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Our journal adopts publication policies to ensure that only ethical and responsible dental research is published; all studies need to have appropriate ethical approval. Before any study is conducted, issues of informed consent, confidentiality, potential benefits and potential harm need to be considered carefully. Good ethical publication practice does not happen by chance and can only be established if we actively promote it. As journal editors, we rely heavily on the vigilance that will ensure that our readers can continue to apply the findings to their clinical and academic practice.

Dr. Manoj Kumar KP

Chief Editor

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A MISCELLANY OF CLASSIFICATIONS OF GINGIVAL RESSIONS UPTO THE TWENTIETH CENTURY:REVIEW

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Dr. Harish Kumar VV, *Dr. Santhosh VC

Abstract

A classification system facilitates the communication and understanding of common standardized identification of the nature of cases, helps in diagnosis, prognosis and finally suitable treatment plan for the condition. Gingival recession, a common condition leading to exposure of root surfaces, is seen in both dentally aware population and those with limited access to dental care. There are several classification systems in literature, with their merits and demerits, to describe recession. In this section the updates till twentieth century is described.

Key Words: gingival recession, classification, update

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Introduction

A beautiful smile is a person's ability to express a range of emotions with the structure and movement of the teeth and lips, can often determine how well a person can function in society. Of course, the importance given to a beautiful smile is not new. The harmony of the smile is determined especially by the shape, the position and the color of the teeth.¹

An adequate mucogingival complex, in which the mucogingival tissues can sustain their biomorphologic integrity and maintain an enduring attachment to the teeth as well as the underlying soft tissue, is always essential for maintaining a beautiful smile. When a mucogingival problem occurs, there are basically two ways in which it presents itself: (a) As a close disruption of the mucogingival complex resulting in pocket formation. (b) As an open disruption of the

mucogingival complex resulting in gingival clefts and gingival recession.²

Gingival recession is defined as "the displacement of marginal tissue apical to the cemento-enamel junction (CEJ)." The term "marginal tissue recession" is considered to be more accurate than "gingival recession," since the marginal tissue may have been alveolar mucosa. Gingival recession is present at most of the ages, starting early in some populations. Loe *et al.* stated a hypothesis that there was more than one type of gingival recession and probably several factors determining the initiation and development of these lesions on the basis of the occurrence and levels of gingival recession.³

Classifications can be defined as "systematic arrangements in groups or categories according to established criteria" (Merriam-Webster 2010). It have been

conceived to facilitate the comprehension of the great amount of factors and information involved in complex systems.⁴ Classifications have proved useful and indispensable in many fields of knowledge, particularly in medicine. It not only provides information that is important for shaping diagnosis, prognosis, treatment planning, but also communication between clinicians. In periodontology, classifications are widely used to categorize defects due to periodontitis according to their etiology, diagnosis, treatment and prognosis. Gingival recessions are frequent lesions, and due to aesthetic reasons, patients have always requested treatment.⁵

There are several classification systems in literature, with their merits and demerits, to describe recession.⁶ In this section the updates till twentieth century is described. They are:

1. Sullivan and Atkins (1968)
2. Mlinek et al (1973)
3. Liu and Solt (1980)
4. Bengue et al (1983)
5. Miller (1985)
6. Smith (1990)
7. Nordland and Tarnow (1998)

The classifications can be outlined as follows:

Sullivan and Atkins (1968)

Based on the depth and width of the defect, he proposed following four categories:³

1. Deep wide
2. Shallow wide
3. Deep narrow
4. Shallow narrow

Limitations

Open interpretation of the examiner and inter examiner variability and is therefore not reproducible.

Mlinek et al. (1973)

- Shallow narrow: Recession <3 mm
- Deep wide: Recession >3 mm.

Advantage: Reduction in subjective variation.

Limitations

The landmark for horizontal measurement was not specified as variable measurement may be present at variable distances.

Liu and Solt (1980)

Based on marginal tissue recession:

1. Visual: Measured from CEJ to soft tissue margin
2. Hidden: Loss of attachment within the pocket that is apical to tissue margin.

Limitations

Less informative as visible recession was not classified.

Bengue et al. (1983)⁷

Based on coverage prognosis:

- U type - poor prognosis
- V type - fair prognosis
- I type - good prognosis.

P.DMiller (1985)

Probably the most widely used system for describing gingival recession. Classification was based on the following aspects:⁸

- a. Extent of gingival recession defects

- b. Extent of hard and soft tissue loss in interdental areas surrounding the gingival recession defects.

Significance:

Useful in predicting the final amount of root coverage following a free gingival graft procedure.

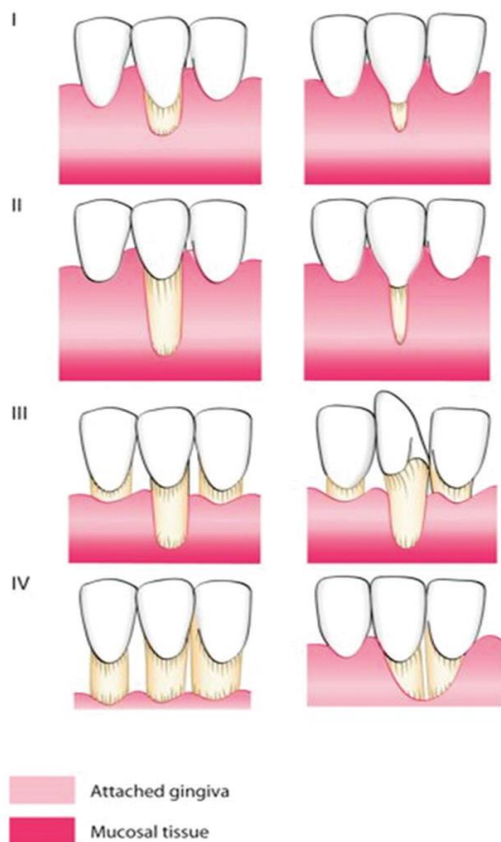


Fig1:PD Miller classification of recession defects

Four types of recession defects were categorized as follows⁶

Class I: Marginal tissue recession, which does not extend to the mucogingival junction (MGJ). There is no periodontal loss (bone or soft tissue) in the interdental area, and 100% root coverage can be anticipated

Class II: Marginal tissue recession, which extends to or beyond the MGJ. There is no periodontal loss (bone or soft tissue) in the interdental area, and 100% root coverage can be anticipated

Class III: Marginal tissue recession, which extends to or beyond the MGJ. Bone or soft tissue loss in the interdental area is present or there is a malpositioning of the teeth, which prevents the attempting of 100% of root coverage. Partial root coverage can be anticipated. The amount of root coverage can be determined presurgically using a periodontal probe.

Class IV: Marginal tissue recession, which extends to or beyond the MGJ. The bone or soft tissue loss in the interdental area and/or malpositioning of teeth is so severe that root coverage cannot be anticipated.

Limitations³

1. The classification considers MGJ as the reference point. The difficulty in identifying MGJ creates difficulties in the classification between Class I and II. There is no mention of presence of keratinized tissue
2. The amount and type of interdental bone loss and the level of interdental papilla in Miller's Class III and IV have not been specified.
3. Class III and IV categories of Miller's classification stated that marginal tissue recession extends to or beyond the MGJ with the loss of interdental bone or soft tissue apical to the CEJ. The cases, which have interproximal bone loss and

the marginal recession that does not extend to MGJ cannot be classified either in Class I because of interproximal bone or in Class III because the gingival margin does not extend to MGJ.

