

INPLASY

Artificial intelligence for the detection of the elongated styloid process on dental radiographic images: a systematic review and literature update

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ADMINISTRATIVE INFORMATION

Support - KKU.

Review Stage at time of this submission - Preliminary searches.

Conflicts of interest - None declared.

INPLASY registration number: INPLASY202650123

Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 22 May 2026 and was last updated on 20 June 2026.

INTRODUCTION

Review question / Objective What is the diagnostic performance of AI in the detection of elongated styloid processes?

Rationale To evaluate the diagnostic performance of artificial intelligence for detecting and classifying elongated styloid processes and stylohyoid chain ossifications on dental and maxillofacial radiographic imaging, and to assess the quality and clinical readiness of the available evidence.

Condition being studied The styloid process elongation detection.

METHODS

Search strategy A systematic search will be conducted in PubMed/MEDLINE, Scopus, and Web of Science from database inception to the final search date. The search strategy will combine three main concepts: elongated styloid process/stylohyoid chain ossification, artificial intelligence/

machine learning/deep learning, and radiographic/maxillofacial imaging. No restriction on publication year will be applied.

The main search terms will include the following combinations:

Concept 1: elongated styloid process / stylohyoid chain
“elongated styloid process” OR “styloid process elongation” OR “styloid process” OR “styloid elongation” OR “stylohyoid ligament”

Concept 2: artificial intelligence
“artificial intelligence” OR “machine learning” OR “deep learning” OR “neural network” OR “convolutional neural network” OR CNN OR “segmentation”

Concept 3: imaging
radiograph OR radiography OR “panoramic radiograph” OR OPG OR “cone-beam computed tomography” OR CBCT OR “computed

tomography” OR CT OR “dental imaging” OR “maxillofacial imaging”

The search will be adapted to each database.

Participant or population Patients, or radiographic images of patients, assessed for elongation of the styloid process or stylohyoid chain ossification on dental or maxillofacial imaging (panoramic radiography, CBCT, or CT)

Intervention AI.

Comparator None. Included studies report the performance of an AI index test against a reference standard; a comparison against unaided human readers was not required for eligibility.

Study designs to be included The review will include original primary studies that evaluate the performance of artificial intelligence, machine learning, or deep learning models for detecting, classifying, segmenting, or measuring elongated styloid process, stylohyoid ligament calcification, or stylohyoid chain ossification on radiographic or maxillofacial imaging.

Eligible study designs will include diagnostic accuracy studies, retrospective observational studies, prospective observational studies, cross-sectional studies, external validation studies, comparative diagnostic studies, and AI model-development or validation studies that report test-set performance metrics.

Randomized or prospective comparative studies will also be eligible if they evaluate an AI-based index test for elongated styloid process detection or classification and report diagnostic or classification performance.

Review articles, editorials, letters, case reports, case series without AI performance evaluation, non-human studies, phantom-only studies, technical papers without clinical image-based validation, and studies not reporting relevant performance outcomes will be excluded..

Eligibility criteria Studies using different models of AI to identify the elongated styloid process.

Information sources The information sources will include electronic database searches of PubMed/MEDLINE, Scopus, and Web of Science. Additional sources will include manual screening of reference lists of included studies and relevant review articles, citation tracking of eligible studies, and searches of Google Scholar for potentially missed

records. If necessary, study authors will be contacted for missing diagnostic accuracy or test-set performance data.

Main outcome(s) AI performance.

Quality assessment / Risk of bias analysis The risk of bias and applicability concerns for each study included in this review were evaluated using the QUADAS-2 tool, which assesses four domains: Patient Selection, Index Test, Reference Standard, and Flow/Timing. While completing the QUADAS-2 form, judgments were made based on one of three classifications (Low, High, or Unclear), taking into consideration factors specific to AI-based reviews (such as Spectrum Effects, selection of archival or web images, and selection of regions from lesions).

Strategy of data synthesis A narrative synthesis was performed. Owing to the small number of eligible studies and their clinical and methodological heterogeneity, no meta-analysis, statistical pooling, or quantitative sensitivity analysis was undertaken. Findings were summarized descriptively and tabulated by study.

Subgroup analysis None.

Sensitivity analysis No quantitative sensitivity analysis was performed, as no meta-analysis or statistical pooling was undertaken given the small number and heterogeneity of the included studies.

Language restriction Only studies in English language.

Country(ies) involved Saudi Arabia.

Keywords Artificial intelligence, styloid process, styloid elongation, diagnostic imaging.

Contributions of each author

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