RESEARCH PAPER

Post-thrombectomy psychiatric disorders in stroke patients: A meta-analysis of current RCTs

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ABSTRACT

This study aimed to investigate psychiatric disorders following thrombectomy intervention. On 17th October 2024 and updated on 20th April 2025, a literature search was conducted in five databases: Google Scholar, Virtual Health Library, Scopus, Web of Science and PubMed. Before the literature search, a comprehensive preliminary search was conducted to capture relevant keywords and to optimize included papers retrieval. Seven RCTs were included from 992 records. Medical therapy and thrombectomy (M+T) were associated with a significantly reduced prevalence of anxiety measured by Patient Health Questionnaire-4 (OR: 0.34, 95%CI: 0.18-0.65, p = 0.001), but not depression (OR: 0.59, 95%CI: 0.31-1.1, p = 0.1) rather than M alone. No significant difference was detected between M+T versus M alone regarding anxiety/depression measured by EuroQol five dimensions questionnaire regarding: level 1 (no problem) (OR: 0.99, 95%CI: 0.66-1.5, p = 0.99), level 2 (some manifestations) (OR: 1.13, 95%CI: 0.75-1.7, p = 0.57) and level 3 (severe manifestation) (OR: 0.62, 95%CI: 0.25-1.49, p = 0.29). Only one patient experienced suicide after 1 year and was in the M group. M+T group had a lower score of substance abuse after 1 year of follow up measured by the Brief Coping Questionnaire. Current evidence suggests that M+T may be associated with more favorable psychiatric outcomes compared with M alone. However, further randomized controlled trials with longer follow-up durations and standardized psychiatric assessment tools are required to confirm these findings.

Keywords:

Thrombectomy, endovascular therapy, stroke psychiatric disorder, met-analysis

INTRODUCTION

Stroke remains a major global public health challenge. The Global Burden of Disease Study 2019 indicated that cardiovascular diseases followed by stroke are the major causes of death worldwide [1,2]. The prevalence of stroke has increased over recent decades, with more than 100 million individuals affected globally in 2019, representing a 33% increase compared with 1990 [1]. This growing burden is driven by population aging and the persistence of well-established risk factors, including comorbid chronic disease, sedentary lifestyle, and smoking [3].

Over the past decade, the management of acute ischemic stroke has undergone a paradigm shift with the widespread adoption of mechanical thrombectomy [4]. Beyond its established role in reducing mortality, thrombectomy has been shown to significantly improve functional outcomes and independence, leading to meaningful gains in post-stroke survival and quality of life. As a result, endovascular thrombectomy has become a cornerstone of acute stroke care for eligible patients, often replacing medical therapy alone when patients present within appropriate therapeutic windows [5].

Despite these advances, post-stroke psychological sequelae remain an under-recognized but clinically significant consequence of stroke. Depression, anxiety, and related psychiatric disorders affect approximately one-third of stroke survivors and are strongly associated with impaired functional recovery, reduced quality of life, increased caregiver burden, and higher rates of recurrent vascular events [6-8].

Importantly, post-stroke depression has been linked to a nearly 60% increase in all-cause mortality, underscoring the need for early identification and prevention of psychiatric morbidity in this population [9]. While improvements in neurological and functional outcomes following thrombectomy are well documented, its impact on psychiatric outcomes remains less clearly defined. Emerging evidence suggests that successful reperfusion and improved functional recovery may translate into better psychological well-being; however, individual randomized controlled trials (RCTs) have reported inconsistent findings. Some studies indicate a reduction in post-stroke anxiety and depression following thrombectomy combined with medical therapy [10,11], whereas others report no significant differences compared with medical therapy alone [12]. To date, no

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systematic review or meta-analysis has comprehensively synthesized evidence from randomized controlled trials to evaluate the psychiatric outcomes associated with thrombectomy in stroke patients. Given the increasing emphasis on patient-reported outcomes and long-term quality of life, understanding the psychological implications of thrombectomy is of growing clinical relevance. In this systematic review and meta-analysis, the aim was to investigate psychiatric disorders following thrombectomy intervention.

