

INPLASY

Effectiveness of swept-source optical coherence tomography in detection of tooth cracks: a systematic review

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ADMINISTRATIVE INFORMATION

Support - None.

Review Stage at time of this submission - Risk of bias assessment.

Conflicts of interest - None declared.

INPLASY registration number: INPLASY202520028

Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 6 February 2025 and was last updated on 6 February 2025.

INTRODUCTION

Review question / Objective What is the effectiveness of swept-source optical coherence tomography (SS-OCT) compared to other diagnostic methods in detecting enamel, dentin, and root cracks in human teeth?

Condition being studied Tooth cracks represent incomplete fractures that affect different layers of your teeth from shallow to deep. These fractures develop when teeth endure too much pressure plus age or when dental work and other stressors affect them. Tooth cracks grow to create discomfort while letting bacteria enter the tooth and lead to pulpitis, periodontal disease, and vertical root fractures. Finding tooth cracks at an early stage helps doctors improve treatment results and slow their growth. This review studies how SS-OCT helps find tooth cracks better than standard diagnostic tools without hurting patients. Healthcare professionals use dental imaging tools

to find tooth cracks and improve treatment results for cracked teeth.

METHODS

Search strategy Narrative description of included studies, focusing on methodology, outcomes, and limitations.

Participant or population Human teeth.

Intervention The systematic review focuses on Swept-Source Optical Coherence Tomography (SS-OCT), an imaging technique that uses near-infrared light to detect tooth cracks in enamel, dentin, and root structures. SS-OCT is a non-invasive, radiation-free diagnostic tool that generates high-resolution, cross-sectional, and 3D images of dental structures.

Comparator The effectiveness of SS-OCT will be compared against traditional and emerging diagnostic methods for tooth cracks.

Study designs to be included The focus of these searches was original research with full access, encompassing English-language articles published between 2012 and 2024. The primary considerations for selecting the identified articles were their relevance and objectivity concerning the subject of the study. The inclusion criteria included (1) the presence of the keywords employed for article searching, (2) papers with titles or abstracts containing the search keywords, and (3) original papers published between the years 2012 and 2024. Non-English papers, reviews, and papers published before 2012 were excluded.

Eligibility criteria The focus of these searches was original research with full access, encompassing English-language articles published between 2012 and 2024. The primary considerations for selecting the identified articles were their relevance and objectivity concerning the subject of the study. The inclusion criteria included (1) the presence of the keywords employed for article searching, (2) papers with titles or abstracts containing the search keywords, and (3) original papers published between the years 2012 and 2024. Non-English papers, reviews, and papers published before 2012 were excluded.

Information sources Clarivate, Scopus, Google Scholar, ScienceDirect, PubMed, Midline, and ResearchGate.

Main outcome(s) Sensitivity and specificity of SS-OCT. Comparative effectiveness of SS-OCT against other diagnostic methods. Depth and resolution of cracks detected.

Quality assessment / Risk of bias analysis A team of two researchers will evaluate the risk of bias in each study. When the two reviewers cannot reach an agreement they discuss and decide. The bias assessment results will appear in a clear table format and the team will explain how these findings affect the review's main results.

Strategy of data synthesis Narrative description of included studies, focusing on methodology, outcomes, and limitations.

Subgroup analysis Diagnostic accuracy of SS-OCT for enamel vs. dentin vs. root cracks. Performance differences in in vitro vs. in vivo studies. Impact of study quality (low vs. high risk of bias).

Sensitivity analysis In this systematic review, sensitivity analysis will be conducted to assess the robustness of the findings by evaluating how

variations in key parameters influence the results. The impact of different inclusion/exclusion criteria (such as study design and diagnostic method), and the type of imaging technology used.

Language restriction English.

Country(ies) involved Saudi Arabia.

Keywords Cracked tooth syndrome, Optical coherence tomography, Crack propagation, Swept source OCT, Imaging.

Contributions of each author

Author 1 - Anfal AlQussier - Both authors will contribute equally to the analysis, drafting of the manuscript, and finalizing the final version.

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