

**“Evaluation and Comparison of Mechanical Thrombectomy
Techniques in Patients with Large-Vessel Occlusion-Associated
Acute Ischemic Stroke”**

ABSTRACT

Background: Acute ischemic stroke (AIS) due to large-vessel occlusion (LVO) is a major cause of mortality and long-term neurological disability worldwide. Mechanical thrombectomy has emerged as the standard treatment for eligible patients with LVO, providing superior recanalization rates and improved clinical outcomes. Several thrombectomy techniques, including Stent Retriever First-Line (SRFL), A Direct Aspiration First Pass Technique (ADAPT), Solitaire, combined thrombectomy procedures, and rescue stenting approaches, are currently employed in clinical practice. However, variations in procedural efficiency, recanalization success, neurological recovery, functional outcome, and complication rates continue to influence technique selection. The present study was undertaken to evaluate and compare the effectiveness of various mechanical thrombectomy techniques in patients with acute ischemic stroke due to large-vessel occlusion.

Aim and Objectives

Aim: [REDACTED]
[REDACTED]

Objectives:

- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]

Materials and Methods: [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

Results and Discussion:

Conclusion: [REDACTED]

[REDACTED]

Keywords: Acute Ischemic Stroke; Large-Vessel Occlusion; Mechanical Thrombectomy; ADAPT; Stent Retriever First-Line; Solumbra Technique; Recanalization; mTICI Score; Modified Rankin Scale; Neurological Recovery.

LIST OF ABBREVIATIONS

Abbreviation	Full Form
ACA	Anterior Cerebral Artery
ADAPT	A Direct Aspiration First Pass Technique
AIS	Acute Ischemic Stroke
CT	Computed Tomography
df	Degrees of Freedom
ICA	Internal Carotid Artery
IQR	Interquartile Range
IV	Intravenous
LVO	Large-Vessel Occlusion
MCA	Middle Cerebral Artery
MRI	Magnetic Resonance Imaging
mRS	Modified Rankin Scale
mTICI	Modified Treatment in Cerebral Infarction
MT	Mechanical Thrombectomy
NIHSS	National Institutes of Health Stroke Scale
OR	Odds Ratio
PCA	Posterior Cerebral Artery
SRFL	Stent Retriever First-Line
tPA	Tissue Plasminogen Activator

Anatomical and Vascular Abbreviations

Abbreviation	Full Form
MCA-M1	First Segment of Middle Cerebral Artery
MCA-M2	Second Segment of Middle Cerebral Artery
AIS-LVO	Acute Ischemic Stroke due to Large-Vessel Occlusion
EVT	Endovascular Therapy
EVT-MT	Endovascular Mechanical Thrombectomy
DSA	Digital Subtraction Angiography
CTA	Computed Tomography Angiography
MRA	Magnetic Resonance Angiography
ICU	Intensive Care Unit
SD	Standard Deviation
SPSS	Statistical Package for the Social Sciences

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INTRODUCTION

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The WHO defined stroke as: ‘rapidly developing clinical signs of focal (or global) disturbance of cerebral function, with symptoms lasting 24 hours or longer or leading to death, with no apparent cause other than vascular origin’ (1). [REDACTED]

The most common types of AIS is large vessel occlusion (LVO) of a large artery in the brain (e.g., internal carotid artery [ICA], middle cerebral artery [MCA], vertebral artery, and basilar artery), which are the more severe cause of AIS with poor prognosis (3). [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] This study is aimed at analysing different techniques of thrombectomy used in acute ischemic stroke due to large-vessel occlusion and to compare their outcomes.

EPIDEMIOLOGY

Global Epidemiology

In the whole world, stroke is one of the most important causes of death and chronic disease. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] World's total stroke incidence rate has stabilized or declined in high-income countries but the number is still on the increase in developing countries because of aged people with chronic disease risk factors (hypertension, diabetes, obesity and atrial fibrillation) on a growing level (14).

Indian Epidemiology

Stroke has a great deal of public health importance in India as one of the primary causes of death and disability. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] Large-vessel

occlusion, as a specific form of ischaemic stroke, warrants effective mechanical reperfusion therapy, but it is restricted to few tertiary stroke centers (17).

AIMS AND OBJECTIVES

AIMS AND OBJECTIVES

AIM:

[REDACTED]

OBJECTIVES:

Primary Objectives:

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Secondary Objective:

[REDACTED]

REVIEW OF LITERATURE

REVIEW OF LITERATURE

According to the World Health Organization, stroke is a rapidly developing clinical syndrome of symptoms indicative of disturbance of brain function, being focal or generalized, which last for more than 24 hours or end up fatally without any reason except vascular (1). [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Classification of Stroke

There are two types of stroke, which include ischemic and hemorrhagic strokes, and their differentiation helps establish initial treatment and prognosis. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

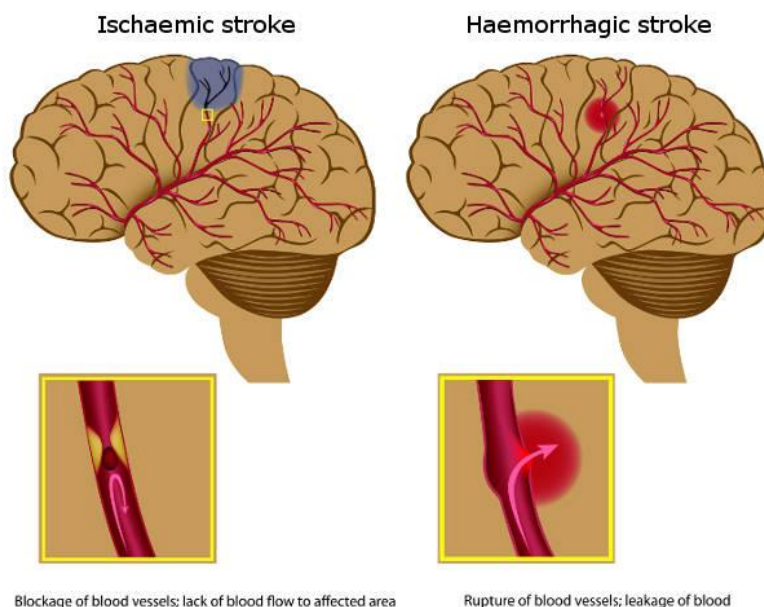


Figure 1. Classification of Stroke

Clinical Importance of Acute Ischemic Stroke

Ischemic stroke is clinically relevant since it is one of the commonest causes of acute neurological deficit and mortality.

- Delays increase infarct size, edema, and hemorrhagic transformation risk

Acute Ischemic Stroke (AIS)

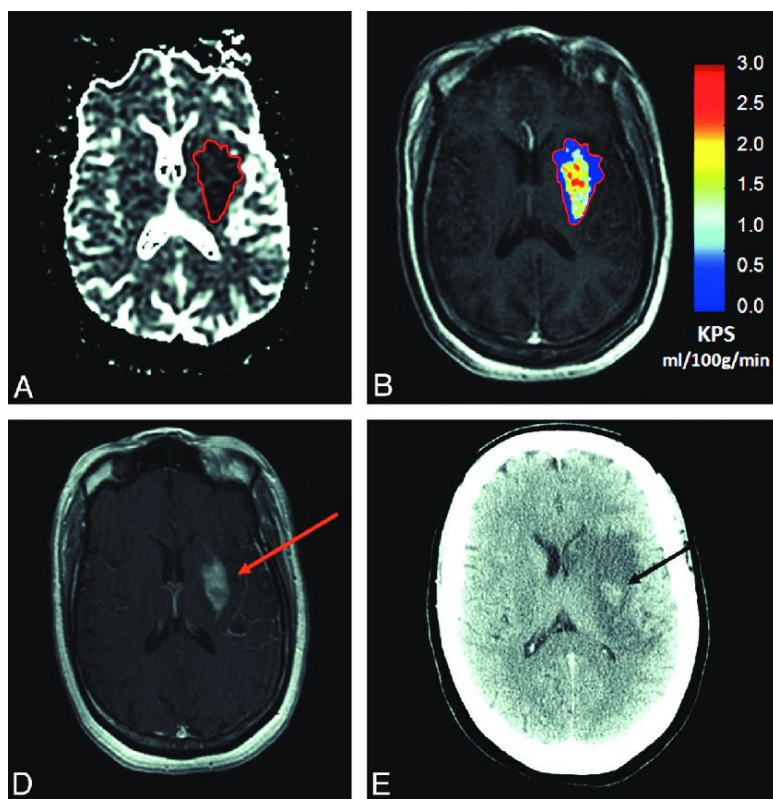


Figure 2. Acute Ischemic Stroke (AIS)

Cerebral Blood Flow and Ischemic Threshold

Ischemic stroke arises due to decreased cerebral blood flow to a level that does not support neural metabolism. In healthy individuals, brain cells depend on a constant supply of oxygen and glucose, and even minor disruption could affect their functions (2).

- Cerebral autoregulation maintains stable flow within limits
- Reduced perfusion causes early functional loss before cell death

[REDACTED]

Ischemic Cascade

Ischemic cascade can be referred to as the series of physiological and molecular processes that take place as a result of insufficient blood flow within the brain tissues. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

- Depolarization and excitotoxic neurotransmitter release

[REDACTED]

[REDACTED]

[REDACTED]

Ischemic Core and Penumbra Concept

The ischemic core is the area of the brain where there has been critical reduction in perfusion over a period of time to cause irreparable damage. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Large-Artery Atherosclerosis

The development of large-artery atherosclerosis results in acute ischemic stroke by means of plaque formation and subsequent acute thrombosis or embolism due to the ruptured plaque.

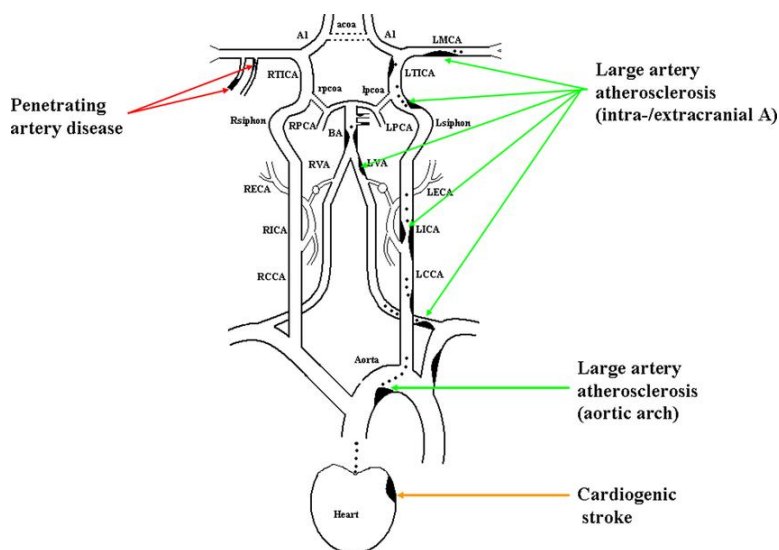


Figure 3. Illustration of Large Artery Atherosclerosis, Cardiogenic Stroke, and Penetrating Artery Disease.

Cardioembolism

One of the main causes of acute ischemic stroke is cardioembolism, which usually results in large vessel occlusion as the result of the size and abrupt nature of the emboli coming from the heart. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

In-situ Thrombosis

Thrombus in situ implies the formation of the thrombus in the place where the pathological process develops in the artery, resulting in the blockage without the passage of the embolus from somewhere else. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

- Endothelial damage and plaque-related thrombosis

[REDACTED]

[REDACTED]

[REDACTED]

Large-Vessel Occlusion (LVO) Stroke

Large vessel occlusion stroke implies the acute ischemic stroke that results from blockage of large intracranial arteries that serve large areas of the brain. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

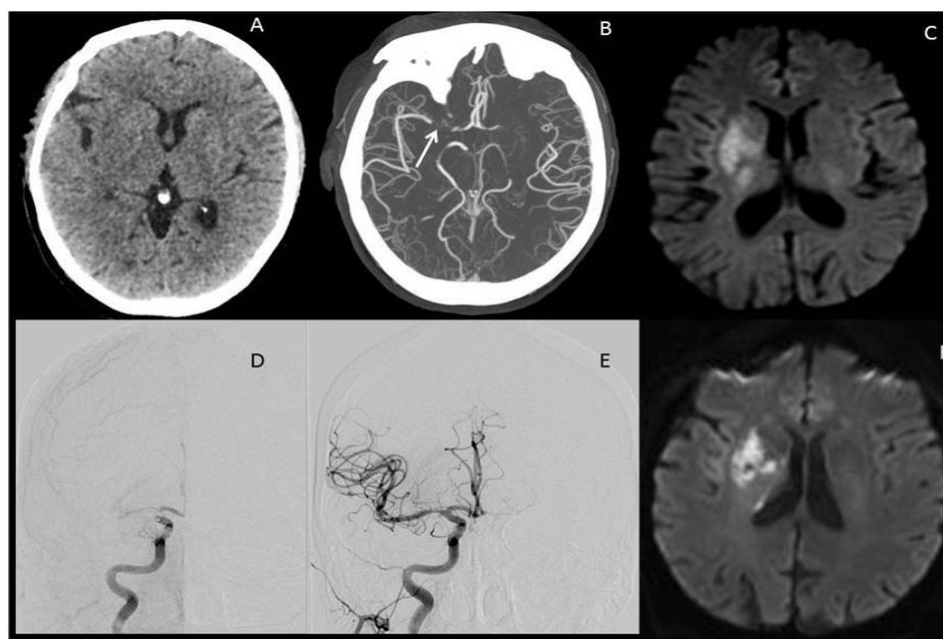


Figure 4. Illustrative Images of a Large Vessel Occlusion (LVO) Stroke Patient.

Common Sites of Large-Vessel Occlusion

The large vessel occlusion usually occurs in specific intracranial arteries responsible for a wide territory in the brain. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Clinical Presentation and Severity Assessment

Occlusion of large vessels normally manifests with acute onset of significant neurological deficits in the region supplied by the involved vessel. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

- Motor weakness
- Language disturbance

[REDACTED]

[REDACTED]

Prognosis Without Recanalization

Untreated cases of large vessel occlusion have been found to be linked with poor neurological outcomes and high mortality rates. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Intracranial Vascular Anatomy Relevant to Thrombectomy

Anterior Circulation

The brain's anterior circulation is mainly fed by the internal carotid arteries and their main branches. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

- Lenticulostriate perforators

Posterior Circulation

The posterior circulation consists of the vertebral arteries that join to create the basilar artery and then branch out to the posterior cerebral arteries. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]

Circle of Willis

The Circle of Willis is an arterial ring with many sides present at the bottom of the brain.

