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IES POSITION STATEMENT

MANAGEMENT OF SEPARATED INSTRUMENTS DURING ROOT CANAL TREATMENT

Authors: Aishwarya Vasudevan, Sanjay Miglani, Vivek Hegde
& Velayutham Gopikrishna

KEY RECOMMENDATIONS

- I. Root canal systems are complex anatomical challenges and **inadvertent separation** of rotary and hand-shaping instruments is a clinical possibility.
- II. Separation of instruments **cannot be considered to be an iatrogenic error** owing to the complexity and variations of the natural anatomy
- III. Dentists are recommended to **refer such cases to specialist endodontists** with access to Dental operating microscopes, CBCT imaging and advanced retrieval systems to handle them predictably.
- IV. The decision to **retain, bypass or retrieve** a separated instrument is based on the individual clinical scenario.

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The root canal system (RCS) has been studied over several years and the literature is replete with variations in canal morphology, patterns, curvatures and other complexities.^(1,2) With the advent of newer imaging modalities and investigative methods, understanding the intricacies of this distinct tooth network has only become more profound.⁽²⁾ Consequently, the *complex RCS anatomy poses a challenge* to any dentist/ endodontist performing root canal therapy.

The introduction of rotary Nickel-Titanium (NiTi) instruments has revolutionised root canal instrumentation⁽³⁾ and enabled efficient shaping of complex canals owing to their flexibility.^(4,5,6,7) Nevertheless, every dentist/ endodontist may have to deal with the undesirable event of an instrument separation. The flexural/ torsional fatigue that the instrument undergoes during its use within the complex RCS, can lead to its inadvertent fracture.⁽⁴⁾ The prevalence of fractured endodontic instruments ranges from 0.7%–6% for stainless steel instruments (SS)⁽⁸⁾ and up to 10% for rotary NiTi instruments.⁽⁹⁾ The fracture of SS hand instruments can be avoided by discarding them as soon as signs of distortion and fatigue are identified.⁽⁵⁾ On the contrary, NiTi instrument separation can happen without any signs of warning, even when a new set of files is being used.^(10,11) Thus, separation of instruments *cannot be considered to be an iatrogenic error* owing to the complexity and variations of the natural anatomy.

Evidence suggests that a retained fractured instrument within the root canal does not necessarily compromise the treatment outcome.^(8,12) Nevertheless, every attempt must be made to remove the broken instrument fragment where suitable.^(13,14)

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Endodontists are best trained to retrieve broken instruments with the aid of appropriate instruments and modern techniques. The use of a dental operating microscope (DOM) and equipment like ultrasonic tips have enabled the successful removal of broken instruments.^(9,15) Grasping devices that use the loop system such as the broken tool removal (BTR) pen and Yoshi loop system are predictable methods for removing separated instruments in the apical third of the root canal system.⁽⁹⁾

In a bid to retrieve a broken instrument, excess troughing of dentin can either cause strip perforations or predispose the tooth to fracture due to thinning of root walls and a decrease in tooth strength.^(16,17) This may ultimately not be considered treatment success, although the broken fragment has been removed. Thus, despite the success rates of instrument retrieval being high, the decision to entomb, bypass or retrieve a fractured instrument must be made by weighing the potential risks against the benefits of doing so.⁽¹⁸⁾ This decision-making lies with the clinician and is based on factors such as the location of the instrument within the canal, the stage of cleaning and shaping, accessibility to the broken fragment, position of the instrument with respect to the canal curvature, presence/ absence of a periapical lesion and sound evidence regarding success rates for each option.^(8,12,13,18) Conservative approaches such as bypassing the broken instrument should also always be considered as an alternative in instances where retrieval is not feasible.⁽¹⁹⁾

Dentists are recommended to *refer such cases to specialist endodontists* with access to DOMs, cone-beam computed tomography (CBCT) imaging and advanced retrieval systems to handle them predictably. The decision to *retain, bypass or retrieve* a separated instrument is based on the individual clinical scenario.

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