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Original Article

Comparative study of short-term outcome of accelerated dose thrombolytic therapy versus standard dose thrombolytic therapy in cases of acute lower limb ischemia

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Abstract

Aim: Acute limb ischemia is a serious disorder that threatens a patient's limbs and even life. Rapid and effective treatment is needed to maintain blood flow. This study aims to compare the short-term outcome of catheter-directed thrombolytic therapy infusion in cases of acute thrombotic lower limb ischemia using the standard regimen versus accelerated dose thrombolytic therapy.

Material and Methods: Forty-two patients with acute thrombotic ischemia Rutherford 1 and 2a, with a mean age of 55 years, were included, of whom 31 were males. All patients received thrombolytic therapy and were divided equally into two groups. The (STT) group received standard dose thrombolytic therapy, and the (ATT) group received accelerated dose thrombolytic therapy. Post-intervention, restoration of flow, limb salvage, patency, amputations, morbidities, and mortalities were evaluated.

Results: In 57% of the ATT group, successful thrombus lysis was performed versus 71% in the STT group, showing a statistically insignificant difference. The culprit arterial lesion was found in 79% of all cases. At one-month follow-up, the patency rate of ATT cases was 52%, and the failure rate was 38% versus 77% and 6% in the STT group, respectively. One-month patency showed a statistically significant difference ($p<0.026$). The amputation rate at one-month follow-up was 5% in the ATT group versus 6% in the STT group. Three patients died: Two from the STT group and one from the ATT group.

Conclusion: Compared to ATT, using STT results in better short-term outcomes regarding patency and limb salvage rates. However, ATT provides the benefit of decreased risk of bleeding and access site hematoma.

Keywords: Endovascular; acute ischemia; catheter-directed thrombolysis; lower limb

INTRODUCTON

Acute limb ischemia (ALI) refers to a sudden reduction in blood flow to the limbs due to an acute blockage in a peripheral artery or bypass graft. Without prompt treatment, the outlook for both the affected limbs and the patient's overall well-being is not favorable [1].

Embolism and thrombosis with different comorbidities make up the two main categories of etiology. The symptoms of acute limb ischemia include numbness, pain, and coldness in the lower limb [2]. An increase in ischemia can also cause paresthesia, contracture, and permanent purpura. The lower extremities' physical and imaging data should be used to determine the severity and the best course of treatment [3].

Acute limb ischemia is linked to high rates of amputation and death. A number of therapeutic approaches, such as percutaneous mechanical thrombectomy (PMT) and catheter-directed

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thrombolysis (CDT), can result in an early restoration of flow by allowing thrombus burden reduction and flow restoration and rapidly exposing the culprit lesion for prompt treatment [4,5].

Since the STILE and TOPAS studies in the 1990s, CDT has been the first line of treatment for acute limb ischemia [6]. Patients who meet the I and IIA-IIB Rutherford diagnostic categories for ALI and do not have any contraindications are now recommended for CDT [7].

Infusion of thrombolysis agents has multiple approaches that are mentioned in previous literature. These techniques include stepwise infusion, continuous infusion, graded infusion, accelerated thrombolysis, enclosed thrombolysis, pulse-spray pharmacomechanical thrombolysis, and pulse-spray infusion [8].

However, thrombolytic therapy still has some known complications, which new research aims to reduce. The most important of all is hemorrhage and its sequelae of hematoma formation, as well as other complications such as embolism, compartment syndrome, and allergic reactions [9,10].

This study aims to compare and evaluate the short-term outcome of catheter-directed thrombolytic therapy infusion regimens in patients with acute lower limb ischemia using either the standard regimen or accelerated dose thrombolytic therapy suggested by some studies regarding the impact of COVID-19 on the availability of intensive care unit (ICU) beds and the need for a shorter hospital stay.

MATERIAL AND METHODS

Our study is a comparative prospective study conducted at the vascular surgery department of a tertiary hospital. The purpose of the work was to compare the short-term outcome, demonstrated by the percentage of successful limb salvage and outflow restoration, in cases with acute lower limb ischemia treated by standard dose thrombolytic therapy (10 mg Recombinant tissue plasminogen activator (r-tPA) loading and then the remaining dose given on the course of 24 hours) versus accelerated dose thrombolytic therapy (loading dose 10 mg r-tPA, then 10 mg r-tPA every hour on the course of three hours). This comparison was performed in cases of acute lower limb ischemia and occluded lower limp arterial stents.

