis of periodontal disease is episodic and does not occur in a continuous linear manner.1 There are various risk factors which are responsible for periodontal destruction. Risk factors may be environmental, behavioural or biological which when present, increase the likelihood that an individual will get the disease. The microbial tooth deposits having pathogenic bacteria, systemic diseases such as diabetes, and local risk factors such as tobacco smoking are the important associated factors.

To overcome the microbial insult, host immune response is activated which is a critical determinant of periodontal disease pathogenesis. The marginal gingival and sulcular area act as battle field where this interaction between bacteria and host takes place. The sulcus is bathed with a fluid, the gingival crevicular fluid (GCF). Its presence has drawn the attention of various investigators since 19th century. Waerhaug (1952)2, Brill and Krasse (1958)3 are the earliest pioneer workers who analyzed the volume, composition and role of GCF in defence mechanism.4

Various components of GCF that have been studied including tissue degradation products e.g. hydroxyproline and glycosaminoglycans, mediators of inflammation and bone resorption e.g. interleukines (IL) and prostaglandin (PG), collagenase and proteases, enzymes that help in the physiology of cell and are released only upon cell death e.g. lactate dehydrogenase and aspartate aminotransferase (AST) also known as SGOT (serum glutamate oxaloacitic transaminase).5,6,7 These may act as biomarkers.

Biomarker is a signal that serves as a guide or indicator of the state of a living organism. In more sophisticated context, hormonal or enzymatic changes in response to toxic substances serve as biomarkers.8 AST is particularly important in the transport of reducing equivalents across the mitochondrial membrane via the malate aspartate shuttle and is a sensitive indicator of necrosis in a number of tissues.9 AST levels in serum, cerebrospinal fluid and joint fluid have been used for several decades in medicine as a diagnostic aid for assessing the cell death and tissue destruction.10 AST levels in blood serum have served for many years as the basis of a test for tissue

 

degradation in disease such as myocardial infarction, hepatic disorders and renal pathology etc. In GCF it has been reported as a possible marker for distinguishing between active and inactive disease sites. AST has been thought to be a useful indicator of periodontal disease activity. 1, 11

During inflammation and cell death this enzyme is not utilized and gets liberated in the extracellular fluid such as GCF where it can be assessed. So, it is hypothesized that during gingival inflammation its concentration will be increased and after nonsurgical therapy when the microbial load is reduced AST levels in gingivitis and periodontitis may also be decreased. So its level in GCF can be used as a diagnostic biological marker to predict the activity and progression of periodontal disease and the earliest interception for its treatment.

## MATERIALS AND METHOD

Selection of subjects, test sites and experimental design

A prospective, interventional, comparative, bio-chemical study was planned, aimed at comparing subjects with pre-treatment and post-treatment evaluations of Aspartate Aminotransferase (AST). An ethical clearance was obtained from Ethical Committee on Human and/or Animal subjects'Research, Kothiwal Dental College and Research Centre (KDCRC), Moradabad.

A total number of 20 patients diagnosed as chronic generalized periodontitis were selected from the out-patient department of Periodontics, KDCRC Moradabad. Subjects having good general health, minimum of 20 natural teeth, excluding 3rd molars, definite clinical evidence of chronic periodontitis, 5-8 mm probing pocket depth, mean GI $\geq$ 2 with definite loss of attachment were included for evaluation. Sites selected for evaluation of AST in GCF were having probing pocket depth of $\geq$ 5mm on at least one location on a minimum of 6 teeth in the mouth. 12

Exclusion criteria included :

1)Periodontal therapy other than standard prophylaxis during the previous 6 months.

2)Use of antibiotics within the previous 3 months.

3)Systemic diseases (cardiovascular disease, diabetes, blood disorders, hepatitis, renal disorders) that could influence the course of periodontal disease.

4)Pregnant women or lactating mothers.

5)Inability of the persons to cooperate because of their physical or mental status or daily routine.

6)Subjects with full crown, orthodontic bands or denture clasps on teeth.

7)Teeth diagnosed as of very poor prognosis.

Periodontal status was assessed by using Probing pocket depth (PPD), Clinical attachment level (CAL), Gingival index (Loe and Silness 1963), and Plaque index (Silness and Loe 1963). Probing pocket depth (PPD) was measured with UNC-15 (University of North Carolina) probe.

## SITE SELECTION

The selection of test site was made one day before the collection of crevicular fluid. One test site was selected from each patient having pocket depth of 5-8 mm and clinical evidence of attachment loss. The clinical parameters were recorded on first day and gingival crevicular fluid (GCF) was collected on the following day. At baseline this was done to eliminate the mechanical effect of procedures of recording of clinical parameters. Oral hygiene instructions were given to the patient and scaling and root planing (SRP) was done. The clinical parameters and GCF- AST quantification was repeated 3 months post-operatively and recorded.

## COLLECTION OF GCF

The gingival margin was dried with air and cotton swabs. Supragingival plaque was removed with a curette/scaler and GCF sample was obtained from mesiobuccal, distobuccal and/or mid buccal site. A standard volume of 1.0 micro liter of crevicular fluid was collected in a Hirschman volumetric micropipette positioned extrasulcularly. These microcapillary pipettes were calibrated from 0 to 5microlitre with a calibration mark after each microlitre, and obtained from "Sigma chemical company" (St. Louis, U.S.A.). If plaque or debris clogged the micropipette or blood contaminated the GCF, the GCF collection was repeated. Samples thus collected were immediately sent to the laboratory for the analysis of Aspartate Aminotransferase enzyme. The biochemical analysis was done for estimation of AST enzyme concentration

at baseline and three months after SRP.

## ESTIMATION OF AST LEVEL IN GCF

The Erba SGOT (AST) kit was used for quantitative estimation of AST activity. This kit is based on the reference method of the International Federation of Clinical Chemistry (IFCC).7 AST activities are measured photometrically by measuring transamination of aspartic acid and oxaloacetic acid. AST activity was measured on semi automated autoanalyser.

## STATISTICAL ANALYSIS

Comparison between the diseased and healthy site for all the measures of periodontal parameters and AST levels were analyzed by applying student paired "t" test. Karl Pearson's correlation coefficient ("r") was calculated among different parameters of periodontal disease and AST concentration.

## RESULTS

Test of significance among various parameters;-

Mean PI at baseline was 1.70± 0.4022 which reduced to 0.96±0.4388 after 3 months of SRP. Mean percentage reduction was 43.38% which was statistically very significant ($t=3.74$, $p<0.01$).