METHODS AND MATERIALS

1. Search strategy

This systematic review and meta-analysis was conducted in accordance with the PRISMA recommendations and a protocol was registered on PROSPERO (CRD420251184871) [13]. On 17th October 2024 and updated on 20th April 2025, one author ran a literature search on five databases: Google Scholar, Virtual Health Library (VHL), Scopus, Web of Science (WOS) and PubMed. Before the literature search, a comprehensive preliminary search was conducted to capture relevant keywords and to optimize included papers retrieval. The search term was "("stroke") AND ("thrombectomy" OR "mechanical thrombectomy" OR "post-thrombectomy" OR "post-mechanical thrombectomy" OR "endovascular therapy") AND ("depression" OR "anxiety" OR "suicide" OR "bipolar" OR "mood disorders" OR "eating disorder" OR "schizophrenia" OR "substance use disorders" OR "neurocognitive disorders" OR "autism" OR "adhd" OR "mental illness" OR "psychiatric disorder" OR "psychiatric" OR "quality of life")".

In each database, the records were transferred to Endnote software. After the records' transfer, duplicates were removed via the same software and were exported into an Excel sheet for screening. Title and abstract screening as well as full text screening were done by one author and revised by the same author to avoid missing any eligible papers and minimize the margin of error.

Inclusion criteria:

Any published randomized controlled trial (RCT) that assessed psychiatric outcomes post-thrombectomy was included.

Exclusion criteria:

1-Other study designs, 2-Books, 3-Conference abstract, 4-Non-English articles, 5-Duplicate studies

2. Data extraction

An extraction sheet was developed. It contained study characteristics: age of patients, male prevalence, median age, reference ID, sample size, compared groups, last follow up point and the scale used for the diagnosis of psychiatric disorders. It also contained the outcomes: the prevalence of psychiatric disorders, either combined or separated. One author extracted the data and revised it again so that the analysis is done on clean data.

3. Quality assessment

The Cochrane risk of bias assessment was used to assess the quality of each study. It consisted of 5 questions. Each question and the total quality of each study were answered by high risk, some concerns and low risk.

4. Statistical analysis

To analyze the data, Comprehensive Meta-analysis (CMA) software was used. The odds ratio (OR) with 95% confidence interval (95%CI) were used to analyze the difference between any two comparable groups. Random effect model was used due to differences in the included population. No publication bias or meta-regression were performed due to the low number of the included studies (needed studies ≥10). P value was considered significant if it was <0.05.

RESULTS

Search results and study characteristics:

992 records were transferred from the systematic search across the five databases. Of those, 371 records were identified as duplicates. The screening of 621 records resulted in inclusion of 58 records for full-text screening assessment. Only 5 articles were eligible in our study, in addition to 2 articles were found through manual search trials [10-17] (Figure 1).

Six RCTs compared psychiatric outcomes between medical therapy + thrombectomy (M+T) and medical therapy (M) alone. While only one study compared the outcomes between intravenous thrombolysis (IVT)+T and T alone. Four trials were multicenter RCTs, and individual studies were conducted in Spain, China, and Canada. The follow-up duration was one year in four studies and three months in three studies.

