Section: CTVS

Original Research Article

ROLE OF THROMBOLYSIS IN THE COMPREHENSIVE MANAGEMENT OF DEEP VEIN THROMBOSIS: A SINGLE-CENTER STUDY

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ABSTRACT

Background: Deep vein thrombosis (DVT) poses a substantial threat to patients, potentially resulting in permanent disability and significant morbidity and mortality. Current standard management involves anticoagulant therapy, graduated elastic compression stockings, and early ambulation. While thrombolysis has traditionally been reserved for complicated cases, this study aimed to assess the efficacy of thrombolysis in patients with varying presentations of DVT.

Materials and Methods: This retrospective study was conducted at a tertiary level hospital (SMS Medical College, Jaipur, Rajasthan) from August 2012 to August 2022. A total of 1289 patients with DVT were enrolled in a single unit of the Department of Cardiovascular and Thoracic Surgery. All patients underwent a combined approach of thrombolysis and anticoagulation, utilizing standard doses of urokinase and streptokinase.

Results: In all cases, patients exhibited recovery from DVT, as confirmed by Doppler imaging, with no instances requiring referral for venous filters. Aggressive management incorporating thrombolysis alongside anticoagulation demonstrated complete resolution of DVT in every case. Timely administration of thrombolysis proved effective in preventing the necessity for inferior vena cava (IVC) filters or surgical interventions.

Conclusion: This study highlights the efficacy of thrombolysis as an integral component in the comprehensive management of DVT. The findings suggest that a combined approach with anticoagulation and timely thrombolysis can lead to complete resolution of DVT, thus mitigating the need for further interventions such as IVC filters or surgery.

Keywords: Deep Vein Thrombosis, Pulmonary Thrombo-Embolism, Post Thrombotic Syndrome, Thrombolysis.

INTRODUCTION

Deep vein thrombosis (DVT) is a significant medical concern, with incidence estimates ranging widely from 350,000 to 600,000, and some sources suggesting numbers as high as 2 million, contributing to a mortality range of 100,000 to 650,000 deaths.[1-4] The sequelae of chronic DVT and the development of post-thrombotic syndrome (PTS) necessitate a thorough exploration of aggressive management strategies. Existing evidence suggests that thrombolysis, particularly with conventional doses of urokinase and streptokinase, holds promise as a standard treatment for both DVT and DVT with PTS. While anticoagulation with heparin and oral anticoagulants remains a cornerstone in DVT management, it may prove insufficient in some cases, prompting the need for more comprehensive approaches such as thrombolysis. Notably, thrombolysis has demonstrated complete curative potential for the majority of cases, offering the prospect of an improved quality of life.

As a government institute, our center provides essential injections such as urokinase and streptokinase at no cost to patients. This accessibility facilitates the implementation of aggressive management strategies in treating DVT. Despite the availability of effective interventions, the recognition of post-thrombotic syndrome as a frequent and serious long-term complication of DVT underscores the importance of further investigation into optimal management approaches.

Recent literature emphasizes the evolving landscape of DVT management, urging a reevaluation of treatment paradigms.[5-7] This review aims to critically assess the current understanding of aggressive management strategies, particularly thrombolysis, in the context of chronic DVT and its associated complications. By synthesizing recent findings, we aim to contribute to the ongoing discourse on refining the recommended management protocols for DVT and improving patient outcomes.

MATERIAL AND METHODS

Study Design and Participants

This prospective study was conducted at a tertiary-level institute, the Cardiovascular and Thoracic Surgery Department of S.M.S. Medical College, Jaipur, Rajasthan. The study included 1289 patients diagnosed with deep vein thrombosis (DVT) through clinical and duplex examinations. Participants were recruited from those admitted to our unit between August 2012 and August 2022. Written informed consent was obtained from each enrolled patient or from their family after a comprehensive explanation of the study's purpose and the associated treatment risks.

Intervention

All patients diagnosed with DVT underwent thrombolysis using urokinase or streptokinase. The selection of thrombolytic agent was based on standard protocols and the patient's medical condition. Thrombolysis was administered in accordance with established guidelines, following the receipt of informed consent.

Exclusion Criteria

Participants meeting any of the following criteria were excluded from the study:

1. Presence of contraindications for thrombolytic agent use, such as a history of major bleeding, recent delivery, or major surgery within 10 days prior to the study onset.
2. Undergoing neurosurgical intervention within the past three months.
3. Recent significant trauma or a known disease with a heightened risk of hemorrhagic complications.
4. Failure to provide informed consent for participation in the study.

Ethical Considerations

This study adhered to the ethical principles outlined in the Declaration of Helsinki. The research protocol was approved by the institutional review board, ensuring the protection of participants' rights and welfare throughout the study duration.

Data Collection and Analysis

Clinical data, including demographic information, medical history, and outcomes of thrombolysis, were systematically recorded. Statistical analyses were conducted using appropriate methods to assess the effectiveness of thrombolysis in the study cohort.

Follow-up

Patients were regularly followed up to monitor their progress and to assess any potential complications arising from the intervention. The duration and frequency of follow-up visits were predefined in the study protocol.

Management Protocol

Thrombolysis

All patients diagnosed with deep vein thrombosis (DVT) underwent thrombolysis using either urokinase or streptokinase. The preferred thrombolytic agent was urokinase due to its lower antigenicity and reduced complications like fever. In cases where urokinase was not readily available through routine government supply, streptokinase (STK) was employed.

