

Title: Non-Invasive Method to Measure the Length of the Soft Tissue from the Papilla to the Crestal Bone

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Abstract: Background: Various Methods Of Measuring The Length Of The Papilla Have Been Introduced To Identify The Regeneration Of Interdental Papillae. Invasive Methods, Such As Bone Sounding Causes Discomfort To The Patient, And Can Cause Damage To The Gingival Unit. The Purpose Of The Study Was To Validate A Method Of Measuring The Length Of Interdental Papilla Non-Invasively, Using Radiopaque Material & A Periapical Radiograph. Methods: This Study Involved 20 Interproximal Papillae In 10 Chronic Periodontitis Patients. The Distance Between The Radiopaque Material & The Most Coronal Portion Of The Crestal Bone Was Measured (RL). Bone Probing At Interdental Papilla Was Performed After Local Anaesthesia (BPL). Actual Length Was Measured After Flap Reflection (AL). Correlation Analysis Was Performed Between AL-RL & AL-BPL Using Pearson's Correlation Coefficients. Results: Correlation Shows Positive Correlation Between AL & RL Which Was 0.9950 & AL-BPL Was 0.9906, Both Showed Statistically Significance At 0.0001 Level Conclusion: By Using A Radio-Opaque Material, It Is Possible To Non Invasively Measure The Papilla Length In Relation To The Crestal Bone As The Values Show No Statistical Difference

Keywords: Interdental Papillae, Bone Sounding

I. Introduction

Rebuilding The Pink Gingival Esthetics Is An Important Issue In Modern Esthetic Dentistry. An Increased Cosmetic Demand From The Profession & The Patient Has Resulted In Overemphasis On Gingival Esthetics.

The Most Challenging & Critical Aspect Of Periodontal Reconstructive & Implant Dentistry Is To Obtain A Predictable Papilla In The Esthetic Zone.

In Modern Periodontics Various Surgical & Non-Surgical Techniques Have Been Developed To Achieve Optimal Results In The Regeneration Of Interdental Papillae. To Verify These Results Various Methods Of Measuring The Length Of Papilla Have Been Introduced ¹.

Some Methods Include The Use Of Clinical Photographs, Use Of Index For Assessing The Contour Of Proximal Papillae² Or Use Of Bone Sounding Technique³. Drawbacks Of These Methods Are That They Are Either Invasive Or Rely On Subjective Estimation Of The Examiner.

Thus It Would Be Useful To Develop A Method Which Would Non-Invasively Measure The Length Of The Gingival Unit From Crestal Bone To The Top Of The Papilla

Aim: The Purpose Of The Present Study Was To Validate A Non-Invasive Method Of Measuring The Length Of The Papilla From The Top Of The Papilla To The Crestal Bone With Radio Opaque Material.

Objectives:

- To Measure The Length Of The Papilla Radiographically
- To Correlate The Radiographic Length With The Actual Length Of The Papilla
- To Test The Accuracy Of The Radiographic Method Used

II. Materials & Methods

Inclusion Criteria: Patients With Chronic Periodontitis & Who Were Scheduled For Flap Surgery Were Selected For The Study.

All The Patients Had Undergone Initial Therapy Including Oral Hygiene Instruction & Ultrasonic Scaling & Root Planing Of Entire Teeth.

Test Site Were Confined To The Anterior Teeth.

Exclusion Criteria:

- Patients With Periapical Involvement Of Teeth
- Teeth With Hopeless Prognosis

- Any Medication Known To Effect The Periodontal Soft Tissue Were Excluded
In Total, 20 Interdental Papillae Were Included In The Study

Procedure

For The Measurement Of The Radiographic Length Of The Papillae, A Radio Opaque Material I.E. Cavit Temporary Cement Was Used, Which Was Placed With A Probe On The Tip Of The Interdental Papilla. An IOPA Was Taken Using Paralleling Technique Along With A 5mm Stainless Steel Wire Attached To The Tooth In Order To Calibrate The Length, & The Radiograph Was Shot & Developed. The Radiograph Was Then Placed In A Grid & The Distance Between The Most Coronal Portion Of The Bone & The Radio Opaque Material Was Then Measured Using A Divider & Metallic Scale With Millimetre Graduation.

Bone Sounding Technique:

A Single Examiner Used A Standard William’s Graduated Periodontal Probe To Measure The Length Of Papilla. After Local Anaesthesia, The Deepest Depth To Which The Probe Met Strong Resistance From Top Of The Papilla To The Bone Was Recorded⁴.

Actual Length:

For Measuring The Accurate Length Of The Papillae An Intracrevicular Incision Was Given & Flap Was Reflected. The Papillae Were Then Measured By The Same Examiner With The Same Probe That Was Used For Bone Sounding From Tip Of Papillae To The Bone Crest.

III. Results

Mean Value Of Radiographic Length (RL) Was 5.62 ± 1.07 mm, The Mean Bone Probing Length (BPL) Was 5.4 ± 1.08 mm & Mean Actual Length (AL) Was 5.85 ± 1.1 mm.

