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Corresponding author:
Ting Wei Wang

eltonwang1@gmail.com

Author Affiliation:
School of Medicine, National Yang-Ming Chiao Tung University.

Systematic Review and Meta-Analysis of Aortic Dissection Diagnosis via CT: Evaluating Deep Learning for Detection Against Expert Analysis and Its Application in Detection and Segmentation

Wang, TW; Tzeng, YH; Hong, JS; Liu, HR; Wu, KT; Hsu, HY; Fu, HN; Lee, YT; Yin, WH; Wu, YT.

ADMINISTRATIVE INFORMATION

Support - Cheng Hsin General Hospital, CY11102 and CY11201.

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 28 March 2024 and was last updated on 28 March 2024.

INTRODUCTION

Review question / Objective Objective: To evaluate the effectiveness and accuracy of deep learning algorithms in the diagnosis of aortic dissection from CT imaging, compared to traditional expert analysis.Aortic dissection, a life-threatening condition characterized by a tear in the aorta's inner layer, causing blood to flow between the aorta's layers.

Condition being studied Aortic dissection, a life-threatening condition characterized by a tear in the aorta's inner layer, causing blood to flow between the aorta's layers.

METHODS

Participant or population Adult patients undergoing CT imaging for suspected aortic dissection.

Intervention Application of deep learning algorithms to CT images for the diagnosis of aortic dissection.

Comparator Diagnosis of aortic dissection by expert radiologists without the assistance of deep learning algorithms.

Study designs to be included Randomized controlled trials, observational studies, and retrospective analyses evaluating the accuracy of deep learning in diagnosing aortic dissection via CT imaging.

Eligibility criteria Studies must use deep learning algorithms for the analysis of CT imaging in diagnosing aortic dissection, compare with expert analysis, and provide accuracy metrics such as sensitivity, specificity, dice score.

Information sources PubMed, Embase, Web of Science.

Main outcome(s) The primary outcomes will include diagnostic accuracy metrics: sensitivity, specificity, dice score.

Quality assessment / Risk of bias analysis For the quality assessment and risk of bias analysis of primary studies included in this systematic review and meta-analysis, we will employ two well-recognized tools: the Checklist for Artificial Intelligence in Medical Imaging (CLAIM) and the Quality Assessment of Diagnostic Accuracy Studies-2 (QUADAS-2).

Strategy of data synthesis A narrative synthesis will provide an overview of the findings. Where appropriate, meta-analytic techniques will be used to combine results from multiple studies, employing random-effects models to account for between-study heterogeneity.

Subgroup analysis Geographic region, validation method, imaging dimensionality, and algorithm type.

Sensitivity analysis Leave one out method.

Country(ies) involved Taiwan.

Keywords Aortic dissection; Deep Learning; CT Imaging; Diagnostic Accuracy; Machine Learning; Artificial Intelligence.

Contributions of each author
Author 1 - Ting-Wei Wang.
Author 2 - Yun-Hsuan Tzeng.
Author 3 - Jia-Sheng Hong.
Author 4 - Ho-Ren Liu.
Author 5 - Kuan-Ting Wu.
Author 6 - Huan-Yu Hsu.
Author 7 - Hao-Neng Fu.
Author 8 - Yung-Tsai Lee.
Author 9 - Wei-Hsian Yin.
Author 10 - Yu-Te Wu