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

- Anterior communicating artery

[REDACTED]

[REDACTED]

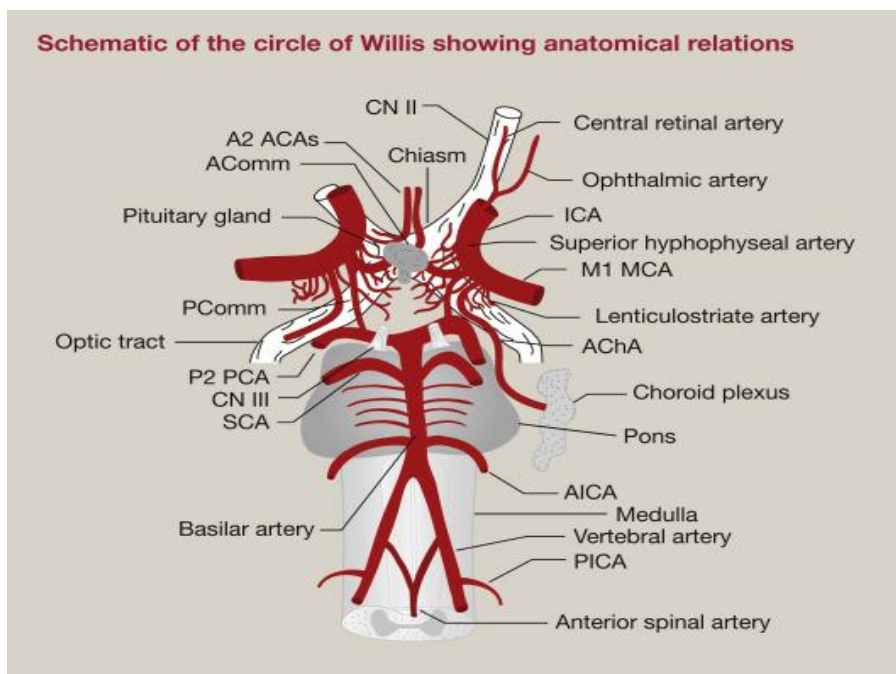


Figure 5. Circle of Willis

Collateral Circulation and Its Role in Outcomes

Collateral circulation is an alternate route of blood supply to the brain in the event of an occlusion of the main artery. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Vascular Access Routes (Femoral and Radial Approaches)

The establishment of vascular access is an essential part of mechanical thrombectomy. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Clinical Assessment

Neuroimaging is a major component in establishing large vessel occlusion and making treatment decisions. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Imaging-Based Patient Selection for Mechanical Thrombectomy

Selection through imaging allows mechanical thrombectomy to be performed on those who will greatly benefit from revascularization. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Management of Acute Ischemic Stroke

Intravenous Thrombolysis

Intravenous thrombolysis is a proven reperfusion treatment modality for ischemic stroke and is used as the first choice in patients who fit the inclusion criteria. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

- **Mechanism**

[REDACTED]

[REDACTED]

[REDACTED]

- **Indications**

[REDACTED]

[REDACTED]

[REDACTED]

- **Limitations in large-vessel occlusion**

[REDACTED]

[REDACTED]

[REDACTED]

Endovascular Therapy

Endovascular therapy has become the gold standard for managing acute ischemic stroke secondary to large-vessel occlusions. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Indications

[REDACTED]

[REDACTED]

[REDACTED]

- **Therapeutic time windows**

[REDACTED]

[REDACTED]

- **Extended window thrombectomy**

[REDACTED]

[REDACTED]

Mechanical Thrombectomy

Concept and Rationale

The mechanical thrombectomy procedure is an endovascular revascularization treatment for the physical extraction of a blocking thrombus within a major intracranial vessel in cases of acute ischemic stroke. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Large-vessel occlusion causes severe, potentially reversible ischemia

[REDACTED]

[REDACTED]

[REDACTED]

Evolution of Endovascular Stroke Therapy

Endovascular stroke therapy evolved in response to limitations of medical treatment in large-vessel occlusion. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

- Better peri-procedural monitoring and complication management

Indications and Eligibility Criteria

The indications for mechanical thrombectomy involve acute ischemic stroke involving large vessel occlusion coupled with severe neurological deficit that would warrant an invasive procedure. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

- No contraindication to contrast or endovascular procedure

Pre-Procedural Evaluation

Pre-procedural evaluation is performed to ascertain the suitability of the patient for thrombectomy and that the endovascular procedure planned is safe and efficient. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]

- Access planning and device preparation

Anesthesia Considerations (General vs Conscious Sedation)

Selection of anesthesia in thrombectomy plays a role in determining the stability of the procedure, the time variables, and physiological management. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

- [REDACTED]
- [REDACTED]
- Posterior circulation involvement

Periprocedural Anticoagulation and Antiplatelet Strategy

Peri-procedure antithrombotic strategies in mechanical thrombectomy include balancing the prevention of further clot formation and bleeding risks. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

- [REDACTED]
- [REDACTED]
- [REDACTED]
- Use imaging to guide timing and intensity of therapy

Thrombectomy Techniques

Stent Retriever Technique

Stent retriever thrombectomy is a popularly adopted form of mechanical thrombectomy where a self-expanding stent-like device is placed across the thrombus to effect clot integration and removal. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

- Complications: vessel injury, vasospasm, distal emboli, hemorrhage

Direct Aspiration First-Pass Technique (ADAPT)

The mechanism for Direct Aspiration First-Pass Technique involves removing the thrombus using suction at the face of the clot through the use of a large bore aspiration catheter.

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

- Complications: distal embolization, vessel wall trauma, vasospasm

Combined Technique (Solumbra / Stent Retriever + Aspiration)

The combined technique integrates a stent retriever with simultaneous aspiration to maximize clot capture and reduce distal embolization. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

- Complications: vasospasm, vessel injury, hemorrhage, access-related issues

Balloon Guide Catheter-Assisted Thrombectomy

Thrombectomy under balloon guide catheter assistance makes use of temporary proximal flow arrest to enhance the efficacy of clot retrieval and prevent distal embolization. [REDACTED]

[REDACTED]

[REDACTED]

- Complications: vasospasm, dissection, access challenges, balloon-related vessel injury

Rescue Techniques

Rescue procedures include extra procedures that are applied when routine thrombectomy does not lead to adequate reperfusion or when there is an inherent vascular lesion that hinders sustained flow (78). [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]

- Complications: hemorrhage, perforation, in-stent thrombosis, re-occlusion

Procedural Workflow in Mechanical Thrombectomy

Door-to-Puncture Time

The term “door-to-puncture time” denotes the time between admission to the hospital and puncture of the artery for mechanical thrombectomy. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

- Direct transfer protocols to angiography suite

Puncture-to-Recanalization Time

The puncture-to-recanalization time denotes the period of time from arterial access to completion of revascularization of the occluded vessel. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

- Periprocedural complications requiring control

Number of Passes

Number of passes is defined as the number of times the device is passed to clear the thrombus. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

- Technique escalation may be required after failed attempt

First-Pass Effect

The term first-pass effect refers to obtaining near total or total revascularization in the first pass of thrombectomy. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

- Accurate catheter positioning at clot interface

Recanalization Assessment (TICI / mTICI Score)

The revascularization assessment process is done by angiography, either during or after thrombectomy, in order to determine the extent of reperfusion within the involved vascular territory. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

- Supports technique comparison and audit

Comparison of Thrombectomy Techniques

Recanalization Rates

Recanalization rate refers to the percentage of thrombectomies that result in successful reopening of the blocked vessel. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

- Underlying atherosclerotic stenosis and re-occlusion tendency

First-Pass Success

First pass success is defined as a successful thrombolysis with one attempt at performing the procedure. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

- Use of combined retrieval and flow arrest strategies

Procedural Duration

The procedural duration in thrombectomy usually is measured from groin or radial puncture until the completion of reperfusion. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

- Need for rescue angioplasty or stenting

Functional Outcomes (mRS at 90 Days)

At 90 days, the modified Rankin Scale is used to determine functional outcomes following stroke through assessment of disability and independence. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

mRS category	Interpretation	Clinical meaning
0	[REDACTED]	[REDACTED]
1	[REDACTED]	[REDACTED]
2	[REDACTED]	[REDACTED]
3	[REDACTED]	[REDACTED]

Mortality

[REDACTED] Death is an important endpoint in the assessment of thrombectomy techniques, particularly in cases of severe large vessel occlusion, where there is already a high risk of mortality at the outset (94). [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

- Medical complications during hospitalization

Safety and Complication Rates

Comparison of safety of different thrombectomy procedures involves incidence of various complications, including symptomatic intracranial hemorrhage, perforation, dissection, vasospasm, distal embolization, and bleeding from the site of arterial puncture. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

- Access-site complications and contrast reactions

Cost and Resource Utilization

The cost and resource consumption is another consideration in the choice of thrombectomy procedures especially in centers with high caseloads. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

- ICU stay length linked to complications and outcome

Learning Curve and Operator Experience

The operator experience plays an important role in the effectiveness of the thrombectomy procedure, as it impacts the speed, effectiveness of the recanalization, and the risk for complications. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

- Prevention and management of complications

Complications of Mechanical Thrombectomy

Symptomatic Intracranial Hemorrhage

Intracranial hemorrhage secondary to symptoms is one of the major complications of thrombectomy and has a great influence on the outcomes of treatment and mortality rate. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

- Elevated blood pressure

Vessel Perforation

Vessel perforation is an uncommon but potentially catastrophic complication during thrombectomy. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

- Fragile vessel wall in ischemic tissue

Vessel Dissection

Dissection refers to an injury to the intima layer of the artery that causes the formation of a false lumen and possible impairment of blood flow. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

- [REDACTED]
- [REDACTED]
- [REDACTED]

- Balloon guide catheter manipulation

Vasospasm

Vasospasm is defined as an intermittent narrowing of the artery in response to irritation or mechanical stimulation of the arterial walls in thrombectomy procedures. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

- [REDACTED]
- [REDACTED]
- [REDACTED]

- Prolonged procedure time

Embolization to New Territory

The occurrence of embolization to another territory involves the breakage of the clots and their movement into another part of the brain via other vessels. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

- Multiple retrieval attempts

Access Site Complications

Complications related to access site occur at the site of arterial puncture, such as formation of hematoma, false aneurysm, thrombosis of the artery, and bleeding. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

- Radial artery occlusion

Contrast-Induced Nephropathy

Nephropathy that is due to contrast is another complication that can arise owing to the use of iodinated contrast agents both during imaging and thrombectomy. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

- Hemodynamic instability

Predictors of Successful Outcomes

Clot Characteristics

Features of the thrombus play an important role in determining the technical success and neurologic outcome in mechanical thrombectomy. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

- Fragmentation tendency

Location of Occlusion

Occlusion location is vital in assessing not only technical possibilities of successful treatment but also the outcome for the patient. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Occlusion site	Technical aspect	Prognostic implication
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]

Collateral Status

The quality of collaterals indicates the effectiveness of alternative routes for maintaining cerebral blood flow under arterial blockage conditions. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

- Smaller ischemic core

Time to Reperfusion

Time to reperfusion is among the most important factors that predict success in cases of stroke involving large-vessel occlusions. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Patient-Related Factors

Patient factors determine both the risk of procedure complications and long-term recovery from mechanical thrombectomy. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Technique Selection

Choice of the method directly impacts the chance of successful recanalization and safety.

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Outcome Assessment

Modified Rankin Scale

The Modified Rankin Scale (mRS) is a popular clinical instrument for determining the degree of global disability following an acute ischemic stroke (122). [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

mRS Score	Description	Functional status
1	[REDACTED]	[REDACTED]
2	[REDACTED]	[REDACTED]
3	[REDACTED]	[REDACTED]
4	[REDACTED]	[REDACTED]
5	[REDACTED]	[REDACTED]

NIHSS Improvement

The NIH Stroke Scale describes the neurologic deficits of the patients at admission and during their clinical course. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

NIHSS Change	Interpretation	Clinical implication
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]

Radiological Outcomes

The radiological results will show objectively the success of the procedure through the effects achieved after the mechanical thrombectomy. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

- Evidence of distal embolization

Functional Independence

Functional independence is considered the primary outcome of mechanical thrombectomy and denotes the ability of the patient to carry out daily tasks on their own. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

- Access to rehabilitation services

Current Guidelines and Recommendations

Indications for Mechanical Thrombectomy

The mechanical thrombectomy is advised for cases of acute ischemic stroke due to occlusion of large vessels in the presence of severe neurological symptoms and favorable radiological characteristics. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

- No intracranial hemorrhage

Time Window Criteria

The time window parameters define the timing and appropriateness of thrombectomy.

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

- Total ischemic time remains critical

Imaging Selection Criteria

Selection criteria based on imaging form an integral part of the patient selection process for mechanical thrombectomy. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Imaging component	Purpose	Clinical impact
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]

Standards of Care in Endovascular Stroke Therapy

Caring standards in endovascular stroke treatment focus on rapid processes, imaging precision, highly qualified practitioners, and systematic follow-up monitoring. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Standard domain	Key requirement	Clinical benefit
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]

Rationale for Comparative Study

Thrombectomy is now an essential procedure for large vessel occlusive stroke treatment, but there are various technical options available in the field of interventional radiology. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] Hence, the need to compare systematically among the procedures within a certain clinical setting.

RESEARCH STUDIES

[REDACTED] (2026) assessed the effect of using balloon guide catheter on the outcome of contact aspiration thrombectomy for treatment of acute anterior circulation stroke. Balloon guide catheters were specifically developed to temporarily stop antegrade flow while retrieving a clot

in the patient. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

The results demonstrate the need for incorporation of the technique of balloon (109).

[REDACTED]. (2025) performed a systematic review and meta-analysis to assess the risk of developing symptomatic intracranial hemorrhage after mechanical thrombectomy in randomized clinical trials. This analysis involved data on several trials concerning endovascular procedures and sought to estimate the frequency of developing hemorrhagic complications among the thrombectomy patients. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] This analysis confirmed the high efficiency of this technique and showed that hemorrhagic transformation is a rare event despite being possible; thus, the further development of thrombectomy procedure made the endovascular treatment of stroke even safer (100).

