Reduction in Tooth Stiffness as a Result of Endodontic and Restorative Procedures

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**Aim**
- To examine nondestructively, the effect of endodontic and restorative procedures on the loss of tooth strength using closed loop servo-hydraulics in conjunction with strain gauge technology.

**Materials & Methods**
- 42 extracted, noncarious MAX. 2nd premolars were used in this study.
- Teeth stiffness was measured under load control, in a closed loop servo-hydraulic system.
- A stress-strain curve was generated from each gauge prior to alteration of the tooth and after each procedure performed on the tooth.
- Cuspal stiffness, as a measure of tooth strength, was evaluated on one of 2 series:

  **Series 1**
  a- Unaltered tooth
  b- Access preparation
  c- Instrumentation
  d- Obturation
  e- MOD cavity preparation

  **Series 2**
  a- Unaltered tooth
  b- Occlusal cavity preparation
  c- 2 surface cavity preparation
  d- MOD cavity preparation
  e- Access
  f- Instrumentation
  g- Obturation

**Results**
- Access opening reduces the relative stiffness by 5%.
- Instrumentation & obturation causes no significant difference in tooth stiffness.
- Occlusal cavity preparation reduces the relative stiffness by 20%.
- Loss of marginal ridge integrity reduces the relative stiffness by 46%.
- MOD cavity preparation resulted in an average of a 63% loss in relative cuspal stiffness.

**Conclusion**
- The Endodontic procedures (access + mechanical + obturation) reduced tooth stiffness by only 5%, which is contributed entirely by the access opening.
- Endodontic procedures do not weaken teeth with intact marginal ridges.
- Restorative procedures were the greatest contributor to loss of tooth stiffness.
- The loss of marginal ridge integrity was the greatest contribution to loss of tooth strength.

**Authors**
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