Patients complaining of acute ischemia with thrombotic occlusion of native arteries of the lower limbs or infra-inguinal bypass graft thrombosis with Rutherford 1 and Rutherford 2a were included in our study, and avoided including Rutherford 2b acute ischemia cases being immediately threatened and a relative contraindication to thrombolysis [9,11-13].

The strategy of catheter based thrombectomy for Rutherford grade IIb ischemia cases seems to be a suitable alternative if rapidly initiated [14].

Patients who were 80 years of age or older, those who had a history of cerebrovascular events (such as transient ischemic attacks within the previous two months), active bleeding diathesis, recent gastrointestinal bleeding (less than 10 days), intracranial trauma within the previous three months, major nonvascular surgery or trauma within the previous 14 days, uncontrolled hypertension: > 180 mm Hg systolic or > 110 mm Hg diastolic, blood glucose concentration less than 50 mg/dL, patients with a computed tomography (CT) that shows a multi-lobar infarction or intracranial tumor, recent eye surgery or retinal/ intravitreous hemorrhage, patients experiencing liver failure, especially those with coagulopathy, increased kidney function with creatinine more than 2.0 mg/dl, bacterial endocarditis, embolic occlusion, and pregnant women were excluded.

Patients were randomized into two groups, with 21 patients in each group. Each treatment group used CDT to restore arterial patency and runoff to the affected lower limb using either standard dose thrombolytic therapy or accelerated dose thrombolytic therapy.

During the study, we assessed the angiographic restoration of blood flow by completion angiography. Restoring the inline flow to the foot without requiring surgical conversion was considered successful revascularization. We also assessed limb viability, patency, the rate of minor vs. major amputation when needed, and mortality and morbidity.

Ethical Consideration

The research protocol was reviewed and approved by the Institutional Research Ethics Committee- Cairo University - Faculty of Medicine Code: MD-407-2021, Date: 17.07.2022. After participants were adequately briefed on the study's goals, their written informed consent was gathered. Subjects was free to withdraw from the study at any moment; participation was entirely voluntary. According to the Declaration of Helsinki, all steps of data collection, entry, and analysis were conducted in a highly confidential and private manner.

Methodology in Detail

All study participants were subjected to proper history taking and clinical examination, together with the required laboratory and radiological investigations.

All of the CDT techniques were carried out in the angiography suite. CO_2 angiography was left for cases with renal impairment.

The common femoral artery (CFA), which was surgically draped, served as the puncture site for lower extremity thrombolysis operations. An ipsilateral antegrade approach was performed in all cases except in obese patients or those with proximal SFA lesions, for whom a contralateral retrograde approach was performed.

Ultrasound guidance for angio-access was used to establish access in all cases. A Seldinger needle and a J-tip starter wire were used to guide the sheath into the vessel. A 6 French sheath with a side port was used, which was flushed with heparinized saline.

An initial scout diagnostic angiography was performed on the affected limb. To study the tibial runoff arteries, substantial contrast volumes and delayed imaging up to 30 seconds were required.

The next procedure was probing the occlusion with a guide wire once it was identified. To see if the clot was amenable to thrombolysis, a soft guide wire passage through the thrombus load was performed. If the wire passed with relative ease, it was considered a positive "Wire traversal test". A multi-side hole infusion catheter was then inserted to allow for the infusion of thrombolytic agents along the whole length of the thrombus if a guide wire was able to pass through it and into the runoff vessel (Table 1).

Table 1. Thrombolysis dosing agents and respective doses for adult use [9]

Agent	Dose (Catheter directed)
Alteplase	Low dose (extended infusions > 12 hours): 0.5-2.5mg/hour High dose: 0.05 mg/kg per hour up to 12 hours (or until maximum of 100mg administered)
Reteplasel	2-U bolus, then infuse 0.5-1 U/hours (should not exceed a total administered dose of 20U)
Tenecteplase	0.25-0.5mg/hour; infusion stopped if no improvements on serial arteriograms

*Dosages are for adult use (=70 kg) [9].

