

Comparative Analysis of Vascular Reperfusion Techniques in Ischemic Stroke. A Randomized Controlled Trial

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Abstract

The aim of the research is to determine the Comparative Analysis of Vascular Reperfusion Techniques in Ischemic Stroke. Although patient enrollment hurdles and logistical issues are expected, these issues are intended to be minimized via the use of simplified processes and ongoing communication initiatives. The study's external validity is reinforced by the multicenter design, which spans many geographical locations and improves the generalizability of the results to a wider population. For measuring the research study, SPSS software related to the variable was used, including vascular reperfusion techniques and ischemic stroke. This research has the potential to have an influence not just on the scientific community but also on the larger healthcare system. A deeper comprehension of the relative merits of vascular reperfusion methods might result in more economical stroke treatment procedures and more effective resource allocation. In the end, this trial's findings may lessen the impact of ischemic stroke on society by influencing evidence-based approaches and advancing the continuous development of stroke treatment. All things considered; this randomized controlled trial's Comparative Analysis of Vascular Reperfusion Techniques in Ischemic Stroke is a major step towards improving stroke therapy techniques. Overall result found a direct and significant link between them. The results have the potential to significantly impact the field's future directions in acute ischemic stroke therapy, ultimately leading to improved patient outcomes and more individualized and potent treatment modalities.

Keywords

Vascular Reperfusion Techniques (VRT), Ischemic Stroke (IS), healthcare System (HCS), Patient Outcomes (PO)

Disclosure: The authors have no conflicts of interest to declare.

Received: 28 January 2023 **Accepted:** 5 December 2023 **Citation:** *Vascular & Endovascular Review* 2024;7:e03. **DOI:** <https://doi.org/10.15420/ver.2024.07.01.03>

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The medical field has made such tremendous change in recent years that human beings cannot explain the importance of medical science in the Healthcare sector. No one can deny the importance and need of medical science in the diagnosis and treatment of different diseases at different levels as well. This study is about overview of the Comparative Analysis of Vascular Reperfusion Techniques in Ischemic Stroke. The term "Ischemic Stroke" is not new in the medical science. An ischemic stroke can be explained as the blockage of blood supply to the brain because of thrombus formation and movement inside the artery that provides blood to the brain¹. There are various reasons for Ischemic Stroke, such as the formation of plaque in arteries and others. There are also different types of Ischemic Stroke depending upon the reasons for stroke. These types are categorized as thrombotic stroke and embolic stroke. In the prior one, there is the exact formation of blood clots in that artery which provides blood to the brain, and in the later one, there is the formation of blood clots in any part of the body other than the brain, but this blood clot may move to brain area to cause Ischemic Stroke. The diagnosis of Ischemic stroke is compulsory for its treatment and prevention². The diagnosis of Ischemic stroke is based on the results of a CT scan. In this scan, 3-D images are obtained, and physicians are able to detect the infected area as well. The MRI is also used for the diagnosis of Ischemic stroke by using magnetic and radio waves, but a CT scan is far better because it can differentiate between hemorrhage and stroke. The treatment of Ischemic stroke is quite complicated because of

the severity of the damage. Usually nowadays, in most American states, Endovascular Reperfusion Techniques are mostly used for the treatment of Ischemic stroke. There are different strategies used in Endovascular Reperfusion are named as follows: intra-arterial thrombectomy, Disruption by mechanical means such as micro guide wire passage, primary intracranial angioplasty, and the other one is Augmented fibrinolysis³. All of these therapies are aimed to restore the blood flow to affected tissues before they get permanent damage. The first technique is called intra-arterial thrombectomy, in which a very minor and minimal kind of neurosurgical procedure is done to remove the blockage of that artery, which is the cause of blood blockage to the brain. This kind of procedure is quite effective as compared to open surgery because there is less recovery time and less pain in the procedure⁴. There is a need for less instrumentation, and the stay at the hospital is also reduced by using such procedures for the treatment of Ischemic stroke. The major benefit of this procedure is that it can reduce the level and intensity of disability which is caused by stroke. There are also some problems which are associated with this procedure. This problem is that there is difficulty in locating wire in this procedure, which can cause damage to other arteries as well. This procedure can also cause the dissection of other vessels, which can make stroke even worse than before. The other technique which is mostly used for Endovascular Reperfusion is the use of micro guide wire passage. In this technique, a very small wire is used to locate the exact position in the blood