[REDACTED] (2025) have analyzed some critical questions concerning endovascular stroke therapy, specifically related to treatment strategies, procedures, and clinical decisions. The article has examined the issue of different thrombectomy approaches that include aspiration, stent retriever, and hybrid techniques using both technologies. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] The article has revealed some critical issues in the question of endovascular stroke treatment (59).

[REDACTED]. (2025) discussed the innovations in stent retrievers and aspiration catheters which allowed making the process more efficient. These tools provide better clot engagement, reduced procedural time, and higher chances of successful reperfusion. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] The rapid diagnostic process, good imaging protocol, and proper stroke care system were necessary for providing the positive outcomes (60).

[REDACTED] (2025) provided information regarding the technique of the double stent retriever mechanical thrombectomy. This method implies the use of two stent retrievers inserted into the affected vessel simultaneously to ensure better engagement of the clot. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Therefore, the researchers stressed the need to optimize the techniques of performing thrombectomy and use appropriate devices in order to increase the chances of achieving early (85).

(2025) explored the correlation between duration of thrombectomy procedures and clinical outcomes in patients with large vessel occlusion who were receiving endovascular treatment. Specifically, the study assessed the effect of procedural duration on patient neurological recovery and overall success.

This study showed that efficient procedures are crucial for achieving better clinical outcomes in patients with large vessel occlusion stroke (92).

(2025), the role of the first-pass effect as an important measure for evaluating thrombectomy technologies was assessed. The first-pass effect involves the achievement of complete or near complete reperfusion in the occluded vessel during a single attempt of thrombectomy.

Moreover, it can be stated that optimization of thrombectomy methods and device selection can help in achieving a higher likelihood of first-pass reperfusion success (86).

██████████ (2024) studied data from the ASSIST Stroke Registry to assess the effects of various reperfusion procedures and types of occlusions on the outcomes of endovascular thrombectomy. This study focused on the effects that variations in thrombectomy procedure type, including the use of aspiration techniques and stent retrievers, have on rates of successful recanalization and clinical recovery. ██████████

██
██
██
██
██
██
██
██

██ This study brought useful information regarding the performance of thrombectomy in clinical setting and helped to understand more about factors influencing treatment outcomes (81).

██████████ (2024) investigated the clinical outcomes of mechanical thrombectomy and possible complications of such procedures in patients with endovascular treatment. Clinical results of patients who underwent mechanical thrombectomy have been assessed by the researchers and factors influencing the success and safety of treatment have been discussed.

██
██
██
██
██
██
██

██ It is worth saying that improvements in technology and methods of thrombectomy devices have increased the safety and efficiency of treatment in patients with large vessel occlusion stroke (10).

██████████ (2024) The article provided a description of the indications, procedure, and advances in device technology for ADAPT technique. This procedure requires the placement of large bore aspiration catheter directly onto the thrombus followed by aspiration.

██████████ It was noted that the choice of thrombectomy technique depends on clot features and anatomy of the vessel as well as on the operator experience (74).

██████████ (2024), There is a research study analyzing the efficacy of three thrombectomy methods – aspiration thrombectomy, stent retriever thrombectomy, and combined thrombectomy techniques that include the use of both types of devices. ██████████

██████████ This information is important in order to understand the practical application of different thrombectomy techniques (83).

██████████. (2023) have summarized the recent advances in mechanical thrombectomy procedures with special emphasis on the development of devices, procedure, and patients. The study has focused on the development of devices that have been designed to retrieve blood clots.

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

In conclusion, the authors stated that the continuous development of the devices and procedures is necessary for obtaining high rates of recanalization and avoiding complications (6).

[REDACTED] (2023) examined current trends and perspectives in mechanical thrombectomy for acute ischemic stroke. In particular, the paper provided information about indications for thrombectomy and the growing evidence base regarding its effectiveness in terms of favorable outcomes for patients receiving treatment during the proper treatment window.

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] In conclusion, the authors noted that future research should pay attention to optimization of thrombectomy devices, procedures themselves, and patient-specific treatment strategies (36).

[REDACTED] (2022) conducted an extensive review about different thrombectomy approaches employed in clinical practice. The paper considered two main approaches for the removal of clots: stent retriever thrombectomy and aspiration techniques. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED] Thus, the review offered an extensive overview of the key thrombectomy techniques in endovascular stroke management (8).

[REDACTED] (2021) conducted a review on the possible complications of thrombectomy, and their prevention and management strategies. The researchers identified several complications associated with thrombectomy procedure, including vessel perforation, arterial dissection, distal embolization, and symptomatic intracranial hemorrhage. [REDACTED]

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED] Though there were possible complications associated with this procedure, mechanical thrombectomy was still one of the most effective approaches to stroke caused by large vessel occlusion (96).

[REDACTED] (2020) explored the role of aspiration pump power in the clinical and technical outcomes of the direct aspiration first-pass technique (ADAPT). It was determined whether different levels of aspiration strength may affect the efficiency of clot elimination and recanalization. [REDACTED]
[REDACTED]
[REDACTED]

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED] In conclusion, it can be stated that optimization of aspiration pump power can positively affect the efficiency of aspiration thrombectomy techniques (75).

[REDACTED] (2019) highlighted GUARD technique that includes guide sheath advance and aspiration at distal petrocavernous internal carotid artery while performing thrombectomy. The objective of the technique is to increase efficacy of clot retrieval by providing aspiration aid during the procedure. [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

The use of balloon guide catheters in contemporary endovascular thrombectomy procedure and its influence on procedural outcomes was discussed in the paper [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

[REDACTED] The use of balloon guide catheter technology may increase the success rates of thrombectomy procedure; however, the choice of devices and the experience of the operator become important for achieving positive outcomes (76).

██████████. (2015) addressed the development of endovascular treatment options and the influence of devices' innovation on the results of thrombectomy. The early versions of endovascular methods involved the use of intra-arterial thrombolysis and mechanical clot disruption, with different efficacy rates being reported. ██████████

██████████

██████████

██████████

██████████

██████████

██████████

██████████

██████████ The study emphasizes the necessity of the innovations in thrombectomy technologies to ensure better treatment outcomes in cases of acute ischemic stroke due to large vessel occlusion (62).

MATERIALS AND METHODS

MATERIALS AND METHODS

STUDY SETTING:

[REDACTED]

[REDACTED]

[REDACTED]

INCLUSION CRITERIA:

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

EXCLUSION CRITERIA:

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

STUDY DESIGN:

[REDACTED]

TIME FRAME/DURATION:

[REDACTED]

SAMPLE SIZE CALCULATION

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

METHODOLOGY

[REDACTED]

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STATISTICAL ANALYSIS

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RESULTS

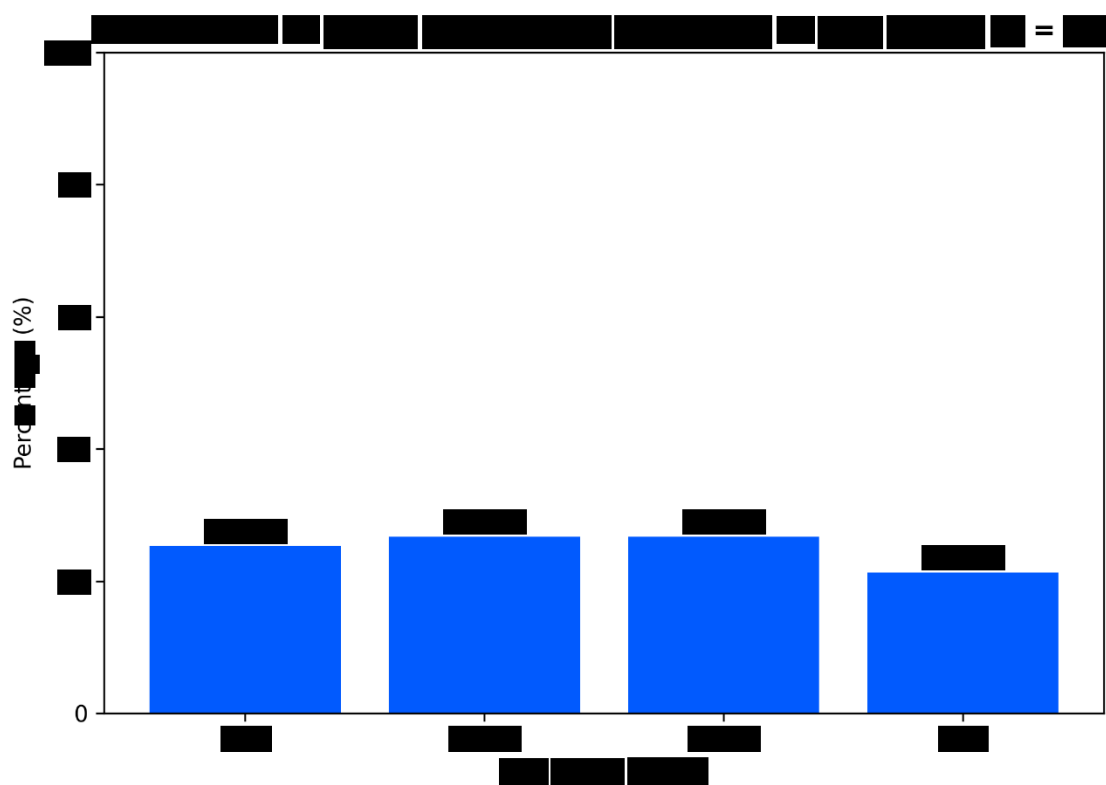
RESULTS

SECTION I: DEMOGRAPHIC DATA

Table 1: Distribution of Study Participants According to Age Group (n = 75)

Age Group (Years)	n	%	Mean Age	Median Age	IQR
≤50	1	1.33	56.8	58	50-60
51-60	1	1.33			
61-70	1	1.33			
>70	1	1.33			
Total	4	5.33			

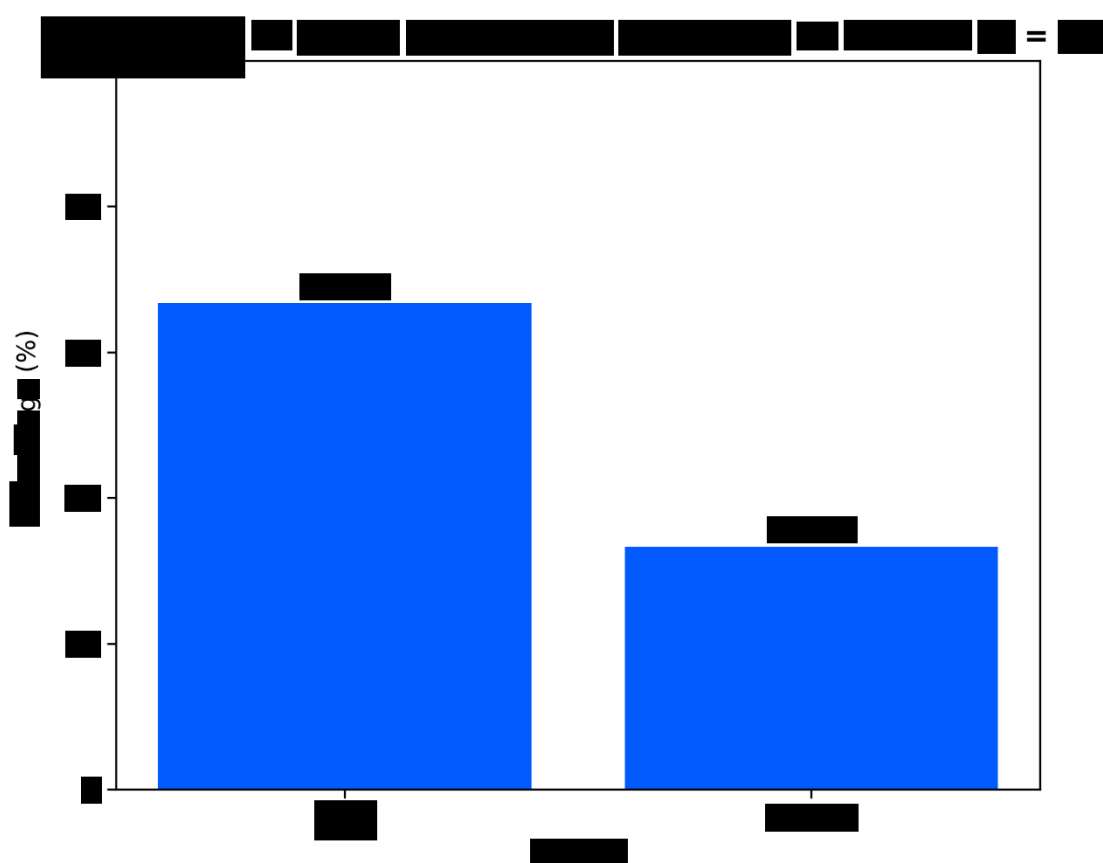
Graph 1: Distribution of Study Participants According to Age Group (n = 75)



In the present study, a total 4 patients with large-vessel occlusion acute ischemic stroke were included.

Table 2: Distribution of Study Participants According to Gender (n = 75)

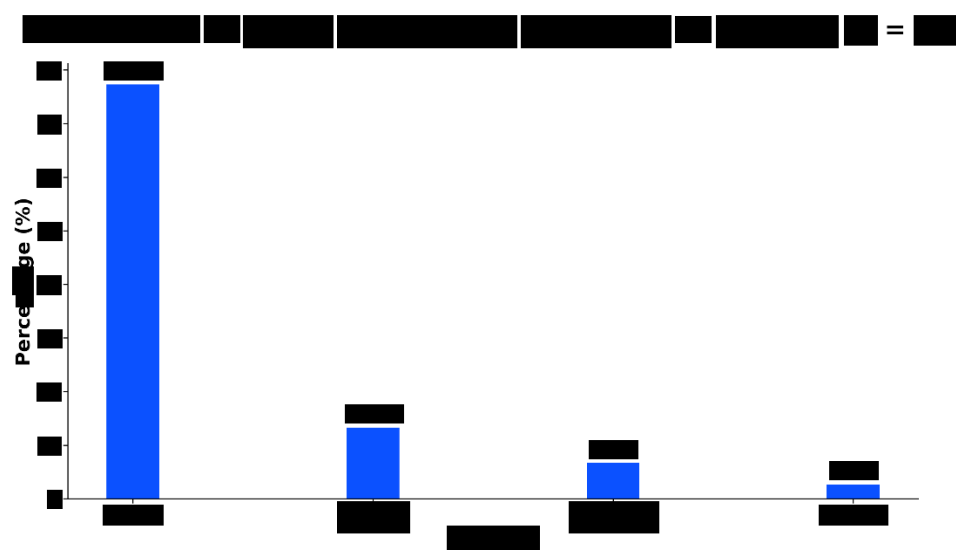
Gender	n	%
Male	■	■
Female	■	■
Total	■	■

Graph 2: Distribution of Study Participants According to Gender (n = 75)

In the present study, out of a total of ■ patients with large-vessel occlusion acute ischemic stroke, ■ patients (■%) were male and ■ patients (■%) were female. ■ The total study population comprised ■ patients (■%).