The thrombolytic therapy received by all patients was performed using a fountain catheter of 50 cm working distance to inject r-tPA inside the thrombus.

For the accelerated dose thrombolysis:

An initial bolus of 10mg r-tPA (recombinant tissue plasminogen activator) was administered, followed by 10 mg r-tPA per hour during the first hour , 10 mg r-tPA during the second hour, and 10 mg r-tPA during the third hour [9].

For the standard dose thrombolysis:

A 10 mg loading was given through the catheter directly inside the occlusion, and the remaining dose was given over the course of 24 hours. 500 IU/hour of unfractionated heparin was infused into the sheath in both regimens [9].

We continuously observed the patients during CDT for serial hematocrit levels, frequent puncture site assessment (hematoma), blood pressure measurement (every 10 minutes), and continuous heart rate monitoring.

The patients' level of consciousness was followed up, and any sign of severe headache or neurological deficit implied cessation of our intervention, fearing intracranial hemorrhage.

Patients were educated that during the infusion, there could be varying degrees of pain due to thrombus lysis, possible embolization and distal trash.

The treated leg was assessed for sensorimotor impairments, distal capillary refill, calf muscle discomfort, and pulse at the end of the r-tPA infusion.

Completion angiography was done to evaluate the completion of thrombus lysis and any residual thrombi or disease or affection of the runoff vessels in comparison to the scout angio (Figure 1).

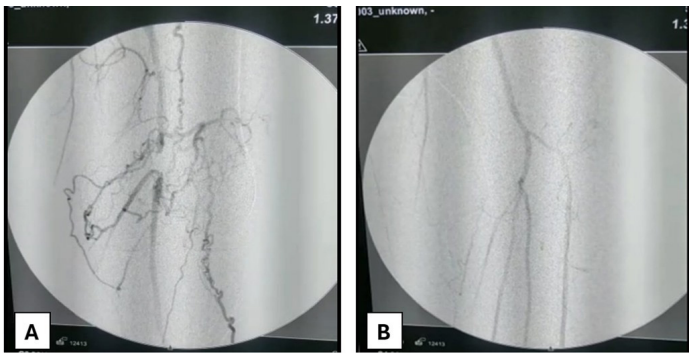

Figure 1. The intraoperative angiogram: (**A**) distal Superficial femoral artery thrombosis in a diabetic patient with acute on top of chronic popliteal and anterior tibial artery occlusion; (**B**) following accelerated thrombolysis and restoring adequate flow and pulse of anterior tibial artery.

Failure to restore arterial patency by angiography, absence of a distal pulse, and critically threatened limbs were all assigned for performance of further intervention.

Further intervention was done when necessary, including but not limited to balloon angioplasty, stenting, and extended thrombolytic therapy infusion using the standard dose of 1 mg/hr. Other options included the use of thrombolytic devices, such as pharmacomechanical treatments, and the continuation of medical treatment, such as anti-coagulants and vasodilators, along with fluid infusion and monitoring.

The criteria for procedural completion were divided into time and clinical criteria. For accelerated thrombolysis, the course of the intervention was 3 hours, while for standard thrombolysis, the intervention was performed over a course of 24 hours.

If primary patency was not achieved following accelerated dose thrombolysis after 3 hours, further procedures were performed to restore arterial perfusion and attempted limb salvage, including extended catheter-directed thrombolytic therapy infusion at the rate of 1 mg/hr for 24 hours.

If completion angiography did not achieve arterial patency, adjunctive revascularization methods were used to achieve

primary assisted patency, including surgical bypass procedures if suitable runoff was found.

Clinically, the Rutherford score improvement was used to judge limb perfusion status.

Following completion of the intervention, patients were kept on prophylactic dose anticoagulation, and compression of the access site was performed to avoid hematoma formation.

The study's primary endpoint was the angiographic restoration of flow and limb salvage. The secondary endpoints were patency as assessed by Doppler and pulse, patient morbidity and mortality, and minor versus major amputation when necessary.

