Program # 348

Resin and Zinc-Oxide Temporary Cements, a Comparative Study

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INTRODUCTION

- Inorganic (zinc oxide) temporary cements continue to be popular because of their long history of clinical success, convenient handling, biocompatible characteristics and adequate retentive properties.
- However they have significant disadvantages:
  - Are not compatible with the new permanent resin cements,
  - Are brittle,
  - Have no adhesive properties,
  - Are relatively soluble in the oral environment.
- Temporary Resin Cements give good marginal seal with no wash out and and can be loaded with active ingredients like anti-bacterial agents and fluoride containing additives.
- The main challenge for Resin based temporary cements remains to mimic the low retention of the inorganic cements and their handling properties.
- Temporary cements are known for providing mechanical retention with no adhesive properties whatsoever. One of the methods we used to evaluate the mechanical retention was to measure it's resistance to impact forces. When removing a temporary cemented crown, the repetitive reverse hammer motion applies an impact force on the cement layer. This eventually causes the cement layer to crack leading to crown removal.

OBJECTIVE

The purpose of this study was to evaluate the physical properties of zinc oxide and resin Temporary Cements, by comparing their adhesion properties, mechanical retention and strength.

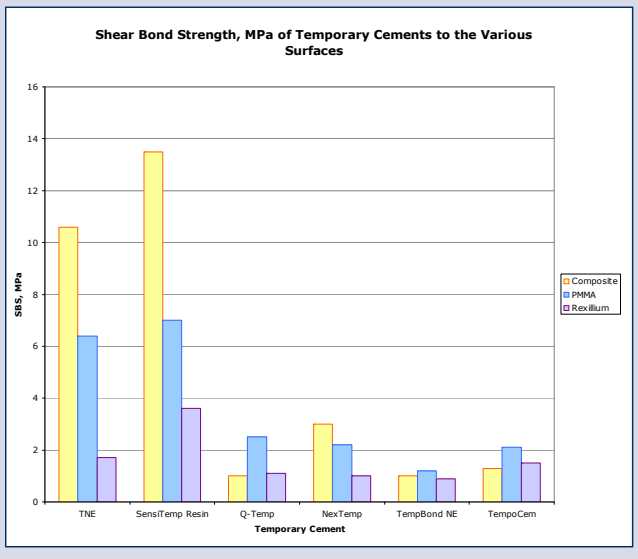
METHODS

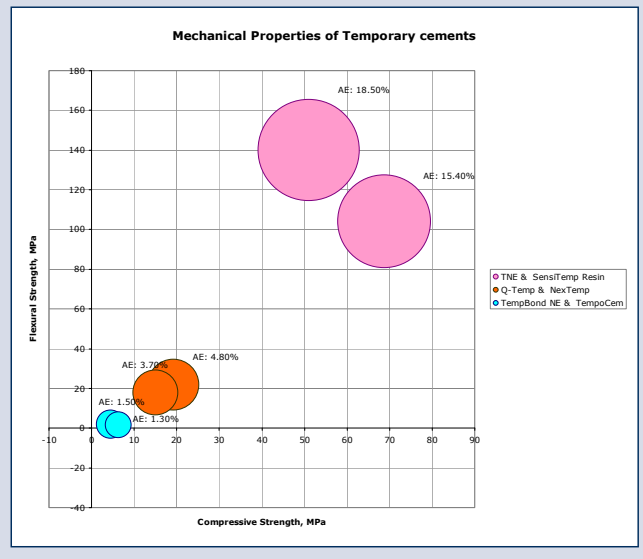
- 4 resin based temporary cements were tested:
  - TNE (Temrex),
  - SensiTemp Resin (Sultan Chemists),
  - Q-Temp (BJM),
  - NexTemp (Premier Dental).
- 2 zinc-oxide based temporary cements served as the control and were characterized under the same conditions:
  - TempBond NE (Kerr),
  - TempoCem (DMG).
- A variety of tests were utilized to evaluate the cements properties:
  - flexural strength [FS] (ISO 4049),
  - compressive strength [CS] (ISO 3107, 9917),
  - absorption energy as a result of un-notched impact test [AE] (BS EN ISO 179-2),
  - shear bond strength [SBS] (ISO/TS11405).
- The experimental results were analyzed statistically (N=10) by ANOVA ($p<0.05$).

RESULTS

- Significant differences in test results were recorded for the various cements and presented in the following table and figures.

Temporary Cement	SBS, MPa			CS, MPa	FS, MPa	AE, %
	Composite	PMMA	Rexillium®			
TNE	10.6±3.0	6.4±2.0	1.7±0.5	68.7±6.0	104.0±10.7	15.4
SensiTemp Resin	13.5±2.5	7.0±1.4	3.6±0.8	51.0±5.6	140.0±9.5	18.5
Q-Temp	1.0±0.4	2.5±0.1	1.1±0.3	19.2±2.8	21.9±3.4	4.8
NexTemp	3.0±0.3	2.2±0.1	1.0±0.2	15.1±3.1	18.0±3.3	3.7
TempBond NE	1.0±0.1	1.2±0.4	0.9±0.3	4.5±1.0	1.9±0.2	1.5
TempoCem	1.3±0.3	2.1±0.2	1.5±0.5	6.3±0.8	1.7±0.3	1.3





DISCUSSION

- Absorption energy, as result of an un-notched impact test, was significantly different for TNE and SensiTemp then for the other tested cements.
- Higher flexural strength combined with higher compressive strength and absorption energy was measured for TNE and SensiTemp Resin cements group than the results demonstrated by both NexTemp and Q-Temp group and Zinc-oxide cements group.
- Shear Bond Strength to Rexillium® alloy, PMMA and composite were higher for resin based cements group than for Zink-oxide cements, but low enough for all groups to deliver easy retrievability when needed.
- Shear Bond Strength values for NexTemp and Q-Temp are much closer to the Zinc-oxide cement group than the values measured for TNE and SensiTemp.

CONCLUSION

- **From the resin cement group only NexTemp and Q-Temp exhibited similar physical properties to the zinc oxide group. TNE and SensiTemp exhibited significantly higher results, more typical to resin cements.**

FUTURE WORK AND RECOMMENDATIONS

- We will design series of tests to evaluate the retention of crowns to the various types of abutments utilizing different cements.
- The tests will simulate the clinical retention instead of the routinely measuring indirect physical parameters like SBS, flexural strength, etc.