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CASE REPORT

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Intravenous tenecteplase for basilar artery occlusion: a case report

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ABSTRACT

There is a paucity of data demonstrating the safety and efficacy of intravenous tenecteplase in patients with acute ischemic stroke in the posterior circulation. Basilar artery occlusion (BAO), resulting from an interruption of blood supply to the vertebrobasilar system of cerebral arteries, is a major cause of severe posterior circulation strokes. A 65-year-old male patient was admitted to the Department of Neurology, Saarland University Medical Center with symptoms of acute ischemic stroke in the posterior circulation. Computed tomography (CT) angiography revealed an acute BAO. The patient was administered intravenous tenecteplase at a dose of 0.25 mg/kg. Following the patient's transfer to the catheterization room for the scheduled endovascular treatment, a notable improvement in symptoms was observed, with an initial National Institutes of Health Stroke Scale (NIHSS) score of 20 decreasing to 2. This substantial improvement precluded the necessity for any catheter intervention. Subsequent control CT angiography demonstrated recanalisation of the BAO after administration of intravenous tenecteplase. No hemorrhagic complications occurred. This case demonstrates that the administration of intravenous tenecteplase at a dose of 0.25 mg/kg in patients with BAO can result in successful reperfusion without symptomatic intracranial hemorrhage.

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Intravenous tenecteplase; basilar artery occlusion; posterior circulation; recanaliztion; case report

Introduction

Approximately one in five ischemic strokes affects the vertebrobasilar artery. Basilar artery occlusion (BAO) in particular has been shown to be associated with a high risk of disability and mortality [1,2]. Life-threatening, diverse, and nonspecific symptoms, as well as fluctuating courses, are clinically challenging. Untreated, BAO has a mortality rate of approximately 80%, which highlights the need for effective reperfusion therapies [3]. Since January 2024, tenecteplase, a second thrombolytic agent for systemic lysis therapy in ischemic stroke, has been approved in Europe. As a genetically modified variant of alteplase, tenecteplase has a higher Plasminogen Activator Inhinbitor-1 (PAI-1) resistance and greater fibrin specificity. An increased half-life allows for simple bolus administration, in contrast to continuous intravenous infusion with alteplase [4]. The simplified application potentially reduces the time to thrombectomy (door-to-needle time) and offers logistical advantages over alteplase when secondary transfer to a suitable center for thrombectomy (drip-and-ship) is necessary [5]. This case report exemplifies the safe and successful utilization of tenecteplase in the management of basilar artery occlusion.

Case presentation

A 65-year-old male patient was admitted to our emergency department with clinical suspicion of an ischemic stroke, the symptoms of which had suddenly appeared approximately two hours prior to presentation. The patient exhibited severe dysarthria, horizontal gaze palsy to the left, hemianopsia to the left, facial palsy to the left, hemispatial neglect to the left, and high-grade left hemiparesis. The National Institutes of Health Stroke Scale (NIHSS) score was 20. Secondary diagnoses included Parkinson's disease, treated with deep brain stimulation and low-dose oral levodopa, no arterial hypertension, no diabetes mellitus, no dyslipidaemia, and

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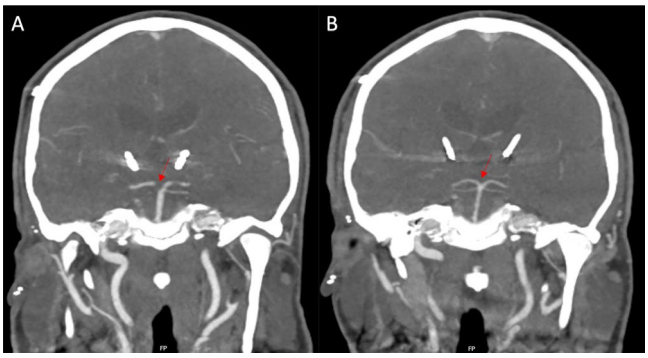

Figure 1. (A) CT angiography performed immediately after initial presentation of the patient. The red arrow shows the basilar artery tip thrombosis and a short-segment occlusion of the proximal P1 segment of the posterior cerebral artery. The electrodes of deep brain stimulation are seen bilaterally in the subthalamic nucleus. (B) Control CT angiography 24 hours after administration of intravenous tenecteplase. The red arrow demonstrates complete reperfusion of the basilar artery.