Mean GI at baseline was 2.14±0.2497 which reduced to 1.10±0.3183 after 3 months of SRP. Mean percentage reduction was 48.54% which was statistically very significant ($t=12.65$, $p<0.01$).

Mean PPD was 3.76±1.0338 at base line which reduced to 2.75±0.7988 after 3 months of SRP. Mean percentage reduction was 28.26% which was statistically very significant ($t=7.33$, $p<0.01$).

Mean CAL at base line was 4.21±0.9222 which reduced to 3.23±0.7385 after 3 months of SRP. Mean percentage reduction was 24.47% which was statistically very significant ($t=6.80$, $p<0.01$).

Mean AST at baseline was 3276.91±1350.25 which reduced to 1658.22±539.67 after 3 months of SRP. Mean percentage reduction was 49.40% which was statistically very significant ($t=6.00$, $p<0.01$).

Coefficient correlation between different parameters and AST levels at Base line;-

PI and AST were found to have statistically insignificant correlation ($r=0.02$, $t=0.07$, $p>0.1$).

GI and AST have shown statistically very significant correlation ($r=0.91$, $t=9.28$, $p<0.01$).

PPD and AST Correlation was statistically significant at 95% level ($r=0.53$, $t=2.65$, $p<0.05$).

CAL and AST was statistically insignificant correlation was found ($r=0.33$, $t=1.48$, $p>0.1$).

Coefficient correlation between different parameters and AST levels after 3 months of SRP;-

PI and AST correlation was statistically insignificant ($r=0.01$, $t=0.02$, $p>0.1$).

Between GI and AST an insignificant correlation was found ($r=0.31$, $t=1.36$, $p>0.1$).

PPD and AST correlation was weakly statistically significant. ($r=0.38$, $t=1.75$, $p<0.1$).

Between CAL and AST statistically very significant correlation was observed ($r=0.83$, $t=6.32$, $p<0.01$).

TABLE 1: Test of significance (Paired't' test) among various parameters

| | Parameter | Mean ±SD | | % Reduction | 't' value | 'p' value |
|---|---|---|---|---|---|---|
| | | Baseline | After 3 months | | ('t' = 2.88) | |
| PERIODONTITIS | PI | 1.70±0.4022 | 0.96±0.4388 | 43.38% | 3.74 | p*<0.01 |
| | GI | 2.14±0.2497 | 1.10±0.3183 | 48.54% | 12.65 | p*<0.01 |
| | PPD | 3.76±1.0338 | 2.75±0.7988 | 28.26% | 7.33 | p*<0.01 |
| | CAL | 4.21±0.9222 | 3.23±0.7385 | 24.47% | 6.80 | p*<0.01 |
| | AST | 3276.91±1350.25 | 1658.22±539.67 | 49.40% | 6.00 | p*<0.01 |

Graph No. 1: Curve showing comparison of AST levels at baseline and after 3 months

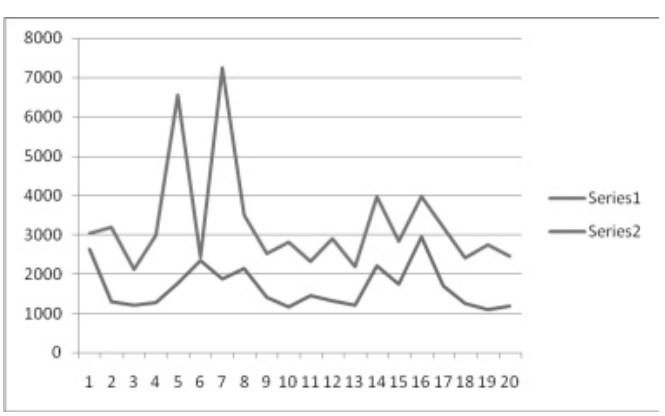

TABLE 2: Coefficient correlation between different parameters at base line (Karl Pearson's correlation coefficient test)

| S. No. | Parameter | 'r' value | 't' cal value | 't'tab value | 'p' value |
|---|---|---|---|---|---|
| 1. | PI and AST | 0.02 | 0.07 | $t_{(12\ 0.1)}$=1.73 | p*>0.1 |
| 2. | GI and AST | 0.91 | 9.28 | $t_{(12\ 0.01)}$=2.88 | p*<0.01 |
| 3. | PPD and AST | 0.53 | 2.65 | $t_{(12\ 0.05)}$=2.10<br>$t_{(12\ 0.1)}$=1.73 | p**<0.05,<br>p***>0.01 |
| 4. | CAL and AST | 0.33 | 1.48 | $t_{(12\ 0.1)}$=1.73 | p***>0.1 |

TABLE 3: Coefficient correlation between different parameters after 3 months (Karl Person's correlation coefficient test)

| S. No. | Parameters | 'r' value | 't' cal value | 't' tab value | 'p' value |
|---|---|---|---|---|---|
| 1. | PI and AST | 0.01 | 0.02 | $t_{(12\ 0.1)}$=1.73 | p*>0.1 |
| 2. | GI and AST | 0.31 | 1.36 | $t_{(12\ 0.1)}$=1.73 | p*>0.1 |
| 3. | PPD and AST | 0.38 | 1.75 | $t_{(12\ 0.1)}$=1.73<br>$t_{(12\ 0.05)}$=2.1 | p**<0.1,<br>p***>0.05 |
| 4. | CAL and AST | 0.83 | 6.32 | $t_{(12\ 0.01)}$=2.88 | p**<0.01 |

p*>0.1-Statistically insignificant, p**<0.1-Statistically weakly significant, p***>0.05-Statistically insignificant

## DISCUSSION

AST levels ranged from 2127.9 to7251.6 $\mu$IU/L at baseline. Kolte Rajashri et al. (2003)7 have reported 1200 $\mu$IU/L to 4400 $\mu$IU/L at diseased sites. Golub et al. (1976)13 , Cohen et al. (1991)14, 15, Chamber et al. (1991)16 and Persson GR and Page RC (1992)17 have also observed in their studies a higher levels of AST at diseased sites. Some sites have shown an abnormally high AST levels which may be due to active periodontal destruction at those sites. Perinetti et al. (2003) and Shimada Koichi (2000) in their longitudinal studies have observed higher levels with disease active sites 18, 9. AST levels were found to be reduced (Table 1) very significantly (P<0.01) after treatment when compared by applying paired 't' test. This reflects that the AST release is associated with inflammation / necrosis. Persson GR et al. (1990)19, Mc Culloch CAG (1994) 20, Chambers D.A. et al. (1984)21 have also quoted the association between enzyme level and gingival inflammation in their studies. This could be because of marked improvement in gingival status after SRP. The residual inflammation in deep pockets may be responsible for lesser reduction of AST levels.