4. The difference between Classes III and IV is based on the position of the gingival margin of the two adjacent teeth. Class III and Class IV can be identified if there are adjacent teeth. However, in case of a missing adjacent tooth, there is no reference point and it is impossible to include this case in Class III or Class IV.
5. Facial (F) or lingual (L) involvement of the marginal tissue has not been specified in the classification.
6. Recession of interdental papilla alone cannot be classified according to the Miller's classification. An additional classification system has to be considered.
7. Palatal recession is another area of concern. The difficulty of the applicability of Miller's criteria on the palatal aspect of the maxillary arch can be reasoned out to the fact that there is no MGJ on palatal aspect.
8. Miller's classification estimates the prognosis of root coverage following grafting procedure.

Miller stated that 100% coverage can be anticipated in Class I and II recessions, partial root coverage in Class III, and no root coverage in Class IV.

Smith (1990) proposed index of recession. In this two figure index, the first digit denotes the horizontal and the second digit denotes the vertical component of a site of recession. An asterisk denotes involvement of mucogingival junction.

Horizontal Extent of Recession

Score 0: No clinical evidence of root exposure

Score 1: No clinical evidence of root exposure plus a subjective awareness of dentinal hypersensitivity in response to a 1 s air blast is reported, and/or there is clinically detectable exposure of the CEJ for up to 10% of the estimated mid-mesial to mid-distal distance

Score 2: Horizontal exposure of the CEJ more than 10% but not exceeding 25% of the estimated midmesial to middistal distance

Score 3 : Exposure of the CEJ more than 25% of the midmesial to middistal distance but not exceeding 50%

Score 4 : Exposure of the CEJ more than 50% of the midmesial to middistal distance but not exceeding 75%

Score 5: Exposure of the CEJ more than 75% of the midmesial to middistal distance up to 100%.

Vertical Extent of Recession

Score 0: No clinical evidence of root exposure

Score 1: No clinical evidence of root exposure plus a subjective awareness of

dentinal hypersensitivity is reported and/or there is clinically detectable exposure of the CEJ not extending more than 1 mm vertically to the gingival margin

Score 2–8: Root exposure 2–8 mm extending vertically from the CEJ to the base of the soft tissue defect

Score 9: Root exposure more than 8 mm from the CEJ to the base of the soft tissue defect

Score *: An asterisk is present next to the second digit whenever the vertical component of the soft tissue defect encroaches into the MGJ or extends beyond it into alveolar mucosa; the absence of an asterisk implies either absence of MGJ involvement at the indexed site or its noninvolvement in the soft tissue defect.⁷

Limitations

- It was proposed that in cases of extensive vertical component further horizontal component may be allotted at an intermediate distance between CEJ and base of the defect, which is not clearly specified.
- Separate values can be assigned for multirouted teeth, which make it more complex. It may lead to overestimation of the condition as it utilizes subjective awareness of sensitivity.
- It is also difficult to detect the midpoints of mesial and distal surfaces, in the presence of intact interdental papilla.

Nordland WP and Tarnow DP (1998)

Based on loss of papillary height:⁹

The system utilizes three identifiable landmarks:

- The interdental contact point,
- The facial apical extent of the CEJ, and
- The interproximal coronal extent of the CEJ.

Normal: Interdental papilla fills embrasure space to the apical extent of the interdental contact point/area.

Class I: The tip of the interdental papilla lies between the interdental contact point and the most coronal extent of the interproximal CEJ.

Class II: The tip of the interdental papilla lies at or apical to the interproximal CEJ but coronal to the apical extent of the facial CEJ

Class III: The tip of the papilla lies level with or apical to the facial CEJ.

Discussion

The aim of these classifications is to answer the pitfalls of the currently used classification systems for recession and to include or help the clinicians to classify those cases, which cannot be categorized into a particular class with any of the current classification systems.

We acknowledge the contributions of various eminent researchers in this field, which has paved a pathway for the current endeavor. Diagnosis and classification form an important part of approach to any condition or disease. The already existing classifications have some shortcomings which have been discussed. Hence, an attempt is made to fill those lacunae by

devising new classifications. Of all the earlier classifications, Miller's classification is still most widely used. It is based on morphological evaluation of injured periodontal tissues and could be useful in predicting final amount of root coverage. The limitations of Miller's classification result in insufficient depiction of clinical condition. Partial depiction leads to an erroneous diagnosis, prognosis, and hence treatment planning.

Conclusion

Towards the beginning of twenty first century several updates were proposed to overcome the limitations of the previous systems. The details of which are described in part II.

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A MISCELLANY OF CLASSIFICATIONS OF GINGIVAL RECESSIONS OF THE TWENTY FIRST CENTURY TILL DATE :REVIEW

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Abstract

A classification system facilitates the communication and understanding of common standardized identification of the nature of cases, helps in diagnosis, prognosis and finally suitable treatment plan for the condition. Gingival recession, a common condition leading to exposure of root surfaces, is seen in both dentally aware population and those with limited access to dental care. There are several classification systems in literature, with their merits and demerits, to describe recession. In this section the updates of twenty first century till date is described.

Key Words: gingival recession, classification, update

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Introduction

Pini-Prato stated, “The prognostic anticipation of a certain amount of root coverage is a complex process that should consider data from reliable studies and cannot be drawn from theoretical considerations.” Difficulty in determining prognosis and treatment plan based on the classification categories, stems from the fact that prognosis depends on many factors other than the clinical features of the disease. The treatment plan and amount of root coverage not only depends on the clinical condition of the tissues, but also on patient-related factors (e.g., habits), tooth/site-related (e.g., recession depth, width), and technique-related (e.g., presence or absence of releasing incisions) prognostic factors. Mucogingival therapy is very

technique sensitive and surgeon’s dexterity can also affect the extent of root coverage.¹

Pini Prato then critically evaluated the limitations of Miller’s classification based on Murphy’s criteria. Since no classification is complete until it is updated regularly, especially in the light of recent innovations and advancements. Hence, in view of the drawbacks associated with Miller’s classification, Mahajan’s classification was proposed in an attempt to emphasize the need to modify Miller’s classification to make it more comprehensive and updated.

There are several classification systems in literature, with their merits and demerits, to describe recession.¹ In this section the updates of twenty first century till date is described. They are:

1. Mahajan (2010)
2. Cairo *et al.* (2011)

3. Rotundo *et al.* (2011)
4. Reddy S *et al.* (2012)
5. Ashish Kumar and Masamatti (2013)
6. Prashant *et al.* (2014)
7. Thakur R (2015)
8. Panda S (2016)

The classifications can be outlined as follows:

Mahajan's modified classification of gingival recession (2010)²

Class I: Gingival recession defect not extending to the MGJ

Class II: Gingival recession defect extending to the MGJ/ beyond it

Class III: Gingival recession defect with bone or soft tissue loss in the interdental area up to cervical 1/3 of the root surface and/or malpositioning of the teeth

Class IV: Gingival recession defect with severe bone or soft tissue loss in the interdental area greater than cervical 1/3 of the root surface and/or severe malpositioning of the teeth.

Prognosis as per Mahajan's classification

Best: Class I and Class II with thick gingival profile

Good: Class I and Class II with thin gingival profile

Fair: Class III with thick gingival profile

Poor: Class III and Class IV with thin gingival profile.

This modification still does not accommodate all clinical conditions. For example, a tooth with gingival recession not extending up to MGJ but with interdental soft and hard tissue loss can neither be placed in Class I nor in Class III since there

is no mention of involvement of MGJ in Class II.

Cairo et al. (2011)³

Based on the assessment of CAL at both buccal and interproximal sites.