Follow-up Criteria

Every two weeks following the intervention, the ankle-brachial index and toe pressures should be checked. If the ankle-brachial index decreases by more than 0.15, if there are any new symptoms, or if the healing of the wound takes longer than expected, extra evaluation should be performed. In order to preserve long-term patency, duplex ultrasonography surveillance should be carried out on bypasses to assess for the onset of stenosis [15].

Statistical Methods

Data entry was performed using SPSS (Statistical Package for Social Science) version 26.0 (IBM, SPSS, USA). The normality of parameters was assessed. Numbers and percentages were utilized for expressing categorical factors, and Fisher's exact test and chi-square analysis were used as needed. The mean, standard deviation, or median for normally distributed data and the interquartile range for non-normally distributed data were utilized for expressing continuous factors; when necessary, comparisons were made using the T test, the Mann-Whitney, and other significant tests. A P-value of less than 0.05 was deemed significant.

RESULTS

The mean age of the work participants was 58 years. There were about 74% males. Regarding comorbidities, 76% of the patients were diabetic, with no significant p-value difference between the two study groups regarding demographic data or risk factors (Table 2).

Table 2. Demographic data, comorbidities and history comparison between the two study groups

Patient demographics, comorbidities, risk factors		Standard thrombolysis group		Accelerated thrombolysis group		p-value
Age (Mean ± SD)		55.10 ± 9.98		60.90 ± 10.68		0.076
		Count	%	Count	%	
Gender	Male	13	61.9	18	85.7	0.079
	Female	8	38.1	3	14.3	
Diabetic	Yes	14	66.7	18	85.7	0.147
	No	7	33.3	3	14.3	
HTN	Yes	6	28.6	12	57.1	0.061
	No	15	71.4	9	42.9	
Smoker	Yes	12	57.1	8	38.1	0.217
	No	9	42.9	13	61.9	
No of risk factors	0	1	4.8	0	0.0	0.196
	1	12	57.1	8	38.1	
	2	4	19.0	10	47.6	
	3	4	19.0	3	14.3	
Ischemic cardiomyopathy	Yes	6	28.6	7	33.3	0.739
	No	15	71.4	14	66.7	
H/o claudication	Yes	17	81.0	19	90.5	0.663
	No	4	19.0	2	9.5	
Duration (age of thrombus)	Less than 14 days	15	71.4	17	81.0	0.469
	More than 14 days	6	28.6	4	19.0	

Abbreviations: H/o, History; HTN, Hypertension; SD, standard deviation.

Most of the patients reported no history of ischemic cardiomyopathy or claudication, as shown in Table 2. It is worth noting that > 75% of the cases presented within 14 days of thrombus formation (early presentation), with no significant difference between the two study groups regarding the thrombus age.

The pattern of the affected vessels in our study showed that a minority of patients had a popliteal and superficial femoral artery affection, and a larger proportion of the cases had tibial disease. Proximal occlusion site, including the femoropopliteal segment, represented about 22%, distal occlusion, including tibial and pedal arch affection, represented about 39%, and mixed segment affection proximal and distal about 39% with no statistical P-value significance among groups.

Regarding the outcome, as mentioned in Table 3, thrombus lysis was complete in 71% of the standard thrombolysis group versus 57% of the cases in the accelerated thrombolysis group. The incidence of port site major bleeding with the need for blood transfusion was higher by one patient assigned to the standard thrombolysis group (3; 14.3%) compared to patients assigned to the accelerated thrombolysis group (2; 9.5%); and this difference was not statistically significant.

Table 3. Intervention characteristics of both standard and accelerated thrombolysis groups

Intervention characteristics		Standard thrombolysis group		Accelerated thrombolysis group		p-value
		Count	%	Count	%	
Thrombus lysis	**Complete**	15	71.4	12	57.1	0.334
	Incomplete	6	28.6	9	42.9	
Extended antithrombotic	**Yes**	5	23.8	14	66	**0.048**
	No	16	76.2	21	100.0	
Culprit lesion	**Present**	16	76.2	17	81.0	1
	Absent	5	23.8	4	19.0	
Further intervention (PTA +/- Stent)	**Yes**	6	28.6	18	85.7	**< 0.001**
	No	15	71.4	3	14.3	
Immediate technical success	**Yes**	13	61.9	12	57.1	0.753
	No	8	38.1	9	42.9	
Run off	**Diseased**	16	76.2	19	90.5	0.410
	Healthy	5	23.8	2	9.5	
Complication (distal embolization)	**Yes**	2	9.5	13	61.9	**< 0.001**
	No	19	90.5	8	38.1	
1 month patency	**Patent**	13	76.5	11	52.4	**0.026**
	Occluded	1	5.9	0	0.0	
	Failure	1	5.9	9	42.9	
	Died	2	11.8	1	4.8	
Amputation	**Yes**	1	4.8	1	4.8	1
	No	20	95.2	20	95.2	

Abbreviations: PTA, percutaneous transluminal angioplasty.