To measure the effect of SRP, the paired 't' test was applied to find the reduction in the periodontal parameter before and after treatment and a statistically very significant reduction (p<0.01) was found suggesting that SRP and motivation for oral hygiene measures helped in improving the periodontal health of subjects (Table-1) . SRP is considered as a gold standard therapy in the treatment of periodontal diseases. This is established in our study also and is in agreement with several studies like those of Li R (1992)22, Page Roy C (1992)23, Mangnesson Ingvar et al. (1996)24, Shimada K et al. (1999)1, Shimada K et al. (2000)9, Tsalikis L et al. (2001).25

On correlating AST levels with clinical parameters by Karl Pearson's coefficient correlation test, there was very significant correlation between AST level and GI (p<0.01). (Table-2) before treatment (at baseline), suggesting that AST level is correlated with severity of gingival inflammation. This observation is in agreement with the findings of the studies of Persson GR et al (1990)19, Kolte Rajashri (2003).7 Magnsson Ingvar et al. (1996) have also found that AST levels consistently increasing with increase in GI.24

A positive correlation was present after treatment between GI and AST (Table 3) but it was statistically insignificant (p>0.1). This might be due to presence of inflammation in deep pockets. SRP reduced the inflammation but might be unable to completely eliminate it in deep pockets. Presence of inflammation is believed to be related to the penetration of antigenic substances via gingival sulcus and junctional epithelium. 7 Even in clinically healthy gingiva with GI scores '0' small foci of inflammatory cells are found in the connective tissue near the base of the sulcus. According to study performed by Page and Schroder (1975), histologically a classical vasculitis of vessels subjacent to JE and gingival sulcus, extracellular presence of serum protein and alteration of most coronal portion of JE could be seen.7 Since, deep periodontal pocket having larger surface area are exposed to external environment, a higher concentration of AST is expected. This finding also

supports that only SRP may not be a sufficient treatment modality for complete debridement of tooth surface and inflamed periodontal tissues; An additional surgical approach may be required for elimination of pocket.

A positive correlation was found between PI and AST at baseline and after 3 months of SRP, but was statistically insignificant ($p>0.1$) (Table 2, 3). This can be explained on the basis of the pathogenicity of plaque supporting the specific plaque hypothesis (Loesche W. J. et al. 1976).25 Specific pathogenic microorganisms in the plaque causes tissue destruction which is responsible for the release of AST in the GCF. A study performed by Kuru B. and Yilmaz S. et al. (1999)26 concludes that P. gingivalis, Actinobacillus actinomycetemcomitans and Prevotella intermedia were detected in AST positives ($AST>600\mu IU$) while Aggregatibacter actinomycetemcomitans species were found in AST negative sites ($AST<600\ \mu IU$). An another study of Kuru B. et al.. in (1999)26 shows that C. rectus, E. corrodens, F. nucleatum, Capnocytophaga species, P. intermedia and P. gingivalis were significantly higher in positive than negative sites. Additionally, PI measures the amount and extent of plaque on the tooth surface supragingivally only. This may be the reason for insignificant correlation between PI and AST. In their studies Silva Emilio Barbosae et al. (2003)27 and Magnusson Ingvar et al. (1996)24 have also found statistically insignificant correlation between AST levels and PI.

The present study also shows a wide fluctuations and variation in GCF-AST levels and overlap of enzyme levels when correlated with PPD among different patients. Page and De Rouen (1992)10, Imery et al. (1991)28 and Persson GR (1995)29 and Page RC 199223 observed fluctuation probably resulted from the known episodic nature of periodontal destruction. There might be active destruction going on at sites showing higher levels of AST activity. Deep pockets provide an excellent habitat for microorganism where sufficient nutrition through GCF and protected environment is available to bacteria away from superficial surfaces of gingiva where environmental resistance is more compared to deeper site. Karl Pearson correlation coefficient test was applied to find the correlation between PPD and AST levels at pre-and post treatment (Table 2,3). A positive and statistically significant association ($p<0.05$) was found at pretreatment sites. This finding suggest that increased periodontal destruction resulted by microbial activity leads to increased AST concentration. Study performed by Persson et al. (1995)29 also supports this statement. Post treatment PPD values were found to be weakly correlated ($p<0.1$, $p>0.05$) with AST values. After SRP when microbial load was reduced, periodontal destruction was also reduced which resulted in the decreased AST concentrations in GCF but reduction was not much significant. This might be due to residual inflammation and ulcerations in the tissues even after SRP in the deep pockets. SRP is not sufficient to remove the inner lining epithelium of the pocket. AJ Smith et al. (1998) have also found no statistically significant correlation between PPD and AST levels.30

Between CAL and AST at baseline, a positive correlation was found though it was not statistically significant, but a statistically very significant correlation was found at post treatment stage between CAL and AST ($p<0.01$). This finding suggests that resolution of inflammation at diseased site along with clinical attachment gain is strongly associated with decreased AST levels. Chambers DA et al. (1991)16, Persson GR and Page RC (1992).17 In their study have also found a positive correlation between AST and CAL. The weak correlation at the baseline may be due to presence of more inactive sites at the time of GCF collection.

However, the detection of the disease at the earliest stage is not possible with the clinical parameters. It requires a very sensitive and specific test. In this aspect AST has got very important role to detect the, quiescent, active and vulnerable sites for periodontal destruction.

## REFERENCES

1. Shimada Koichi, Mizuno Tsuyoshi, Uchida T, Kato T, Ito K, Murai S. relationship between levels of Aspartate Aminotransferase in gingival crevicular fluid and conventional measures of periodontal status assessed by using Pocket Watch TM: a cross sectional study. J Clin Periodontol 2000; 27: 819-823.