- *Recession Type 1:* Gingival recession with no loss of interproximal attachment. Interproximal CEJ was clinically not detectable at both mesial and distal aspects of the tooth.
- *Recession Type 2:* Gingival recession associated with loss of interproximal attachment. The amount of interproximal attachment loss (measured from the interproximal CEJ to the depth of the interproximal pocket) was less than or equal to the buccal attachment loss (measured from the buccal CEJ to the depth of the buccal pocket)
- *Recession Type 3:* Gingival recession associated with loss of interproximal attachment. The amount of interproximal attachment loss (measured from the interproximal CEJ to the depth of the pocket) was higher than the buccal attachment loss (measured from the buccal CEJ to the depth of the buccal pocket).

This classification provides a simplified method of categorizing gingival recession and also emphasizes the role of interproximal attachment level, one of the important site related prognostic factor. However, it does not consider the remaining width of attached gingiva, relationship of gingival margin, and MGJ, which play a very important role and govern the choice of treatment procedure; and tooth malposition which greatly affects the treatment outcome.

Rotundo et al. (2011)










Based on both soft and hard dental tissues. For this classification, specific taxonomic variables have been considered, and in particular, the amount of keratinized tissue (KT = 2 mm); the presence/absence of noncarious cervical lesion (NCCL), with a consequent unidentifiable CEJ; and the presence/absence of interproximal attachment loss.

Considering these variables, the following method of assessment is suggested:

- A. $KT \geq 2$ mm
- NCCL – absent
 - Interproximal attachment loss – absent.
- B. $KT < 2$ mm
- NCCL – present
 - Interproximal attachment loss – present.
- As a consequence, the following classes may be identified within the population:
- $KT \geq 2$ mm – no NCCL – no interproximal attachment loss (AAA)
 - $KT \geq 2$ mm – NCCL – no interproximal attachment loss (ABA)
 - $KT \geq 2$ mm – no NCCL – interproximal attachment loss (AAB)
 - $KT \geq 2$ mm – NCCL – interproximal attachment loss (ABB)
 - $KT < 2$ mm – no NCCL – no interproximal attachment loss (BAA)
 - $KT < 2$ mm – NCCL – no interproximal attachment loss (BBA)
 - $KT < 2$ mm – no NCCL – interproximal attachment loss (BAB)
 - $KT < 2$ mm – NCCL – interproximal attachment loss (BBB).⁴

Reddy et al 2012⁵

Based on the relation between the gingival margin and MGJ, status of the interdental hard and soft tissues, tooth malposition, palatal gingival recession and gingival recession can be classified as:

	Class I- Marginal tissue recession does not extend up to mucogingival junction (Fig 1).
	Class I A- Marginal tissue recession does not extend up to mucogingival junction with loss of interdental soft tissue beyond the interproximal CEJ† (Fig 2).
	Class I B -Associated with tooth malposition (Fig 3).
	Combined Class I -Includes both A & B components i.e., Marginal tissue recession does not extend up to mucogingival junction with loss of interdental soft tissue beyond the interproximal CEJ associated with tooth malposition (Fig 4).
	Class II- Marginal tissue recession extends up to or beyond mucogingival junction (Fig 5).
	Class II A- Marginal tissue recession extends up to or beyond mucogingival junction, with loss of interdental soft tissue beyond the interproximal CEJ† (Fig 6).
	Class II B-Associated with tooth malposition (Fig 7).
	Combined Class II- Includes both A & B components i.e., marginal tissue recession extends up to or beyond mucogingival junction with loss of interdental soft tissue beyond the interproximal CEJ associated with tooth malposition (Fig 8).
	Class III- Marginal tissue recession seen on palatal surfaces of maxillary teeth (Fig 9).
†- interproximal soft tissue loss is accompanied by underlying bone loss. Note- In cases where MGJ cannot be identified, gingival recession not extending/ extending into alveolar mucosa should be considered to designate Class I/ Class II.	

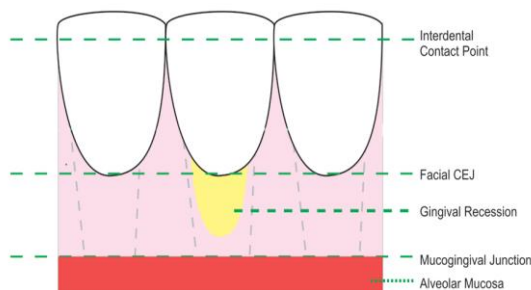
Kumar and Masamatti (2013)

Based on amalgamation of certain criteria of Miller's classification with the certain features of Nordland and Tarnow's classification.⁵ It can be applied for facial surfaces of maxillary teeth and facial and lingual surfaces of mandibular teeth.

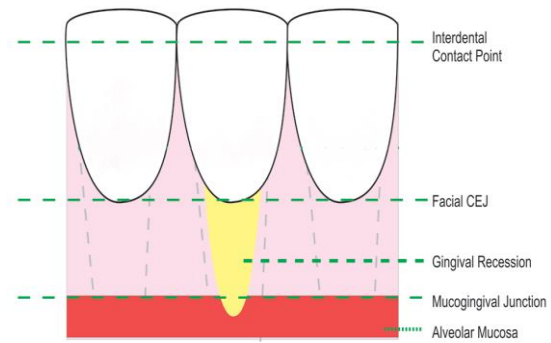
Interdental papilla recession can also be classified according to this new classification. Class I deals with marginal tissue recession with no loss of interdental bone or soft tissue. Class II and III deal with the loss of interdental bone/soft tissue with/without marginal tissue recession.

- Class I: There is no loss of interdental bone or soft tissue. This is subclassified into two categories:

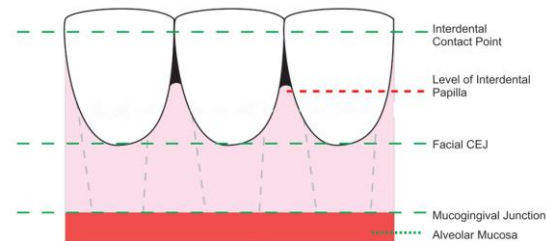
Class IA: Gingival margin on facial/lingual aspect lies apical to CEJ, but coronal to MGJ with attached gingiva present between marginal gingiva and MGJ [Figure 1a]



Class IB: Gingival margin on facial/lingual aspect lies at or apical to MGJ with an absence of attached gingiva between marginal gingiva and MGJ [Figure 1b]. Either of the subdivisions can be on F or L aspect or both (facial and lingual).

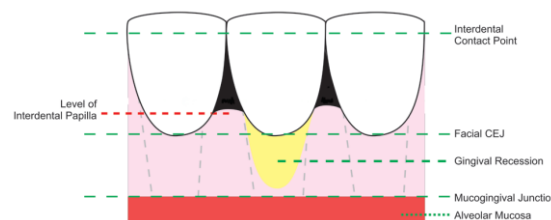


- Class II: The tip of the interdental papilla is located between the interdental contact point and the level of the CEJ midbuccally/midlingually. Interproximal bone loss is visible on the radiograph. This is subclassified into three categories:

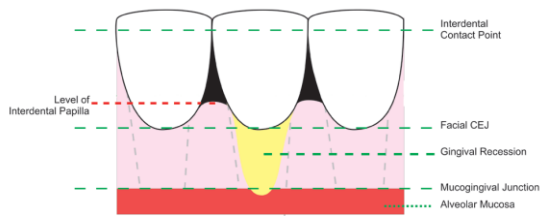


Class IIA: There is no marginal tissue recession on facial/lingual aspect [Figure 2a]

Class IIB: Gingival margin on facial/lingual aspect lies apical to CEJ but coronal to MGJ with attached gingiva present between marginal gingiva and MGJ [Figure 2b]

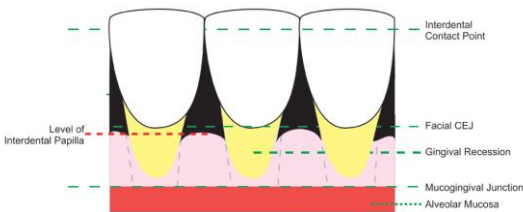


Class IIC: Gingival margin on facial aspect lies at or apical to MGJ with an absence of attached gingival between marginal gingiva and MGJ[Figure 2c].