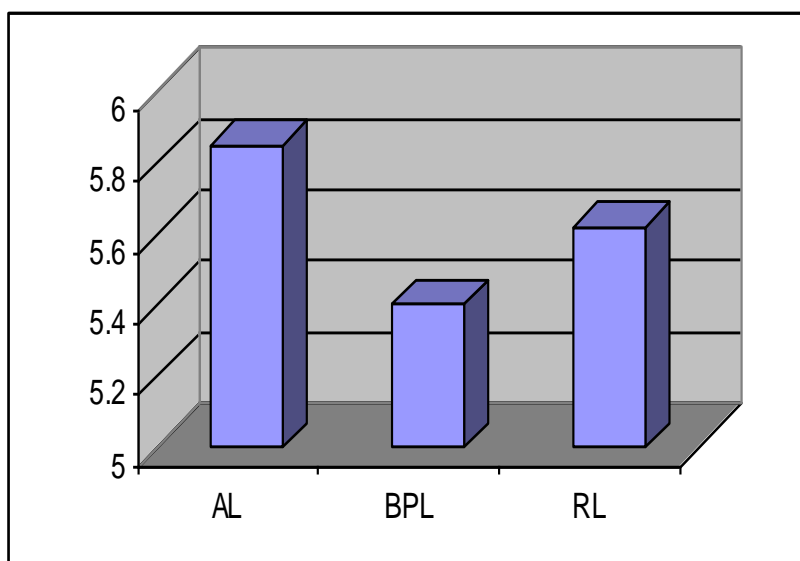
Mean Value ± SD For Clinical Measurements (Mm) & Correlation B/W Measurements & Actual Alveolar Bone Level

RL	BPL	AL	RL:AL	BPL:AL
5.62 ± 1.07	5.4 ± 1.08	5.85 ± 1.1	0.9950	0.9906

P=0.0001 LEVEL, PEARSON’S CORRELATION

By Using “Students Unpaired T Test” The Results Showed That The Means Do Not Differ Significantly & The Pearsons Correlation Shows Positive Correlation Between AL & RL Which Was 0.9950 & AL-BPL Was 0.9906, Both Showed Statistically Significance At 0.0001 Level

Table Showing Relation between the 3 Parameters



IV. Discussion

One Of The Crucial Elements Involved In Restoring The Periodontal Apparatus And Teeth Is Restoring The Interdental Zone. This Zone Is Composed Of The Contact Area, The Interproximal Embrasure And The Interdental Gingiva. The Shape Of The Interdental Dental Papilla Is Determined By The Contact Relationships Between The Teeth, The Width Of The Approximal Tooth Surfaces, And The Course Of The Cementoenamel Junction⁵. It Is Difficult To Restore The Proximal Defect By Regeneration Of The Papilla. Various Methods Have Developed To Achieve Optimal Regeneration Of The Papilla. To Verify These Results, Various Methods Have Been Introduced.

The Purpose Of The Study Was To Validate The Proposed Method, Designed To Record The Relationship Between The Papilla And The Interdental Bone. Radiography Is A Valuable Diagnosis Method In Dentistry. It Is Non Invasive And Requires Minimal Patient Co-Operation⁶. Also This Method Can Be Conveniently Applied To Implant Dentistry, Since There Are Many Reference Points For Calibration Such As The Thread Pitch Distance, Fixture Diameter & Length, Thus Making It Possible To Predict The Regeneration Of The Papilla. The Results Obtained Using This Technique Were Found To Have High Correlation With The Actual Soft Tissue Changes Confirmed By Reflection Of The Flap And Measuring The Length Of The Papillae. This Is In Contrast To The Bone Probing Technique Which Is Confirmed A Valid Method For Measuring Papilla Length But Is Invasive & The Administration Of Local Anaesthesia Is Likely To Cause Patient Discomfort & Pain, Thus Making The Clinician A Little Hesitant To Use This Technique In Daily Practice.

V. Conclusion

By Using A Radio-Opaque Material, It Is Possible To Non Invasively Measure The Papilla Length In Relation To The Crestal Bone As The Values Show No Statistical Difference.

Thus, We Can Conclude That There Is High Correlation Between The Actual Length Of The Papilla & The Radiographic Length Of The Papilla

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a. Master Table:

	Area Selected	Actual Length (AL)	Bone Probing Length (BPL)	Radiographic Length (RL)
1	11-21	6mm	5.5mm	5.8mm
2	21-22	5.5mm	5mm	5.4mm
3	11-12	6.5mm	6mm	6.2mm
4	42-41	6mm	5.5mm	5.6mm
5	41-31	5m	4.5mm	4.8mm
6	31-32	5mm	5mm	5mm
7	21-22	6.5mm	6mm	6.1mm
8	11-21	4.5mm	4mm	4.2mm
9	12-11	5mm	4.5mm	4.8mm
10	11-21	8mm	7.5mm	7.6mm
11	11-21	4.5mm	4mm	4.2mm
12	21-2	5.5mm	5mm	5.3mm
13	12-11	5mm	4.5mm	4.9mm
14	11-21	8mm	7.5mm	7.7mm
15	21-22	5.5mm	5mm	5.3mm
16	11-21	6.5mm	6mm	6.2mm
17	41-31	5mm	4.5mm	4.7mm
18	31-32	5mm	5mm	5mm
19	42-41	6mm	5.5mm	5.8mm
20	11-21	8mm	7.5mm	7.8mm

Legends

Figure 1: Armamentarium

Figure 2: Radioopaque Material Placed As A Marker On The Tip Of The Papilla

Figure 3 : Radiograph Showing Radioopaque Maker On The Tip Of The Papilla

Figure 4: Bone Sounding Technique To Estimate The Length Of The Papilla

Figure 5: Surgical Exploring Of The Length Of Papilla