Table 3: Distribution of Study Participants According to Religion (n = 75)

Religion	n	%
Hindu	58	77.33
Muslim	10	13.33
Christian	2	2.67
Buddhist	2	2.67
Others	3	4.00

Graph 3: Distribution of Study Participants According to Religion (n = 75)

In the present study, a total of 75 patients with acute ischemic stroke were included. The majority of the study participants were Hindus (77.33%).

SECTION II: DESCRIPTIVE CLINICAL DATA

Table 4: Distribution of Study Participants According to Clinical Features (n = 75)

Clinical Features	n	%
Hemiparesis/Hemiplegia	15	20.0
Facial Deviation	10	13.3
Speech Disturbance	10	13.3
Altered Sensorium	10	13.3
Giddiness/Vomiting	10	13.3
Seizures	5	6.7

Graph 4: Distribution of Study Participants According to Clinical Features (n = 75)

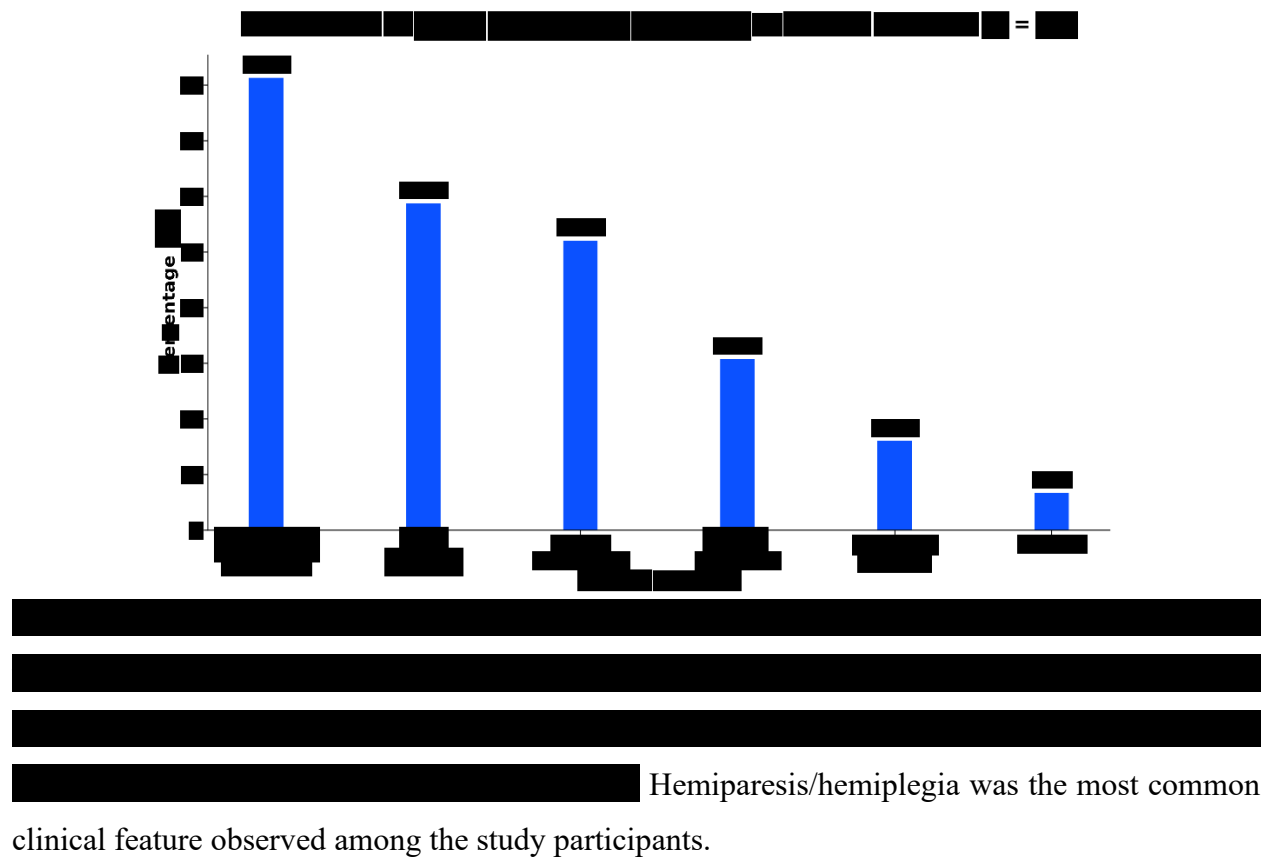
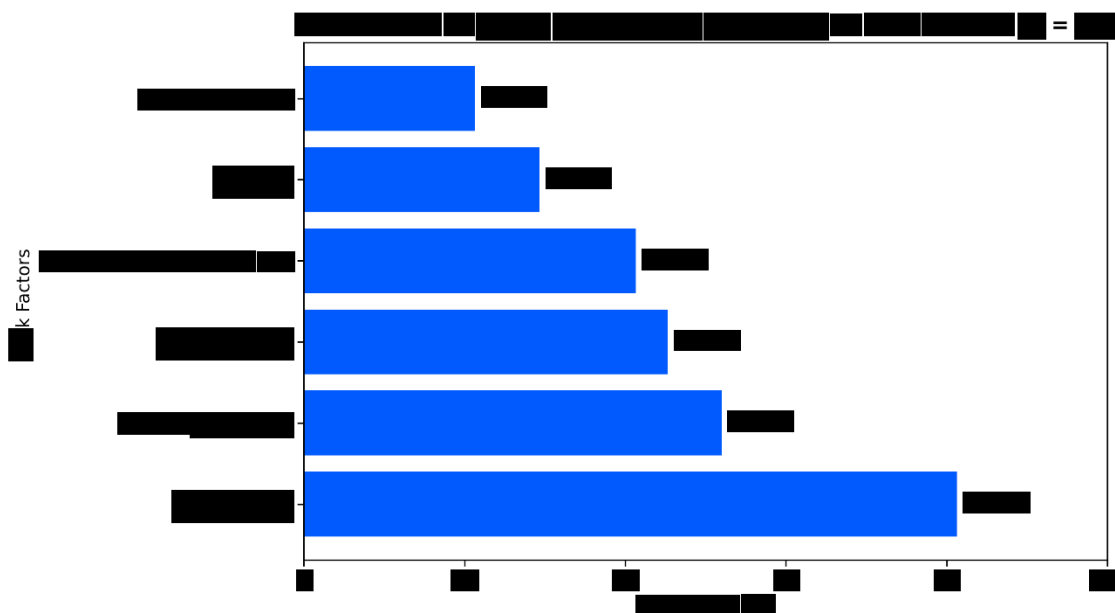


Table 5: Distribution of Study Participants According to Risk Factors (n = 75)

Risk Factors	n	%
Hypertension	15	20.0
Cardiac Arrhythmia	10	13.3
Hyperlipidemia	12	16.0
Previous Antithrombotic Use	10	13.3
Smoking	10	13.3
Diabetes Mellitus	8	10.7

Graph 5: Distribution of Study Participants According to Risk Factors (n = 75)

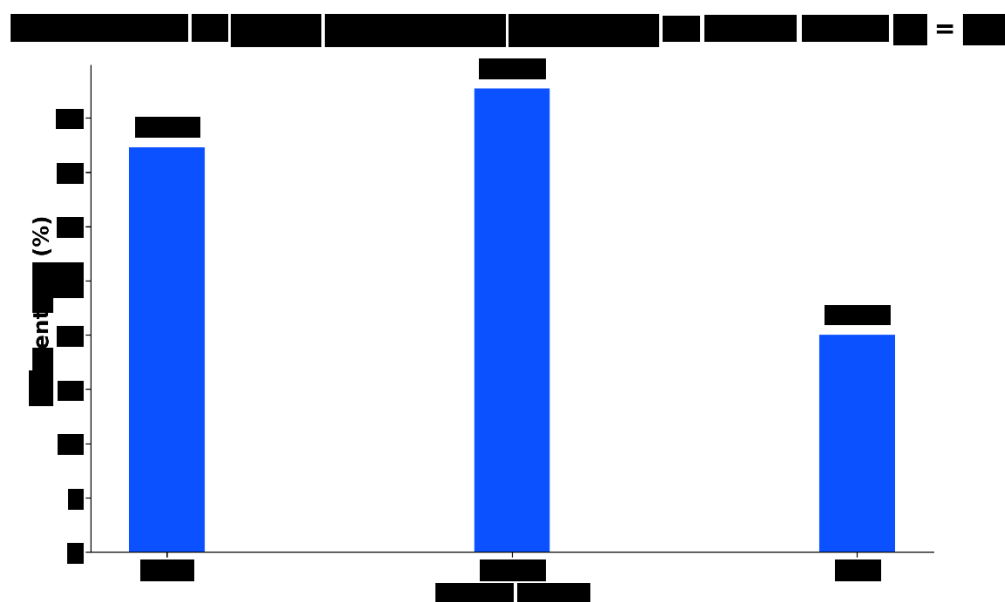
In the present study, hypertension was the most common risk factor and was present in 15 patients (20.0%).

Thus, hypertension was the most frequently observed risk factor, followed by cardiac arrhythmia, hyperlipidemia, previous antithrombotic use, smoking, and diabetes mellitus among the study population.

Table 6: Distribution of Study Participants According to NIHSS Score (n = 75)

NIHSS Score	n	%	Mean NIHSS	Median NIHSS	IQR
8–14	■	■	■	■	■
15–20	■	■			
>20	■	■			
Total	■	■			

Graph 6: Distribution of Study Participants According to NIHSS Score (n = 75)

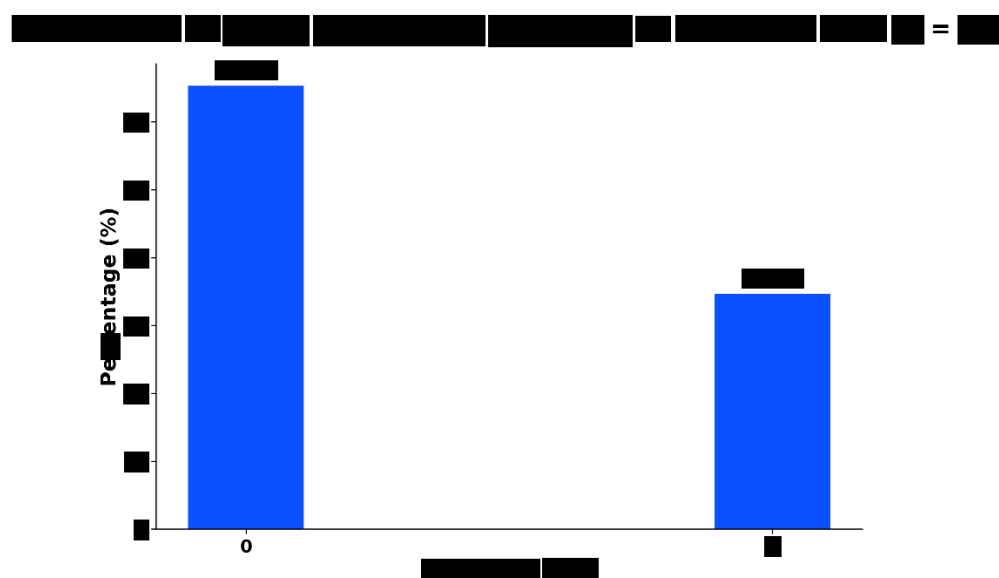


In the present study, ■ patients (■%) had an NIHSS score between ■–■, ■ patients (■%) had an NIHSS score between ■–■, and ■ patients (■%) had an NIHSS score of >■.

■ The mean NIHSS score of the study participants was ■ ± ■, with a median NIHSS score of ■ and an interquartile range (IQR) of ■–■.

Table 7: Distribution of Study Participants According to Pre-event mRS (n = 75)

Pre-event mRS	n	%
0	■	■
1	■	■
Total	■	■

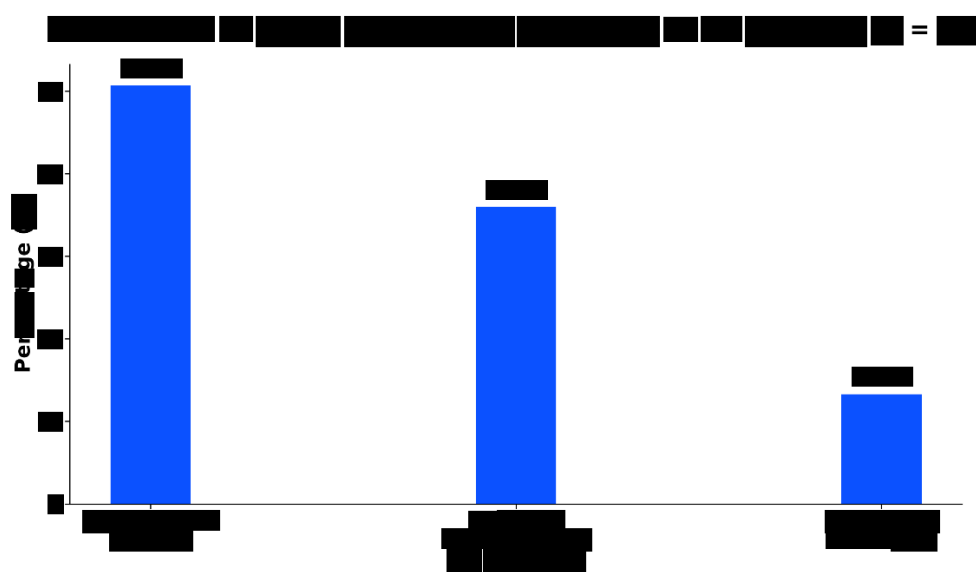
Graph 7: Distribution of Study Participants According to Pre-event mRS (n = 75)

The majority of the study participants had a pre-event mRS score of 0 (80%).