2. Waerhaug J. The gingival pocket-Anatomy, pathologic deepening and
elimination. Odont Tidskaift 1952; 60: 1.
3. Brill N, Krasse B. The passage of tissue fluid into the clinically healthy gingival pocket, Acta Odontol Scand 1960; 18: 95.
4. Newman Michael G, Takei Henery H, Carranza Fermin. Carranza's Clinical Periodontology 9th edition 2003. Sounders; an imprint of Elsevier. The Curtis center Independence Pheladelphia Pennsylvania 19106. A Risk assessment: 469-474.
5. Lamster IB, Hartley LJ, Vogal I. Development of biochemical profile for gingival crevicular fluid. Methodological consideration and evaluation of collagen degradation and groud substance degradation enzyme activity during experimental gingivitis. J Periodontol 1986; 57: 13-21.
6. Cimasoni G, Kowashi Y. Borderland between caries & periodontal disease. Academic Press1980; 11: 31-49.
7. Kolte Rajashri, Kolte Abhay, Yeltiwar RR. Quantitative estimation of aspartate amino transferase (AST) in gingival crevicular fluid and blood serum in clinically healthy gingival, chronic gingivitis and chronic periodontitis. JPFA 2003; 17: 41-47.
8. Clayton L. and Thomas. Taber's cyclopedic medical dictionary, 18th edition 1997; F. A. Davis company 1915 Arch street, Philadelphia, PA 19103: 221.
9. Shimada Koichi, Mizuno Tsuyoshi, Ohshio Kaori, Kamaga Masayuki, Murai Seidai and Ito Koichi et al. Analysis of Aspartate aminotransferase in gingival crevicular fluid assessed by using Pocket Watch TM: A longitudinal study with initial therapy. J. Clin. Periodontol 2000; 27: 819-823.
10. Persson R, De Rouen T, Page RC. Relationship between levels pf aspartate amino transferase in crevicular fluid and gingival inflammation. J Periodontol 1989; (submitted).
11.Adolph L, Lorenz R. Enzymatic diagnosis in myocardial infarction in enzymatic diagnosis of disease of the heart, liver and pancreas. Basel: S. Karger 1982: 64-80.
12. Preshaw PM. Definitions of periodontal disease in research. J Clin Periodontol 2009;36:1-2.
13. Golub LM, Kleinberg I. Gingival crevicular fluid: a new diagnostic aid in managing the periodontal patient. Oral Sci Rev 1976; 8: 49-61.
14. Cohen RL, Alves MEAF, Mc SwigginT, Imery PB, Crawford JM, Chambers DA. Histopathologic correlation with crevicular fluid during experimental periodontitis. J Dent Res1989; 68: 916.
15. Cohen RL, Alves ME, Crawford JM, McSwiggin T, Chambers DA. Association of gingival crevicular fluid aspartate aminotransferase levels with histopathology during ligature-induced periodontitis in the beagle dog. J Dent Res. 1991; 70: 984-87.
16. Chambers DA, Imrey PB, Cohen RL, Crawford JM, Alves MEAF, McSwiggin TA. A longitudenal study of aspartate aminotransferase in human gingival crevicular fluid; J Periodontal Res 1991. 26: 65-67.
17. Persson GR and Page RC. Diagnostic characteristics of crevicular fluid aspartate aminotransferase (AST) levels associated with periodontal disease activity. J Clin Periodontol 1992; 19: 43-48.
18. Periinetti Giuuseppe, Paolantonio Miichele, D' Attilio Miichele et al. Aspartate Aminotransferase Activity in Gingival Crevicular Fluid during Orthodontic Treatment: A Controlled Short-Term Longitudinal Study. J Periodontol 2003; 74: 145-152.
19. Persson GR. Relationship between Gingival Crevicular fluid levels of Aspartate amino transferase and active tissue destruction in treated chronic periodontitis patients. J. Periodontol. Res 1990; 25: 81-87.
20. Mc Culloch CAG. Host enzymes in Gingival Crevicular Fluid as diagnostic indicators of Periodontitis. J Clin Periodontol (1994); 21: 497-506.
21. Chambers DA , Crawford J M, Mukerjee S et al.; Aspartate amino transferase increases in crevicular fluid during experimental periodontitis in Beagle dogs. J Periodontol 1984; 55: 526-530.
22. Li R. Gingival crevicular aspartate aminotransferase levels in periodontitis patients before and after periodontal treatment. Zhonghua Kou Qiang Yi Xue Za Zhi. 1992; 27: 70-73.
23. Roy C. Page. Host response tests for diagnosing periodontal diseases; J Periodontol 1992; 63: 356-366.
24. Magnusson Ingvar, Persson Rutger G., Page Roy C., De Rouen Timothy A.et al. A multicenter clinical trial of a new chairside test in distinguishing between

 

diseased and healthy periodontal sites. II. Association between site type and test outcome before and after therapy. J Periodontol 1996; 67: 589-596.
25. Loesche WJ et al. Chemotherapy of Dental plaque infections. Oral Sci Rev 1976; 9: 65.
26. Kuru B, Yilmaz S, Noyan U, Acar O, Kadir T. Micrbiological features and crevicular fluid Aspartate aminotransferase enzyme activity in early onset periodontitis patients. J Clin Periodontol 1999; 26: 19-25.
27. Silva Emílio Barbosae, Salvador Sérgio Luís S., Fogo José Carlos and Marcantonio Rosemary Adriana C. Use of Aspartate Aminotransferase in diagnosing periodontal disease: a comparative study of clinical and microbiological parameters. Journal of oral science 2003; 45: 133-138.
28. Imrey PB, Crawford JM, Cohen RL, Alves ME, McSwiggin TA, Chambers DA. Cross-sectional analysis of Aspartate Aminotransferase in human gingival crevicular fluid. J Periodontal Res 1991; 26: 75-84.
29. Persson G. Rutger, Alves Mario E. A. F., Chamber Donald A et al. A multicenter clinical trial of PerioGardTM in distinguishing between diseased and healthy periodontal sites. J Clin Periodontol 1995: 22; 794-803.
30. Smith AJ, Alexander M, Mackenzie D, Lennon A, Riggio MP, Mac Farlane TW et al. Microbial factors and gingival crevicular fluid aspartate aminotransferase levels: a cross sectional study. J Clin Periodontol 1998; 25: 334-339.

# FRENECTOMY COMBINED WITH A LATERALLY DISPLACED PEDICLE GRAFT

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Abstract

An aberrant frenum is postulated to create functional and aesthetic problems. Archer's 'classical frenectomy' is an extensive procedure including the excision of fibres, interdental papilla and exposure of alveolar bone up to the palatine papilla. The resultant delayed healing, loss of interdental papilla and abnormal scar led towards the conservative approaches like Edward's frenectomy, frenum relocation by Z-plasty and free gingival graft; with their technical and aesthetic limitations.

A better approach to make a primary closure in midline and to avoid unesthetic scar by creating a zone of attached gingiva, frenectomy is assisted with lateral pedicle graft. The interdental papilla is left surgically undisturbed andhealing takes place by primary intention. Miller, in his study on 27 subjects, suggested that the newly created zone of attached gingiva might have bracing effect inhibiting reopening of diastema. A case series of this technique with its distinct advantages is presented.

Key words

Aberrant frenum, Frenectomy, Lateral pedicle graft.