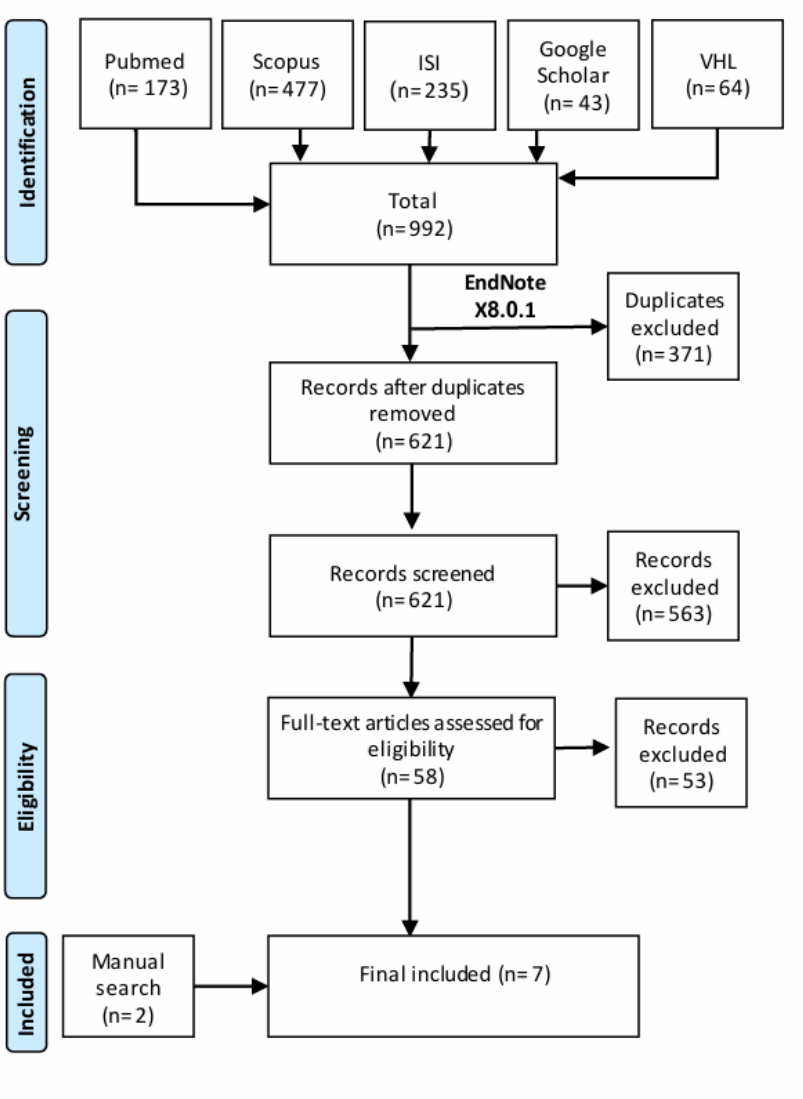

Figure 1: Study selection flow diagram.

Three studies used the EuroQol five dimensions questionnaire (EQ-5D), two studies used the Patient Health Questionnaire-4 (PHQ-4), and one study for each: Neuro-quality of life (Neuro-QOL) scale, and Brief Coping Questionnaire (Brief-COPE)+ EuroQoL (EQ-5D) (Table 1).

Table 1: Characteristics of the included studies

Reference ID	Compared groups	Sample size	Median age	Male (%)	Diagnosis of psychiatric disorders	Follow up
Bendszus-2023-multicenter	M+T vs M	125-128	73-74	55-48	Patient Health Questionnaire-4 (PHQ-4).	3 months
Thomalla-2024-multicenter	M+T vs M	125-128	73-74	55-48	Patient Health Questionnaire-4 (PHQ-4).	1 year
Davalos-2017-Spain	M+T vs M	103-103	65.7-67.5*	53-52	EuroQol five dimensions questionnaire (EQ-5D)	1 year
Joundi-2021-Canada	M+T vs M	165-150	71-70	48-47	EuroQol five dimensions questionnaire (EQ-5D)	3 months
Villarroya-2020-Multicenter	M+T vs M	42-40	67-8*	55-50	Brief Coping Questionnaire (Brief-COPE)+EuroQoL (EQ-5D)	1 year
Sarraj-2024-	M+T vs M	178-174	66-67	60-57	Neuro-QOL scale	1 year

multicenter						
Zhang-2022-China	IVT+T vs T	256-259	69-69	55-58	The 5-Dimensional European Quality of Life Scale (EQ-5D-5L)	3 months
*mean, M= medical therapy, T= thrombectomy, IVT= intravenous thrombolysis						

All studies were rated as having a high risk of bias, primarily because participants were aware of their treatment allocation, and several trials had incomplete outcome data (Figure 2).