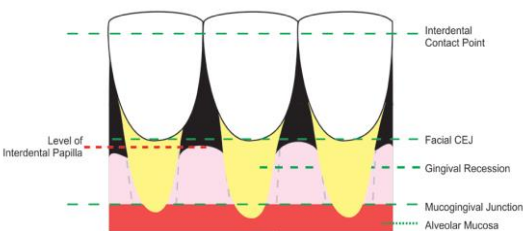
Either of the subdivisions can be on facial or lingual aspect or both (facial and lingual)

- Class III: The tip of the interdental papilla is located at or apical to the level of the CEJ midbuccally/midlingually. Interproximal bone loss is visible on the radiograph. This is subclassified into two categories:



Class IIIA: Gingival margin on facial/lingual aspect lies apical to CEJ, but coronal to MGJ with attached gingiva present between marginal gingiva and MGJ (Fig 2a)

Class IIIB: Gingival margin on facial/lingual aspect lies at or apical to MGJ with an absence of attached gingiva between marginal gingiva and MGJ.



Either of the subdivisions can be on facial/lingual aspect or both (facial and lingual) (Fig 2b).

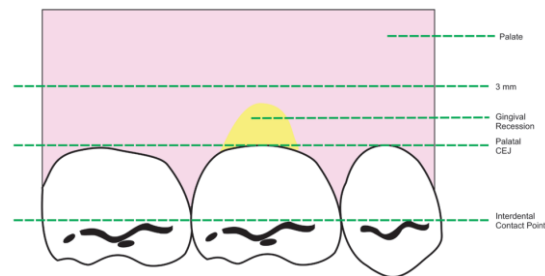
Classification of Palatal Gingival Recession

The position of interdental papilla remains the basis of classifying gingival recession on palatal aspect. The criteria of sub classifications have been modified to compensate for the absence of MGJ.

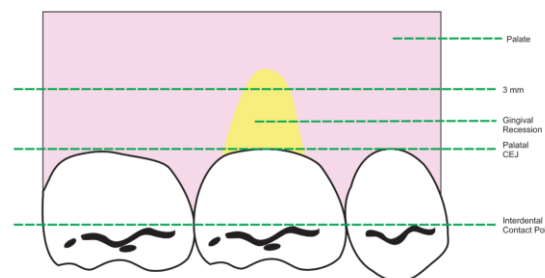
Palatal recession I

There is no loss of interdental bone or soft tissue. This is subclassified into two categories:

- Palatal recession IA (PR-IA): Marginal tissue recession ≤ 3 mm from CEJ [Fig 3a]



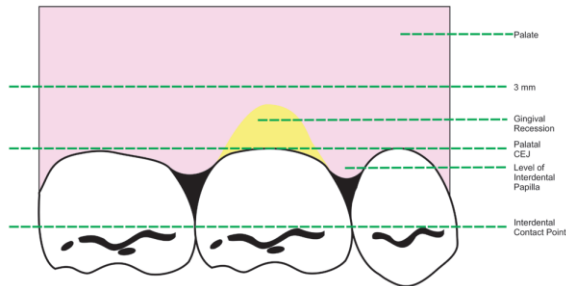
- PR-IB: Marginal tissue recession >3 mm from CEJ [Fig 3b].



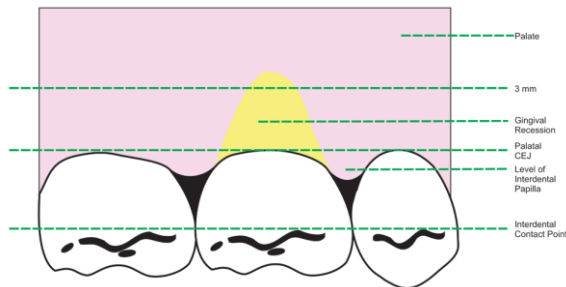
Palatal recession II

The tip of the interdental papilla is located between the interdental contact point and the level of the CEJ midpalatally. Interproximal bone loss is visible on the radiograph. This is subclassified into two categories:

- PR-IIA: Marginal tissue recession ≤ 3 mm from CEJ [Fig 4a]



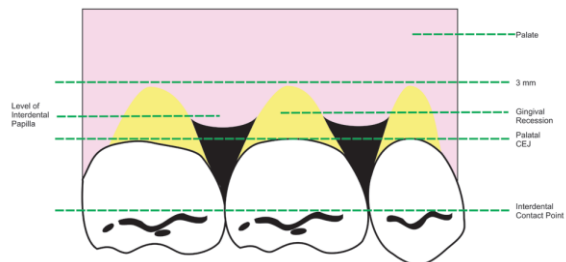
PR-IIB: Marginal tissue recession >3 mm from CEJ [Fig 4b].



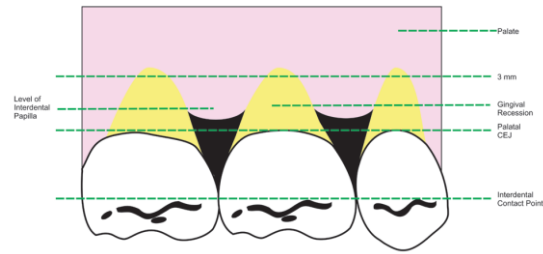
Palatal recession III

The tip of the interdental papilla is located at or apical to the level of the CEJ mid-palatally. Interproximal bone loss is visible on the radiograph. This is subclassified into two categories:

- PR-III A: Marginal tissue recession ≤ 3 mm from CEJ [Fig 5a]



- PR-III B: Marginal tissue recession >3 mm from CEJ [Fig 5b].



Prashant et al. (2014)

Based on the dental surface defects that are of paramount importance in diagnosing gingival recession areas which might help in selecting definite treatment approach.

The evaluation was performed on both frontal and lateral views using a $\times 4$ magnification lens, a periodontal probe (PCP UNC 15), and a dental explorer.

Two variables were considered:

- CEJ and
- Cervical discrepancies.

Considering the presence of the CEJ on the buccal surface, two classes were identified:

- Class A, identifiable CEJ on the entire buccal surface and
- Class B, unidentifiable CEJ totally or partially.

Considering the presence of cervical discrepancies (step), measured with a periodontal probe perpendicular to the long axis of the tooth in the deepest point of the abrasion, two classes were identified: Class (+), presence of cervical step (>0.5 mm) involving the root or the crown and the root and Class (-), absence of cervical step as shown in Table 1. Therefore, a working classification identifies four different conditions as in the table.

Prashant B <i>et al's</i> classification		
CEJ	Step	Descriptions
Class A	-	CEJ visible, without step
	+	CEJ visible, with step
Class B	-	CEJ not visible, without step
	+	CEJ not visible, with step

Thakur R (2015)

Based on the gingival recession on radicular surface and interdental area in relation to mucogingival junction and mid facial/lingual extent of the cemento-enamel junction.