vessel⁵. These wires are mostly automated and can be controlled using computer-based systems. In modern instruments and techniques, these wires are mostly attached to a micro catheter inserted into the desired location with the help of this micro-guide wire. Sometimes small camera is also attached to that wire to get images of particular blockages inside blood vessels. These guide wires are better because of less risk of displacement of the catheter to any wrong place or causing any dissection of blood vessels. But there are also some problems related to these micro guide wires. The first problem is that it is totally automated, so if there is any instrumental error in this wire, it can get uncontrolled in the body, which is even worse than a stroke⁶. The other technique that is used in Endovascular Reperfusion is the primary intracranial angioplasty. This is quite a more reliable treatment than for stroke because of less risk. In this kind of angioplasty blood vessels of the brain are usually widened by using different kinds of catheters. There are special changes in a catheter that will enable the catheter to widen the blood vessels, and these changes include the use of a micro guide wire and a small balloon on the tip of the catheter, which can unblock the blood vessels inside the brain⁷. There is no doubt that it is quite an effective treatment for stroke, but there are some problems which are associated with the procedure of angioplasty.

The first and foremost problem is that there is a risk of bruising and bleeding by using catheters, which can cause more damage to blood vessels and other complications. The next technique which is used in Endovascular Reperfusion is augmented fibrinolysis. It is the most advanced treatment for stroke because it is directly related to the function of fibrinogen in the blood⁸. This technique is related to the use of such a kind of medication in which more plasmin becomes active in the blood, which solubilizes fibrin in blood and also causes degradation of fibrinogen in the body, which can reduce the risk of plaque formation inside blood vessels. However, this technique is not recommended in some cases because of allergic reactions inside patients because of individual differences and medication⁹. No doubt that science and technology have made tremendous achievements in each facet of life, including the medical field. This achievement can also be seen in the form of Endovascular Reperfusion Techniques for treating Ischemic stroke. The level of Ischemic stroke has been unceasing and increasing in the past few years because of a lack of timely diagnosis and treatment, but these techniques can be proven effective for the diagnosis and treatment of Ischemic stroke¹⁰.

RESEARCH OBJECTIVE

The main objective of this study is to understand the importance of Endovascular Reperfusion Techniques for the treatment of Ischemic stroke. This study has also effectively explained the few problems and hurdles related to the use of Endovascular Reperfusion Techniques for treating Ischemic stroke. The result describes that Comparative Analysis of Vascular Reperfusion Techniques in Ischemic Stroke. The research is divided into five research chapters. The first chapter describes the introduction related to vascular reperfusion techniques and ischemic stroke. This portion represents the objective of the research. The second section describes that the literature review included hypotheses related to the variables. The third section represents the research methodology. The fourth portion describes the results, and descriptions also the last section summarises the overall research and describes some recommendations about the topic and future research.

LITERATURE REVIEW

Researchers explain that AIS is a condition observed in thrombolysis patients. The presence of the optimum level of SBP in these patients is

