MANILA CENTRAL UNIVERSITY

SCHOOL OF GRADUATE STUDIES

MASTER OF SCIENCE IN DENTISTRY - ORTHODONTICS

MICROSCOPIC EVALUATION OF ENAMEL SURFACE AFTER DEBONDING OF ORTHODONTIC BRACKETS USING ATRAUMATIC BRACKET REMOVER AND CONVENTIONAL DEBONDING PLIER

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Introduction: Removal of orthodontic brackets from enamel surface is a potential risk for changes in enamel topography in form of microcracks. This enamel micro cracks may jeopardize the integrity of the enamel. The unfavorable effect of bracket debonding from enamel using debonding pliers is an iatrogenic problem, moreover care should be taken using debonding pliers as too much forces with such instruments can visibly damaging the enamel.

Aim: Evaluate the enamel surface topography under field emission scanning electron microscope after debonding of orthodontic bracket using two types of debonding plier, the Conventional Debonding Plier and the Atraumatic Bracket Remover.

Methods: Sixty (60) human maxillary premolars with no visible cracks examined under transillumination were embedded to an acrylic block. Orthodontic brackets were attached to buccal surface of the maxillary premolars and were divided into 2 Groups. Group A, the Conventional Debonding Plier Group and Group B, the Atraumatic Bracket Remover Group. The teeth were soaked in normal saline solution and after 24 hours the orthodontic brackets were debonded. The type of Bond Failure was assessed using Adhesive Remnant Scoring after debonding. Pre molar samples with Enamel adhesive Interface bond failure (all adhesive left on the bracket mesh) were the only samples subjected to Field Emission Scanning Electron microscope evaluation. The microcracks total numbers, its micro crack length measurement and micro crack surface location were noted. Out of sixty (60) premolar samples, sixteen (16) fell under Enamel adhesive interface bond failure, Eight (8) comes from conventional debonding plier and eight (8) from atraumatic bracket remover. Ten (10) of the sixteen (16) were randomly picked for microscopic evaluation. Five (5) premolar samples from GROUP A and Five (5) from premolar samples from group b.

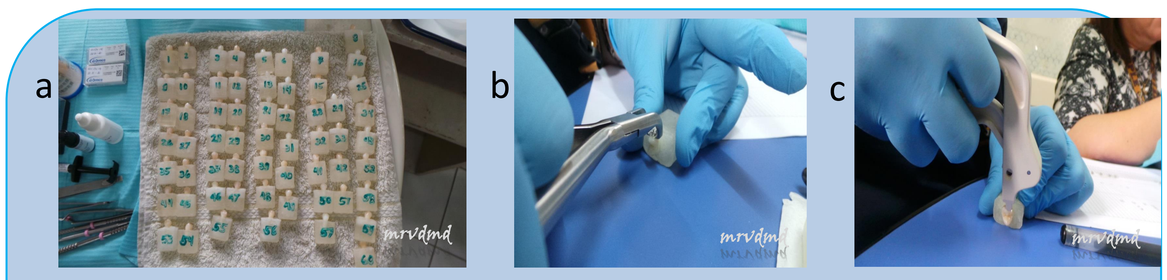

Figure 1.a ***60 premolars with number coding are divide into 2 groups***
Numbers 1 to 30- GROUP A for conventional debonding plier
Numbers 31 to 60 GROUP B for atraumatic bracket remover
1.b ***orthodontic bracket debonded by conventional debonding plier***
1.C orthodontic ***bracket debonded by atraumatic bracket remover***

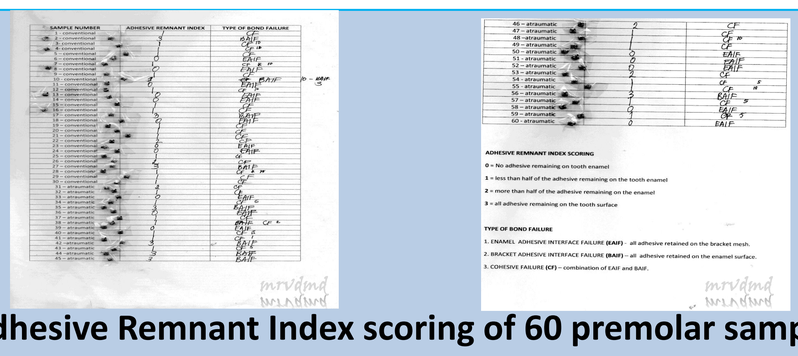

Figure 2. Adhesive Remnant Index scoring of 60 premolar samples after debonding of orthodontic brackets