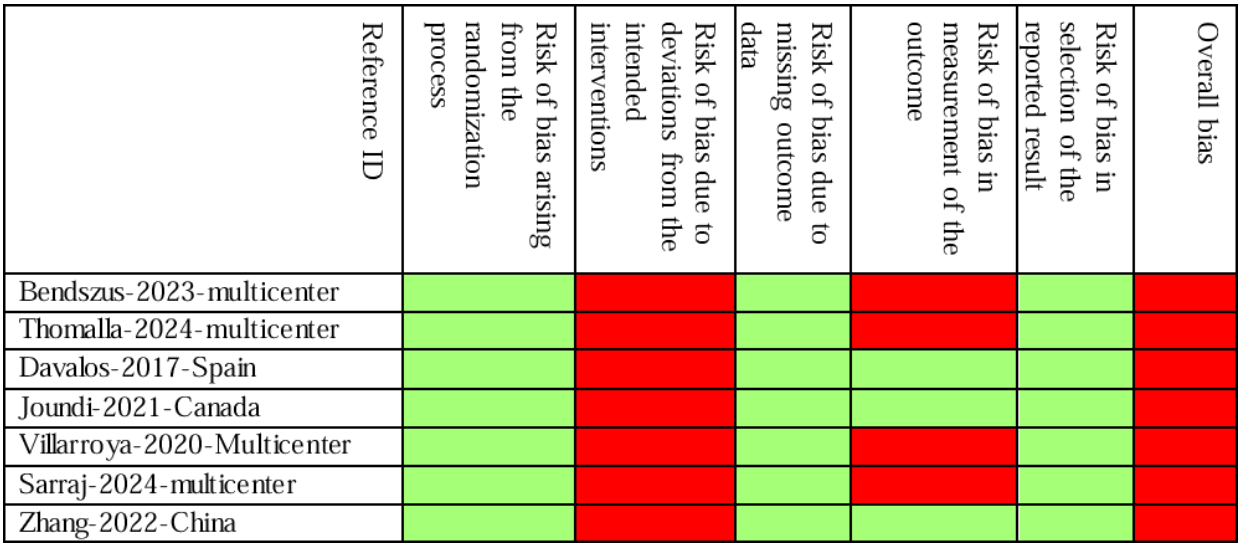

Figure 2: Study-level risk-of-bias assessment. Green = low risk; Red = high risk.

Anxiety: Two studies reported anxiety outcome using the Patient Health Questionnaire-4 (PHQ-4) [10,11]. M+T demonstrated a significantly lower prevalence of anxiety compared to M alone (OR: 0.34, 95%CI: 0.18-0.65, p = 0.001) (Figure 3).

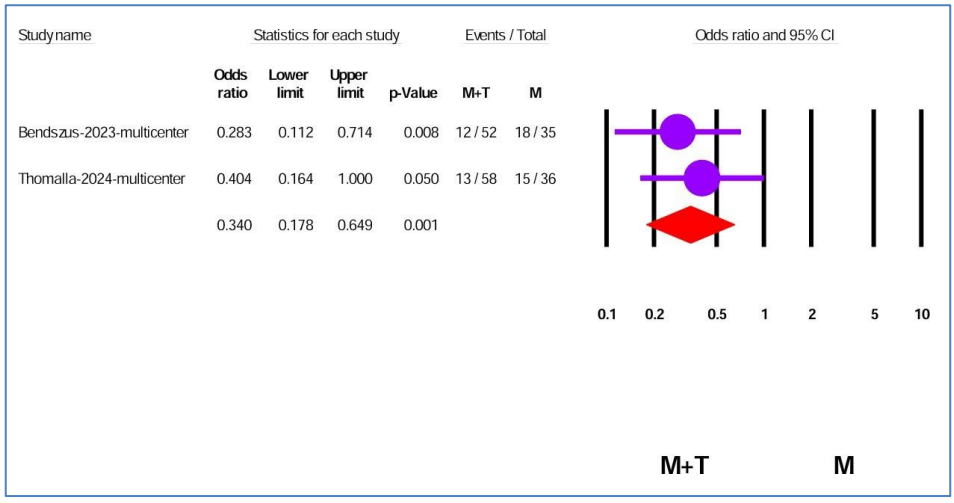

Figure 3: Study-specific and pooled effect estimates for M+T versus M shown as odds ratios with 95% confidence interval.

