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Review Article

Implemented Protocol Regarding Recombinant Tissue Plasminogen Activator Administration for Nurses: An Updated Review

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Abstract

There are several thrombolytic agents in use; however, this article will focus on tissue type plasminogen activator (TPA). A thorough understanding of the benefits and risks associated with thrombolytic administration will be critical in the successful utilization of this form of therapy. Recent data show that infarct size is linked to mortality. In the 1980s, therapy for acute myocardial infarction (AMI) patients is directed at salvaging myocardium and limiting infarct size. Before this, therapy consisted mainly of supportive care that resulted only in minor effects on the patients prognosis. Intracoronary thrombus has recently been recognized as the cause in most cases of AMI. Thrombolytic therapy represents a method of dissolving a thrombus and reestablishing blood flow to the previously occluded coronary artery. Early reperfusion of ischemic myocardial tissue can limit the amount of damage caused by evolving myocardial infarction. There is a need for a standard protocol for the improvement of knowledge and practice regarding recombinant tissue plasminogen activator administration.

Keywords: Nurse, plasminogen activator, recombinant tissue

Introduction

Intravenous thrombolytic therapy is rapidly gaining acceptance in the care of acute myocardial infarction (AMI) patients. There are several thrombolytic agents in use; however, this article will focus on tissue type plasminogen activator (TPA). A thorough understanding of the benefits and risks associated with thrombolytic administration will be critical in the successful utilization of this form of therapy. Recent data show that infarct size is linked to mortality. In the 1980s, therapy for AMI patients is directed at salvaging myocardium and limiting infarct size. Before this, therapy consisted mainly of supportive care that resulted only in minor effects on the patients prognosis. Intracoronary thrombus has recently been recognized as the cause in most cases of AMI. Thrombolytic therapy represents a method of dissolving a thrombus and reestablishing blood flow to the previously occluded coronary artery. Early reperfusion of ischemic myocardial tissue can limit the amount of damage caused by evolving myocardial infarction.

Intervention with thrombolytic therapy in the early hours of AMIs has been associated with reduction in the infarct size, improvement in left ventricular function, and reduction in mortality. Nursing plays a critical role in ensuring the successful use of thrombolytic therapy by early identification of appropriate patients and accurate administration of the thrombolytic agent.[1]

In the past decade, thrombolytic therapy has become standard treatment of AMI. When the importance of thrombosis in the pathogenesis of acute infarction was fully recognized, several plasminogen activators were developed, streptokinase, urokinase, recombinant tissue-TPA (TPA, alteplase), anistreplase, and saruplase (prourokinase).

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Thrombolytic agents are plasminogen activators which possess as a characteristic the ability to activate plasminogen to plasmin and result in fibrinolysis and varying degrees of depletion of circulating fibrinogen, factor V and factor VIII. A lot of animal experiments provided the basis for the rationale that recanalization and reperfusion early in the course of myocardial infarction would limit myocardial necrosis, improve left ventricular function, and improve patient outcome. Native tissue plasminogen activator (TPA) is normally secreted by vascular endothelium and the most important property of the drug is its relative fibrin specificity. Fibrin strikingly increases the rate of conversion of plasminogen to plasmin by TPA.[2]

Nursing protocol for patients treated with thrombolysis for acute ischemic stroke developed during the stroke association phase of the third international stroke trial (IST-3), a randomized controlled trail of recombinant TPA (RTPA) for acute ischemic stroke.

The IST-3 nurse collaborative group met 3 times over 3 years. Lack of knowledge, fear of bleeding complications, and lack of appropriate NHS beds were common barriers. Core nursing requirements suggested by this research included: Fast tracking of patients; access to trained stroke physicians; acute physiological monitoring and nursing intervention; effective communication and support of patients and careers; knowledge of complication and actions to be taken; transfer to an appropriately skilled stroke unit environment; and successful discharge planning to home or rehabilitation.[3]

The development of comprehensive nursing protocols is basic to a nursing quality control program. Most nursing tasks are carried out at the initiative of the nurses rather than in direct response to a physician order. The physician makes the medical decisions about medications, diet, and so on; but, the nurses must fill in the details to ensure that the patient receives comprehensive nursing care.

The nursing staff must also ensure that nursing services are rendered if the physician is derelict in writing basic orders. While a careful nursing staff will quickly call this problem to the attention of the attending physician, this can delay the patient's care. Since a principal goal of a legally effective quality control program is to reduce litigation through increased patient satisfaction, the delay poses a problem, since it will reduce patient satisfaction even if it does not result in an injury.[4]

Researcher assumes that the nurses have an important role in administration of tissue plasminogen. The nurses should know the assessment of patient and calculation of dose of drugs nurses is working in ICU. Hence, nurses should be attentive and focusive in regard to services which are rendered to the patients. A nurse plays an important role in administration of TPA in stroke and MI patient.

The investigator found that the nurse's knowledge of the administration of tissue plasminogen in stroke patient and its applicability in practices provides accurate decision-making ability during critical care is not adequate. There is a need to update knowledge regarding administration of RTPA. This observation encouraged the investigator to conduct the study of RTPA administration. The objective of the review article was to implement protocol regarding RTPA administration for nurses.