Table 8: Distribution of Study Participants According to CT Findings (n = 75)

CT Findings	n	%
Early Ischemic Changes	15	20.0
No Visible Infarct Changes	45	60.0
Hyperdense Vessel Sign	5	6.7
Total	65	86.7

Graph 8: Distribution of Study Participants According to CT Findings (n = 75)

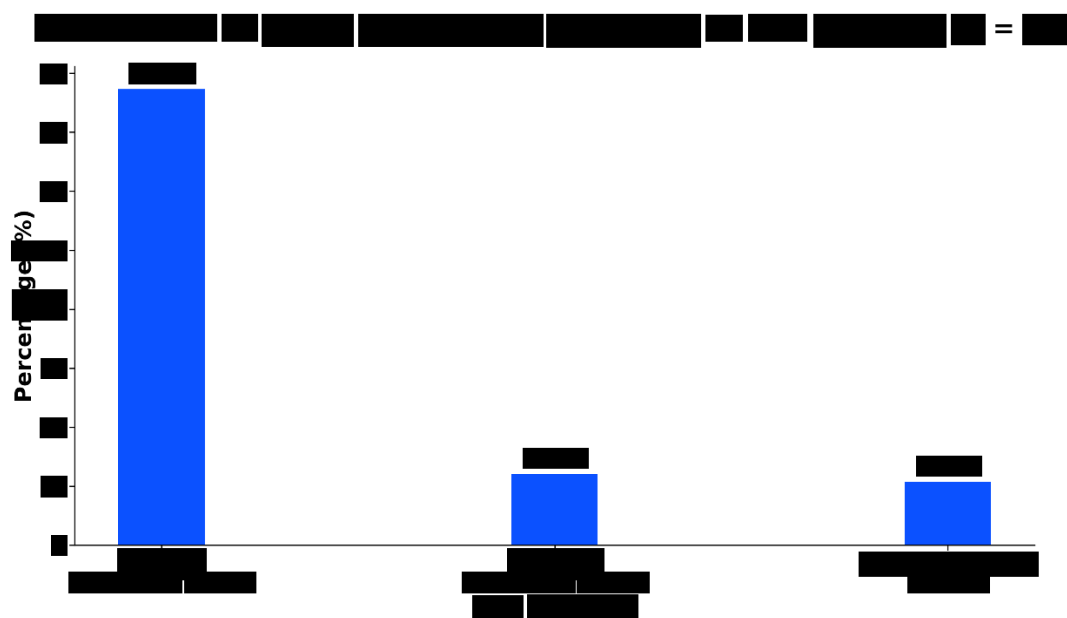


Early ischemic changes were the most common CT finding among the study participants.

Table 9: Distribution of Study Participants According to MRI Findings (n = 75)

MRI Findings	n	%
Anterior Circulation Infarct	1	1.33
Posterior Circulation Infarct	1	1.33
Multiple Territory Infarcts	1	1.33
Total	3	4

Graph 9: Distribution of Study Participants According to MRI Findings (n = 75)

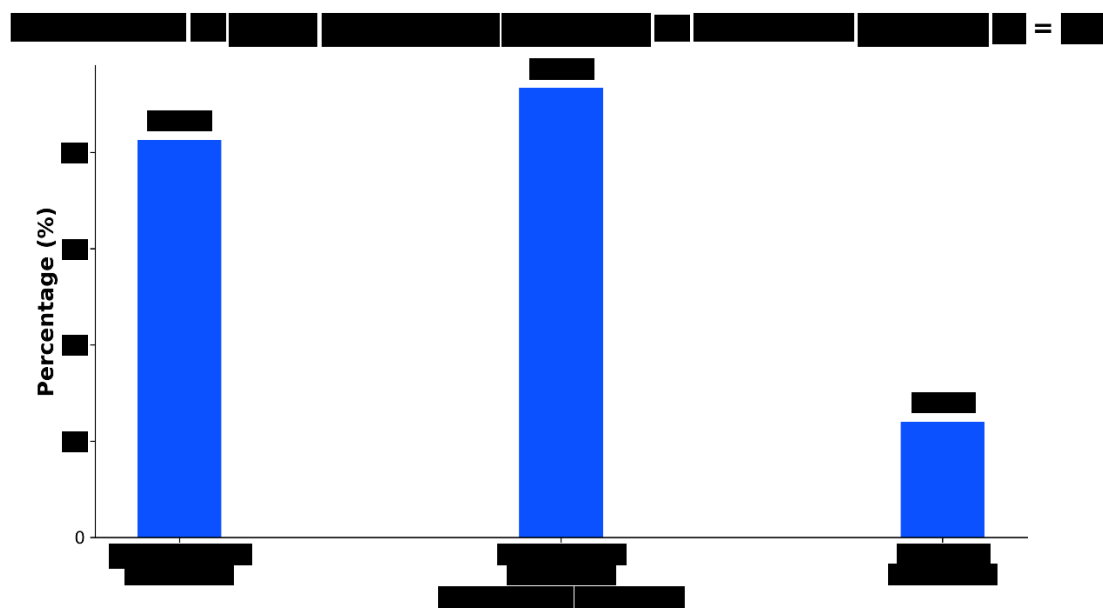


In the present study, anterior circulation infarct was observed in 1 patients (1.33%), posterior circulation infarct was present in 1 patients (1.33%), and multiple territory infarcts were observed in 1 patients (1.33%).

Table 10: Distribution of Study Participants According to Circulation Territory (n = 75)

Circulation Territory	n	%
Right Anterior Circulation	1	1.33
Left Anterior Circulation	1	1.33
Posterior Circulation	1	1.33
Total	3	4

Graph 10: Distribution of Study Participants According to Circulation Territory (n = 75)



In the present study, right anterior circulation involvement was observed in 1 patients (1.33%), left anterior circulation involvement was observed in 1 patients (1.33%), and posterior circulation involvement was observed in 1 patients (1.33%).

--	--	--	--

1. $\mathbf{A} = \begin{pmatrix} 1 & 2 & 3 \\ 2 & 3 & 4 \\ 3 & 4 & 5 \end{pmatrix}$, $\mathbf{B} = \begin{pmatrix} 1 & 2 & 3 \\ 2 & 3 & 4 \\ 3 & 4 & 5 \end{pmatrix}$

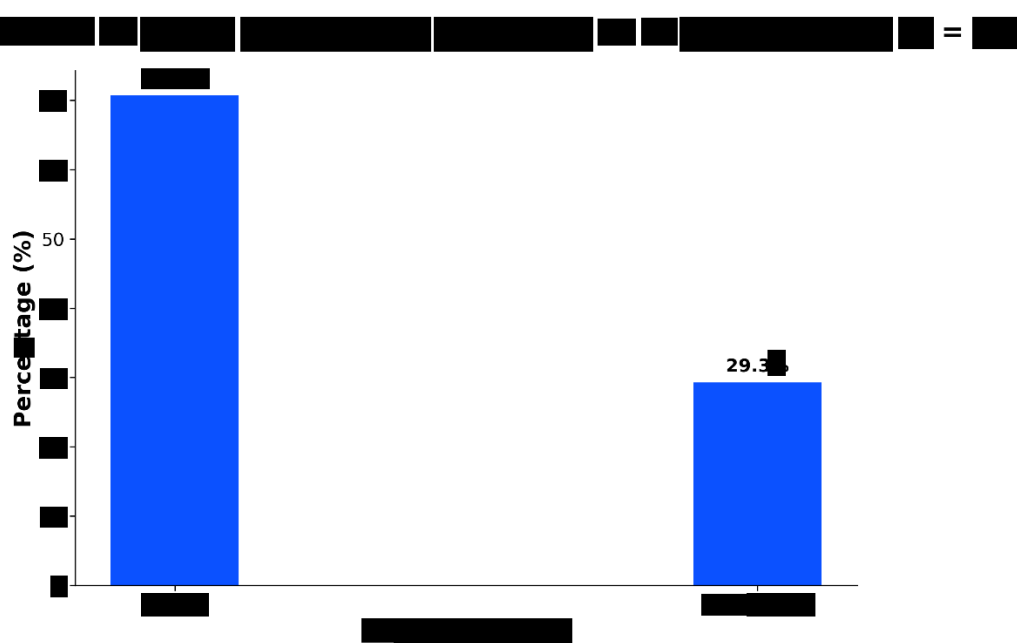


1. *Journal of Management Studies*, 1990, 27, 1, 1-14.

Table 12: Distribution of Study Participants According to IV Thrombolysis (n = 75)

IV Thrombolysis	n	%
Given	■	■
Not Given	■	■
Total	■	■

Graph 12: Distribution of Study Participants According to IV Thrombolysis (n = 75)

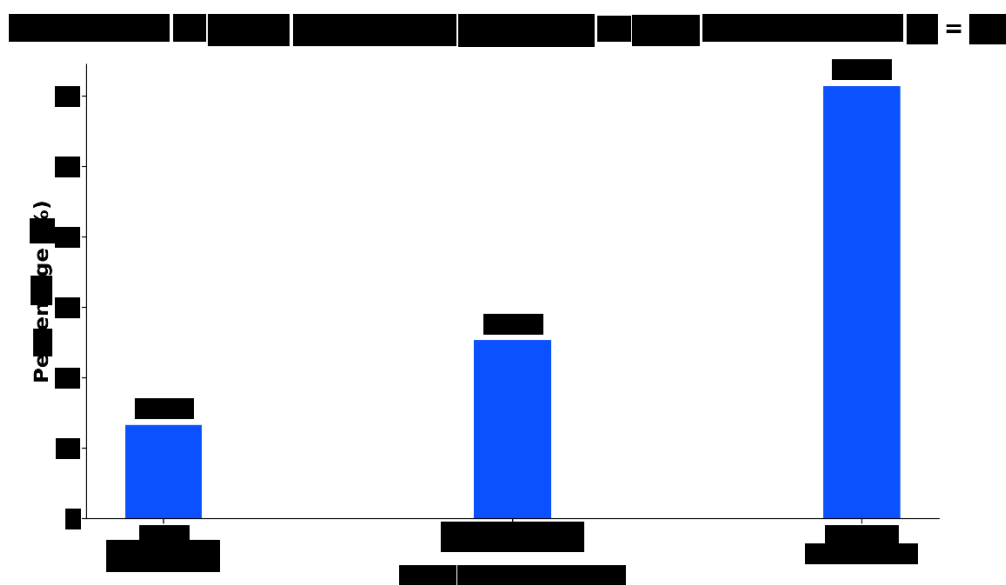


In the present study, IV thrombolysis was given to ■ patients (■%), while ■ patients (■%) did not receive IV thrombolysis. The majority of the study participants received IV thrombolysis (■%).

Table 13: Distribution of Study Participants According to Type of Anaesthesia (n = 75)

Type of Anaesthesia	n	%
General anaesthesia	1	1.33
Analgesedation	1	1.33
Local anaesthesia	1	1.33
Other	1	1.33

Graph 13: Distribution of Study Participants According to Type of Anaesthesia (n = 75)



In the present study, local anaesthesia was administered to 1 patients (1.33%), analgesedation was administered to 1 patients (1.33%), and general anaesthesia was administered to 1 patients (1.33%).

SECTION III: AIM AND OBJECTIVE-WISE RESULTS

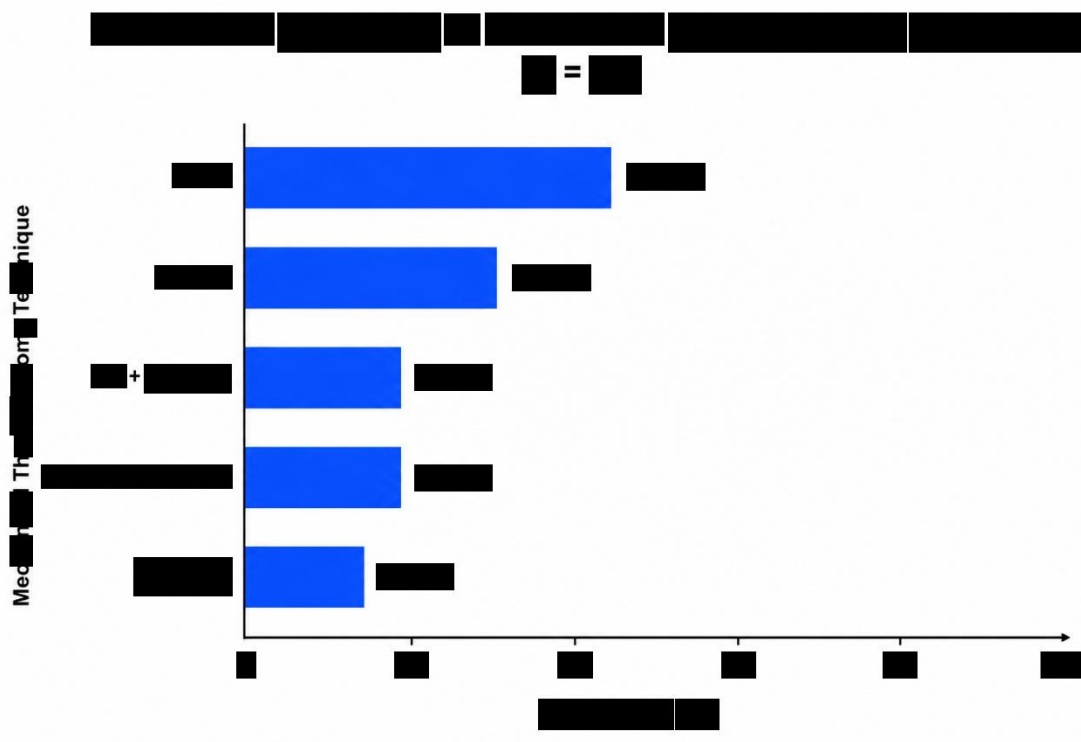
PRIMARY OBJECTIVE: ■

To Study Various Mechanical Thrombectomy Techniques Used in Acute Ischemic Stroke

Table 14: Distribution of Mechanical Thrombectomy Techniques

Mechanical Thrombectomy Technique	n	%
SRFL	■	■
ADAPT	■	■
MT + Stenting	■	■
Combined Procedure	■	■
Solumbra	■	■
Total	■	■

Graph 14: Distribution of Mechanical Thrombectomy Techniques



In the present study, SRFL was the most commonly utilized mechanical thrombectomy technique and was performed in █ patients (██%). █

█

█

█ Overall, a total of █ patients (██%) underwent mechanical thrombectomy, with SRFL being the most frequently used technique, followed by ADAPT, MT + Stenting, Combined Procedure, and Solumbra.