Depression: Depression was investigated in two studies using the Patient Health Questionnaire-4 (PHQ-4) [10,11]. M+T decreased the prevalence of depression compared to M alone; however, the comparison did not reach statistical significance (OR: 0.59, 95%CI: 0.31-1.1, p = 0.1) (Figure 4).

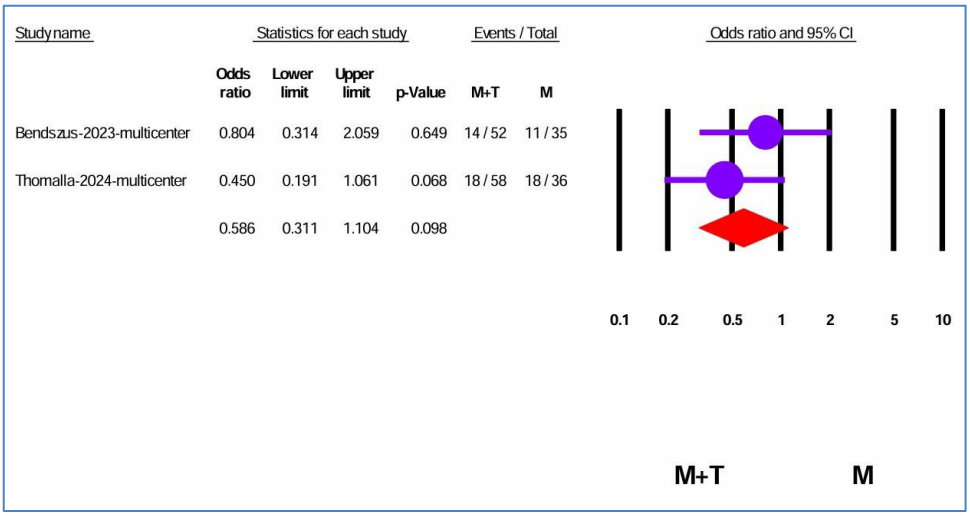

Figure 4: Forest plot of odds ratios (ORs) with 95% confidence intervals (CIs) for M+T versus M.

Anxiety/depression: Three studies compared the levels of the combined outcome of anxiety/depression using EuroQol five dimensions questionnaire (EQ-5D) [12-17]. No differences were found between M+T and M alone regarding level 1 (no problem) (OR: 0.99, 95%CI: 0.66-1.5, p = 0.99), level 2 (some manifestations) (OR: 1.13, 95%CI: 0.75-1.7, p = 0.57) and level 3 (severe manifestation) (OR: 0.62, 95%CI: 0.25-1.49, p = 0.29) (Figure 5a,b and c).

Zhang et al [17], demonstrated that patients allocated to IVT+T had a significantly lower prevalence of some or severe anxiety/depression level rather than patients who received T alone (39% vs 48%).

Suicide: Only one patient experienced suicide after 1 year and was in the M group [14].

Substance abuse: Only one paper reported substance abuse. M+T group had a lower score of substance abuse after 1 year of follow up using the Brief Coping Questionnaire (Brief-COPE) [15].

