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Meta-analysis of the preventive effect of neuromuscular electrical stimulation on postoperative deep vein thrombosis

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ADMINISTRATIVE INFORMATION

Support - Hospital.

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 18 September 2024 and was last updated on 18 September 2024.

INTRODUCTION

Review question / Objective P: Patients who need to stay in bed after various types of surgery. I: Neuromuscular electrical stimulation. C: Routine prevention of DVT. O: DVT Common femoral vein flow rate D-dimer. S: RCT.

Condition being studied Deep vein thrombosis (DVT) is a disease of abnormal blood coagulation commonly found in lower limbs or pelvic veins, which can lead to swelling, pain and limited movement of the affected limb. The three factors of DVT are blood stasis, blood hypercoagulability and vascular endothelial injury. The above three factors exist in different forms in perioperative period. Up to 85% of orthopaedic patients without prevention, which seriously affects the postoperative recovery and quality of life of patients, if the thrombus falls off, it may enter the pulmonary artery with the blood circulation system,

leading to pulmonary embolism, which is life-threatening. Therefore, the prevention of postoperative DVT is the key to guarantee the patients' life and postoperative quality of life.

METHODS

Participant or population Patients who need to stay in bed after all kinds of surgery, aged ≥ 18 years, have normal muscle and nerve function of lower extremity, no damage and swelling of lower extremity skin, normal coagulation function, and no DVT.

Intervention Routine prevention+Neuromuscular electrical stimulation of the leg or sole is performed during or after surgery.

Comparator Routine prevention: Dietary guidance, massage, ankle pump exercise, health education, fluid rehydration, drug anticoagulation and physical prevention, etc.

Study designs to be included 19 RCTS of neuromuscular electrical stimulation for prevention of postoperative deep vein thrombosis, 8 in Chinese and 11 in English.

Eligibility criteria Inclusion criteria: Randomized controlled trial (RCT), patients aged ≥ 18 years after surgery, normal lower extremity muscle and nerve function, no damage or swelling of lower extremity skin, normal coagulation function, no DVT; Exclusion criteria: articles inconsistent with research content, review articles, conference papers, dissertations, case reports or research protocols, duplicate publications, studies involving animals, articles not in English or Chinese, retracted articles.

Information sources PubMed, Web of Science, Cochrane Library; Cnki, Wanfang, VIP.

Main outcome(s) Incidence of DVT; D-dimer content (D-D) ; Common femoral vein flow rate(CFV).

Quality assessment / Risk of bias analysis Selected studies were scored by two researchers trained in evidence-based systematic review using the Cochrane bias risk criteria, which included seven types of bias risk assessment: random sequence generation, assignment hiding, subject and person blindness, blind outcome assessment, incomplete outcome data, selective reporting, and other bias.

Strategy of data synthesis Meta analysis was performed using Stata17.0 software. Weighted mean difference (WMD) were used as effect indexes for measurement data, and relative risk (RR) was used as effect indexes for counting data. The heterogeneity was evaluated according to I-Square value. When $P \geq 0.1$ and $I\text{-Square} \leq 50\%$, the heterogeneity was small, and the fixed-effect model was adopted. When $P > 50\%$, the heterogeneity is large, and the random effects model is used. Publication bias was assessed using the Egger test and the Begg test, and if there was any publication bias, the clip-supplement method was used to adjust for publication bias. A sensitivity analysis was performed for each outcome, excluding one study at a time to assess the stability of the meta-analysis results. To assess the impact of potential factors on the results of the meta-analysis, we conducted multiple subgroup analyses based on study level characteristics. All statistical analyses were performed using Stata17.0 software, and $p < 0.05$ indicated statistically significant differences..

Subgroup analysis meta analysis was performed using Stata17.0 software. Weighted mean difference (WMD) were used as effect indexes for measurement data, and relative risk (RR) was used as effect indexes for counting data. The heterogeneity was evaluated according to I-Square value. When $P \geq 0.1$ and $I\text{-Square} \leq 50\%$, the heterogeneity was small, and the fixed-effect model was adopted. When $P > 50\%$, the heterogeneity is large, and the random effects model is used. Publication bias was assessed using the Egger test and the Begg test, and if there was any publication bias, the clip-supplement method was used to adjust for publication bias. A sensitivity analysis was performed for each outcome, excluding one study at a time to assess the stability of the meta-analysis results. To assess the impact of potential factors on the results of the meta-analysis, we conducted multiple subgroup analyses based on study level characteristics. All statistical analyses were performed using Stata17.0 software, and $p < 0.05$ indicated statistically significant differences.

Sensitivity analysis Excluding any study, there was no significant change in the results, and the results of meta-analysis were stable.

Country(ies) involved China.

Keywords Neuromuscular electrical stimulation; Surgical patients; Deep vein thrombosis; meta-analysis.

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