PRIMARY OBJECTIVE: ■**To Compare the Efficacy of Different Mechanical Thrombectomy Techniques****Table 15: Comparison of Median Procedure Duration According to Technique Used**

Technique	Median Duration (Minutes)	IQR	H-value	df	p-value
ADAPT	■	■	■	■	■
SRFL	■	■			
Solombra	■	■			
MT + Stenting	■	■			
Combined Procedure	■	■			

■

■

■

■

■

■

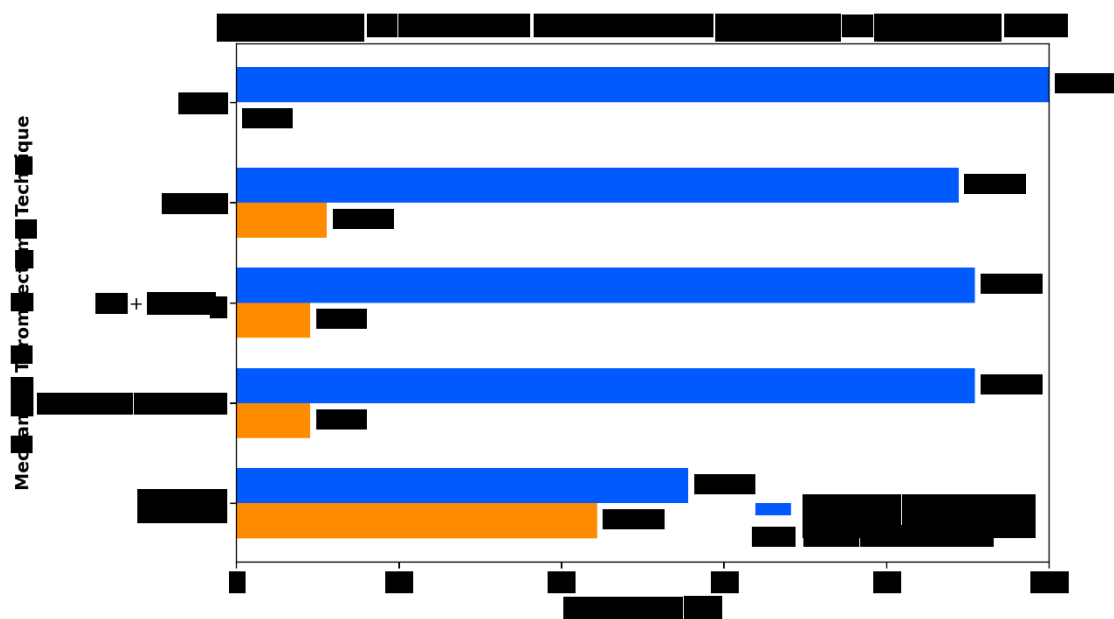
■

The Kruskal-Wallis test showed a statistically significant difference in procedure duration among the different techniques (H-value = ■, df = ■, p-value < ■).

Table 16: Comparison of Successful Recanalization According to Technique Used

Mechanical Thrombectomy Technique	Successful Recanalization n (%)	Failed Recanalization n (%)	Total n (%)	Chi-square (χ^2)	df	P value
SRFL						
ADAPT						
MT + Stenting						
Combined Procedure						
Solumbra						
Total						

Graph 15: Comparison of Successful Recanalization According to Technique Used



In the present study, successful recanalization was achieved in ■ patients (■%), while failed recanalization was observed in ■ patients (■%). ■■■■■

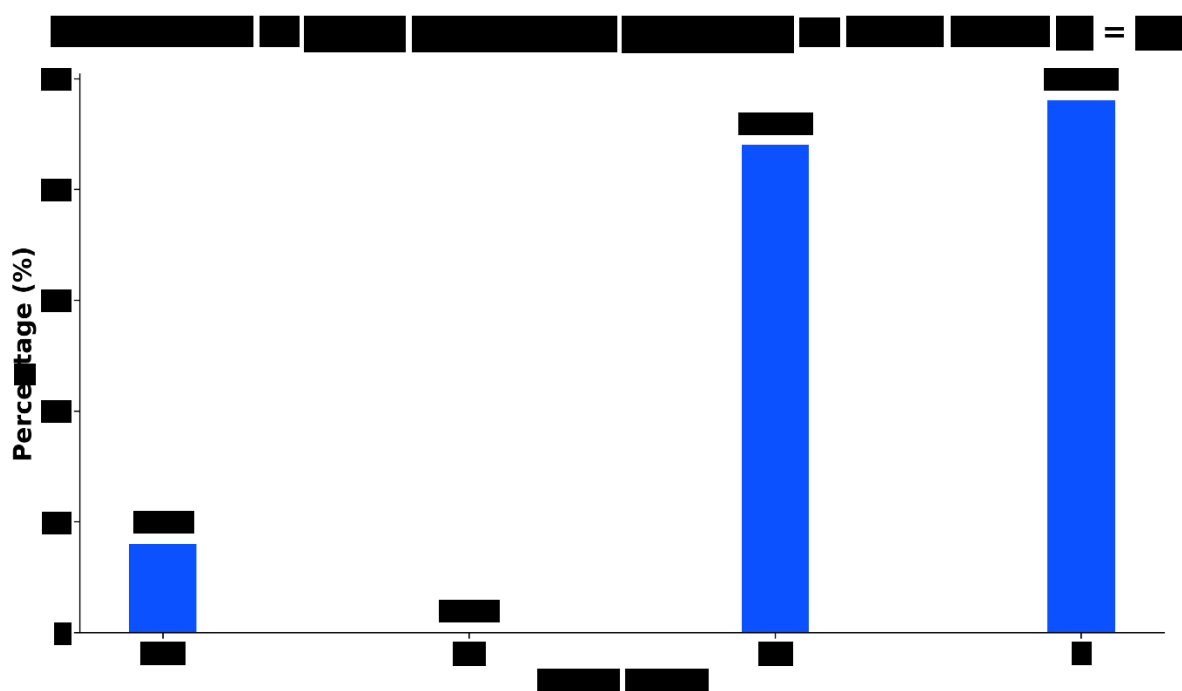
■■■■■
■■■■■
■■■■■
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■■■■■

■■■■■ The distribution of successful and failed recanalization across the different mechanical thrombectomy techniques was statistically significant ($\chi^2 = \blacksquare$, $df = \blacksquare$, $p = \blacksquare$).

Table 17: Distribution of Study Participants According to mTICI Score (n = 75)

mTICI Score	n	%
0–1	1	1.3
2a	1	1.3
2b	2	2.7
3	2	2.7
Total	6	8.0

Graph 16: Distribution of Study Participants According to mTICI Score (n = 75)

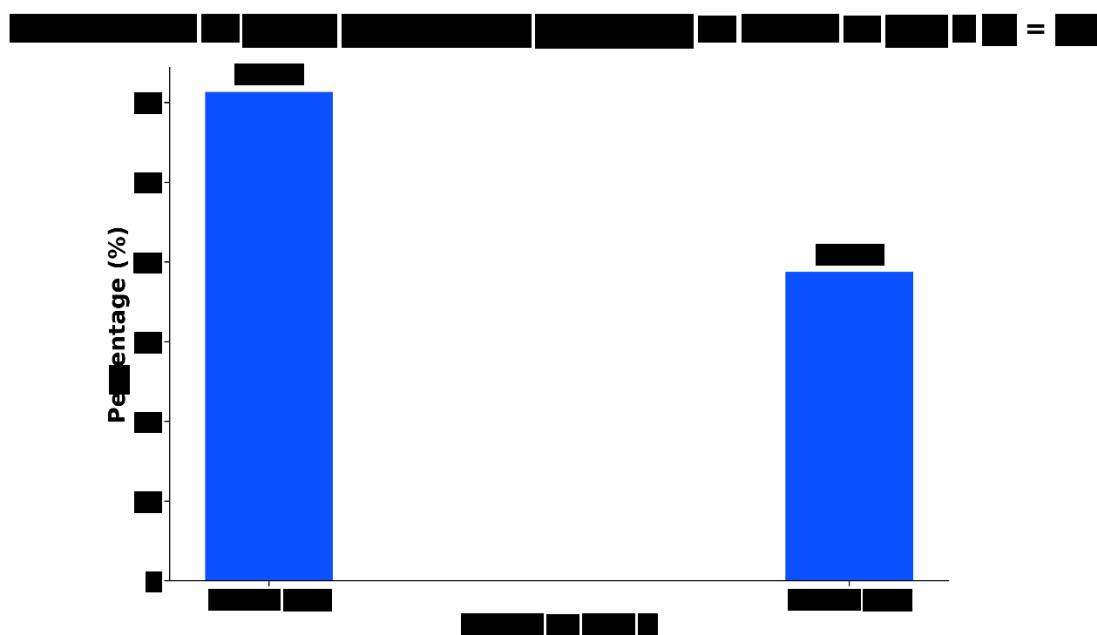


In the present study, 1 patients (1.3%) had an mTICI score of 0–1, no patients (0%) had an mTICI score of 2a, 2 patients (2.7%) had an mTICI score of 2b, and 2 patients (2.7%) had an mTICI score of 3. The majority of the study participants had an mTICI score of 3 (2.7%).

Table 18: Distribution of Study Participants According to NIHSS at Day 7 (n = 75)

NIHSS at Day 7	n	%	Median NIHSS	IQR
NIHSS <10	■	■	■	■
NIHSS ≥10	■	■		
Total	■	■		

Graph 17: Distribution of Study Participants According to NIHSS at Day 7 (n = 75)



■ The median NIHSS score at Day ■ was ■ with an interquartile range (IQR) of ■-■.

Table 19: Comparison of Median NIHSS Improvement According to Technique Used

Technique	Median NIHSS Improvement	IQR	H-value	df	p-value
ADAPT	■	■	■	■	■
SRFL	■	■			
Solumbra	■	■			
MT + Stenting	■	■			
Combined Procedure	■	■			

■
■
■
■
■

■ The Kruskal-Wallis test demonstrated a statistically significant difference in median NIHSS improvement among the different techniques (H-value = ■, df = ■, p-value = ■).

PRIMARY OBJECTIVE

To Study the Advantages of One Technique Over Other Available Techniques

Table 20: Comparison of Median Hospital Stay According to Technique Used

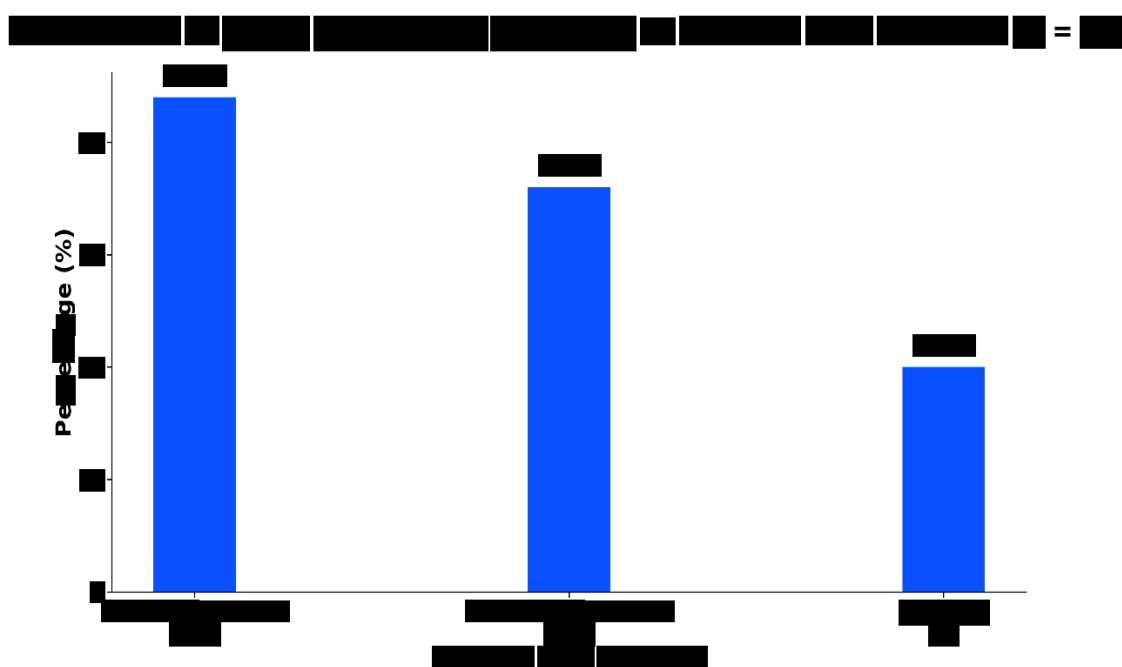
Technique	Median Hospital Stay (Days)	IQR	H-value	df	p-value
ADAPT					
SRFL					
Solumbra					
MT + Stenting					
Combined Procedure					

The Kruskal-Wallis test demonstrated a statistically significant difference in median hospital stay among the different techniques (H-value = , df = , p-value =).

