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An *in vitro* comparative study of compressive resistance of endodontically treated teeth restored with adhered glass fiber posts using total and self etching techniques

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Abstract

Aim of study: This research aims to know the better technique (total etch and self etch) that achieve the higher compressive resistance for teeth restored with resin reinforced fiber glass posts affixed using those techniques. This research compares between these two techniques by using the test of compressive resistance and study the pattern of failure happening.

Materials and Methods: The sample consisted of from 40 lower premolars, there crowns cutted horizontally 2 mm away from the cemento-enamel junction and root canal endodontically treated, and then divided into 2 groups according to the adhesive cement used to lute the glass fiber posts which used to restore the teeth: Group A: posts luted with resin cement based on total etch technique Group B: posts luted with adhesive resin cement based on self etch technique.

Then, cores built up of all the teeth from composite and teeth crowned with metal crowns cemented with zinc phosphate cement. Each specimen was secured in a universal load-testing machine. A compressive load was applied at 45° degree angle at a crosshead speed of 1 mm/min to the long axis of the tooth until fracture occurred. Compression resistance recorded for each sample, and the statistical study was conducted for the results of the test.

Results: The results of mechanical test indicated that there is no statistically significant differences in the average compressive resistance between two groups. Also there is no statistically significant differences in the frequencies place of failure between two groups. **Conclusions:** Compressive resistance of treated teeth restored with glass fiber posts doesn't affect when attached to two different adhesive techniques (Total etch and Self etch) using resin cement and adhesive resin cements. The pattern of failure in all samples is the preferred type and capable to restore and repair.

Keywords: Compressive resistance, resin cement, dental dentin, phosphate zinc cement

1. Introduction

The increased awareness of intellectual, scientific and cultural dental clinic in a patient in our time imposed on the dentist to be more familiar with the developments in the field of dentistry. There have been significant developments in the field of dentistry, where new generations of luting cements grew up which sought to acquire the perfect properties, and also evolved new restorative materials to get rid of metal and disadvantages of health and color, these materials came to meet the needs of the patient and the doctor together starting from fillings to the posts and cores used for restore weakened teeth.

2. Materials and Methods

Sample of this research consisted of 40 lower premolars.



Fig 1: Sample of the research

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- The teeth were divided randomly into 2 groups according to the adhesive cement used to lute the glass fiber posts which used to restore the teeth:

Group A: Posts luted with resin cement based on total etch technique

Group B: Posts luted with adhesive resin cement based on self etch technique

- Specimens were sectioned horizontally 2 mm away from the cemento enamel junction.
- The endodontic treatment was carried out conventionally.

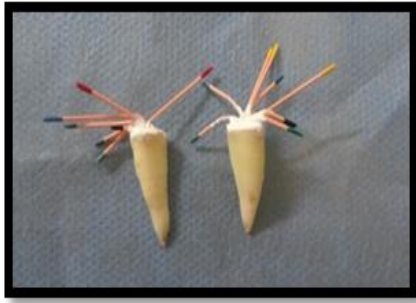


Fig 2: Endodontic treatment

- The remaining coronal part of the teeth was prepared with a chamfer finishing line.



Fig 3: Teeth preparing

- Post space was prepared to leave one third of the endodontic filling.



Fig 4: Post space preparing

- Posts were bonded in each group of the sample according to the bonding cement's manufacturer protocol.
- Composite cores were built for all teeth.



Fig 5: Composite cores building

- Sample teeth were fixed in wooden molds of uniform length and diameter.
- Metal crowns were made in a dental lab, then were bonded on the sample teeth with zinc phosphate cement.

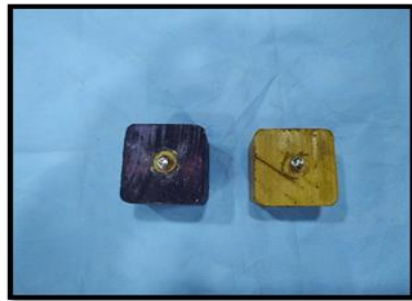


Fig 6: Final shape of the sample

- Each specimen was secured in a universal load-testing machine. A compressive load was applied at 45° degree angle at a crosshead speed of 1 mm/min to the long axis of the tooth until fracture occurred.