## INTRODUCTION

A frenum is an anatomic structure formed by a fold of mucous membrane and connective tissue, sometimes muscle fibres. The superior labial frenum is triangular in shape and attaches the lip to the alveolar mucosa and/or gingiva. It extends over the alveolar process in infants and forms a raphe that reaches the palatal papilla. Through the growth of alveolar process as the teeth erupt, this attachment generally changes to assume the adult configuration.[1] Taylor has observed that a midline diastema is normal in about 98% children between 6 and 7 years of age but the incidence decreases to only 7 % in persons 12-18 yrs old.[2] But in some instances the infantile arrangement is retained. This high coronal attachment is generally associated with a hypertrophy of the frenum. Depending upon the extension of attachment of fibres, frena have been classified as-[3]

1.Mucosal – when the frenal fibres are attached up to mucogingival junction.

2.Gingival – when fibres are inserted within attached gingiva.

3.Papillary – when fibres are extending into interdental papilla; and

4. Papilla penetrating – when the frenal fibres cross the alveolar process and extend up to palatine papilla.

Clinically, papillary and papilla penetrating frena are considered as pathological and have been found to be associated with loss of papilla, recession, diastema, difficulty in brushing, alignment of teeth and psychological disturbances to individual.[4,5]

Abnormal or aberrant frena are detected visually, by applying tension over it to see the movement of papillary tip or blanch produced due to ischemia of the region.[6] Miller has recommended that the frenum should be characterised as pathogenic when it is unusually wide or there is no apparent zone of attached gingiva along the midline or the interdental papilla shifts when the frenum is extended.[7]

In such cases, it is necessary to perform a frenectomy for aesthetic, psychological and functional reasons. There are numerous surgical techniques for the removal of labial frenum. In the "classical frenectomy" by Archer [8] and Kruger [9] the frenum, interdental tissue and palatine papilla are completely excised leading to exposure of underlying alveolar bone and thus leading to scarring. Though this technique resulted into an unesthetic scar, but this approach was advocated to assure removal of muscle fibres, supposedly connecting the orbicularis oris with the

palatine papilla. It was thought that if this was not done, the diastema would reopen.

Henry et al. studied thoroughly the histological constituents of frenum and found considerably dense collagenous tissue, loose connective tissue and elastic fibres but no muscle fibres.[1] So Edward[10], evaluating 308 patients who demonstrated either a diastema or an abnormal frenum or a combination of both, advocated a "conservative surgical procedure". His method consisted of three procedures :

1.Apically repositioning of the frenum (with denudation of alveolar bone),

2.Destruction of the trans-septal fibres between the approximating central incisors,

3.Gingivoplasty of any excess labial and/or palatal tissue in the interdental area.

One of the salient aspects of Edward's technique was the aesthetic maintenance of the interdental papilla. But the healed scar in the midline appeared unesthetic to the subjects.

Coleton[11] and Lawrence[12] have used free gingival graft combined with frenectomy. This procedure avoids the scar but a mismatched gingival colour in midline and need of a second surgical site to achieve donor tissue complicate the technique. Laser has been used by various clinicians which has its relative advantages and disadvantages.[13,14]

Miller has presented a surgical technique combining the frenectomy with a laterally positioned pedicle graft. Closure across the midline by laterally positioned gingiva and healing by primary intention resulted in aesthetically acceptable attached gingiva across the midline. No attempt was made to dissect the trans-septal fibres and hence, interdental papilla remained undisturbed. Aesthetically and functionally better results were obtained.[7]

So, in the following case-series this technique has been attempted and results are presented.

## Materials and Methods

The present surgical technique was undertaken at Kothiwal Dental College and Research Centre, Moradabad. It was approved by Ethical Committee on Human and/or Animal Subjects' Research, Kothiwal Dental College and Research Centre, Moradabad. The subjects underwent frenectomy for functional, aesthetic, periodontal or orthodontic reasons. A frenum was judged abnormal if it was unusually broad and there was no apparent attached gingiva in the midline and the interdental papilla could be stretched by the frenum.[7]

### Case-1

A 32-year male complained of receding gingival tissue in upper mid line region. On clinical examination, a papilla-penetrating upper mid frenum was found (Fig. 1a).

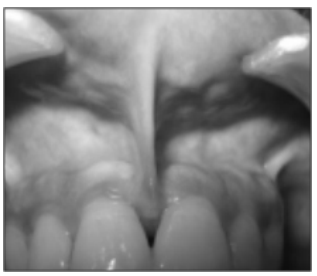

Fig-1a

After local anaesthesia, a horizontal incision was taken to separate the frenum from the base of interdental papilla. This incision was extended apically up to the vestibular depth to completely separate the frenum from alveolar mucosa. Any remnant of frenal tissue in the mid line and on the under surface of lip was excised (Fig. 1b).

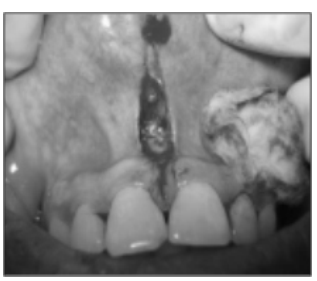

Fig-1b

A vertical parallel incision was taken on the mesial side of lateral incisor, 2-3mm apical to marginal gingiva, up to vestibular depth. The gingiva and alveolar mucosa in between these two incisions were undermined by partial dissection to raise the flap (Fig. 1c).

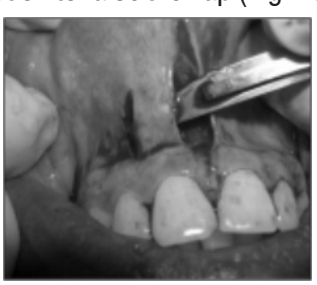

Fig-1c

A horizontal incision was then given 1-2 mm apical to gingival sulcus in the attached gingiva, connecting the coronal ends of the two vertical incisions. Flap was raised, mobilised mesially and sutured to obtain primary closure across the midline (Fig. 1d).

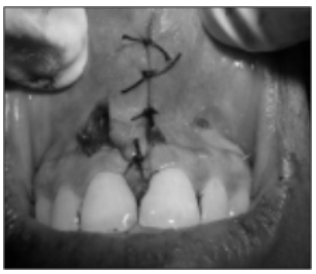
Fig-1d

No attempt was made to dissect trans-septal fibres between approximating central incisors. Gingivoplasty of any excess labial and/or palatal tissue in the interdental area was done, preserving the integrity of the interdental papilla. The surgical area was dressed with COE PAK (GC America Inc., USA). Dressing and the sutures were removed 1 week later. A healing zone of attached gingiva was clearly visible with no loss of interdental papilla (Fig. 1e).