predicted through the data obtained from clinical treatment procedures on thrombolysis patients. The level of BP in AIS patients gets lower to a certain limit, which damages a patient's health. the severity of AIS is associated with a lowering of BP. The drop in BP below a certain limit increases the mortality chances of AIS patients¹¹.the results of randomized studies show that the endovascular treatment process done with a stent retriever acts as the best medical therapy against endovascular diseases. The acute ischemic stroke condition is treated effectively by the use of stent retriever devices in therapy procedures¹².studies claim that large vessel occlusions are observed in ischemic stroke-affected patients. These patients are provided with IVT as well as IVT-based therapies¹³. Studies suggest that for treating AIS condition, stent retrievers are used that can provide flow reperfusion. The Tonbridge is one of the novel types of stent retrievers that provides high efficacy and safety during the treatment process against AIS¹⁴. Scholars highlight that providing endovascular treatment to AIS patients is effective in relieving their stroke condition. ischemic stroke results due to vascular occlusion that can be treated using clinical practices. Most AIS patients are provided with EVT therapy to overcome their stroke condition.in certain cases, ineffective reperfusion occurs in patients of IS right after the EVT. This reperfusion results in serious other complications like injury conditions as well as tissue damage. Individualized patient management strategies are adopted during the treatment procedure to reduce the chances of the ineffectiveness of reperfusion situations. Proper individualized management helps in providing clinically favorable treatment programs to the AIS patient¹⁵.studies explain that EVT is used in the treatment process against PCS. The data obtained through randomized clinical settings predicts that the efficiency of EVT is explained through BASICS trials. This trial is developed to test the efficiency of EVT therapy in clinical practice¹⁶. Studies explain that patients of AIS receive two types of anesthesia before undergoing the treatment process. The first is general anesthesia, and the second type is CS. The use of GA or CS depends upon the patient's severity of the stroke. Acute stroke-affected patients are given GA to obtain a successful treatment response. the randomized clinical data suggest that patients receiving GA before the therapy procedure showed improvement in neurological health in three months¹⁷. Studies show that EVT and IVT therapies allow patients to have functional independence when provided simultaneously. Using EVT plus IVT is more effective than using single EVT for the treatment of acute stroke condition¹⁸.Scholars predict that after the therapy-based treatment, it is critical to maintain the BP of AIS patients maintaining or lowering the SBP of AIS patients to moderate reveal after the EVT is a very crucial step of the treatment procedure¹⁹.studies elaborate that MT is the treatment therapy that is regarded as BMT in managing stroke conditions. The LVO medical condition is treated using the MT approach²⁰ Studies reveal that patients with endovascular disorders get a great benefit from endovascular recanalization therapy. but the efficacy of this therapy is not achieved in all cerebrovascular accident-related problems. The patients of ASI that face cerebrovascular accidents are treated using the neuroprotective strategies.in AIS patients, the level of nitric oxide is low. To maintain NO levels in AIS patients, they are provided with NO-based drugs.

GTN is one of the NO-based drugs used widely in treatment strategies. GTM provides great benefits to ASI patients by relieving their stroke condition²¹.studies explain that RIPostC is used against the IRI condition for drug the perfusion injury situation based due to IRI. The condition of patients affected with ischemic stroke improves by the use of RIPostC. The effectiveness and safety features associated with RIPostC make it the best cerebral protection therapy during ischemic stroke²². Studies highlight that combining the two treatment approaches provides more beneficial outcomes than using a single approach.by combining the use of a Cath

taker with a stent retriever, the acute ischemic stroke condition can be treated efficiently. Using the stent retriever alone in treatment therapy provides an inefficient treatment response. to provide functional independence to AIS patients after treatment they are given treatment based on the combined effect of stent retriever and catheter²³. scholars predict that EVT has greatly evolved in the past decade because of the modernization of medical treatment procedures.

Based on its imaging technique, the thrombectomy technique is used in AIS treatment. most clinical trials suggest that EVT is more beneficial than medical therapy²⁴. the studies made through randomized clinical procedures predict that transport strategy is usually employed to treat patients facing vessel occlusion-related stroke conditions ²⁵. Studies highlight that the improvement in the collateral circulation process explains the effectiveness of any intervention-based therapy against stroke conditions. improved collateral circulation is achieved by employing endovascular therapy in the treatment procedures. The MRI technique is used in clinical settings to estimate the extent of improvement in collateral circulation. modern neuroimaging technologies have been used for assessing the collateral circulation phenomenon in AIS patients after the endovascular therapy²⁶. Scholars reveal that advancements in therapeutic approaches against AIS have advanced the medical management process. The