Review of Literature Regarding Problem

Reviewing of literature is important for understanding and gaining insight into the problem, which is necessary for the development of the conceptual content. In other words, review of literature means the activities involved in identifying and pursuing research to unravel information related to the topic and develop a comprehensive idea regarding the topic. It is also used to designate or write summary of the state of the art on a research problem.[5]

Review of literature helps the researcher in many ways starting from selection contemplator about the problem, to identify what is known and not known about topic, to develop a theoretical or conceptual framework for the study, and to assess feasibility to plan and study methodology.

This study represents a review of selected literature relevant to the study and it consists of the following headings.

- Review of literature related to S.O.P.
- Review of literature related to RTPA
- Review of literature related to nursing protocol on tissue recombinant plasminogen activator administration.

Review of Literature Related to S.O.P.

The National Institute of Neurological Disorders and Stroke (n = 624 patients) and ECASS III (n = 821 patients) are two pivotal randomized controlled trials providing evidence for the use of intravenous TPA within 3 h or 3–4.5 h from stroke onset, respectively. Both trials have shown that TPA administration decreases disability at 90 days from stroke. Furthermore, a recent pooled analysis of randomized controlled trial (2010, n = 3670 patients) supports these results, highlighting that early stroke treatment is associated with better outcomes, especially when treatment is started within 90 min of stroke onset (but suggesting that the benefit could be afforded within a 4.5 h time window).

Three major observational trials, STARS (n = 389 patients), CASES (n = 1135 patients), and SITS-MOST (n = 6483 patients), have reported acceptable safety and efficacy in clinical practice. However, only a small proportion of acute ischemic stroke patients receive TPA in clinical practice, because of the limited availability of TPA-utilizing sites and suboptimal use of TPA in sites where it is available. TPA reduces disability in stroke patients.[6]

Stroke is the second most common cause of death and major cause of disability worldwide. Because of the ageing population, the burden will increase greatly during the next 20 years,

especially in developing countries. Advances have occurred in the prevention and treatment of stroke during the past decade.

For patients with acute stroke, management in a stroke care unit, intravenous TPA within 3 h or aspirin within 48 h of stroke onset, and decompressive surgery for supratentorial malignant hemispheric cerebral infarction are interventions of proven benefit; several other interventions are being assessed. Proven secondary prevention strategies are warfarin for patients with atrial fibrillation, endarterectomy for symptomatic carotid stenosis, antiplatelet agents, and cholesterol reduction. The most important intervention is the management of patients in stroke.[7]

Review of Literature Related to RTPA

TPA (abbreviated TPA or PLAT) is a protein involved in the breakdown of blood clots. It is a serine protease (EC 3.4.21.68) found on endothelial cells, the cells that line the blood vessels. As an enzyme, it catalyzes the conversion of plasminogen to plasmin, the major enzyme responsible for clot breakdown. Because it works on the clotting system, TPA (such as alteplase, reteplase, and tenecteplase) is used in clinical medicine to treat embolic or thrombotic stroke. Use is contraindicated in hemorrhagic stroke and head trauma. The antidote for TPA in case of toxicity is aminocaproic acid.

TPA may be manufactured using recombinant biotechnology techniques. TPA created that this way may be referred to as RTPA.[8]

RTPA is used in some cases of diseases that feature blood clots, such as pulmonary embolism, myocardial infarction, and stroke, in a medical treatment called thrombolysis. The most common use is for ischemic stroke. It can either be administered systemically, in the case of AMI, acute ischemic stroke, and most cases of acute massive pulmonary embolism, or administered through an arterial catheter directly to the site of occlusion in the case of peripheral arterial thrombi and thrombi in the proximal deep veins of the leg.[9]

Review of Literature Related to Nursing Protocol on Tissue Recombinant Plasminogen Activator Administration

This study evaluates the efficacy of our protocol using intra-arterial infusion of TPA on free flap salvage following venous thrombosis.

A retrospective review was conducted of every free flap performed by a single surgeon since the beginning of his practice. Free flap salvage rates were documented following flap exploration, intra-arterial infusion of TPA, and revision of the venous anastomosis, with or without vein grafting. One hundred and twenty-two free tissue transfers were performed from July 2003 through April 2006. Twelve anastigmatic complications occurred in 11 flaps (1 arterial thrombosis and 11 venous thromboses).

One free muscle flap failed due to arterial thrombosis. All venous thromboses were salvaged using the TPA protocol, although one revision thrombosed on post-operative day 1 and required a second venous revision, leading to its ultimate salvage. We believe that intra-arterial TPA is an effective adjunct in the treatment of microsurgical venous thrombosis and may increase salvage rates following anastomotic complications.[10]

A study conducted on assesses the efficacy and safety of thrombolytic treatment of neonatal catheter-related thrombus (CRT) formation with RTPA. Over a 6-year period, 14 neonates with CRT were treated with the same RTPA protocol regarding dose of RTPA (an initial bolus of 0.7 mg/kg over 30–60 min followed by infusion of 0.2 mg/kg/h). With the use of close clinical and hematological monitoring on a neonatal intensive care unit combined with serial two-dimensional color echocardiography, the present RTPA protocol was shown to be a safe and effective method of clot dissolution in neonates.[11]

Conclusion

There is a need for a standard protocol for the improvement of knowledge and practice regarding RTPA administration. Null hypothesis rejected and alternative hypothesis is accepted that there is a significant change in before and implementation of protocol.

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