Immediate technical success (restoration of angiographic patency) was 62% in the standard thrombolysis group versus 57% in the accelerated thrombolysis group, which had no statistically significant difference.

Extended thrombolysis was needed in 66% of the accelerated thrombolysis group versus 24% of the standard thrombolysis group, with a significant $p < 0.05$. Also, there was a significant difference between the two groups regarding the need for further

endovascular intervention to restore adequate arterial flow and achieve technical success (86% of the accelerated thrombolysis group versus 24% in the standard group), with a $p < 0.001$.

Distal embolization was 10% in the standard thrombolysis group versus 62% in the accelerated thrombolysis group, and this variation was statistically significant ($p < 0.001$).

The findings of our one-month follow-up of patients as regards patency were 77% in the standard thrombolysis group versus 53% in the accelerated thrombolysis group. The failure rate at one-month follow-up was 43% in the accelerated thrombolysis group versus 6% in the standard thrombolysis group. These results were statistically significant ($p < 0.05$) (Table 3 and Figure 2).

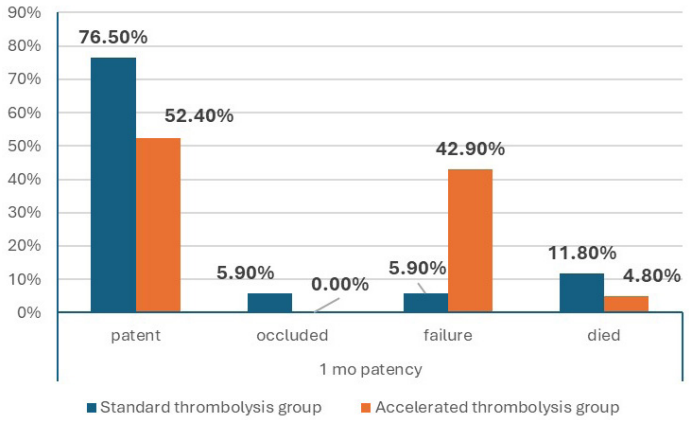

Figure 2. One-month patency outcome in both study groups.

Table 4. Complications and outcome in standard and accelerated thrombolysis group in relation to age of thrombus

Standard thrombolysis group		Duration (age of thrombus)				p-value
		Less than 14 days (n = 15)		More than 14 days (n = 6)		
		Count	%	Count	%	
Complication (distal embolization)	Yes	2	13.3	0	0.0	1
	No	13	86.7	6	100.0	
Immediate technical success	Yes	9	60.0	4	66.7	1
	No	6	40.0	2	33.3	
1 month patency	Patent	9	69.2	4	100.0	1
	Occluded	1	7.7	0	0.0	
	Failure	1	7.7	0	0.0	
	Died	2	15.4	0	0.0	
Extended antithrombotic	Yes	2	13.3	3	50.0	0.115
	No	13	86.7	3	50.0	
Accelerated thrombolysis group		**Duration (age of thrombus)**				**p-value**
		Less than 14 days (n = 17)		**More than 14 days (n = 4)**		
		Count	**%**	**Count**	**%**	
Complication (distal embolization)	Yes	11	64.7	2	50.0	0.618
	No	6	35.3	2	50.0	
Immediate technical success	Yes	10	58.8	2	50.0	1
	No	7	41.2	2	50.0	
1 month patency	Patent	10	58.8	1	25.0	0.421
	Failure	6	35.3	3	75.0	
	Died	1	5.9	0	0.0	
Extended antithrombotic	Yes	17	100.0	4	100.0	----
	No	0	0	0	0	

Overall, in all 42 patients of our study, the thrombus age, whether the patient presented early in the acute phase (< 14 days) or late (> 14 days), was compared with the incidence of complications of distal embolization, technical success, patency, and the use of extended antithrombotic therapy. It was found that distal embolization occurred more often in cases presenting in the acute phase (41%) but without a statistically significant difference ($p > 0.05$). The overall technical success rates and one-month patency were comparable in both early and late groups, with no statistically significant difference; however, it is worth mentioning that three patients of all study participants died, and the three presented in the acute phase.