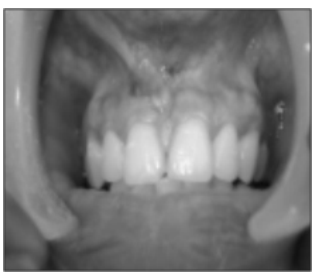
Fig-1e

**Case-2**

In this case, high frenum was associated with the loss of interdental papilla and diastema (Fig. 2a).

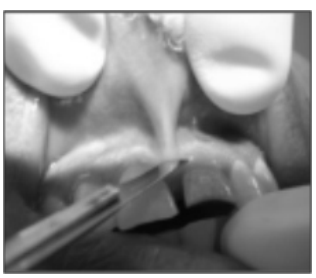
Fig-2a

The same surgical steps were followed. 10 days post-operative observations show the formation and maturation of attached gingiva in the midline (Fig. 2b).

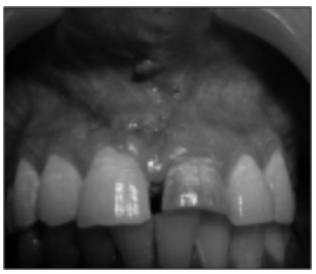
Fig-2b

**Case-3**

The patient had a complaint of a small nodular mass under upper lip. He had developed a habit of playing with it. On examination a high frenum with a nodule was found (Fig. 3a).

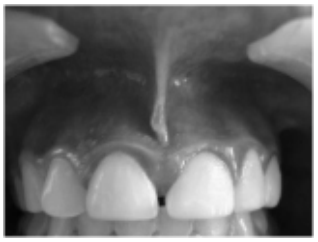
Fig-3a

Same surgical steps were followed. 10 days post-operative view (Fig. 3b)

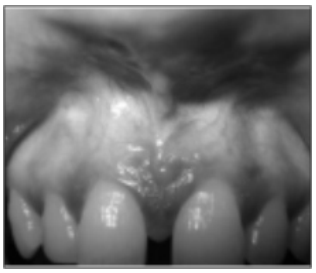
Fig-3b

shows elimination of the nodule and healing with epithelialisation in midline apical to the interdental papilla.

**Case-4**

A 20-year male patient was referred from the Department of Orthodontics for frenectomy. On examination a papillary frenum associated with midline diastema was found (Fig. 4a ).

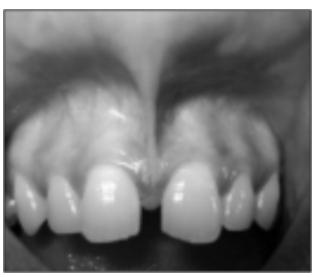
Fig-4a

It was thereafter managed surgically following the above mentioned technique. Two weeks post-operative view (Fig. 4b)

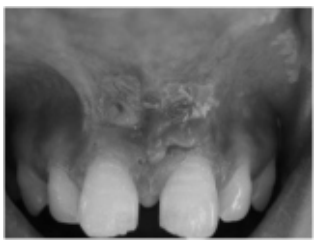
Fig-4b

shows a healing zone of attached gingiva in midline. After complete healing no scar was observed. There was no loss of interdental gingiva. The zone of attached gingiva was increased and the colour was comparable to the adjacent tissue (Fig. 4c and 4d).

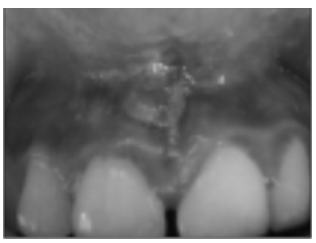

Fig-4c

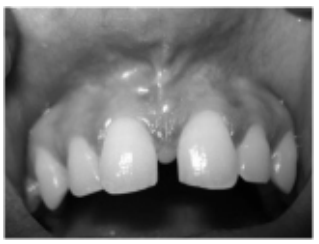

Fig-4d

## Results

The outcome of this surgical procedure shows this technique produced a pleasing aesthetic result. Scar formation in the midline could be avoided. On healing a wider zone of attached gingiva was obtained. It was colour matched with adjacent tissue. Healing was obtained by primary intention. No loss of interdental papilla was observed. No complication was noted during healing period. Patient's compliance was also very good.

## Discussion

In the era of periodontal plastic surgery, more conservative and precise techniques are being adopted to create more functional and aesthetic results. The management of aberrant frenum has travelled a long journey from Archer's[8] and Kruger's[9] "classical techniques" of total frenectomy to Edward's[10] more conservative approach. Recent techniques added frenal relocation by Z-plasty[15], frenectomy with soft-tissue graft[11,12] and Laser[13,14] applications to avoid typical diamond-shaped scar and facilitate healing. Each method has its own advantages and disadvantages.

A frenum is evaluated in relation to vestibular depth, zone of attached gingiva, interdental papilla and diastema. If there is an adequate zone of attached gingiva, coronal to the frenum, it is of no clinical significance. A zone of attached gingiva is considered to prevent recession and it also gives an aesthetically pleasant appearance.

In this context, Miller's technique combined with a laterally positioned pedicle graft[7] was attempted in this case series, due to its salient features. This technique offers two distinct advantages. First, on healing there is a continuous band of gingiva across the midline rather than unesthetic scar. The second advantage is that trans-septal fibres are not disrupted surgically, to avoid any trauma to interdental papilla. This prevents loss of interdental papilla. Though a continuous follow up is required for a long period to observe any loss or stability of interdental papilla, Miller, in his study observed that interdental papillae were maintained in all 27 cases surgically treated by this method.

The timing of frenectomy before or after closer of diastema has been controversial. Surgical resection of frenum prior to orthodontic treatment has been advocated since the frenum was considered to be the primary cause of diastema.[15] Edward suggested that during closure of diastema the different interdental fibres remained convoluted and compressed in a coiled up manner so they should be dissected during frenectomy.[10] On the other hand, others have felt difficulty in orthodontically moving the teeth through the scar tissue, if done afterwards.[16] At the same time, loss of interdental papilla due to destruction of trans-septal fibres is suspected. In the present case series no attempt was made to destroy the trans-septal fibres. Ten Cate et al.[17] have observed that there is simultaneous degradation and synthesis of collagen fibres in trans-septal area. So Miller feels that this physiological process may achieve remodelling of trans-septal fibres without surgical intervention. This will also prevent any loss of interdental papilla.[7]

In a study on 27 subjects with abnormal frenum who had undergone orthodontic closer of diastema, Miller did frenectomy combined with a laterally positioned pedicle graft. There was no loss of interdental papilla. No relapse of diastema was found in 24 cases and in three cases only minimal relapse (less than 1 mm) was noted. He has suggested that the newly formed broad attached gingiva contains collagenous fibres which may have a bracing effect and prevented reopening of diastema. He has further suggested that the ideal time for performing this surgery should be after orthodontic movement is complete and about 6 weeks before

appliances are removed. This not only allows for healing and tissue maturation but also permits the surgeon to use orthodontic appliances as a means of retaining periodontal dressing.[7] This observations can be utilised during post-orthodontic retention period, but gain of attached gingiva in place of scar and no loss of interdental papilla are definite advantage of this technique.