This classification system utilizes three identifiable anatomical landmarks⁵ –

1. Gingival Margin,
2. Mid facial extent of the cemento-enamel junction (CEJ),
3. Mucogingival junction (MGJ)

Class I		RGR not extending up to MGJ and no IDGR.
Class II		RGR extending up to/beyond MGJ but no IDGR.
Class III	Type A	RGR not extending up to MGJ and IDGR not extending beyond mid facial CEJ.
	Type B	RGR not extending to MGJ and IDGR extending beyond mid facial CEJ but not up to MGJ.
	Type C	RGR not extending up to MGJ and IDGR extending up to/beyond MGJ.
Class IV	Type A	RGR extending up to/beyond MGJ with IDGR not extending beyond facial CEJ.
	Type B	RGR extending up to/beyond MGJ with IDGR extending beyond facial CEJ but not up to MGJ
	Type C	Both RGR and IDGR extending up to/beyond MGJ.

Gingival recession classification based on Thakur R et al

Panda.S (2016)

Based on an amalgamation of certain criteria of Miller's classification with the certain features of Nordland and Tarnow's classification.¹²

I Marginal tissue recession not extending to MGJ without mal-positioning of teeth

- a) Without interdental tissue loss on both sides.
- b) With interdental tissue loss on either side.

II Marginal tissue recession extending to or beyond MGJ without mal-positioning of teeth

- a) Without interdental tissue loss on both sides.
- b) With interdental tissue loss on either side.

III Marginal tissue recession with mal-positioning of teet & intact Interdental tissue

- a) Not extending to MGJ
- b) Extending to or beyond MGJ

IV Marginal tissue recession with mal-positioning of teeth & Interdental tissue loss

- a) Not extending to MGJ
- b) Extending to or beyond MGJ

Sub-Classification of Grade III and IV recession cases :

SubClass R:

RA: Rotation by 1/4th turn

RB: Rotation by ½ turn

RC: Rotation by 3/4th turn

Subclass E: Presence of any supra-eruption

Subclass M: Missing adjacent tooth

Subclass L: Presence of labial proclination

LA: Labial proclination by 0.5 mm

LB: Labial proclination by 1.0mm

LC: Labial proclination more than 1mm.

Discussion

The aim of these classifications is to answer the pitfalls of the currently used classification systems for recession and to include or help the clinicians to classify those cases, which cannot be categorized into a particular class with any of the current classification systems.

We acknowledge the contributions of various eminent researchers in this field, which has paved a pathway for the current endeavor. Diagnosis and classification form an important part of approach to any condition or disease. The already existing classifications have some shortcomings which have been discussed. Hence, an attempt is made to fill those lacunae by devising new classifications. Of all the earlier classifications, Miller's classification is still most widely used. It is based on morphological evaluation of injured periodontal tissues and could be useful in

predicting final amount of root coverage. The limitations of Miller's classification result in insufficient depiction of clinical condition. Partial depiction leads to an erroneous diagnosis, prognosis, and hence treatment planning.

Pini-Prato stated, "The prognostic anticipation of a certain amount of root coverage is a complex process that should consider data from reliable studies and cannot be drawn from theoretical considerations." Difficulty in determining prognosis and treatment plan based on the classification categories, stems from the fact that prognosis depends on many factors other than the clinical features of the disease. The treatment plan and amount of root coverage not only depends on the clinical condition of the tissues, but also on patient-related factors (e.g., habits), tooth/site-related (e.g., recession depth, width), and technique-related (e.g., presence or absence of releasing incisions) prognostic factors. Mucogingival therapy is very technique sensitive and surgeon's dexterity can also affect the extent of root coverage.⁶

Pini Prato then critically evaluated the limitations of Miller's classification based on Murphy's criteria. Since no classification is complete until it is updated regularly, especially in the light of recent innovations and advancements. Hence, in view of the drawbacks associated with Miller's classification, Mahajan's classification was proposed in an attempt to emphasize the

need to modify Miller's classification to make it more comprehensive and updated.³

Apart from the standard landmarks used by Miller, there was a need to consider interproximal CEJ and gingival recession on palatal surfaces of maxillary teeth, to make the classification more useful and comprehensive. Hence, a new classification for palatal gingival recession was proposed. The factors considered in palatal gingival recession are:

- a. Relation of the gingival margin to MGJ: It determines the remaining width of attached gingiva and also governs the selection of treatment procedure.
- b. Height of the interdental papilla: It plays a very important role as the interdental papilla acts as the most coronal vascular bed to which the soft tissues covering the root exposure are anchored. By the inclusion of interdental papilla and proximal CEJ in this classification, it may be useful for interdental papilla reconstruction around natural teeth.
- c. Tooth malposition: It is important to recognize these situations as tooth malposition can impair complete root coverage; resulting in persistence of root exposure after surgery. It also dictates the need for orthodontic treatment (e.g., Miller's Class I with tooth malposition).
- d. Palatal recession: Although palatal recessions do not pose any esthetic problem, they have to be considered as

they may result in root caries and dentin hypersensitivity, which is one of the most common problems patients seek dental assistance for. Root caries and dentin hypersensitivity can be addressed by other nonsurgical treatment modalities which have a favorable outcome.

We understand that all the classifications have some inbuilt drawbacks and none of them can actually serve the whole purpose. Hence, we recommend that the classification system which is suitable for a particular case should be used.

Conclusion

Although various classification systems are in use and each system has an advantage of its own. No classification system can be complete and everlasting; with time and its continual use, one realizes the advantages and disadvantages of each system. An attempt has been made to review almost all the systems so that more accurate and detailed clinical picture can be made out for wide variety of cases.

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BIODEGRADABLE IMPLANTS FOR ORTHODONTIC ANCHORAGE; A NEW PARADIGM

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Abstract

A Temporary Anchorage Device (TAD) is a device that is temporarily fixed to bone for the purpose of enhancing orthodontic anchorage either by supporting the teeth of the reactive unit or by obviating the need for the reactive unit altogether. Various authors have stated that Endosseous Titanium implants are suitable as anchoring units for long term orthodontic treatment. Present investigations in resorbable implants in other medical fields showed histological findings with an encapsulation of the implants by bony tissue with interposition of a thin layer of fibrous tissue occasionally. This review is on Resorbable implants that can be applied with success for orthodontic purposes. The correct PLA/PGA ratio should be selected to obtain the maximum performance during treatment.

Key Words: Temporary Anchorage Device, orthodontic implants , resorbable implants

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Introduction

“Give me a lever long enough, a place to stand and I shall lift the earth”- said the great Archimedes. A place to stand is what anchorage does in orthodontics. Anchorage in orthodontics can be defined as the resistance which the dentofacial structures offer to change in form or position under applied force. The anchorage preservation has been a perennial problem to the traditional orthodontist.

Earlier, the orthodontists have used intra-oral appliances and extra-oral appliances to control anchorage while completing the desired movement of other teeth. The best known intra-oral appliances are palatal or lingual bars, the Nance holding arch and inter-maxillary elastics. But on usage of these appliances loss of anchorage leads to

undesirable side-effects such as protrusion of the incisors, extrusion and tipping of the teeth and negative influence on the occlusal plane. The most frequently used extra-oral anchorage, headgear is always subjected to negative criticism regardless of its large range of applications as acceptance problems on the part of patients may result in poor compliance.

The orthodontists of earlier times have always struggled to attain efficient control of anchorage and have always dreamt of a device which can provide absolute anchorage. This dream have come true with the advent of implants. The implants have burst onto the clinical orthodontic scenario to assist the orthodontist in controlling tooth movement. New era has dawned in ‘Anchorage Paradigm’ with wider

applications of implants in orthodontics. The incorporation of implants into orthodontic treatment made absolute and infinite anchorage possible. The primary advantage over the previously used modalities of anchorage is that the implants provide skeletal anchorage, which is undoubtedly more predictable and stable than methods requiring patient compliance.