Also, comparison of each of the study groups separately showed the same results with no significant difference between early and late presentation (Table 4).

DISCUSSION

Acute ischemia of the lower limbs is a frequent vascular surgical emergency and remains a major contributor to both morbidity and mortality [16]. Prompt recognition, careful evaluation, and timely treatment are essential to preserve the affected limb and reduce the risk of major amputation [17]. Early diagnosis and timely restoration of blood flow, whether through CDT or open surgery, are vital to lowering the chances of limb loss and mortality. Continuous intra-arterial CDT is a viable option for managing ALI and can offer outcomes comparable to surgery, achieving technical success rates of roughly 80% to 90% [18]. Catheter-directed thrombolysis provides an emerging treatment that is critical for acute limb ischemia [11]. Different authors have suggested different doses and complementary treatments to further complement catheter-directed thrombolysis; however, no Food and Drug Administration (FDA) approval has been granted for using r-tPA to treat acute ischemic thrombosis of the lower limbs yet.

In light of our results, we tried to relate the relevance of using accelerated and standard dose thrombolytic therapy regimens and relate the thrombus age to the complications, technical success, one-month patency, access site bleeding, and amputation-free survival of each regimen.

This study provided a chance to compare two distinct intra-arterial thrombolysis treatment techniques with continuous heparin and to assess the variables related to bleeding and technical success. In terms of limb salvage and survival, the standard thrombolysis group's treatment regimens had better success rates than the rapid thrombolysis group.

This study determined a mean age of 58 years, 74% males, and 76% of the patients were diabetic, whereas the mean ± SD age of the patients was 66 ± 5 years, the majority were male (64%), and diabetes was present in 30% as reported in a systematic review by Ebben et al [19].

In this study, > 75% of the cases presented within 14 days of thrombus formation (early presentation), with no significant difference between the two study groups regarding the thrombus age compared to findings of Barac et al. where 30 patients (18.98%) had a symptom duration of less than 24 hours before admission, 60 patients (37.97%) had symptoms for 2–7 days, 30 patients (18.98%) for 7–14 days, and 38 patients (24.05%) experienced symptoms for more than 14 days [20].

In this study, a larger proportion of the cases had tibial disease affection, proximal occlusion site, including the femoropopliteal segment, represented about 22%, distal occlusion, including tibial and pedal arch affection, represented about 39%, and mixed segment affection, proximal and distal, about 39%.

Teodoro et al. in their research found that the main arteries occluded were the arteries of the leg (tibial and fibular) (78.1%), the superficial femoral-popliteal segment (79.05%), and the common femoral artery (54.29%) [21].

In our study, the amputation-free survival was nearly 95% in each treatment group. This was comparable to the findings of the study performed by Grip et al., investigating the results and side effects of intra-arterial thrombolysis for lower limb ischemia, who found an 83.6% amputation-free survival rate [22]. As highlighted in Swischuk et al., the amputation-free survival at 30 days reached 93% [23].

The lowest effective dose of r-tPA has not yet been identified, despite numerous trials demonstrating its effectiveness over a broad range of doses. A greater dose of r-tPA may be beneficial for patients suffering from acute ischemia since it can accelerate thrombolysis and restore blood flow more quickly [24]. Faster thrombolysis with a higher dose of r-tPA is discredited by a higher rate of bleeding complications, and it is very important to weigh the bleeding risk for each case.