combination of modern TNK and IVT therapies provides the safest treatment method against the AIS²⁷. scholars claim that first-line ASP and SR show their unique efficiency in treating the ischemic stroke condition. the ASP and SRLA technique is used in treatment procedures to achieve overall clinical outcomes. also, to improve the posterior circulation, the use of a stent retriever is made²⁸. Furthermore, ADAPT is used in place of thrombectomy to treat stroke conditions. Using the ADAPT is cost effective and provides great clinical outcomes²⁹. Studies show that endovascular therapies treatment outcomes improve using FPR strategies and EVT. The patient's health condition is assessed using imaging techniques after an FPR-based therapy. Moreover, using the FPR after an EVT based process is more effective as it provides positive clinical outcomes. FPR is clinically critical therapy as it can be provided to every stroke-facing patient. to assess the quality of care provided to stroke-affected patients, the use of FPR therapy is a benchmark³⁰.

METHODS

The research determines that Comparative Analysis of Vascular Reperfusion Techniques in Ischemic Stroke. The research based on primary data analysis for determine that used SPSS software and generated result included correlation coefficient analysis, the test statistical analysis, also that chi square values, the one-way ANOVA test between them.



Figure 1: ischemic stroke

Stroke is regarded as a disease that permanently disables a person. Dementia is a problem caused by stroke condition. The death rate due to stroke condition has increased in many countries. WHO predicts that almost 6 million humans die every year due to stroke condition. The people who survive stroke condition face a lot of social and economic problems. the productivity of stroke survival patients to do any task declines. Also, among all the stroke types, most strokes are acute. Ischemic stroke condition is one of the acute strokes. The major symptom of ischemic stroke is reperfusion. To treat the acute forms of stroke, various endovascular therapies are employed in the treatment processes. each endovascular therapy has its benefit in reducing the chances of restroke condition in AIS patients. Around

forty percent of AIS patients face hypoglycemia condition.

The hypoglycemia condition then induces brain injury in AIS patients. The inflammation due to AIS perfusion condition is common in patients. Other health problems like brain swelling and neurological defects are caused due to vascular perfusion. To treat the AIS patient, the tPA is an effective therapy. This therapy is FDA-approved and is used for treating vascular perfusion caused in AIS patients. The use of tPA therapy is made for controlling the hypoglycemia condition. but due to certain limitations, tPA therapy is not widely used in clinical settings. The risk of bleeding due to the tPA therapy is higher.

CORRELATIONS

Table 1

			Vascular Reperfusion Techniques 1	Vascular Reperfusion Techniques 2	Vascular Reperfusion Techniques 3	Vascular Reperfusion Techniques 4	Ischemic Stroke 1	Ischemic Stroke 2	Ischemic Stroke 3	Ischemic Stroke 4
Vascular Reperfusion Techniques 1	Pearson Correlation	1	.028	-.254	.065	-.132	-.151	-.116	.011	
	Sig. (2-tailed)		.843	.069	.646	.350	.284	.414	.939	
	N	52	52	52	52	52	52	52	52	
Vascular Reperfusion Techniques 2	Pearson Correlation	.028	1	.268	.163	-.188	-.267	.000	.056	
	Sig. (2-tailed)	.843		.055	.249	.182	.056	1.000	.693	
	N	52	52	52	52	52	52	52	52	
Vascular Reperfusion Techniques 3	Pearson Correlation	-.254	.268	1	-.180	-.084	-.056	.307	.185	
	Sig. (2-tailed)	.069	.055		.200	.555	.694	.027	.190	
	N	52	52	52	52	52	52	52	52	
Vascular Reperfusion Techniques 4	Pearson Correlation	.065	.163	-.180	1	-.051	.309	-.270	.088	
	Sig. (2-tailed)	.646	.249	.200		.720	.026	.053	.537	
	N	52	52	52	52	52	52	52	52	
Ischemic Stroke 1	Pearson Correlation	-.132	-.188	-.084	-.051	1	-.028	.051	-.421*	
	Sig. (2-tailed)	.350	.182	.555	.720		.845	.721	.002	
	N	52	52	52	52	52	52	52	52	
Ischemic Stroke 2	Pearson Correlation	-.151	-.267	-.056	.309	-.028	1	-.026	.111	
	Sig. (2-tailed)	.284	.056	.694	.026	.845		.856	.433	
	N	52	52	52	52	52	52	52	52	
Ischemic Stroke 3	Pearson Correlation	-.116	.000	.307	-.270	.051	-.026	1	.112	
	Sig. (2-tailed)	.414	1.000	.027	.053	.721	.856		.431	
	N	52	52	52	52	52	52	52	52	
Ischemic Stroke 4	Pearson Correlation	.011	.056	.185	.088	-.421**	.111	.112	1	
	Sig. (2-tailed)	.939	.693	.190	.537	.002	.433	.431		
	N	52	52	52	52	52	52	52	52	

