

INPLASY

Analysis of the Impact of the Ninja Endodontic Access Cavity on the Fracture Resistance in Endodontics, Systematic Review of Vitro Study

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ADMINISTRATIVE INFORMATION

Support - University of Foggia.

Review Stage at time of this submission - Completed but not published.

Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 08 January 2024 and was last updated on 08 January 2024.

INTRODUCTION

Review question / Objective The following research question guided the study selections: Do teeth treated endodontically with an ultraconservative access cavity exhibit greater resistance to fracture under masticatory loads compared to those with a traditional endodontic access?

Condition being studied In recent years, there has been a surge in the development of novel endodontic access techniques, driven by the goal of improving treatment precision, quality, and overall effectiveness while preserving maximum dental tissue for subsequent prosthetic rehabilitation. The accurate execution of endodontic access is identified as crucial for the success of therapy, impacting all subsequent phases of canal treatment, including orifice localization, shaping, cleansing, disinfection, and achieving apical and coronal seals. Additionally, appropriate endodontic access is deemed

essential to prevent fractures that could jeopardize subsequent prosthetic rehabilitation.

Traditional endodontic accesses adhere to two key principles: creating a convenient form and implementing a broad endodontic opening. These principles aim to prevent complications during canal localization, probing, and shaping by facilitating direct access to the root canal orifice through cavity wall extension. The operational translation of these principles includes removing the roof of the pulp chamber, establishing an unobstructed path to canal orifices, and preserving healthy dental structure.

Acknowledging the increasing acceptance of minimally invasive dentistry in endodontics, which prioritizes maximum dentin preservation, the goal is to conserve dental structures by retaining part of the pulp chamber roof. This approach aims to reduce cusp deflection caused by occlusal forces after prosthetic restoration. However, teeth undergoing endodontic treatment exhibit a lower long-term survival rate compared to intact teeth due to reduced fracture resistance.

Numerous clinical studies have investigated the risk of dental fractures associated with endodontic treatment, particularly during caries removal and access preparation. While minimally invasive endodontics has gained approval, scientific evidence supporting this perspective is still limited. Doubts have been raised about the potential limitations of minimally invasive access cavities in phases such as orifice identification, irrigation, shaping, and root canal filling, influencing the entire endodontic treatment process.

Insufficiently sized access cavities pose a risk of incidents and complications during endodontic treatment. Conversely, traditional openings may increase the risk of fractures due to reduced resistance to masticatory loads resulting from the loss of coronal mineralized substance. A systematic review conducted in 2021, comparing different endodontic access methods through network meta-analysis, identified only two studies for Ninja accesses, classified as ultraconservative. The meta-analysis, while lacking definitive data, anticipates an enhancement in statistical significance with the release of additional studies in 2022 and 2023. This enhancement is expected to facilitate a more meaningful direct comparison of fracture resistance between Ninja accesses and traditional openings.

To address this objective, the systematic review focuses on pulp chamber opening techniques, specifically delving into ultraconservative approaches like Ninja Access. The aim is to compare the fracture resistance of teeth subjected to Ninja access with those undergoing a Traditional Endodontic Access Cavity (TEC). This comprehensive exploration seeks to contribute valuable insights into the comparative effectiveness of these techniques in preserving dental integrity and preventing fractures during endodontic treatment.

METHODS

Participant or population Teeth to which ultraconservative openings have been performed.

Intervention Fracture load test.

Comparator Teeth to which traditional endodontic access openings have been made.

Study designs to be included In vitro Study.

Eligibility criteria In vitro studies related to ultraconservative endodontic access cavities, specifically focusing on those providing data on the fracture resistance of teeth treated

endodontically, particularly those connected to the Ninja Endodontic Access Cavity.

Information sources The search was conducted on 3 databases, namely Science Direct, SCOPUS, and PubMed, and one registry, the Cochrane Library. Additionally, Google Scholar (key-words, Ninja Access), gray literature sources such as Open Gray (keywords, Ninja Access), and references from previous systematic reviews on access cavity were searched.

Main outcome(s) Std. Mean Difference in Fracture Resistance ta Endodontically treated teeth with an ultraconservative access cavity (NAC) and those with a traditional endodontic access (TEC).

Quality assessment / Risk of bias analysis The risk of bias was evaluated using the Checklist for Reporting In vitro Studies (CRIS) guidelines, proposed for the assessment of in vitro dental studies.

For the meta-analysis, specifically in calculating the Std. Mean difference ratio, Reviewer Manager 5.4 software (Cochrane Collaboration, Copenhagen, Denmark) was utilized.

Strategy of data synthesis The extracted results have been tabulated, and data related to fracture resistance have also been represented in figures, such as the forest plot, displaying the respective numerical values of mean and standard deviation. These were then compared with the mean values of the control groups to obtain the mean difference and indices of heterogeneity, such as the Higgins index (I²).

Subgroup analysis A subgroup analysis based on the type of tooth (molar or premolar) subjected to the intervention was conducted.

Sensitivity analysis A sensitivity analysis was performed by excluding studies with low C.I. overlap or those identified graphically in the funnel plot.

Country(ies) involved Italy.

Keywords Endodontic; Access Cavity; Ninja Access; Ultraconservative Access; Dental; Endodontic failure.

Contributions of each author

Author 1 - Mario Dioguardi - Mario Dioguardi drafted the manuscript.

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