Comparing our results to other trials that were done involving thrombolytic therapy, such as Taha et al., they mentioned that technical success at one month in the endovascular revascularization group was 81%. The failure rate at one month, as in re-thrombosis, was 15% and an amputation rate of 6.5% and a one-month mortality rate of 5% were found [25]. In concordance, large studies have discussed the effect of CDT, such as the Natali Database study of 2004, which retrospectively analyzed 1139 cases of acute ischemia treated with CDT. At 30 days, amputation-free survival was 75.2%, the amputation rate was 12.4%, and mortality was 12.4% [26]. At 30-day follow-up, the endovascular group had better patency (83·0 *versus* 78·6 per cent; $p < 0·001$). Amputation rates were similar at 30 days (7·0 per cent in the endovascular group *versus* 8·2 per cent in the open group; $p = 0·113$) as mentioned by Grip, O.et al. [27]. Similarly, in a retrospective cohort study by Poursina et al, technical success was achieved in 58 patients (97%), with

open conversion required in two patients (3%). At 30 days postoperatively, 52 patients (87%) survived, and 53 (88%) had successful limb salvage [28].

Another important study was performed by Ebben et al, which included one hundred and six studies: 19 randomized controlled trials (RCTs), 38 prospective studies, 48 retrospective studies, and one mixed cohort study. The studies comprised a total number of 10,643 cases, of which 9877 received CDT for lower extremity arterial occlusion, with a mean treatment duration of 21.4 hours (95% confidence interval (CI) 21.0–21.8), an angiographic patency of 75% [19].

As for our results, the overall patency rate after one month was 57%, specifically 77% in the standard thrombolysis group versus 53% in the accelerated thrombolysis group. The failure rate at one-month follow-up was 24%, specifically 43% in the accelerated thrombolysis group versus 6% in the standard thrombolysis group. Regarding amputation rates, two patients, 1 in each group, underwent amputation, representing 5% of the study population. Unfortunately, after one month, a total of 3 cases died, 2 in the standard thrombolysis group and 1 in the accelerated thrombolysis group, representing 7% of all study cases. Lukasiewicz et al reported that successful thrombolysis (grades 2 and 3) was observed in 37 patients (90.2%). Successful thrombolysis occurred in 30 (73.2%) patients after receiving 40 mg rt-PA and in seven (17.1%) patients after an additional course of rt-PA (total 80 mg rt-PA) [29].

Thrombolysis failed in four patients (9.8%). In two patients, significant outflow compromise was observed during angiography [24]. Falkowski et al reported successful thrombolysis in 83.5% of cases, with overall clinical success reaching 88.7%. The 30-day amputation-free survival rate was 93.8%. Major bleeding complications were observed in 10 patients (10.3%), while there were two deaths (2.1%) and four amputations (4.1%). Over the long term, 70% of patients remained free from amputation [30]. It is worth mentioning that in a retrospective analysis of prospective databases from Uppsala University Hospital and the Vascular Centre, Malmö, achieved technical success in 80.2%, reported major amputation and death within 30 days in 13.1% and 4.4% respectively. Bleeding complications occurred in 227 treatments (30.3%). Blood transfusion was required in 104 (13.9%) [22].

Limitations

Careful patient selection and resource assessment, including but not limited to ICU availability, can affect the decision to intervene in patients. It is to be noted that some of our interventions were performed during the COVID-19 pandemic, when resources, such as ICU beds, were sometimes scarce, and this was taken into consideration in the decision-making process for patient interventions.

The sample size of this study should be bigger to avoid statistical errors.

This study encompasses the usage of CDT protocols and should be compared to the outcomes of management of acute thrombotic cases managed by other modalities, such as surgical, hybrid and other pharmacomechanical modalities.

CONCLUSION

In conclusion, success rates with standard thrombolytic therapy had better short-term outcomes regarding patency and limb salvage rates versus the accelerated thrombolysis group. While accelerated thrombolysis provides the benefit of a decreased risk of bleeding and access site hematoma.

Ethics Committee Approval: Research Ethics Committee-Cairo university - Faculty of Medicine, Code: MD-407-2021, Date: 17.07.2022.

Patient Consent for Publication: All patients signed an informed consent and had the procedure explained to them before any intervention was done.

Data Sharing Statement: The data that support the findings of this study are available from the corresponding author upon reasonable request.

Author Contributions: All authors contributed equally to the article.

Conflict of Interest: The authors declared no conflicts of interest with respect to the authorship and/or publication of this article.

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