

**Success Rates for Removing or Bypassing Fractured Instruments: A Prospective Clinical Study**

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**Aim**
- To assess the success rates of techniques for removing or bypassing fractured instruments
- To determine whether visualization of the fractured instrument with the aid of an operating microscope (DOM) has any impact on the success rates.

**Materials & Methods**
- 112 patients with separated instruments inside root canals were included in the study.
- The following procedure was performed in an attempt to retrieve the broken instrument:
  1. Straight-line access to the fragment was created using hand files followed by GG burs
  2. Direct visualization was then attempted in all cases by using a DOM
  3. Ultrasounic was applied to create a groove around the fractured instrument
  4. Dislodgement of the fragment was then attempted using ultrasonic tips
- When the fragment could not be removed with the technique described above or when it was not visible under the DOM, bypassing was attempted.
- When removal was impossible, an attempt was made to reach the WL with the hand files, prepare the entire root canal system, and incorporate the fragment into the obturation.
- Success was defined as the complete removal or complete bypass of the fragment without creating a perforation.
- The procedure was considered unsuccessful when one of the following events occurred:
  a- Fragment was not completely removed or not completely bypassed
  b- A root perforation occurred
  c- The fragment was pushed beyond the apical foramen into the periradicular tissues.
- To determine whether successful visualization of the fractured instrument under DOM had any effect on the success rates, the visible & nonvisible instrument groups were statistically compared.

**Results**
- Out of the 112 separated instrument
  a- 68 were visible under the DOM
  b- 44 were nonvisible under the DOM.
- The overall success rate for removal or bypassing was 70.5%
- For visible fragments, the success rate was 85.3%
- For nonvisible fragments the success rate was 47.7%
- Success rates were significantly higher when the separated instruments were visible with the DOM.

**Conclusion**
- The standardized techniques used in this study for removing or bypassing fractured instruments were effective.
- The success rate was 2 times greater when the fragment was visible inside the root canal compared with when it was nonvisible.

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