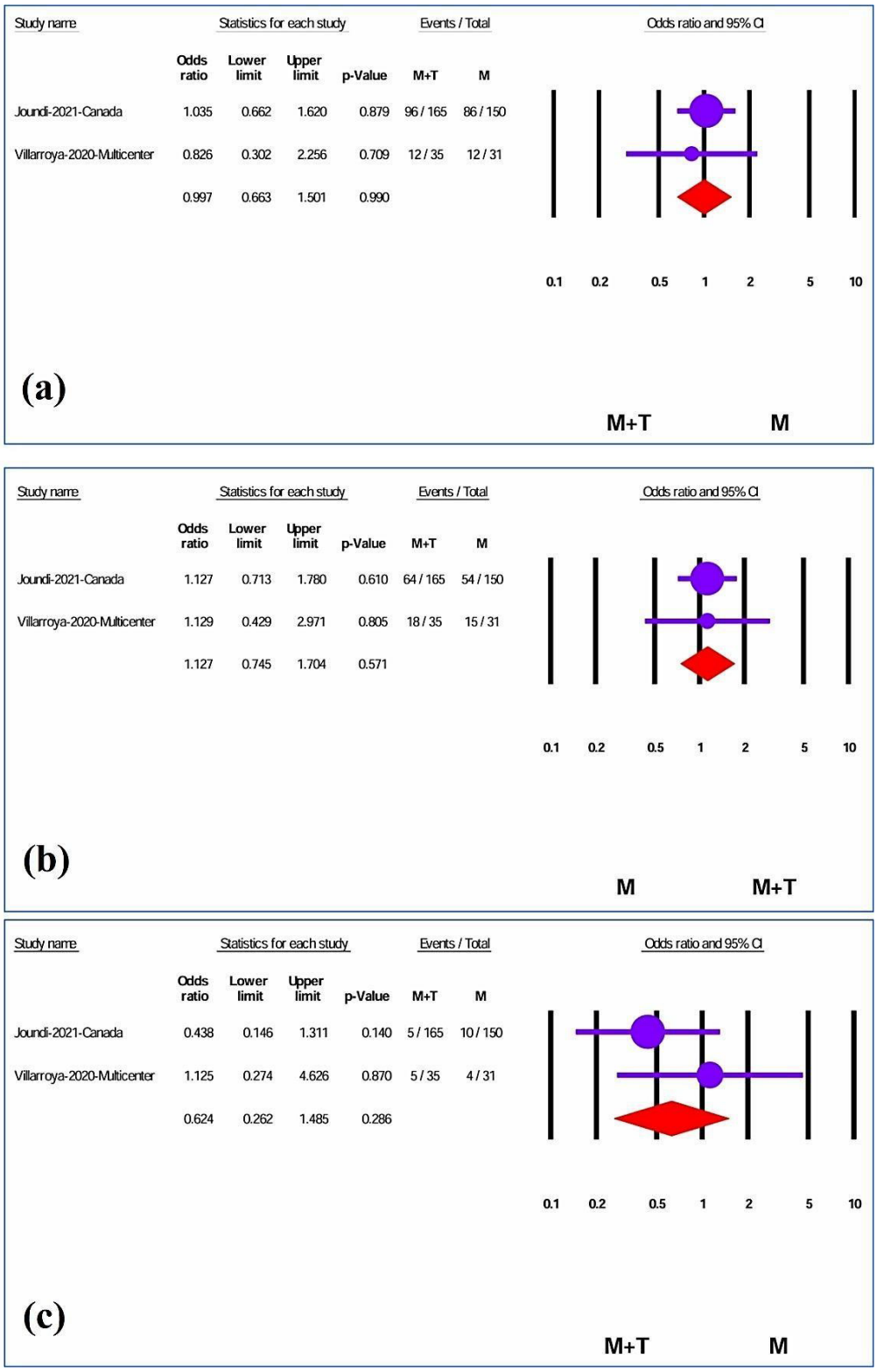

Figure 5: Meta-analysis forest plots comparing M+T and M across three outcomes. Panels (a), (b), and (c) show the study-specific and pooled odds ratios (ORs) with 95% confidence intervals (CIs).