Over the years, a variety of terms have been used to describe the orthodontic implants such as mini screws, mini implants, micro implants and micro screw implants. The term ‘Temporary Anchorage Devices’ (TAD) are also widely used for mini screw implant as TAD seems to be the most unambiguous term. A Temporary Anchorage Device (TAD) is a device that is temporarily fixed to bone for the purpose of enhancing orthodontic anchorage either by supporting the teeth of the reactive unit or by obviating the need for the reactive unit altogether.

Anchorage thus derived from the implant has been termed as indirect anchorage by Roberts. TAD’s has opened a new horizon to orthodontic treatment and has increased the treatment possibility for patients and also improved the functional results of the treatment.

Implant structure

The commonly used implant screw/plate has two parts

- a. Implant head – serves as an abutment and also a source of attachment for elastics/coil springs.

- b. Implant body – this is the part embedded inside the bone. This may be a screw type or a plate type.

Classification of implants

Implants can be classified under the following headings

1. Based on the location – Subperiosteal, Transosseous, Endosseous
2. Based on the configuration design - Root form implants, Blade/plate implants
3. According to the composition - Stainless steel, Cobalt- Chromium- Molybdenum, Titanium, Ceramic, Miscellaneous- Vitreous carbon, Composite, Polylactide

Common problems associated with metallic fixation

Problems related to rigid fixation in the growing skull include restriction of growth and passive translocation of metallic implants. Metallic fixation devices may also cause a distinct cosmetic deformity, palpability or wound dehiscence, especially if placed under a scarred, tight region as well as allergic reactions, and may interfere with radiological investigations and other imaging. Common reasons for metallic rigid fixation removal include palpable or prominent fixtures, loosening of plates and screws, pain, infection and wound dehiscence/ exposure of hardware.

Bioresorbable implants

Various authors have stated that Endosseous Titanium implants are suitable as anchoring units for long term orthodontic treatment. Furthermore, the applied force may induce marginal bone apposition adjacent to implants and thus will lead to better stability

of the fixtures. This suggests that implants can also be used as principal anchorage elements for complex orthodontic movements. If the implant is solely used for anchorage purposes, it has to be removed in a secondary operation after orthodontic treatment.

So the ideal solution would be a stable positioned implant which could assume a stationary anchorage function for an adequate period but could then be readily removed or preferably resorb within the tissues. This objective was the basis of development of the bioresorbable implant anchor for orthodontics system (BIOS) which are made of biodegradable polylactide alpha- polyester and adapted to the respective range of indications. They should retain the required stability for a period of 9-12 months and then degraded, with no trace of residual material and without a significant foreign body reaction.

Present investigations in resorbable implants in other medical fields showed histological findings with an encapsulation of the implants by bony tissue with interposition of a thin layer of fibrous tissue occasionally.

BIOS implant comprises of a biodegradable implant body and a variable metal abutment as superstructure. The metal abutment is anchored by means of a metrically-standardised internal thread located in the plastic implant. The technological innovation of this development is however, in the biodegradable poly LDL lactide copolymer (90/10 percent) implant body. It is a polymer of L- isomer poly L-lactic acid (PLA) and poly glycolic acid (PGA) in various proportions. This copolymer was widely used for some considerable time as

an osteo-synthetic material in trauma – related applications. The resorbable implant body was produced by injection molding and sterilized using Ethylene oxide. This has the advantage of reducing the number of instruments required for implantation as BIOS implants can be inserted with conventional instruments. Polyglycolic acid (PGA) with metal abutment was developed by Glatzmaier. PGA is hard, brownish crystalline polymer which is susceptible to hydrolysis.

Copolymers of PLA and PGA offer the capability of degradation rate and mechanical properties by changing the PLA/PGA ratio. If the PLA/PGA ratio is 75/25, the absorbable time period is approximately 220 days. If the ratio is 50/50, the time taken to resorb will be 180 days. If the ratio falls to be 82/18, the implant gets resorbed in 180-450 days.

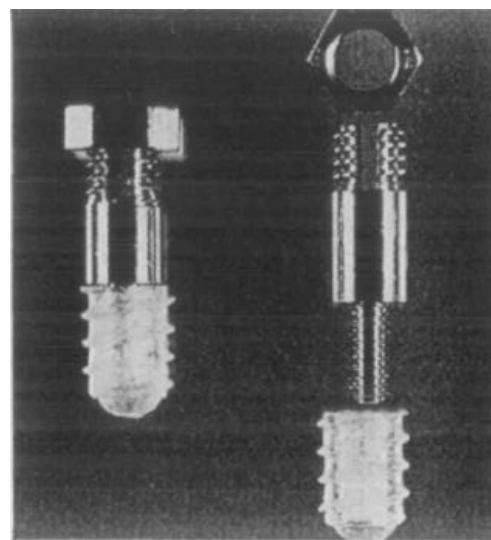


Fig 1: Structure of BIOS implant

Advantages of resorbable implants

1. Less stress shielding on the bone.
2. Less interference with modern imaging techniques

3. Elimination of the need for subsequent procedures to remove the implant.

Disadvantages

1. If treatment is not finished within the time period the resorbable implant will not serve the purpose.
2. Strength of the implant varies according to the site of implant placement.

Conclusion

Resorbable implants can be applied with success for orthodontic purposes. The correct PLA/PGA ratio should be selected to obtain the maximum performance during treatment. Further studies should involve the appropriate shape for orthodontics as well as effect on the roots when the tooth is moved against the implant.

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MUCOCELE OF THE GLANDS OF BLANDIN–NUHN ON THE VENTRAL SURFACE OF TONGUE – A CASE REPORT

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Abstract

A mucocele is a common, benign, mucus-containing cystic lesion of the minor salivary glands in the oral cavity. They are known to occur in various locations in the oral cavity overlying accessory minor salivary glands, most frequently located on the lower lip. Occurrence of a mucocele on the ventral surface of the tongue is rarely seen. This article reports a pediatric case of mucocele of the glands of Blandin and Nuhn on the ventral surface of tongue.

Key Words: Mucocele, extravasation, mucous retention, Blandin–Nuhn glands.

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Introduction

Mucocele can be defined as a cavity filled with mucus.¹ It can be a nodular or a vesiculobullous lesion, bluish red in color and flabby in consistency.² Two types of mucoceles can be differentiated based on the histologic features of the cyst wall: a extravasation mucocele formed by mucous pools surrounded by granulation tissue (92%) and a retention mucocele with an epithelial lining (8%).^{3,4} Although minor salivary glands are found in most parts of the oral cavity except the gingival, the prevalence of mucocele of glands of Blandin–Nuhn has been reported as unusual.⁵ Mucoceles is seen more frequently in children than in adults and are associated with traumatic injuries.^{5,6} On clinical presentation, mucoceles are usually single, although more than one may be

present at any given time. Regardless of their location, they present as soft painless swellings, with a normal or bluish color. It is fluctuant and movable because of its mucinous contents. The diameter may range from a few millimetres to a few centimetres. If left untreated, an episodic decrease and increase in size may be observed, corresponding to rupture and subsequent mucin production.⁷

Case Report

An 8 years old male patient presented to our institution with the chief complaint of swelling below the tongue since the past 5 months. The lesion was sudden in onset, gradually increased in size, ruptured spontaneously with a watery discharge, following which it decreased in size. The patient gave a history of consecutive increases in size followed, after few days, by

rupture with a watery discharge. It was affecting patient's speech and tongue movement. It was not associated with pain or any other symptoms. The patient was unable to recall any history of trauma in the area. On oral examination a solitary, well defined globular swelling was present on the ventral surface of the tongue along the lingual frenulum, 1cm posterior to the tip of the tongue (Fig 1), roughly measuring about 1.0cm x 1.0 cm in size. The swelling appeared pinkish white in color, with smooth surface.



