Intra-Arterial Treatment for Patients with Severe Acute Vertebrobasilar Occlusion: A Single-Center Retrospective Study

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Background: Recently, favorable outcomes from several randomized controlled trials of rapid endovascular treatment for acute ischemic stroke has emerged. *Objective:* The aim of this retrospective study is to present our clinical experience in severe acute vertebrobasilar occlusion (AVBO) using intra-arterial treatment (IAT). *Methods:* Twenty patients with ischemic stroke in the vertebrobasilar circulation treated by IAT between March 2011 and December 2014 were included. We retrospectively assessed National Institutes of Health Stroke Scale (NIHSS) score on admission and at discharge, Thrombolysis in Cerebral Infarction (TICI) scale, and clinical outcome using modified Rankin scale (mRs) at 90 days, and causes of stroke were prospectively assessed. *Results:* The mean NIHSS score on admission was 26.4 ± 7.9 (range 9-33) points. The mean time from symptom onset to revascularization was 349.5 ± 124.0 (range 201-579) minutes. Successful recanalization (TICI ≥2b) was achieved in 19 (95.0%) patients. The mean NIHSS score at discharge was 5.7 ± 9.0 (range 0-30) points. A favorable clinical outcome (mRS ≤2) was observed in 12 (60.0%) patients at 90 days and mortality was 25.0% (n = 5). *Conclusion:* IAT for AVBO provides high rate of recanalization, favorable clinical outcome, and improved survival. **Key Words:** Acute vertebrobasilar occlusion—intra-arterial treatment—recanalization—clinical outcome—retrospective study.

Introduction

Ischemic stroke is a devastating condition and is a leading cause of death and disability in China. Posterior circulation strokes accounts for approximately 20% of all ischemic strokes.[1] High morbidity and mortality rates are commonly observed in patients with posterior-circulation (vertebrobasilar) occlusion.[2,3] Despite the treatment modality used, patients with posterior-circulation occlusion universally have a poor prognosis.[4-6] The possibility of survival is only 2% without recanalization,[2] whereas successful recanalization is strongly associated with improved clinical outcome and reduced mortality.[1,7]

Intravenous thrombolysis (IVT) and intra-arterial treatment (IAT) are the 2 major treatments for acute vertebrobasilar occlusion (AVBO). IVT refers to the systemic intravenous administration with recombinant tissue plasminogen activator (rt-PA), whereas IAT which comprises pharmaceutical thrombolysis and mechanical thrombectomy (MT) refers to the endovascular approach

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targeting the occlusions.[8] However, the IVT effect on large vessel occlusion (LVO) of the main cerebral artery is poor.[5,9-11] The intravenous rt-PA administration is restricted to within 4.5 hours from stroke onset and is limited by physiological contraindications.[12,13] It is widely recognized that IVT with rt-PA is not an optimal option in LVO.[14] In recent years, IAT has emerged as a new choice in LVO treatment with a longer therapeutic window, a higher recanalization rate, as well as a better clinical outcome.[15-17] Several randomized controlled trials (RCTs) confirm that rapid IAT could improve functional outcomes and reduce mortality in patients with acute ischemic stroke with proximal vessel occlusion.[18-20] Many new devices have been developed in recent years for IAT. The stent retriever appears to have a more favorable clinical outcome with decreased time to recanalization and higher rate of complete clot resolution.[21]

In the present study, we retrospectively analyzed 20 patients after the onset of confirmed AVBO and who received IAT between March 2011 and December 2014 in our department. The purpose of our study is to present our clinical experience in IAT for AVBO.

Materials and Methods

Patients

We reviewed patients with AVBO who accepted IAT in our department between March 2011 and December 2014. All patients underwent unenhanced brain computed tomography (CT) scan on arrival to exclude intracranial hemorrhage. The inclusion criteria were as follows: (1) arrival at the hospital within 8 hours from symptom onset; (2) age 80 years or less; (3) National Institutes of Health Stroke Scale (NIHSS) score 8 or greater; (4) detection of AVBO on CT and magnetic resonance angiogram; and (5) signed informed consent from each patient or relatives before treatment. The exclusion criteria were as follows: (1) a long duration from symptom onset (≥12 hours); (2) detection of large cerebellar and brainstem infarction on unenhanced CT or magnetic resonance imaging; (3) the presence of cerebral hemorrhage; (4) any medical conditions that preclude general anesthesia. Anyone without the official approval could not access to the details that could identify individual patients. Written informed consent was obtained from every patient or his or her relatives. The study was approved by the Research Ethics Board of The First People's Hospital of Changzhou.

IAT Procedure

Patients were treated usually under local or general anesthesia via a transfemoral approach. A 6 French guide catheter was placed in the proximal vertebral artery. During the procedure, neither intravenous anticoagulants nor antiplatelets were administered. A Rebar-18 microcatheter (ev3, Irvine, CA) for the 4-mm Solitaire stent was advanced over a Traxcess .014-inch microwire (MicroVention, Aliso Viejo, CA) to the desired position adjacent the clot. The Solitaire stent was advanced through the microcatheter, and the device was deployed to by pulling back the microcatheter to cover the entire length of the occlusion. After the stent was maintained in place for at least 3-5 minutes, the stent retriever and the microcatheter were removed as a system into the guide catheter. To prevent fresh embolism by lost clots, continuous manual negative suction with a 50-cc syringe was applied during retrieval of the stent at the time the flushing was stopped. The angiography was repeated to assess distal emboli, revascularization, and vessel injury. If the occlusion persisted after the first MT, the procedure was performed again. The balloon angioplasty or permanent stent deployment was considered if there was obvious stenosis. Before placement of the definitive stent, the patients were given a loading dose of .4 mg of tirofiban followed by .25 mg/h maintenance infusion for 12 hours and were then transferred to antiplatelet therapy.

Postprocedure Management

The patients were transferred to the intensive care unit after the procedure. A nonenhanced CT was performed in the first 12-24 hours after the procedure to rule out hemorrhage. The choice of antiplatelet or anticoagulation therapy was adjusted case-by-case, depending on the cause of stroke and other individual patient characteristics. The antiplatelet therapy (aspirin, 100 mg/d, or clopidogrel, 75 mg/d) was preferred when atherothrombotic etiologies were suspected or when a permanent stent was deployed. The initial anticoagulation with warfarin was preferred when cardioembolic etiologies were suspected.

Outcome Measures

Patient basic clinical characteristics during the IAT, including age, gender, vascular risk factors (hypertension, diabetes mellitus, hypercholesterolemia, atrial fibrillation, cigarette smoking), occlusion site, treatment, the number of passes, and the time from symptom onset to revascularization were recorded. Stroke subtypes were classified according to the Trial of ORG 10172 in Acute Stroke Treatment (TOAST) criteria. The NIHSS score was assessed on admission and at discharge by a neurologist. Assessment of recanalization was based on TICI scale, with grades 2b and 3 regarded as being successful. Assessment of the mRS was performed 90 days after treatment, with mRS 2 or below as good functional outcome. The stroke etiology was based upon the history, physical examination, and initial brain imaging study.

Statistical Analysis

Data were presented as the mean ± standard deviation. The statistical analysis was performed with SPSS version 17.0 (SPSS Inc., Chicago, IL).