DISCUSSION

In this analysis, patients who were treated with M+T experienced less anxiety, but not less depression, when compared to those who were treated with M. This is the same case with the ASPECT trial that also reported a decrease in anxiety but no depression changes. The same was evidenced by the TENSION trial, but not statistically significant. Conversely, ESCAPE and REVASCAT did not

find any significant difference between the groups in terms of anxiety or depression. Such differences can be due to differences in follow-up time, symptoms measurement instruments, or sample size. Thrombectomy can lead to reduced anxiety, which enhances blood flow, neurological recovery, and independence, which reduces psychological distress after the stroke. Nevertheless, despite appropriate recovery, anxiety and depression remain, indicating that even physical recovery is not the only factor that has an effect on post-stroke mental health.

Notably, functional recovery and psychiatric morbidity are similar but different outcomes. Although better functional status is commonly related to positive psychological well-being, psychiatric illnesses can be prevalent in patients who experience positive neurological outcomes [24]. There is some prior evidence that a significant percentage of stroke survivors develop depression or anxiety in the face of good functional recovery [24], indicating that the psychiatric morbidity might be affected by other factors, including pre-stroke mental health, social support or even coping mechanisms. Hence, the fact that some psychiatric outcomes did not show serious differences even though functional advantages of thrombectomy are reported, points to the necessity to think of the psychological health as a separate area of post-stroke recovery and not a direct consequence of the neurological outcome.

In fact, ESCAPE trial, young adult, less than 60 years old had better quality of life than elderly patients who are over 60 years as young adults are likely to have better functional results, not to mention social support because it is estimated that the expectancy of life is higher in young adult patients compared to elderly patients [18]. The other element to be considered is the nursing care and support throughout the treatment and follow up process which may develop substantial change in the outcomes of the patients. The intervention arm wherein nurse care rehabilitation was provided to patients with acute ischemic stroke after thrombectomy had significantly lower length of stay, NIHSS score and better quality of life, specifically lower anxiety and depression levels after 3 months of follow up as compared to the control arm wherein no nurse care was provided after thrombectomy [25]. The location of ischemic stroke is of crucial interest as well, and it is also an important factor in the quality of life of thrombectomy patients. The prospective study of Chatterji et al, which involved the stroke patients, who underwent thrombectomy intervention, found out that the prevalence of anxiety and depression was significantly higher among the right sided hemisphere stroke patients compared to the left sided hemisphere stroke patients [26].

Infrequent psychiatric outcomes were hardly reported. In one study, there was one suicide in the M group over 1 year of follow-up and the other study did not show a difference in substance abuse between the arms. Due to the fact that these discoveries were made in single studies, one should take them with caution. None of the trials evaluated eating disorders, schizophrenia, bipolar disorder or other psychiatric disorders, which points out a significant gap in future RCT. Only one RCT that compared thrombectomy plus alteplase to thrombectomy alone was also found; the former had a lower level of anxiety/depression. The patients with anxiety/depression also had lower mRS and NIHSS scores, which indicate that worsened clinical outcome could be associated with worse psychological conditions.

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CONCLUSION

Current evidence suggests that T+M may be associated with better psychiatric outcomes than M alone. Nevertheless, further randomized controlled trials with longer follow-up periods and standardized psychiatric assessment tools are necessary to validate these findings.

Abbreviations

VHL: Virtual Health Library; **WOS:** Web of Science (WOS); **CMA:** Comprehensive Meta-analysis; **OR:** odds ratio; **CI**: Confidence interval (95%CI); **RCT:** Randomized controlled trial; **M+T:** Medical therapy + thrombectomy, **M:** Medical therapy; **IVT:** Intravenous thrombolysis; **EQ-5D:** EuroQol five dimensions questionnaire; **PHQ-4:** Patient Health Questionnaire-4; **Neuro-QOL**: Neuro-quality of life; **mRS 0-2**: Modified Rankin Scale, **NIHSS 0-2**: National Institute of Health Stroke Scale.

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Author contribution: Abdulaziz Muflih Abudasser was responsible for the idea and study design, manuscript writing, and approval of the final version.

Availability of data and materials: Data for this paper are available from the corresponding author upon reasonable request.

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