GROUP A Convenional Debonding Plier

PREMOLAR SAMPLE #	TOTAL NUMBER OF CRACKS	TOTAL MICRO CRACK LENGTH MEASUREMENT (µm)	NO. OF CRACKS PRESENT		
			OCCLUSAL	MID-BUCCAL	CERVICAL
#8	**5**	**9600.7**	1	4	0
#11	***NO CRACKS***				
#14	**4**	**8950.2**	4	0	0
#18	**5**	**10746.25**	2	3	0
#23	**9**	**19120.6**	6	3	0
	23	48,417.75 µm	13	10	0

GROUP B Atraumatic Bracket Remover

PREMOLAR SAMPLE #	TOTAL NUMBER OF CRACKS	TOTAL MICRO CRACK LENGTH MEASUREMENT (µm)	NO. OF CRACKS PRESENT		
			OCCLUSAL	MID-BUCCAL	CERVICAL
#33	**5**	**10189.1**	1	1	3
#36	**11**	**15831.1**	8	3	0
#39	**4**	**1329.03**	2	2	0
#51	**3**	**2224.96**	1	2	0
#58	**9**	**7784.26**	0	6	3
	32	37,358.45 µm	12	14	6

Result: The result of the study shows that the Atraumatic Bracket Remover produced number of cracks with the total of 32 micro cracks while the Conventional Debonding Plier with a total of 23 microcracks, however for the crack length measurements, Conventional debonding plier shows more crack length having an average of 48,417. 75 µm while the Atraumatic bracket remover having an average of 37,358.um. Surface most affected by the micro cracks were the occlusal surface for conventional debonding plier while mid-buccal surface for atraumatic bracket remover.

Mann Whitney U Test was used to compare differences between the two pliers. There is a significant difference in enamel surface topography when using Conventional Debonding pliers and Atraumatic Bracket remover in terms of crack length measurement with a p-value of 0.003 which is less than the α = 0.05, but there is no significant difference in terms of micro crack numbers for both plier.

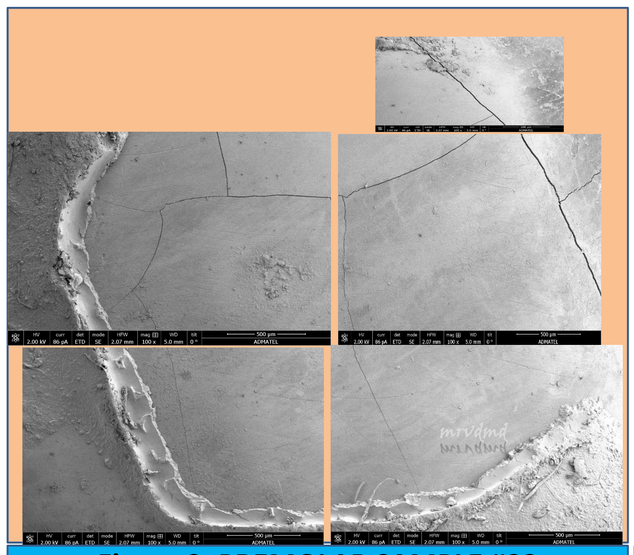

Figure 3. PREMOLAR SAMPLE #23
In 100 X magnification
Conventional Debonding Plier

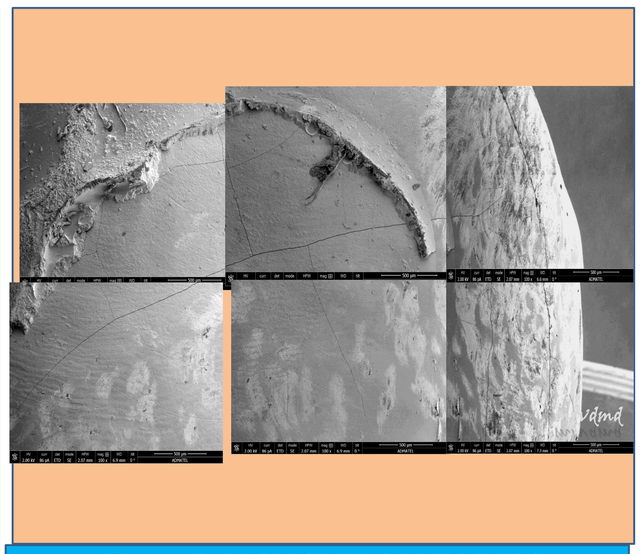

Figure 4. PREMOLAR SAMPLE #36
In 100 X magnificatiion
Atraumatic Bracket Remover

Recommendation: This study proved and recommends the use of Atraumatic Bracket Remover as it causes less changes in enamel surface topography in term of micro crack length after debonding.