

INPLASY PROTOCOL

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Conflicts of interest:
None.

Superb microvascular imaging for detecting carpal tunnel syndrome compared with power Doppler ultrasonography: A protocol for systematic review and meta-analysis

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Review question / Objective: The meta-analysis to systematically review and synthesize relevant data on the evaluating intraneural blood flow of the median nerve (MN) using SMI and PDUS was undertaken.

Condition being studied: Sonography enhances diagnostic accuracy by the detection of the epineural or intraneural blood flow. Power Doppler ultrasonography (PDUS) in carpal tunnel syndrome (CTS) has been previously studied and shown to be valid and reliable for grading the intraneural flow. However, superb microvascular imaging (SMI) represents a new era in diagnostic sonography, and this new technology enables accurate visualization of vascular structures with intensive clutter suppression to provide flow signals for large to small vessels, and it presents these data at high frame rates. Studies suggested that SMI is more sensitive in demonstrating blood flow in the diagnosis of CTS compared with PDUS.

INPLASY registration number: This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 5 January 2021 and was last updated on 5 January 2021 (registration number INPLASY202110018).

INTRODUCTION

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blood flow. Power Doppler ultrasonography (PDUS) in carpal tunnel syndrome (CTS) has been previously studied and shown to be valid and reliable for grading the intraneural flow. However, superb microvascular imaging (SMI) represents a new era in diagnostic sonography, and this new technology enables accurate visualization of vascular structures with intensive clutter suppression to provide flow signals for large to small vessels, and it presents these data at high frame rates. Studies suggested that SMI is more sensitive in demonstrating blood flow in the diagnosis of CTS compared with PDUS.

METHODS

Participant or population: The patients should be those who had undergone the carpal tunnel syndrome.

Intervention: CTS of all patients were assessed with SMI and PDUS.

Comparator: CTS of all patients were assessed with SMI and PDUS.

Study designs to be included: We will search PubMed, Web of Science, Cochrane Library, and Chinese biomedical databases from their inceptions to the December 31, 2020, without language restrictions. Two authors will independently carry out searching literature records, scanning titles and abstracts, full texts, collecting data, and assessing risk of bias. Review Manager 5.2 and Stata14.0 software will be used for data analysis.

Eligibility criteria: None.

Information sources: PubMed, Web of Science, Cochrane Library, and Chinese biomedical databases will be searched from their inceptions to the December 31, 2020, without language restrictions. The search strategy for PubMed is shown in Table 1. Other online databases will be used in the same strategy.

Main outcome(s): This systematic review will investigate whether superb microvascular imaging is more sensitive to

display the blood flow in the median nerve with carpal tunnel syndrome than Power Doppler ultrasonography.

Quality assessment / Risk of bias analysis:

The following data will be extracted from each included research: year of article, first author's surname, sample size, number of microvascular flow grades within the MN, number of every grade. The quality of selected studies will be independently evaluated according to a tool for the quality assessment of methodological index for non-randomized studies (MINORS). The MINORS criteria included 12 assessment items. Each of these items is scored as "yes" (2), "no" (0), or "unclear"(1). MINORS score ranged from 0 to 24; and score \geq 17 indicate a good quality. Any disagreements between 2 investigators will be solved through discussion or consultation by a 3rd investigator.

Strategy of data synthesis: The STATA version 15.1 software (Stata Corporation, College Station, TX, USA) will be used for meta-analysis. We calculated the pooled summary odds ratio (OR) and its 95% confidence interval (CI). The Cochran's Q-statistic and I² test will be used to evaluate potential heterogeneity between studies. [15] If the Q-test shows a P \geq 50%, indicating significant heterogeneity, and the random effect model will be employed or if heterogeneity is not significant, the fixed-effects model was used. If it is possible, we will perform meta-analysis to analyze the pooled outcome data when acceptable homogeneity has been identified.

Subgroup analysis: We will conduct subgroup analysis to investigate potential causes for substantial heterogeneity among eligible studies. Sensitivity analysis will be performed to evaluate the influence of a single study on the overall estimate. We will use Begger's funnel plots and Egger's linear regression test to investigate publication bias.

Country(ies) involved: China.

Keywords: carpal tunnel syndrome; median nerve; superb microvascular imaging;

Power Doppler ultrasonography; meta-analysis.

Contributions of each author:

Author 1 - Jili Zhang.

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