## CONCLUSION

The present study describes the surgical technique combining frenectomy with a lateral pedicle graft. This method has certain distinct advantages e.g.-

1. Healing takes place by primary intention.
2. A zone of attached gingiva, matching with adjacent tissue, forms in midline which is pleasing to the individual.
3. No unesthetic scar formation.
4. No recession of interdental papilla occurs because the transseptal fibres are not severed out.
5. The attached gingiva in midline may have a bracing effect which helps in prevention of orthodontic relapse.

## REFERENCES

1. Henry SW, Levin MP, Tsaknis PJ. Histological features of superior labial frenum. J Periodontol 1976;47:25-28.
2. Taylor JE. Clinical observation relating to the normal and abnormal frenum labii superioris. Am J Orthod Oral Surg 1939;25:646.
3. Placek M, Miroslavs, Mrklas L. Significance of the labial frenal attachment in periodontal disease in man. Part 1; Classification and epidemiology of the labial frenum attachment. J Periodontol 1974;45:891-94.
4. Dewel B F,The labial frenum, midline diastema and palatine papilla: a clinical analysis. Dent Clin North Am 1966;175-84.
5. Maria E Diaz-Piaz, Manual O Lagravere, Rita Villera. Midline diastema and frenum morphology in the primary dentition. J Dent 2006;26:11-14.
6. Gottsegen R. Frenum position and vestibule depth in relation to gingival health. Oral Surg 1954;7:1069-72.
7. Miller P D Jr. The frenectomy combined with a laterally positioned pedicle graft; functional and aesthetic consideration. J Periodontol 1985;56:102-106.
8. Archer W H (ed). Oral surgery- a step by step atlas of operative techniques, 3rd edition. Philedelphia ,W B Saunders Co.,1961;192.
9. Kruger GO (ed). Oral surgery, 2nd edition. St. Louis, The C.V. Mosby Co.,1964;146.
10. Edwards J G. The diastema, the frenum, the frenectomy: a clinical study. Am J Ortho1977;71:489.
11. Colten S M. Mucogingival surgical procedures employed in re-establishing the integrity of the gingival unit(III):The frenectomy and the free mucosal graft. Quintessence Int 1977;8:53-61.
12. Lawrence G B, Fowler E B, Moore E A, Murray D J. The free gingival graft combined with the frenectomy; A Clinical review. Gen Dent 1999;47:514-18.
13. Coluzzi D J. Fundamentals of dental laser, science and instruments. Dent Clin North Am 2004;48:751-70.
14. Gontizo F, Navarro R S, Haypek P, Ciamponi A L, Haddad A S. The application of diode and Er;YAG lasers in labial frenectomy in infant patients. J Dent Child 2005;72:10-15.
15. Tait CH. Median frenum of upper lip and its influence on spacing of upper central incisor teeth. N Z Dent J 1929;25:116.
16. Finn SB. Clinical Pedodontics. Philadelphia, W. B. Saunders Co. 1973;416.
17. Ten Cate AR, Deporter DA, Freeman E. The role of fibroblasts in the remodelling of periodontal ligament during physiologic tooth movement. Am J Orthod 1976;69:155.

# Infection Control - A Review

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## Introduction

Infection control program aims at providing a framework in which dental treatment can be rendered safely and effectively. In the dental office infection may be transmitted via direct contact with blood, saliva, secretions via indirect contact with contaminated instruments, environmental surfaces and via air through aerosols of infectious body fluids.

A comprehensive infection control plan involves creation of protocols to safeguard health and safety of both patient and dental team; continuous review of infection control hazards and exposure, and routinely performing it in a strict manner.

## Standard precautions

The Centre for Disease Control defines standard precautions as "any standard of care designed to protect health care personnel and patients from pathogens that can be spread by blood or any other body fluids, excretion or secretion". Many infectious diseases including HIV, Hepatitis B, C and D are commonly asymptomatic making it impossible to identify all those who may be carrying such infectious disease. Therefore, all body fluids from all patients should be treated as potential carriers of infective agents and the same infection control procedures must be used for every patient.

## Information and training

All clinical staff including laboratory technicians must receive mandatory training covering Occupational Safety and Health Administration (OSHA) standards, blood borne diseases and their immunization, use of personal protective equipment (PPE), post exposure protocol and disposal of biohazard waste. It should be conducted annually and its formal record should be kept. All procedures in which actual/potential exposure to blood or infectious material may be anticipated and all individuals performing these procedures which are at great risk for exposure to pathogens should be identified. The risk of infection following exposure is determined by inoculum's size, method of exposure and susceptibility of the host.

## Immunization:-

All of the staff who are at potential risk of exposure should be offered vaccination for Hepatitis B virus. Immunization against rubella, mumps, influenza, rubeola, varicella zoster, tetanus is also recommended.

## Infection Control procedures:-

Personal protective equipment (PPE):-

Appropriate PPE should be provided for all clinical staff.

Protective clothing: It is the outer layer/covering of garments that would first be contacted by the contaminating droplets. Protection against sprays, splashes, spatter, spills of body fluids or chemicals can be provided by high neck, long- sleeved, knee length garments.

Hand washing: Hand washing is an important means of protection and disease prevention. Hands should be washed with an antimicrobial soap (e.g. 4% chlorhexidine) or an alcohol based hand rub.

Gloves: Gloves should be worn for all patient contact activity. These needs to be changed between patients and a pair of gloves should not be used repeatedly. Hands should be washed before donning gloves and after their removal. Surgeon's gloves should be worn during surgical procedures. Heavy utility gloves provide better protection during surface cleaning and disinfection and when handling contaminated instruments during clean-up.

Face masks: Face masks prevent patient's spatter, splashes of contaminated solutions from contacting mucous membrane of mouth or nose of dental staff along with reduction in the inhalation of air borne particles.

Eyewear: Eyewear with face shield should be

whenever aerosolization, spray or spatter is encountered.

