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ORIGINAL ARTICLE

Efforts to reduce the door-to-needle time of thrombolysis in acute ischemic stroke: Video-assisted therapeutic risk communication

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Background/Purpose: Explaining the risks and benefits of recombinant tissue-plasminogen activator (rtPA) to eligible patients with acute ischemic stroke (AIS) within a few minutes is important but difficult. We examined whether a new thrombolysis program can decrease the door-to-needle (DTN) time when treating patients with AIS.
Methods: A new rtPA thrombolysis program with video assistance was adapted for patients with AIS and their families. We retrospectively compared outcome quality before (2009–2011) and after (2012) the program began. Outcomes included DTN time, the percentage of rtPA thrombolysis within 3 hours of onset in all hospitalized patients with AIS who presented within 2 hours of onset (2hr%) and the percentage of rtPA thrombolysis in all hospitalized patients with AIS (AIS%).
Results: We recruited patients with AIS who had undergone thrombolytic therapy before ($n = 18$) and after ($n = 14$) the initiation of the new program. DTN time decreased (93 ± 24 minutes to 57 ± 14 minutes, $p < 0.001$) and the AIS% increased (2% to 5%, $p = 0.010$) after the program. The 2hr% marginally significantly increased (18% to 33%, $p = 0.080$).

Conflicts of interest: All the authors declared no conflict of interest.

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Conclusion: A thrombolysis program with video-assisted therapeutic risk communication decreased DTN time and increased the treatment rate of patients with AIS.

Introduction

Recombinant tissue-type plasminogen activator (rtPA) is the only approved effective thrombolytic agent for acute ischemic stroke (AIS). When administered intravenously within 3 hours of symptom onset, rtPA increases by at least 33% the chance of functional independence within 3 months, but also increases by at least 1000% the risk of intracerebral hemorrhage (ICH) for patients with AIS.[1] The narrow window of treatment time and the potential risk of ICH when using rtPA has substantially limited the use of this treatment.[2] The Taiwan Stroke Registry shows that from 2006 through 2008, only approximately 1.5% of all hospitalized patients with AIS and 8.8% of those who presented within 2 hours of symptom onset were given intravenous (IV) rtPA.[3] In Taiwan and other countries, informed consent must be obtained before thrombolytic therapy is instituted. Because stroke is an acute and serious neurologic disorder, it may be difficult for physicians to explain the risks and benefits of rtPA to patients or their surrogates in an emergency. Visual analogues such as figures and outcome wheels have been used to convey such important information about rtPA to those for whom it is potentially warranted.[4,5] However, the effect of these methods of communication has been insufficiently studied, especially in community hospitals. In the current study, we compared the effect of a thrombolysis program with video-assisted therapeutic risk communication on the improvement of the quality of care for patients with AIS.

Patients and methods

Hospital setting

The Tainan Sin Lau hospital (SLH; Tainan, Taiwan) is a community regional teaching hospital and a secondary referral center in the East District of Tainan City. SLH has 285 acute beds, with an average of 273 hospitalized patients per day in 2012. Three board-certified neurologists see approximately 300 patients with AIS per year.

Thrombolytic program

SLH set up its own primary stroke center in 2009 and provided thrombolytic therapy 24 hours a day, 7 days a week for indicated patients with AIS who presented within 3 hours of symptom onset. The Taiwan Department of Health accredited the SLH Stroke Center to perform stroke thrombolysis in 2011. We followed the treatment guidelines of the Taiwan Stroke Society[6] when selecting patients eligible for rtPA. If eligible, patients with AIS are treated with an IV dosage of 0.9 mg rtPA/kg of body weight.[7] The initial 10% of the rtPA was administered with an IV bolus injection within 1 minute, whereas the other 90% was administered via IV drip for 1 hour.[7] Because treatment initiation time was critical and limited, we accepted from the patient or the patient's surrogate an oral statement of the patient's body weight to calculate the required dose of rtPA.

From 2012, several new strategies have been implemented to reduce DTN time. For example, the computed tomography (CT) room has been moved from the first basement level to the first floor to reduce the delay in diagnostic imaging. In addition, a special plastic bag is now used when transferring blood samples to indicate that the blood tests should be done as soon as possible. A new thrombolysis program with video-assisted therapeutic risk communication has also been initiated. Briefly, all patients with hyperacute stroke who are potentially eligible for rtPA and their family are shown a 5-minute animated video. The content of the video is now available online (www.stroke.org.tw). It simply illustrates the pathophysiology of AIS, the mechanism of rtPA to dissolve the thrombus, and the overall risks and benefits of the treatment. This video is usually shown while the patient is waiting for an emergency brain CT or an evaluation by the neurologist on duty. After they have watched the video, the patient and family members can direct questions about the procedure to the emergency physician or neurologist on duty. After obtaining an evaluation of the patient and the informed consent of the patient or surrogate, the neurologist on duty makes the final decision on patient eligibility for rtPA treatment.

Study design

This retrospective study used preexisting stroke registry materials. SLH started to register patients hospitalized with AIS in 2009 based on the format of the Taiwan Stroke Registry (TSR). To assess the video-assisted thrombolytic program's effectiveness, all patients with AIS who underwent intravenous rtPA in SLH were separated into two groups: before (2009—2011) and after (2012) the program's implementation. Baseline demographics, comorbidities, current medications before treatment, pretreatment National Institute of Health Stroke Scale (NIHSS) total score, actual dose of rtPA (mg/kg of body weight), as well as the treatment outcomes of patients in the two groups, were all retrieved from the stroke registry data. The TSR protocol was approved by the SLH institutional review board before the current study began.

Outcome measures

The main outcome of interest in the current study was DTN time; specifically, the time spent from the patient's arrival to IV bolus injection of rtPA. Other structural outcomes were also selected for comparison: the percentage of DTN time $\leq$ 60 minutes, door-to-CT time, onset-to-needle time, door-to-laboratory time, the percentage of rtPA thrombolysis within 3 hours of onset in all hospitalized patients with AIS who presented within 2 hours of onset (2hr%), and the