Table 21: Distribution of Study Participants According to 3-Month mRS Outcome (n = 75)

3-Month mRS Outcome	n	%
Favorable Outcome (0–2)	44	58.7%
Unfavorable Outcome (3–5)	24	32.0%
Mortality (6)	7	9.3%
Total	75	100%

Graph 18: Distribution of Study Participants According to 3-Month mRS Outcome (n = 75)

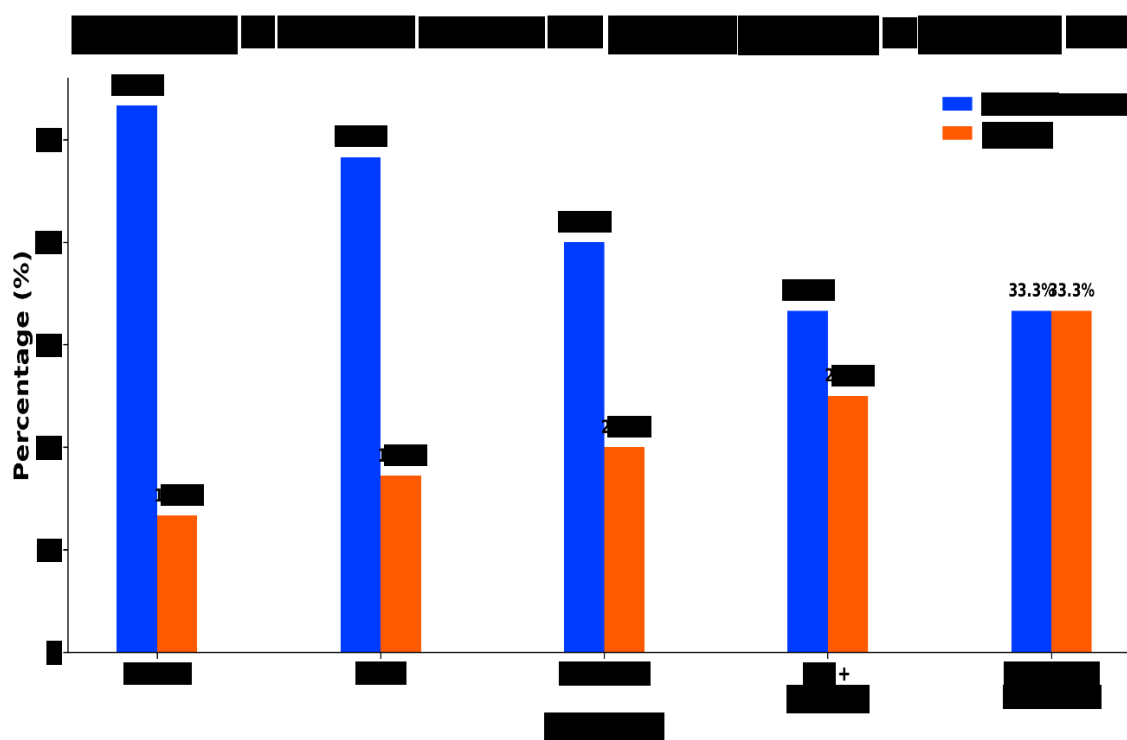


In the present study, favorable outcome (mRS 0–2) was observed in 44 patients (58.7%), unfavorable outcome (mRS 3–5) was observed in 24 patients (32.0%), and mortality (mRS 6) was observed in 7 patients (9.3%). Favorable outcome (mRS 0–2) was the most common 3-month mRS outcome among the study participants.

Table 22: Comparison of Favorable Outcome and Mortality According to Technique Used

Technique	Favorable Outcome		Mortality		Fisher Exact Value	p-value
	n	%	n	%		
ADAPT	1	100%	1	100%	0.000	0.000
SRFL	1	100%	1	100%		
Solumbra	1	100%	1	100%		
MT + Stenting	1	100%	1	100%		
Combined Procedure	1	100%	1	100%		

Graph 19: Comparison of Favorable Outcome and Mortality According to Technique Used



In the present study, favorable outcome was observed in 1 patients (100%) treated with the ADAPT technique, 1 patients (100%) treated with the SRFL technique, 1 patients (100%) treated with the Solumbra technique, 1 patients (100%) treated with MT + Stenting, and 1 patients (100%) treated with the combined procedure.

[REDACTED]

[REDACTED]

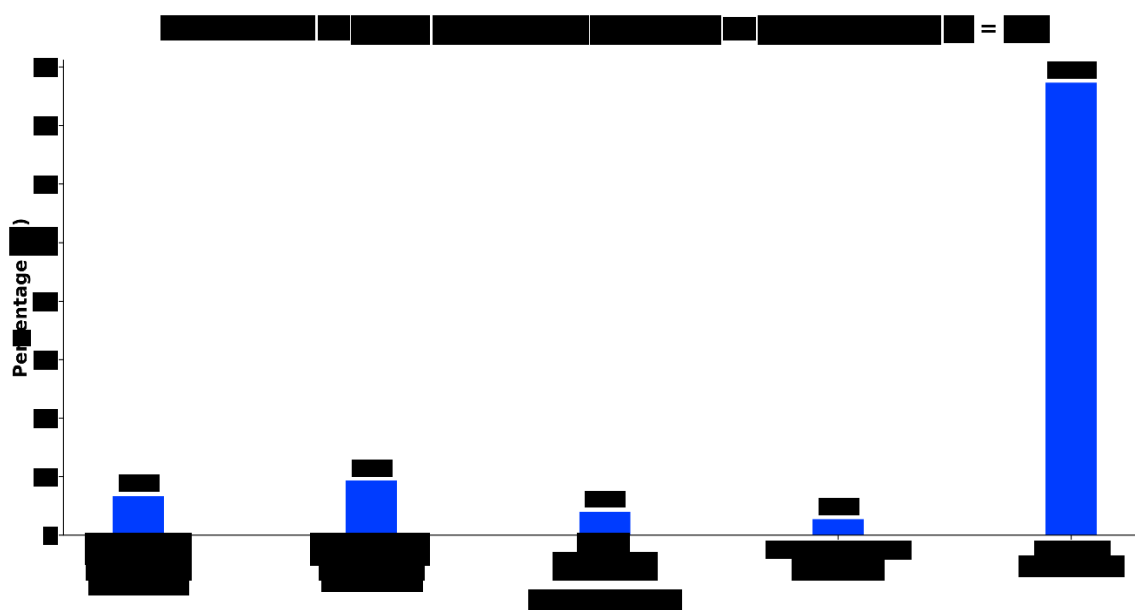
PRIMARY OBJECTIVE ■:

To Study the Complications Associated with Different Mechanical Thrombectomy Techniques.

Table 23: Distribution of Study Participants According to Complications (n = 75)

Complications	n	%
Symptomatic Intracerebral Hemorrhage	■	■%
Asymptomatic Intracerebral Hemorrhage	■	■%
Distal Embolization	■	■%
Vessel Dissection/Perforation	■	■%
No Major Complication	■	■%
Total	■	■%

Graph 20: Distribution of Study Participants According to Complications (n = 75)



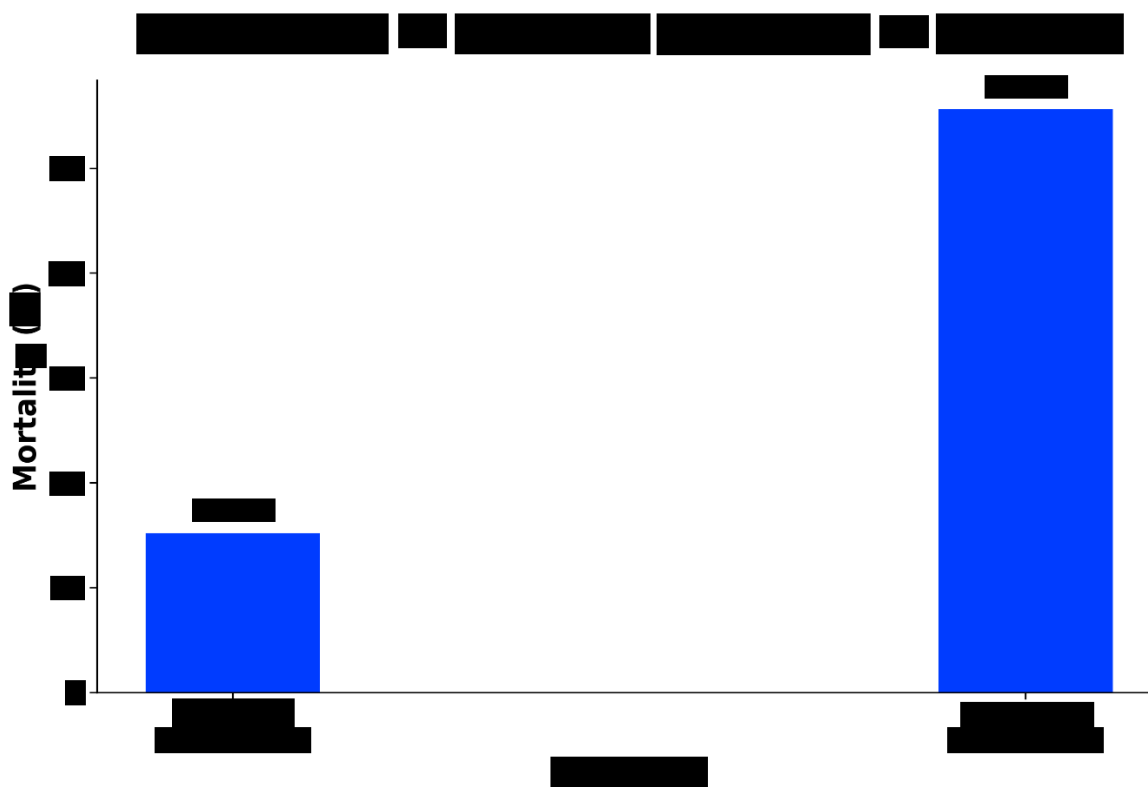
In the present study, symptomatic intracerebral hemorrhage was observed in ■ patients (■%), asymptomatic intracerebral hemorrhage was observed in ■ patients (■%), distal embolization was observed in ■ patients (■%), vessel dissection/perforation was observed in ■ patients (■%),

and no major complication was observed in ■ patients (■%). ■
■

Table 24: Comparison of Mortality According to Territory

Territory	Mortality		Fisher Exact Value	p-value
	n	%		
Anterior Circulation	■	■	■	■
Posterior Circulation	■	■		

Table 21: Comparison of Mortality According to Territory



In the present study, mortality was observed in ■ patients (■%) with anterior circulation involvement and in ■ patients (■%) with posterior circulation involvement. ■

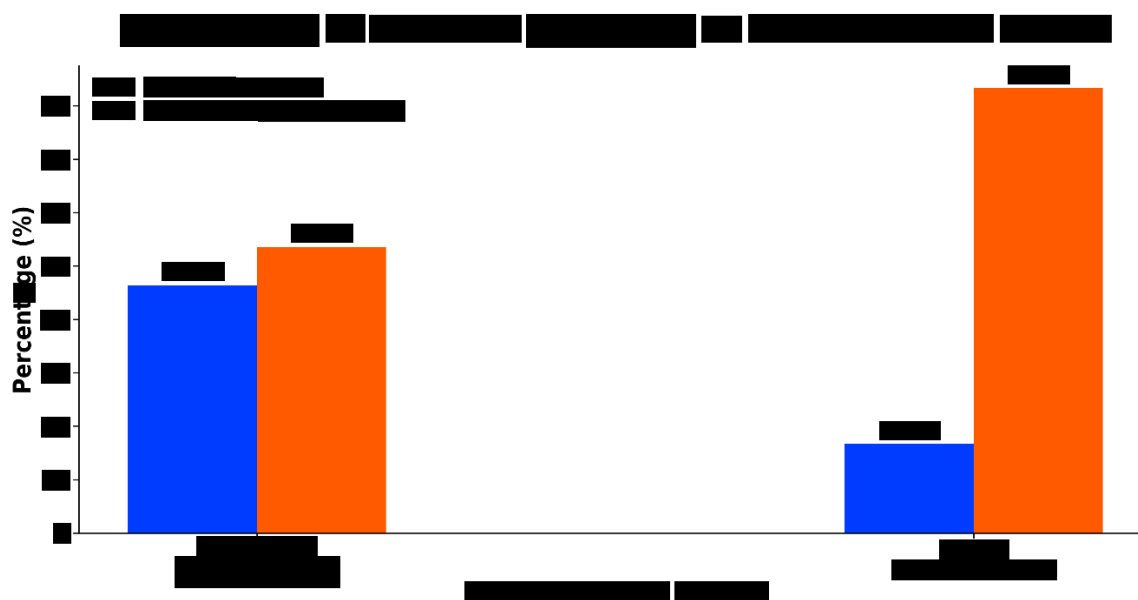
SECONDARY OBJECTIVE

To Study Relevant Intracranial Circulation Anatomy Related to Mechanical Thrombectomy

Table 25: Comparison of Outcome According to Recanalization Status

Recanalization Status	Favorable Outcome		Unfavorable Outcome/Death		χ^2	df	p-value
	n	%	n	%			
Successful Recanalization	■	■	■	■	■	■	■
Failed Recanalization	■	■	■	■			

Graph 22: Comparison of Outcome According to Recanalization Status



In the present study, among patients with successful recanalization, favorable outcome was observed in ■ patients (■%), while unfavorable outcome/death was observed in ■ patients (■%).

DISCUSSION

DISCUSSION

Acute ischemic stroke is a major global cause of death and long term disability due to large vessel occlusion. [REDACTED]

Each study variable was subsequently discussed in more detail with regard to current knowledge and compared with present findings so that a clear picture regarding the efficiency and clinical implications of different mechanical thrombectomy techniques applied in acute ischemic stroke caused by large vessel occlusion can be obtained.

In this study, out of █ patients of acute ischemic stroke who underwent mechanical thrombectomy, █ patients (██%) were █ years old, █ patients (██%) were █-█ years old, █ patients (██%) were █-█ years old and █ patients (██%) were >█ years old. █

A horizontal bar chart consisting of 15 black bars. The bars are arranged in a single column. The lengths of the bars vary, with the longest bars at the top and bottom, and the shortest bar in the middle. The bars are arranged in a single column, with the longest bars at the top and bottom, and the shortest bar in the middle.

Distribution of Study Participants According to Gender

[illegible]

More percentage of males may have happened in the present study due to a higher burden of cardiovascular risk factors like hypertension, smoking, hyperlipidemia and cardiovascular disease in the male population, leading to an increased risk of large-vessel occlusion stroke.

	1	2	3	4
1	1			
2		1		
3			1	
4				1

[illegible]

[REDACTED]

[REDACTED] (2017) suggested that the most common causes of stroke-related disability and death are large-vessel occlusion strokes that depend on clinical and radiological features, not religion, for the prognosis (13).

Distribution of Study Participants According to Clinical Features

In the present study, hemiparesis/hemiplegia was the most common clinical presentation, observed in [REDACTED] patients ([REDACTED]%), followed by facial deviation in [REDACTED] patients ([REDACTED]%), speech disturbance in [REDACTED] patients ([REDACTED]%), altered sensorium in [REDACTED] patients ([REDACTED]%), giddiness/vomiting in [REDACTED] patients ([REDACTED]%), and seizures in [REDACTED] patients ([REDACTED]%). [REDACTED]

[REDACTED]

Distribution of Study Participants According to Risk Factors

Distribution of Study Participants According to NIHSS Score

In the present study, █ patients (██%) had an NIHSS score between █–█, █ patients (██%) had an NIHSS score between █–█, and █ patients (██%) had an NIHSS score greater than █. █

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[REDACTED]

[REDACTED] Their

findings reinforce the observation that patients undergoing thrombectomy frequently present with substantial neurological deficits, similar to those documented in the present study.