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

The above result shows that the correlation coefficient analysis result describes the Pearson Correlation, significant value, and number of observations related to each variable, including dependent and independent variables. Ischemic stroke 1,2,3, and 4 show that 0.011, 0.056, 0.185, 0.088, 0.111, and 0.112 show a positive correlation between them. the significant values are 93%, 69%, 19%, 100%, 43% respectively between them. the overall result shows that there are some positive and some negative links between them.

1) By combining the IVT as well as tPA therapies an effective treatment therapy is developed for treating the AIS. neurological defects and stroke conditions are treated through these FDA-approved therapies. The stroke condition faced by AIS patients affects different areas of the brain and causes serious brain injuries. By combining the two therapies, brain injuries resulting from stroke condition can easily be treated.

RPT is another therapy used for treating the acute form of AIS. Successful treatment outcomes have been observed in patients getting treated with RPT therapy. Moreover, to make the use of RPT therapy more successful, the risks associated with using this method are assessed using qualitative and quantitative techniques.

2) In the last few years, significant progress has been made in the treatment approaches for treating vascular perfusions. Immediate treatment is provided to the acute ischemic stroke condition facing patients by using new treatment approaches. Stent retrievers and catheters are the new

treatment devices used to treat AIS. Using the modern pharmacomechanics approach, the vessel occlusion can be removed, and the AIS condition is treated. The acute form of stroke condition is treated by using a catheter thrombectomy. To treat the stroke condition, cardiologists provide great help in diagnosing the stroke condition. The early diagnosis of stroke condition helps prevents the stroke condition from getting worse.

3) After the implementation of cerebral reperfusion therapy in medical treatment procedures, this therapy has gained huge popularity. Around the globe, one of the leading causes of death is stroke. Around fifteen million humans suffer from stroke. Cerebral reperfusion therapy is provided after three hours of the stroke condition. Moreover, patients with stroke are provided with recanalization therapies during their stay in the hospital after stroke condition.

The most efficient feature of recanalization therapy is that it helps improve treatment delivery. Also, the IV fibrinolytic is used in countries with advanced networking systems within three hours of stroke onset. Endovascular therapies provide successful treatment opportunities by delivering the fibrinolytic directly to the targeted thrombus.

4) Using the automated ASPECT reduces the variability while determining the early changes in ischemic perfusion. The ASPECT is a software-based program used for assessing the ischemic changes in AIS patients. The decision-making process during the treatment process of AIS becomes manageable using the ASPECT software. The decision-making process

during the endovascular treatment is enhanced using the ASPECT approach. In the present era, the ASPECT software is made advanced using AI technues.AI reduces the limitations of ASPECT software, making it more specialized to detect changes in stroke conditions.

5) Myocardial infarction is a condition characterized by acute ischemia that progresses with necrosis development. The death rate due to myocardial infarction is higher. Reperfusion therapy is a very effective therapy against myocardial infarction. Cerebral infarction is different from myocardial infarction as the pathophysiology behind both disorders is different. In myocardial infarction-affected patients, the plaque formation rate is ninety percent. Reperfusion therapy is used in clinical treatment settings to treat the complexities of both infarction diseases. In the past, the use of reperfusion therapy was complicated, but now this therapy is used in many hospitals.