Fig 7: Universal load-testing machine

Compression resistance was recorded for each sample, and the statistical study was conducted for the results of the test

3. Results

Table 1: Results

Pattern of failure happening.	Post dislocation	Place of failure	Compressive resistance (newton)	Cement type	Tooth number
Tooth fractured in the level of the root in conjunction with post dislocation	happened	root	228.89	Total etch	1
Tooth fractured in the level of the crown with out post dislocation	Not happened	crown	245.66	Total etch	2
Tooth fractured in the level of the crown in conjunction with post dislocation	happened	crown	220.36	Total etch	3
Tooth fractured in the level of the crown with out post dislocation	Not happened	crown	230.85	Total etch	4
Tooth fractured in the level of the crown in conjunction with post dislocation	happened	crown	248.90	Total etch	5
Tooth fractured in the level of the root in conjunction with post dislocation	happened	root	215.95	Total etch	6
Tooth fractured in the level of the cervix in conjunction with post dislocation	happened	cervix	199.08	Total etch	7
Tooth fractured in the level of the crown in conjunction with post dislocation	happened	crown	236.25	Total etch	8
Tooth fractured in the level of the crown in conjunction with post dislocation	happened	crown	243.50	Total etch	9
Tooth fractured in the level of the root in conjunction with post dislocation	happened	root	258.12	Total etch	10
Tooth fractured in the level of the cervix with out post dislocation	Not happened	cervix	254.49	Total etch	11
Tooth fractured in the level of the crown in conjunction with post dislocation	happened	crown	248.59	Total etch	12
Tooth fractured in the level of the crown in conjunction with post dislocation	happened	crown	265.27	Total etch	13
Tooth fractured in the level of the crown with out post dislocation	Not happened	crown	262.63	Total etch	14
Tooth fractured in the level of the root in conjunction with post dislocation	happened	root	227.91	Total etch	15
Tooth fractured in the level of the root in conjunction with post dislocation	happened	root	221.14	Total etch	16
Tooth fractured in the level of the crown in conjunction with post dislocation	happened	crown	245.46	Total etch	17
Tooth fractured in the level of the crown with out post dislocation	Not happened	crown	265.27	Total etch	18
Tooth fractured in the level of the crown in conjunction with post dislocation	happened	crown	292.05	Total etch	19
Tooth fractured in the level of the crown in conjunction with post dislocation	happened	crown	309.80	Total etch	20

Pattern of failure happening.	Post dislocation	Place of failure	Compressive resistance (newton)	Cement type	Tooth number
Tooth fractured in the level of the crown with out post dislocation	Not happened	crown	276.75	Self etch	21
Tooth fractured in the level of the root in conjunction with post dislocation	happend	root	294.40	Self etch	22
Tooth fractured in the level of the crown with out post dislocation	Not happened	crown	275.08	Self etch	23
Tooth fractured in the level of the cervix in conjunction with post dislocation	happend	cervix	277.24	Self etch	24
Tooth fractured in the level of the root in conjunction with post dislocation	happened	root	245.37	Self etch	25
Tooth fractured in the level of the crown in conjunction with post dislocation	happened	crown	277.24	Self etch	26
Tooth fractured in the level of the root in conjunction with post dislocation	happened	root	267.24	Self etch	27
Tooth fractured in the level of the root in conjunction with post dislocation	happened	root	250.56	Self etch	28
Tooth fractured in the level of the crown with out post dislocation	Not happened	crown	250.27	Self etch	29
Tooth fractured in the level of the cervix in conjunction with post dislocation	happened	cervix	230.95	Self etch	30
Tooth fractured in the level of the root in conjunction with post dislocation	happend	root	283.12	Self etch	31
Tooth fractured in the level of the root with out post dislocation	Not happened	root	278.22	Self etch	32
Tooth fractured in the level of the crown in conjunction with post dislocation	happened	crown	248.60	Self etch	33
Tooth fractured in the level of the crown in conjunction with post dislocation	happend	crown	277.73	Self etch	34
Tooth fractured in the level of the crown in conjunction with post dislocation	happened	crown	275.28	Self etch	35
Tooth fractured in the level of the crown with out post dislocation	Not happened	crown	240.76	Self etch	36
Tooth fractured in the level of the crown in conjunction with post dislocation	happened	crown	226.05	Self etch	37
Tooth fractured in the level of the crown with out post dislocation	Not happened	crown	225.65	Self etch	38
Tooth fractured in the level of the cervix in conjunction with post dislocation	happened	cervix	287.44	Self etch	39
Tooth fractured in the level of the crown in conjunction with post dislocation	happened	crown	250.07	Self etch	40

- The results of statistical study indicated that there is no statistically significant differences in the average compressive resistance between the two groups.
- Also that there is no statistically significant differences in the frequencies place of failure between the two groups.

4. Conclusion

Compressive resistance of treated teeth restored with glass fiber posts doesn't affect when attached to two different adhesive techniques (Total etch and Self etch) using resin cement and adhesive resin cements.

The pattern of failure in all samples is the preferred type and capable to restore and repair.

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