## Limiting contact with aerosol and spatter:-

While performing procedures on the patient steps should be taken to minimize splashing splattering and generation of aerosol. This is accomplished with the use of rubber dam, high-volume evacuation (HVE) and low-volume saliva ejector. Patient should not close his lips around the ejector tip or during use of HVE as it leads to back flow as a result of decrease in line pressure. Patient rinsing with an antimicrobial mouthrinse before starting the procedure helps in minimizing aerosol contamination.

## Sterilization:-

Use of disposable items best prevents patient to patient contamination. These include gloves, masks, gowns, patient bibs, saliva ejector tips, trays etc. Only sterilized instruments should be used on patients. Presterilization cleaning should be done. Ultrasonic cleaning has shown effective results in removing dried blood and saliva. Usually, 2 to 20 minutes is needed to clean instruments ultrasonically. The cleaning solution used should be changed at least daily. After cleaning the instruments should be packed in a self-sealing, paper/plastic peel pouches.

To sterilize dental instruments various procedures are given. These can basically be categorized into:-

High-temperature sterilization/heat sterilization:- dry heat, steam, flash sterilization etc.

Low-temperature sterilization:- ethylene oxide gas, radiation, gas plasma hydrogen peroxide sterilization etc.

Liquid sterilants at room temperature:- 2.0% to 3.2% solutions of glutraldehyde for a contact time of at least 10 hours.

## Sterilization monitoring:

Three types of monitoring process are there to ensure that the instruments are safe for patient care.

· Physical – these include use of gauges, dials, indicators to show proper levels of time, temperature or pressure.

· Chemical/Process indicators – it uses heat sensitive inks that show change in color at a certain temperature.

· Biologic – it measures whether highly resistant bacterial spores have been killed. For steam and unsaturated chemical vapor Bacillus stearothermophilus spore and Bacillus subtilis for dry heat, ethylene oxide and gas plasma hydrogen peroxide is used.

This monitoring should be done weekly or monthly.

## Radiographic asepsis:-

Surface of X-Ray unit should be covered. Plastic disposable covers should be placed on packs before they are placed into patient's mouth. If these covers are not used, gloves must be worn for handling films. The contaminated wrappers are discarded, gloves removed and films are processed.

## Laboratory asepsis:-

All contaminated items e.g. impressions, prostheses should be cleaned to remove blood, saliva, debris then disinfected with glutraldehyde, hypochlorite or iodophor before they are sent to the dental laboratory. Similarly, the items should be disinfected before they are sent back to the dental office from the laboratory. Laboratory equipment should also be sterilized or disinfected.

## Surface asepsis:-

The surfaces in the dental treatment area can be separated into housekeeping surfaces e.g. floor, walls, and clinical contact surfaces that are often touched during treatment (e.g. handles, switches, instrument arms) requiring more thoroughly disinfection than housekeeping surfaces. PPE should be worn when performing surface cleaning/disinfection.

There are two general approaches for surface asepsis – to clean and disinfect contaminated surfaces and secondly use of surface covers to prevent the surfaces from contamination.

Surface disinfection – housekeeping surfaces must be cleaned with a detergent or disinfect on a regular basis. Clinical contact surfaces should be disinfected with a tuberculocidal surface disinfectant. Other intermediate disinfectants which are bactericidal or virucidal can

also be used. Hypochlorite, iodophor, water-based/alcohol-based synthetic phenolics, alcohol-based quaternary ammonium compounds are active ingredients in surface disinfectants.

Surface covers- materials that are impervious to moisture (e.g. thin plastics) are used as surface covers to prevent contamination of surfaces. These are particularly useful in areas that are difficult to clean and disinfect (dental light handles, knurled handles, air-water syringe buttons). In case the covered surfaces become contaminated, it should be removed and replaced.

## Dental Unit Waterline (DUW):-

For surgery and endodontic irrigation dental unit water should not be used as microbes are present in it. For this purpose sterile irrigating solutions must be used. In dental unit water tubing the bacteria exists in the form of biofilm that coats inside of the lines. DUW effluent must contain less than 500 CFU of bacteria per mL. The control unit should be activated for 30 seconds before starting patient's treatment. Flushing of water units with a disinfectant (hypochlorite solution), use of a bacterial filter into waterline of handpiece and air-water syringe and installing an anti-retraction valve to reduce retraction of contaminated water and saliva through dental handpiece into the water lines are the steps recommended to decrease the microbial potential for disease transmission.

## Post Exposure Protocol:-

In case of an exposure, the route(s) of exposure and the circumstances under which the exposure occurred, the employee's vaccination status should be documented. The sources individual's blood should be treated to check for HBV, HIV diseases etc. after exposure, the employee's blood should be tested immediately and follow-up should be done for 90 days.

## Summary:-

Infection control consists of a series of procedures directed at reducing the number of microbes shared among people. Success of infection control depends upon establishing the proper procedure for it and then incorporating it in to daily practice in a disciplined manner. Due to emergence of new threats, it becomes extremely important to remain aware of these changes so as to provide effective infection control in order to safeguard the health of patient as well as clinical staff while providing dental health care.

## References

1. American Academy of Oral and Maxillofacial Radiology: Infection control guidelines for dental radiographic procedures. Oral Surg Oral Med Oral Pathol 73:248-249, 1992.

2. American Dental Association Council on Scientific Affairs and ADA Council on Dental Practice. Infection control recommendation for the dental office and the dental laboratory. J Am Dent Assoc 127:672-680, 1996.

3. Cochran MA, Miller CH, Sheldrake MA: The efficacy of the dental dam as a barrier to the spread of microorganisms during dental treatment. J Am Dent Assoc 119: 141-144, 1989.

4. Craig DC, Quale AA: The efficacy of face-masks. Br Dent J 158: 87-90, 1985.

5. Miller CH: Disciplined microbial control. Dent Clin North Am 35:339-355, 1991.

6. Miller CH: Infection control. Dent Clin North Am 40: 437-456, 1996.

7. Miller CH, Sheldrake MA: The ability of biological indicators to detect sterilization failures. Am J Dent 7: 95-97, 1994.

8. Mc Dowell JW, Paulson DS, Mitchell JA: A simulated- use evaluation of a strategy for preventing biofilm formation in dental unit waterlines. J Am Dent Assoc 135: 799-805, 2004.

9. Sanchez E, Macdonald G: Decontaminating dental instruments. Testing the effectiveness of selected methods. J Am Dent Assoc 126: 359-368, 1995.

10. Terezhalmy GT, Gitto CA : Today's minimal requirements for a practical dental office infection control and exposure control program. Dent Clin North Am 42: 629-642, 1998.

11. Thomas MV, Jarboe G, Frazer RQ: Infection control in the dental office. Dent Clin North Am 52: 609-628, 2008.

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