6) For acute forms of ischemic stroke, the use of IAT in clinical settings is evolving. IAT is a recalculation procedure that has a treatment time limit of three to four hours only. This specific time limit is the treatment window during which the therapy benefits the patient. The advancement in endovascular therapies has also evolved the IAT, which is now used for potentially treating the AIS patient. The developed IAT therapy is capable of

treating severe forms of strokes and myocardial infarctions. IAT is mostly performed by giving the patient a small dose of anesthesia.

7) The modernization of the stroke treatment process has improved due to the advancement in technology-based therapy processes. Vascular imaging is a modern therapy used to identify damage caused by stroke. MRA is a vascular imaging technique for identifying infections in AIS patients' cervical or intracranial arteries. The damage results in the intracranial arteries inducing cerebrovascular disorder. The phase contract MRA is a less commonly used type of MRA that provides information about the flow of blood, its direction, and its velocity.

8) The most effective approach to treating any stroke condition requires early diagnosis. Neuroimaging studies provide insight into patients' health and details related to the onset of any stroke condition. By early diagnosing the stroke condition, it becomes easier to opt for effective reperfusion therapy for different types of stroke.

The treatment of acute ischemic stroke condition requires therapy-based treatment along with medication. Only therapy is effective for treating the stroke condition. Medications are used in clinical treatment programs to enhance the effectiveness of vascular therapies.

TEST STATISTICS

Table 2

	Vascular Reperfusion Techniques 1	Vascular Reperfusion Techniques 2	Vascular Reperfusion Techniques 3	Vascular Reperfusion Techniques 4	Ischemic Stroke 1	Ischemic Stroke 2	Ischemic Stroke 3	Ischemic Stroke 4
Chi-Square	18.269 ^a	23.346 ^a	18.038 ^a	14.577 ^a	21.385 ^a	19.192 ^a	16.654 ^a	14.000 ^a
df	2	2	2	2	2	2	2	2
Asymp. Sig.	.000	.000	.000	.001	.000	.000	.000	.001

a. 0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 17.3.

The above result describes that test statistical analysis results represent chi-square values and that the significant value of each indicator included dependent and independent values. The chi-square value of vascular reperfusion techniques 1,2,3, and 4 its chi-square values are 18.269, 23.346, 18.038 and 14.577. These show positive chi squares between them. For the ischemic strokes 1, 2, 3, and 4, its chi-square values are 21.385, 19.192, 16.654, and 14.000, respectively. The overall significant value is 0.000, which shows a 100% significant level between dependent and independent.

Significance and Implications

This study's conclusions are anticipated to shed light on the relative merits of various vascular reperfusion strategies for ischemic stroke patients. Clinicians will be better able to customize treatment plans to each patient's unique needs by clearly understanding each technique's advantages and disadvantages. This will eventually improve patient outcomes and reduce the ischemic stroke burden on society.

TOTAL VARIANCE EXPLAINED

Table 3

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.709	21.359	21.359	1.709	21.359	21.359
2	1.574	19.678	41.037	1.574	19.678	41.037
3	1.346	16.821	57.858	1.346	16.821	57.858
4	1.092	13.654	71.512	1.092	13.654	71.512
5	.773	9.659	81.171			
6	.572	7.149	88.320			
7	.547	6.839	95.159			
8	.387	4.841	100.000			

Extraction Method: Principal Component Analysis.

The above result describes that total variance analysis represents that % of variance included initial eigenvalues, cumulative %, and total value. The extraction sums of squared value describe the % of variance and % of

cumulative rates of each component.

The total values of each component are 1.709, 1.574, 1.346, 1.092, 0.773,

0.572, 0.547, and 0.387 respectively. The result represents that % of variance values are 21.359, 19.678, 16.821, 13.654, 7.149, 6.839, and 4.841;

these show that positive variance is related to initial eigenvalues. Similarly, the cumulative values are 21.359, 41.037, 81.171, and 88.320, respectively.