Urokinase Thrombolysis

- Loading Dose: 4400 IU/kg
- Maintenance Dose: 2200 IU/kg/hr
- Duration: 24 to 36 hours or until symptom relief
- Streptokinase (STK) Thrombolysis:
- Loading Dose: 2.5 lacs IU
- Maintenance Dose: 1 lacs IU/hr

Duration: 24 to 36 hours or until symptom subsidence

Anticoagulation

Following thrombolysis, patients received anticoagulation therapy, consisting of continuous intravenous heparin administration at a rate of 1000 IU/hr. Additionally, oral anticoagulants, including aspirin and acitrom, were prescribed to achieve an international normalized ratio (INR) greater than 2.5. Once the standard INR was achieved, intravenous heparin was discontinued, and only oral anticoagulation was continued. The oral anticoagulant dosage was adjusted to maintain an INR in the range of 2.0 to 3.0.

Supportive Management

Patients received supportive measures such as elastic stocking compression (ECS), limb elevation, and anti-inflammatory agents to complement the thrombolytic and anticoagulation therapy.

Therapeutic Choice Adjustment

In cases where fever occurred during thrombolysis with streptokinase, a substitution to urokinase was implemented to manage complications effectively.

Discharge and Follow-up

Patients were discharged with recommendations for continued oral anticoagulant therapy, maintaining the prescribed INR levels. Regular follow-up appointments were scheduled to monitor patient

progress and address any potential complications or concerns arising during the post-treatment period.

RESULTS

Demographic Characteristics of Patients

1. Age:
   - The age range of the enrolled patients varied from 18 years to 76 years.
2. Sex:
   - Male: 754 (58.48%)
   - b. Female: 535 (41.51%)
3. Affected Part:
   - a. Left Lower Limb: 937 (72.66%)
   - b. Right Lower Limb: 272 (21.11%)
   - c. Left Upper Limb: 39 (0.03%)
   - d. Right Upper Limb: 25 (0.02%)
   - e. Bilateral Lower Limb: 13 (0.01%)
   - f. Bilateral Upper Limb: 4 (0.003%)
4. Thrombolysis:
   - Urokinase: 670 (52.25%)
   - Streptokinase: 619 (47.75%)
5. Duration:
   - a. Acute: 433 (33.56%)
   - b. Chronic (>14 days): 780 (60.55%)
   - c. Recurrent: 76 (5.88%)
6. Complications:
   - a. Bleeding: None reported
   - b. Fever: 25 cases (Only observed in patients treated with Streptokinase)

These observations provide a comprehensive overview of the demographic characteristics, distribution of affected limbs, thrombolysis methods, duration of the condition, and complications among the enrolled patients. Notably, the majority of patients were male, with the left lower limb being the most frequently affected. The use of urokinase for thrombolysis was slightly more prevalent than streptokinase, and the chronic duration of DVT cases constituted a substantial proportion. Additionally, fever as a complication was exclusively observed in patients treated with streptokinase.

DISCUSSION

Deep vein thrombosis (DVT) is a prevalent vascular disorder with potentially severe consequences, demanding diligent exploration of effective management strategies. Our study, conducted at the Cardiovascular and Thoracic Surgery Department of S.M.S. Medical College, Jaipur, Rajasthan, sheds light on various aspects of DVT management, encompassing patient demographics, thrombolysis protocols, treatment duration, and observed complications. The age range of our diverse patient cohort, spanning from 18 to 76 years, underscores the broad spectrum of individuals susceptible to DVT. This demographic variation is in line with existing literature on the condition, emphasizing the importance of considering age as a relevant factor in tailoring management approaches.[4]

Gender distribution revealed a higher prevalence of DVT in males (58.48%) compared to females (41.51%), aligning with established trends reported in epidemiological studies.[1,4] This discrepancy might be attributed to various factors, including hormonal differences and lifestyle variations, warranting further investigation into gender-specific risk factors. The predominance of left lower limb involvement (72.66%) highlights the asymmetric distribution of DVT in our study population. The lower extremities' higher susceptibility aligns with the typical anatomical distribution of DVT, emphasizing the importance of meticulous evaluation and management of lower limb symptoms in clinical practice.[5]

Our thrombolysis protocol, predominantly utilizing urokinase (52.25%) and, to a lesser extent, streptokinase (47.75%), underscores the diverse pharmacological interventions available for DVT management. Notably, the choice of urokinase was favored due to its lower antigenicity and reduced complication rates, aligning with contemporary evidence supporting its use.[2,8]

The majority of our patients presented with chronic DVT (>14 days), comprising 60.55% of the study population. This emphasizes the significance of addressing prolonged and persistent cases, as chronic DVT poses unique challenges and requires tailored management strategies.[5,6]

In terms of complications, bleeding events were notably absent, emphasizing the safety of the thrombolysis protocols employed. However, fever was observed in 25 cases, exclusively in patients treated with streptokinase. This finding aligns with existing literature, highlighting the need for careful monitoring and potential adjustments in cases where complications arise during thrombolytic therapy.[3,9]

Our study's strengths include a robust sample size, rigorous thrombolysis protocols, and a comprehensive analysis of demographic and clinical variables. However, limitations, such as the single-center design and retrospective nature, warrant consideration in interpreting the findings.

CONCLUSION

In conclusion, our study contributes valuable insights into the nuanced management of DVT. The observed demographic trends, thrombolysis preferences, and complication profiles provide a foundation for further research and refinement of treatment protocols, ultimately enhancing patient outcomes in the challenging landscape of deep vein thrombosis.

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