Fig 1: Intraoral view

On palpation it was soft in consistency, freely mobile on all planes with firm attachment to ventral surface of tongue. Based on history and clinical examination, a provisional diagnosis of mucocele was given and a differential diagnosis of lipoma, traumatic fibroma, pyogenic granuloma and vascular lesion was considered. After obtaining informed consent, an excisional biopsy (Figs 2, 3) was performed and sent for histopathological examination.

The soft tissue section showed moderately collagenous connective tissue and area of eosinophilic material suggestive of mucin

with foamy histiocytes. A focal area of dense inflammation predominantly of lymphocytes is seen. Few salivary gland ductal structures are also seen suggestive of mucous extravasation phenomenon.



Fig 2: Surgical removal



Fig 3: Excised mucocele

Discussion

The glands of Blandin-Nuhn are a compact group of small mixed mucous and serous salivary glands, situated on both sides of the midline of ventral surface of the tongue. Each gland is approximately 1-8mm wide and 12-25mm deep and consists of several small independent glands. They drain by means of 5-6 small ducts that open near the lingual frenum.⁸ Mucoceles of the glands of Blandin-Nuhn have been considered to be uncommon.^{1,2,8,9}

In 1970 Heimansohn first reported a case of mucocele of Blandin and Nuhn in a 14-year old female (his daughter).¹⁰ Since that period more cases have been reported. Out of the 400 cases of mucocele reviewed by Harrison,⁹ only 9 cases were on the tongue. Even though it is described as a rare lesion, some authors have several cases reported.

In a Brazilian study with pediatric patients up to 15 years old, mucoceles in the ventral aspect of the tip of the tongue accounted for 8.3% of the cases.¹⁰ According to Jinbu *et al.*, Blandin–Nuhn mucoceles comprise 9.9% of all oral mucoceles studied by them.⁴ According to Saza *et al.*, mucoceles of glands of Blandin–Nuhn comprised 9.6% of all the mucoceles.¹¹ Kurozu reported the proportion of oral mucoceles that were of glands of Blandin–Nuhn as 10.3%.¹²

The incidence of mucoceles in these glands is higher in youth and females.¹³ Females are more affected than males by a ratio of 4:1.⁴ The age of the patients ranges from 5 years to 36 years with an average of 17 years. The duration between when the lesion was first noticed and the first presentation to the hospital ranged from 1 week to 2 years with an average of 3.6 months.¹⁴

Mucoceles of Blandin and Nuhn are usually asymptomatic and relatively small in size ranging from 2 mm in diameter to 20mm. Sometimes they can grow relatively large enough to cause feeding difficulties especially in babies¹⁵ or difficulty in speech and mastication.¹⁶ Mucocele of Blandin and Nuhn may be located anywhere on the ventral surface of the tongue.

Jinbu *et al.*⁴ reported that 17 of the 26 cases (65.4%), lesions were located in the ventral tip of tongue, while 9 (34.6%) occurred midway between the tip and the root of tongue. They also noted that 19 cases (73%) were in the midline while 7 were lateral to this. There are 2 types of Blandin–Nuhn mucoceles: - one is characterized by a submucosal lesion covered with integral mucosa, characterized by a long-term development with no symptoms; - the other one is more protuberant, frequently presents with a pedunculated base, and is characterized by painful sensibility and an history of local trauma.¹⁷

Abnormal ducts or traumatic injury to this structure is the most likely etiologic factor leading to the development of these lesions⁸ probably favoured by the frequent oscillation of the tongue.¹⁷ Sugerma *et al.* stated that the mucoceles of the Blandin–Nuhn glands are clinically similar to vascular lesions, pyogenic granulomas, polyp, and squamous papiloma, depending on the vascularization degree and the atrophy of the acinus.⁸ Lymphangioma may also be considered in the Differential diagnosis of this lesion.¹⁸

Histopathological examination of the mucoceles of the glands of Blandin–Nuhn reported in the literature revealed that they consist of mucus extravasation phenomenon with no epithelium lining the mucin collection. This feature is strongly related to the fact that the extravasation-type lesion is more common in young patients, and most patients diagnosed for mucocele of the glands of Blandin–Nuhn in the literature

were under 40 years old.¹⁷ Special stains such as mucicarmine and Halcian blue, are helpful in identifying mucin that is present freely in tissues or in the foamy macrophages.¹⁹

Treatment

Small mucoceles are best treated by excision followed by careful dissection of the affected minor salivary gland.¹⁷ Careful clinical evaluation and complete excision of the lesion along with the involved minor salivary may minimize the chance of recurrence. In some cases, prior to surgery, the cystic cavity is filled with rubber impression material improving the visual access for surgical excision.²⁰ Laser ablation, cryosurgery, and electrocautery are approaches that have also been used for the treatment of the conventional mucocele with variable success.²¹ Larger lesions may also be managed by marsupialization, but will only result in re-occurrence.²²

Conclusion

Mucoceles of the glands of Blandin and Nuhn need to be considered in differential diagnosis of asymptomatic mass on ventral surface of tongue as they are clinically similar to vascular lesions, pyogenic granulomas, polyp, squamous papiloma and lymphangioma. Excision should always be followed by histopathological examination, to avoid misdiagnosis.

Conflict of Interest

The Authors declare that they have no conflict of interest

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NEUTRAL ZONE TECHNIQUE IN REHABILITATION OF SEVERELY RESORBED MANDIBULAR RIDGE- A CASE REPORT

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Abstract

Reduction in denture foundation is one of the common problems encountered by long term edentulous patients and denture wearers. Prosthetic rehabilitation of a patient with severely resorbed ridge is the most challenging therapy a Prosthodontist can undertake. For better prognosis of denture therapy, impression techniques elected should be based on the present state of basal tissue support. The neutral zone is the area in the oral cavity where during function; the forces of the tongue pressing outward are neutralized by the forces of cheeks and lips pressing inward. The technique of neutral zone is to construct a denture that is shaped by muscle function and is in harmony with the surrounding oral structures. This clinical report describes rehabilitation of a patient with severely resorbed mandibular ridge using neutral zone impression technique.

Key Words: Neutral zone technique, atrophic mandibular ridge, case report

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Introduction

The eruption of the teeth in the oral cavity is influenced by the forces exerted by tongue, cheeks and lips. These muscular forces collectively determine the dental arch form and position of the tooth in the oral cavity. This muscular environment continues throughout life, even after teeth have been lost and greatly influences this potential space. It is one of the major determining factors for any prosthesis that will be placed in the oral cavity.¹

Ridge resorption is a chronic, progressive, irreversible and cumulative localized bone loss. Most resorption occurs in alveolar process whereas the basal portion remains intact. This leads to qualitative and

quantitative reduction in denture bearing area; loss of sulcus depth and available ridge height; decrease in load bearing capacity of denture bearing area and reduced denture stability. Conventional dentures may not provide desired results in these cases. Provision of implant retained prostheses may serve the purpose. But every patient is not suitable for implants. To get the successful results in such cases other factors may have to be exploited. These may include improved impression techniques; proper location and arrangement of artificial teeth and appropriate form of polished surfaces.^{2,3}

The neutral zone impression technique is the only option left for the stabilization of

the complete denture in atrophic ridges. Neutral zone is defined as the potential space between the lips and cheeks on one side and the tongue on the other; that area or position where the forces between the tongue and cheeks or lips are equal. It is not only a treatment of choice in atrophic mandible but also in patients with partial glossectomy, mandibular resections or motor nerve damage to the tongue which have led to either atypical movement or an unfavorable denture bearing area.^[4] The present article describes the fabrication of a complete denture using neutral zone impression technique in atrophic mandibular ridge.