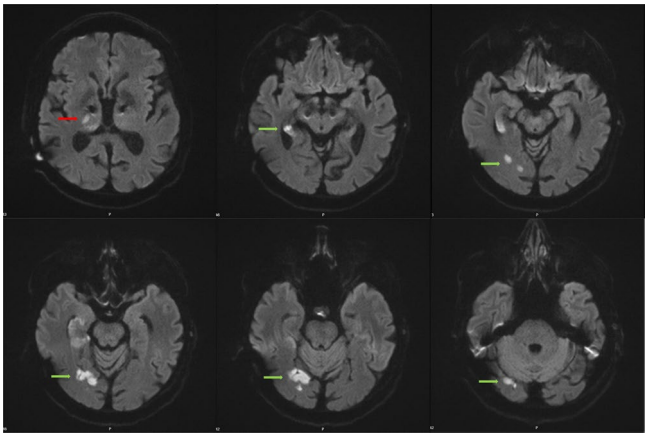

Figure 2. Diffusion-weighted MR imaging showing acute infarction in the right thalamus (red arrow) and right occipital lobe (green arrows).

no smoking history. Acute imaging using computed tomography angiography (CT-A) showed a top of the basilar artery thrombosis and a short-segment occlusion of the proximal P1 segment of the PCA on the right (shown in Figure 1(A)) with native tomographic signs of early ischemia and perfusion delay. Following the exclusion of contraindications, systemic thrombolysis with tenecteplase at a dose of 0.25 mg/kg was applied. After that the patient was immediately transferred to the catheter room for mechanical thrombectomy. Within minutes, even before the planned intervention took place, a significant clinical improvement was observed. Only mild dysarthria and mild left-sided arm paralysis (NIHSS 2 points) persisted. Because of the mild residual symptoms, the indication for thrombectomy was revised and patient was transferred to the stroke unit for ongoing monitoring and further diagnostic procedures without intervention. Control CT-A performed after 24 hours revealed complete reperfusion of the vertebrobasilar artery (shown in Figure 1(B)), with no intracranial hemorrhage. MRI showed infarction in the right thalamus and right occipital lobe of the brain (shown in Figure 2). Within 48 hours after bolus administration the symptoms regressed completely (NIHSS 0 points).

Discussion

The case demonstrates that intravenous tenecteplase at a dose of 0.25 mg/kg can result in complete recanalisation of BAO without hemorrhagic complications.

Due to its longer half-life, tenecteplase is administered as a bolus, which simplifies the application of systemic lysis therapy and potentially makes the procedures more effective, particularly in combination with subsequent mechanical thrombectomy.

The EXTEND-IA TNK study demonstrated that the application of tenecteplase resulted in a significantly higher recanalisation rate prior to mechanical thrombectomy (22% vs. 10%) in comparison to alteplase in cases of ischemic stroke with large vessel occlusion [6]. A recent meta-analysis of seven studies and a total of 3,548 patients also indicated a higher probability of early vessel recanalisation in the tenecteplase group (0.25 mg/kg) compared to the alteplase group (0.9 mg/kg) [7]. An observational study was able to confirm these findings, particularly for BAO (26% vs. 7%) [8]. A possible explanation for these results could be the altered mechanism of action of tenecteplase, with 15-fold higher fibrin specificity, higher PAI-1 resistance and reduced clearance, suggesting more efficient thrombolysis at higher plasma concentrations and thus earlier restoration of patency of the basilar artery [4,6].

The findings indicate that the use of tenecteplase in BAO may increase the possibility of early vessel recanalization compared to alteplase (0.9 mg/kg). Mechanical thrombectomy, which is associated with risk of intervention associated complications in the posterior circulation, may therefore be less frequently necessary. However, it should be noted that the findings from a single case report cannot be generalized in their entirety but highlight the need for further randomized controlled trials.

Author contributions

JF: Writing – original draft, Methodology, Resources; PL: Writing – review & editing; MG: Writing – review & editing, Resources, Visualization; WR: Writing – review & editing, Resources, Visualization; SG: Writing – review & editing, Project administration; YW: Writing – review & editing, Conceptualization, Validation, Supervision.

Disclosure statement

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