Distribution of Study Participants According to Pre-event mRS

In the present study, among [REDACTED] patients with acute ischemic stroke undergoing mechanical thrombectomy, [REDACTED] patients ([REDACTED]%) had a pre-event modified Rankin Scale (mRS) score of [REDACTED], while [REDACTED] patients ([REDACTED]%) had a pre-event mRS score of [REDACTED].

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] In the present study, pre-event mRS assessment helped establish that most patients were functionally independent before stroke, thereby allowing post-treatment outcomes to be interpreted more meaningfully.

Distribution of Study Participants According to CT Findings

In the present study, early ischemic changes were observed in [REDACTED] patients ([REDACTED]%), no visible infarct changes were noted in [REDACTED] patients ([REDACTED]%), and a hyperdense vessel sign was identified in [REDACTED] patients ([REDACTED]%). [REDACTED]

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[REDACTED]

[REDACTED] Their observations

support the imaging findings documented in the present study and reinforce the importance of CT in the acute stroke pathway.

Distribution of Study Participants According to MRI Findings

In the present study, anterior circulation infarcts were observed in ■ patients (■%), posterior circulation infarcts in ■ patients (■%), and multiple territory infarcts in ■ patients (■%). [REDACTED]

[REDACTED]

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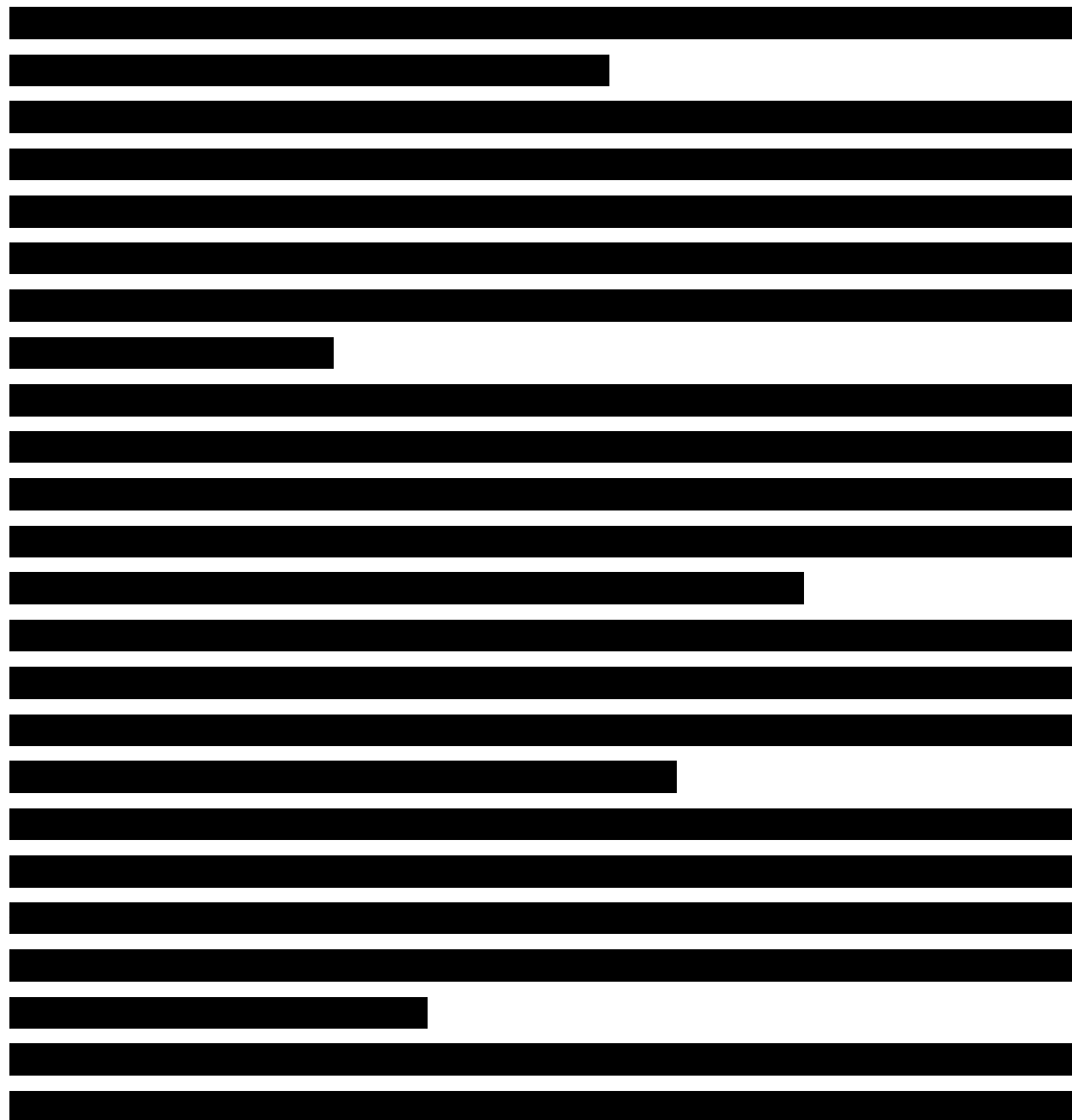
Distribution of Study Participants According to Circulation Territory

[illegible]

greater clinical recognition of dominant hemisphere symptoms such as aphasia and language dysfunction, which often result in earlier hospital presentation and treatment.

Distribution of Study Participants According to Vessel Involved

In the present study, MCA-M1 was the most commonly involved vessel, observed in █ patients (█%), followed by MCA-M2 involvement in █ patients (█%), ICA terminus involvement in █ patients (█%), basilar artery involvement in █ patients (█%), and ACA/PCA involvement in █ patients (█%). █



[REDACTED]

[REDACTED] Their findings closely parallel the vascular distribution observed in the present study.

Distribution of Study Participants According to IV Thrombolysis

In the present study, intravenous thrombolysis was administered to [REDACTED] patients ([REDACTED]%), whereas [REDACTED] patients ([REDACTED]%) did not receive intravenous thrombolysis prior to mechanical thrombectomy. [REDACTED]

[REDACTED]

with the treatment pattern observed in the present study.

[illegible]

Distribution of Mechanical Thrombectomy Techniques

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[illegible]

[REDACTED]

The longer procedure durations seen with MT+Stenting, Solumbra and the Combined procedure may be attributed to increased procedural complexity, extra device manipulation, rescue procedures, and technically demanding vascular anatomies.

Comparison of Successful Recanalization According to Technique Used

In the present study, successful recanalization was achieved in █ patients (█%), while failed recanalization was observed in █ patients (█%). [REDACTED]

[REDACTED]

In the present study, an mTICI score of 2a was achieved in 10 patients (20%), while 10 patients (20%) achieved an mTICI score of 2b.

findings are comparable with the high rate of mTICI 2b–3 reperfusion documented in the present study.

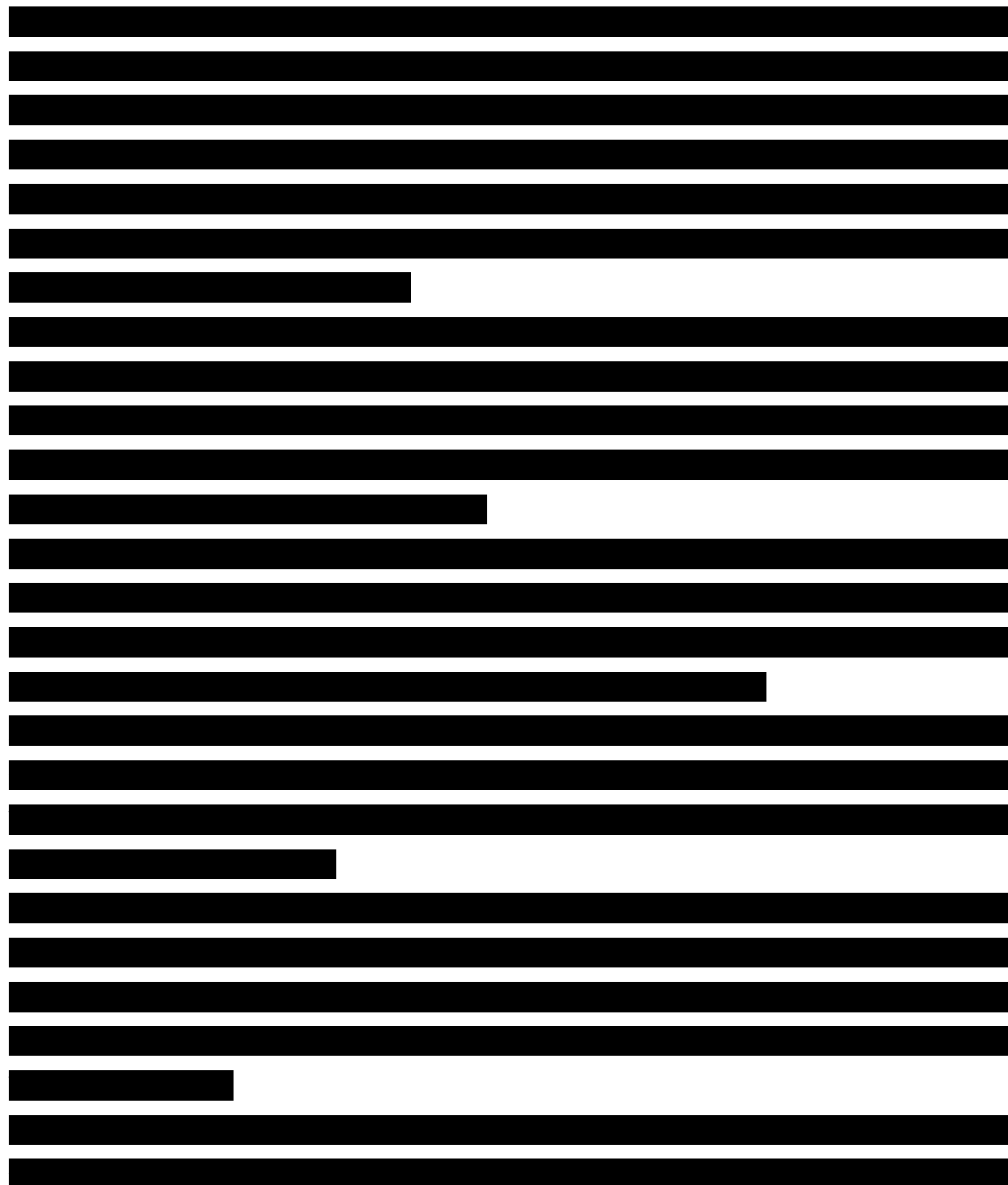
In the present study, █ patients (██%) achieved an NIHSS score of less than █ at Day █, whereas █ patients (██%) had an NIHSS score of █ or greater. █

█

█

Comparison of NIHSS Improvement According to Mechanical Thrombectomy Technique

In the present study, the degree of neurological improvement following mechanical thrombectomy varied significantly according to the thrombectomy technique employed. ■



██████████ Their findings reinforce the association between thrombectomy performance and neurological recovery observed in the present study.

The median length of hospital stay was shorter in the ADAPT technique ($\square$ days [$\square\text{--}\square$ days]) followed by the SRFL technique ($\square$ days [$\square\text{--}\square$ days]). [REDACTED]

that successful endovascular treatment improves recovery and clinical outcomes in patients with ischemic stroke (81).

In the present study, favorable functional outcome at 12 months, defined as modified Rankin Scale (mRS) 1-2, was observed in 10 patients (10%).

In the present study, no major complication was observed in 10 patients (100%), indicating that mechanical thrombectomy was performed safely in the majority of cases.

Comparison of Mortality According to Circulation Territory

[illegible]

■■■■ Their observations reinforce the significant association between recanalization status and outcome demonstrated in the present study.

STRENGTHS AND LIMITATIONS

STRENGTHS AND LIMITATIONS

Strengths of the Study

■. This study specifically targeted patients with large-vessel occlusion (LVO) acute ischemic stroke, the stroke subset where mechanical thrombectomy is most likely to be beneficial.

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[REDACTED]

[REDACTED]. MRS at [REDACTED] months showed meaningful results on overall patient outcome after procedure.

Limitations of the Study

[REDACTED]. The study was conducted in a single tertiary referral center, which may limit generalizability to other centers and other populations.

[REDACTED]

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[REDACTED]. With advancements in technology it is possible that future outcomes would not be similar to those noted in this study.

CONCLUSION

CONCLUSION

outcomes, mortality, and complications. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

In summary, this study demonstrates the feasibility and effectiveness of mechanical thrombectomy for acute ischemic stroke due to large-vessel occlusion, showing high rates of recanalization and reperfusion with acceptable safety, and advocating the use of ADAPT and SRFL as preferred first-line mechanical thrombectomy strategies in patients with acute ischemic stroke due to large-vessel occlusion selected for intervention.

SUMMARY

SUMMARY

The aim of this study was to evaluate and compare different techniques of mechanical thrombectomy for acute ischemic stroke due to large vessel occlusion. [REDACTED]

[REDACTED]

[REDACTED]

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Overall, mechanical thrombectomy was safe and effective in the treatment of large vessel occlusion stroke and it is proved to have good procedure and clinical outcome in both ADAPT and SRFL groups.

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BIBLIOGRAPHY

1. Coupland AP, Thapar A, Qureshi MI, Jenkins H, Davies AH. The definition of stroke. *J R Soc Med.* 2017;110(1):9. doi:10.1177/0141076816680121. PMID: 28084167.

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associations with clinical care and patient outcomes. *Adv Simul (Lond)*. 2025;10(1):52.
doi:10.1186/s41077-025-00383-x. PMID: 41137101.

ANNEXURES

ANNEXURES I - CONSENT FORM

I _____ hereby, give free and voluntary consent for inclusion of my patient in the clinical study “**COMPARISON OF MECHANICAL THROMBECTOMY TECHNIQUES IN PATIENTS WITH LARGE-VESSEL OCCLUSION IN ACUTE ISCHEMIC STROKE**”

Date:

I confirm that I have explained the nature of the study to the person who has signed the above consent form.

ANNEXURES II – PROFORMA

Name of the patient: _____

Age: _____ Sex: _____ Caste: _____ Religion: _____

Address: _____ Contact No.: _____

Clinical Details:

History of Present Illness

Comorbidities:

CT Brain Findings:

MRI Brain Findings:

NIHSS Score:

Cerebral Angiography Findings:

Thrombectomy performed: Yes/No

Thrombolysis Performed: Yes/ No

Type of thrombectomy performed:

Patient Outcome:

Duration of Hospital Stay:

MRS score at discharge:

Sign of Investigator

Sign of Guide

MASTER CHART