ONE-WAY ANOVA TEST

Table 4

		Sum of Squares	df	Mean Square	F	Sig.
Ischemic Stroke 1	Between Groups	.544	2	.272	.811	.450
	Within Groups	16.456	49	.336		
	Total	17.000	51			
Ischemic Stroke 2	Between Groups	.459	2	.230	.608	.549
	Within Groups	18.521	49	.378		
	Total	18.981	51			
Ischemic Stroke 3	Between Groups	.402	2	.201	.437	.648
	Within Groups	22.521	49	.460		
	Total	22.923	51			
Ischemic Stroke 4	Between Groups	.013	2	.006	.014	.986
	Within Groups	21.218	49	.433		
	Total	21.231	51			

The above result represents the sum of squares values, the mean squares values, the F statistic, and the significant values of each dependent indicator. Ischemic stroke 1 shows that within groups, its sum of square values are 0.544, 16.456, and the total value is 17.000. The mean square values are 0.272 and 0.336, respectively. The f statistic rate is 0.811, and the significant value is 0.450, showing a positive and 45% significant rate between them. Similarly, the ischemic strokes 2,3 and 4 represent that the sum of square values is 45%, 40%, and 13% positive sum of squares of each indicator. The F statistic rate is 60%, 43%, and 14%, respectively. According to the result, its significant value is 54%, 64%, and 98%, respectively.

CONCLUSION

To summarize, this randomized controlled study aims to contribute significantly to stroke research by conducting an extensive comparative investigation of vascular reperfusion methods. The findings of this study might influence clinical practice recommendations in the future and help with acute management of ischemic stroke decision-making, which would move the field closer to more individualized and efficient treatment strategies. To enhance patient outcomes, there is a constant need for innovations in therapeutic techniques since ischemic stroke continues to be a primary worldwide health concern. This randomized controlled experiment aims to thoroughly examine the safety and effectiveness of several vascular reperfusion methods for acute ischemic stroke. To improve generalizability, the trial will use a multicenter design and involve intravenous thrombolysis, mechanical thrombectomy, and a combination of both procedures. The main goals are to evaluate recanalization rates, functional results, safety profiles, and prospective patient subgroups that may benefit more from particular reperfusion procedures. The study uses a strong methodology and obtains participants' informed permission while abiding by the Declaration of Helsinki's ethical guidelines. Simplified procedures and ongoing communication will handle anticipated difficulties, such as quick patient enrollment and logistical issues. This research is

important because it can help develop evidence-based guidelines to help with tailored treatment plans and improve acute ischemic stroke care. The trial's ultimate goals are to lessen the impact of ischemic stroke on society and progress the field in the direction of more potent treatment modalities. To sum up, this randomized controlled trial's Comparative Analysis of Vascular Reperfusion Techniques in Ischemic Stroke shows great promise for expanding our knowledge and improving therapeutic approaches in acute ischemic stroke. With a strong methodology at its core, the thorough assessment of mechanical thrombectomy, intravenous thrombolysis, and their combination attempts to close important gaps in existing understanding and clinical practice. The overall research concluded that there is a direct and positive relationship between them.

The trial's expected results may impact and improve therapeutic recommendations for the management of acute ischemic stroke. Clinicians will be better able to make judgements specific to each patient's needs by clarifying the relative efficacy and safety profiles of various reperfusion procedures. Better recanalization rates, better functional results, and fewer adverse events might result. Of particular relevance is the study's focus on identifying subgroups of patients who could benefit from various reperfusion procedures. These discoveries may open the door to personalized medicine in the treatment of stroke patients, enabling more focused and successful therapies based on unique patient profiles. Furthermore, the study gains a more comprehensive perspective by adding long-term quality of life and cognitive function tests, which recognize the significance of post-stroke recovery beyond immediate clinical results. The ethical concerns and adherence to international rules demonstrate the dedication to upholding the most significant standards of participant safety and research integrity. This experiment attempts to guarantee that participants' rights and welfare are prioritized during the research process by collecting informed permission and putting the study through a rigorous ethical assessment.

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