Case report

A 50 year old female patient was referred to the Department of Prosthodontics at KMCT Dental College for the provision of complete denture. History revealed period of edentulous for the last 11 years and no history of previous denture wearing. Patient gave history of treatment for OSMF and angular cheilitis since 1 year. Mouth opening was reduced due to angular cheilitis. Severe loss of vertical dimension was observed. Intraoral examination revealed severely resorbed mandibular residual alveolar ridge. Maxillary ridge was favorable for denture. Buccal, labial and tongue mucosa was stiff on palpation. It was decided that complete denture would be provided to the patient using the neutral zone approach so that retention and stability of mandibular denture could be improved. Option of mandibular implant retained overdenture remained unfeasible as the expense of the treatment was unaffordable by the patient.

Clinical procedures

Clinical visit 1: Preliminary impressions of arches were recorded with impression compound using metallic non perforated stock trays. Primary casts were poured and custom trays were prepared using auto polymerizing acrylic resin.

Clinical visit 2: After evaluation of extensions of the custom trays in both passive and active movement, border molding and wash impressions were functionally recorded. The master cast was poured and cast was duplicated. Denture base was fabricated using heat cure acrylic resin.

Clinical visit 3: The adjustment of occlusion rims intra-orally done to permit an acceptable occlusion vertical dimension and a 2mm of freeway space. Centric relation was attained. The upper and lower master cast with occlusal rims was mounted on an articulator. Two acrylic pillars were constructed on either sides of the lower wax occlusal rim after removing the wax from the respective areas. Stainless steel orthodontic wires were bent and incorporated into the mandibular denture base using auto polymerizing acrylic resin. Waxes were removed from the remaining portion of mandibular denture base (Fig.1).

Clinical visit 4: Maxillary wax occlusal rim was placed and mandibular denture base was inserted into patient's mouth. Maxillo-mandibular relation was reanalyzed. Softened impression compound and green stick in the ratio of 3:7 was mixed as per McCord's technique. ^[2]It was loaded onto the lower acrylic denture base. This was

reheated in water bath and carried into the patient's mouth. Patient was asked to perform a series of actions like speaking, sucking, swallowing, pursing lips, sipping water, pronouncing vowels and slightly protruding tongue several times. Retentive loops provided retention for the impression compound and acrylic pillar maintained vertical dimension during the procedure. After 5-10 minutes, the set impression was removed from the mouth, placed in cold water and examined (Fig.2).

The neutral zone impression so obtained was placed on the master model. Both the upper wax occlusal rim and lower impression were then replaced on the articulator to evaluate the vertical dimension. Index was made around the molded impression compound rims using die stone and sectioned (Fig 3). The molded impression compound rims were removed and the index was replaced. Wax was then poured into this space which gave an exact representation of the neutral zone (Fig.4). The new wax rims were then placed on the articulator and teeth arrangement was done exactly within the index boundaries (Fig 5). The position of the teeth after arrangement was verified by placing the index.

Clinical visit 5: The trial dentures were checked in the patient's mouth for aesthetics, phonetics and occlusion. Trial dentures were then processed and finished.

Clinical visit 6: As the denture was constructed in harmony with the surrounding musculature, the patient was satisfied with its improved stability and retention (Fig 6).



Fig 1 : Mounted mandibular cast with maintained vertical dimension



Fig 2: Neutral zone recorded

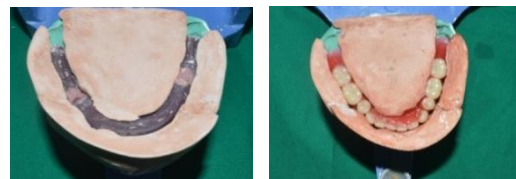


Fig 3 &4: Wax poured into the neutral zone, teeth arrangement done



Fig 5: Trial denture



Fig 6: Complete denture insertion

Discussion

Usually the contours of the external surfaces of the denture are arbitrarily determined by the dentist or technician. With the neutral zone procedure, the external contours are molded by muscle function. We should not insist that teeth be placed over the crest of the ridge, buccal or lingual to the ridge. Teeth should be placed as dictated by the musculature, and this will vary for different patients.⁵

A comparative study done by Zaigham A et al about selective pressure impression technique and neutral zone approach in atrophic mandibular ridges shows that successful dentures can be provided to the patients by both techniques, but neutral zone seemed to have slightly superior edge over selective pressure impression technique. This success may be due to the fact that factors like polished surfaces, teeth positioning and tongue space are better addressed by neutral zone.⁶

Raja HZ et al was done a study about neutral zone dentures and conventional

dentures in diverse edentulous periods. Post insertion assessment of conventional and neutral zone denture was compared. Both denture techniques showed satisfactory assessment results in shorter edentulous period. In longer edentulous period, neutral zone dentures showed better assessment results.⁷

Orthodontic relapses, postoperative problems, unsuccessful periodontal procedures and relapse with orthognathic surgery can be attributed to neutral zone imbalance. Complete and partial denture failures are often related to noncompliance with neutral zone factors. Thus neutral zone must be evaluated as an important factor before one rates any changes in arch form or alignment of teeth.⁸ Though this is indicated for patients with severe residual ridge resorption, it can also be used for full mouth rehabilitation of edentulous patients with dental implants.⁹ This procedure can also be utilized to the maxillary residual alveolar ridge whenever it is required.¹⁰

Conclusion

Neutral zone technique is one of the best alternative techniques in case of highly atrophied mandibular residual ridge, but it is rarely used because of the extra clinical step involved. The neutral zone philosophy is based on the concept that for each individual patient there exists within the denture space a specific area where the function of the musculature will not unseat the denture, and at the same time where the forces generated by the tongue are neutralized by the forces generated by the lips and cheek.

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ACHIEVEMENT

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ORIGINAL ARTICLE

Topical fluoride use: Knowledge, attitudes and practices of undergraduate dental students of three Dental Colleges in South India

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Abstract

Objectives

For effective utilisation of topical fluorides in caries prevention, dental professionals should have adequate knowledge regarding its appropriate use. The decision regarding preventive treatments like topical fluorides is influenced by knowledge acquired during undergraduate training. The aim of this study was to assess the knowledge, attitudes and practices of undergraduate dental students in the use of topical fluorides.

Methodology

A descriptive cross-sectional questionnaire study was conducted from June to August 2015 following ethical clearance. Three willing Dental Colleges from 3 states of South India participated. Information regarding the knowledge, attitudes and practices of students in the use of topical fluorides was collected using a validated questionnaire.

Results

Nine hundred and seventy-two dental students (79.6% females, 20.4% males) participated. Freshers and preclinical batches had poor overall knowledge of fluorides, which did not show substantial improvement by internship. Self-applied topical fluoride use (fluoridated toothpaste) was seen in more than 90% of interns, and majority had “positive fluoride attitude.” Having knowledge of topical fluorides and positive attitudes to topical fluorides did not result in “good oral self-care behaviour” nor appropriate clinical use of topical fluorides. Students who used topical fluorides for persons with history of caries had highest odds of brushing twice a day (OR = 2.7, 95% CI = 1.54, 4.12) and a “positive fluoride attitude” (OR = 1.2, 95% CI = 0.21, 1.57).

Conclusion

Dental students showed deficiencies in their knowledge and understanding of topical fluorides. Dental education in India needs emphasis on topical fluorides across all years, with a special focus on caries risk-based topical fluoride use.