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None declared.

Risk factors for deep vein thrombosis in patients with cerebral hemorrhage: a systematic review and meta-analysis

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Review question / Objective: **To identify the risk factors of deep venous thrombosis in patients with cerebral hemorrhage.**

Eligibility criteria: **Inclusion criteria: ①Comply with the "Guidelines for diagnosis of cerebral hemorrhage in China"[7] or "Guidelines for the management of spontaneous intracerebral hemorrhage in the United States"[37], or be diagnosed as ICH in combination with brain CT, MRI, and cerebral angiography; ②Age ≥18 years old; ③Ultrasonography or color polygraph Pler ultrasonography confirmed DVT; ④ The study type was cohort study or case-control study; ⑤ Newcastle-Ottawa Scale (NOS) [8] score ≥ 6 points; ⑥ The language was limited to Chinese and English. Exclusion criteria: ① Repeated publications; ② Studies without full text, incomplete information, or data extraction impossible.**

INPLASY registration number: This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 15 March 2022 and was last updated on 15 March 2022 (registration number INPLASY202230068).

INTRODUCTION

Review question / Objective: **To identify the risk factors of deep venous thrombosis in patients with cerebral hemorrhage.**

Condition being studied: **Stroke patients are at a particularly high risk of developing venous thromboembolism (VTE) during hospitalization, with DVT being the most common manifestation and pulmonary embolism (PE) the most dangerous form. The study found that stroke patients with hemiplegia were 75% more likely to develop deep vein thrombosis (DVT) and 20% more likely to develop PE without VTE**

prophylaxis. [1] VTE not only affects the transformation and outcome of the disease, but also increases the risk of death, with 25% of stroke cases leading to early death after stroke due to VTE. [2] The incidence of cerebral hemorrhage ranks second in all subtypes of stroke, second only to ischemic stroke, but it is the most deadly, and the mortality rate accounts for 10% of all strokes. Up to 50% of mortality can be attributed to medical complications after stroke. VTE is one of the important complications of cerebral hemorrhage, and the risk of death within 1 month of deep vein thrombosis (DVT) and pulmonary embolism is 6% and 12%, respectively. [3] The prevalence of VTE in intracerebral hemorrhage is higher than in ischemic stroke. [4,5] Some studies have found that the risk of in-hospital DVT in patients with cerebral hemorrhage is 7.35 times that of patients with ischemic stroke. [2] While the current research mainly focuses on ischemic stroke, there are few studies on the risk factors of DVT in cerebral hemorrhage. A definitive clinical diagnosis of DVT remains difficult because there are no consistent and reliable clinical signs or symptoms. Most cases of DVT detected by ancillary workup are asymptomatic. [6] B-ultrasound and lower extremity venography are the gold standard for diagnosing DVT, but they are complicated and lagging behind. Therefore, identifying the risk factors of DVT in intracerebral hemorrhage and establishing a clinically applicable prediction model are of great significance for the early identification and prevention of DVT.

METHODS

Participant or population: Patients with cerebral hemorrhage.

Intervention: Cerebral hemorrhage patients with DVT.

Comparator: Cerebral hemorrhage patients without DVT.

Study designs to be included: Cohort study or case-control study.

Eligibility criteria: Inclusion criteria: ①Comply with the "Guidelines for diagnosis of cerebral hemorrhage in China" [7] or "Guidelines for the management of spontaneous intracerebral hemorrhage in the United States"[37], or be diagnosed as ICH in combination with brain CT, MRI, and cerebral angiography; ②Age ≥18 years old; ③Ultrasonography or color polygraph Pler ultrasonography confirmed DVT; ④ The study type was cohort study or case-control study; ⑤ Newcastle-Ottawa Scale (NOS) [8] score ≥ 6 points; ⑥ The language was limited to Chinese and English. Exclusion criteria: ① Repeated publications; ② Studies without full text, incomplete information, or data extraction impossible.

Information sources: We searched electronical database: Cochrane Library, PubMed, Embase, Web of science, China national knowledge infrastructure, Wan-Fang Database, China Science and Technology Journal Database and China Biomedical Literature Database. The search period was from January 1, 2007 to January 1, 2022.

Main outcome(s): Identifying the risk factors of DVT in intracerebral hemorrhage and establishing a clinically applicable prediction model.

Quality assessment / Risk of bias analysis: Two researchers independently used NOS to evaluate the quality of the literature, and any disagreements were resolved through consultation or third-party opinion. NOS includes 4 items (4 points) for "selection", 1 item (2 points) for "comparability" and 3 items (3 points) for "outcome" or "exposure" with a full score of 9 points. The articles with NOS score ≥6 was classified as high quality literature and <6 was considered low-quality articles.

Strategy of data synthesis: Data were analyzed using RevMan 5.4. For enumeration data, the odds ratio (OR) was used as the effect index, the mean

difference (MD) was selected for continuous variables, and the interval estimation was expressed by 95% confidence interval (95% CI). If the heterogeneity test P≥0.1, I2≤50%, it indicates the homogeneity among the studies, and the fixed effect model is used for combined analysis; If the heterogeneity is still large, a random effect model is used or the results are discarded and combined, and descriptive analysis is used. When more than 10 articles were included in the analysis of a single risk factor, a funnel plot was used to analyze the publication bias of each risk factor.

Subgroup analysis: If there is significant heterogeneity in the included trials, a subgroup analysis will be performed based on potential factors such as the underlying disease or age of patients with cerebral hemorrhage to explore possible factors for heterogeneity

Sensitivity analysis: A sensitivity analysis will be performed to test the robustness of the review result and to detect the source of heterogeneity This can be done by excluding trials with a high risk of bias or eliminating each study individually.

Country(ies) involved: China.

Keywords: cerebral hemorrhage; deep vein thrombosis; risk factors; meta-analysis.

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