

## Thrombolysis for Ischemic Stroke during Pregnancy: A Case Report and Review of the Literature

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*Background and Purpose:* Our knowledge of the safety of thrombolytic therapy in pregnancy stems from individual case reports and series. We report the successful use of intravenous alteplase (tissue plasminogen activator; tPA) thrombolysis in a pregnant woman with acute cardioembolic stroke presumed to be paradoxical embolism through a patent foramen ovale. *Methods:* A literature review found several case reports and case series of pregnant patients treated with either intravenous or intra-arterial tPA for acute ischemic stroke. *Results:* A literature review yielded 10 cases of intravenous tPA administration and 5 cases of intra-arterial tPA. In total, there were 3 cases of asymptomatic intracerebral hemorrhage and 1 case of maternal and fetal death. *Conclusions:* Our patient improved clinically with no residual deficits. There was no evidence of placental or fetal injury following administration of tPA on follow-up obstetrical evaluations. **Key Words:** Ischemic stroke—pregnancy—tPA—alteplase—thrombolysis.

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Pregnancy has long been an exclusion criterion from all randomized controlled trials that validated thrombolytic therapy in stroke. Today, our knowledge of the safety of thrombolytic therapy in pregnancy stems from individual case reports and series. Herein, we present a case of successful intravenous (IV) thrombolysis during the first trimester of pregnancy with complete recovery of symptoms and no adverse effects.

A 31-year-old woman presented to a local emergency room with a chief complaint of sudden onset slurred speech, mild right hemiparesis, and hemisensory loss

(National Institutes of Health Stroke Scale—5). She presented 2 hours after last known well. She had an unremarkable head computed tomography scan and was clinically diagnosed with an ischemic stroke. During evaluation for thrombolytic therapy, a urine pregnancy test was positive. She was determined to be at 5 weeks gestation (G2P1), calculated from her last menstruation. The patient was counseled on the risks and benefits of thrombolytic therapy with tissue plasminogen activator (tPA), including risks to the fetus, and was treated shortly thereafter. She had a medical history of ischemic stroke with a prior pregnancy, and documented protein C and S deficiencies. She had decided to discontinue daily low molecular weight heparin therapy and had not followed up with her primary physician.

The patient was transferred to a comprehensive stroke center for post-tPA management and close obstetrical monitoring. Brain diffusion weighted magnetic resonance imaging demonstrated a left thalamic and internal capsular infarct. Diagnostic evaluation revealed a deep vein thrombosis (DVT) of the right gastrocnemius vein and a patent foramen ovale (PFO) with a right-to-left shunt.

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From the Northwell Health, Great Neck, New York.

Received March 21, 2016; revision received May 2, 2016; accepted June 17, 2016.

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1052-3057/\$ - see front matter

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<http://dx.doi.org/10.1016/j.jstrokecerebrovasdis.2016.06.023>

**Table 1.** Cases of using rt-PA for stroke during pregnancy

Author	Year	Trimester	Route of rt-PA	Infarct location	NIHSS	Hemorrhage	Mother outcome	Infant status	Stroke etiology
Dapprich et al <sup>5</sup>	2002	First	Intravenous	Left MCA	N/A	Small left basal ganglia hemorrhage	Marked improvement	Healthy infant	Reduced protein S
Elford et al <sup>6</sup>	2002	First	Intra-arterial	Right MCA	11	Small right basal ganglia hemorrhage	Marked improvement	Healthy infant	Ovarian hyperstimulation syndrome
Johnson et al <sup>7</sup>	2005	Third	Intra-arterial	Right MCA	20	No hemorrhage	Marked improvement	Healthy infant	Probable reduced protein S
Leonhardt et al <sup>8</sup>	2006	Third	Intravenous	Left MCA	N/A	No hemorrhage	Good improvement	Healthy infant	Antiphospholipid syndrome
Wiese et al <sup>9</sup>	2006	Second	Intravenous	Left MCA	13	No hemorrhage	Residual NIHSS of 4	Healthy infant	Mechanical valve prosthesis
Murugappan et al <sup>10</sup>	2006	First	Intravenous	Right MCA	N/A	Intrauterine hematoma	Recovered well	Medical termination of pregnancy	Mitral valve replacement embolism
Murugappan et al <sup>10</sup>	2006	First	Intravenous	Right MCA	N/A	Significant intracranial hemorrhage/dissection during angioplasty	Died	Fetus died with mother	Aortic valve replacement embolism
Murugappan et al <sup>10</sup>	2006	First	Intravenous	Left MCA	19	No hemorrhage	Recovered well	Medical termination of pregnancy	Decreased protein S
Murugappan et al <sup>10</sup>	2006	Third	Intra-arterial	Left MCA	13	No hemorrhage	Recovered well	Healthy infant	Protein C, protein S, and antithrombin III deficiencies
Yamaguchi et al <sup>11</sup>	2010	Second	Intravenous	Left MCA	6	No hemorrhage	Complete recovery	Healthy infant	Elevated factor VIII level
Li et al <sup>12</sup>	2012	First	Intra-arterial	Left MCA	13	No hemorrhage	Complete recovery, Recurrence at 2 weeks	Healthy infant	PFO/ASA or pulmonary AVM
Tassi et al <sup>1</sup>	2013	Second	Intravenous	Left MCA	20	No hemorrhage	Marked improvement	Healthy infant	Factor V Leiden deficiency
Hori et al <sup>13</sup>	2013	Second	Intravenous	Right PCA	N/A	No hemorrhage	Good improvement	Healthy infant	Reduced protein S
Mantoan Ritter et al <sup>14</sup>	2014	Third	Intra-arterial	left MCA	22	No hemorrhage	Marked improvement	Healthy infant	Cryptogenic
Ritchie et al <sup>15</sup>	2015	Third	Intravenous	Right MCA	11	No hemorrhage	Marked improvement	Healthy infant	Cryptogenic
Our observation	2016	First	Intravenous	Left MCA	5	No hemorrhage	Complete recovery	Healthy infant	Protein C and S deficiency, PFO

Abbreviations: ASA, atrial septal aneurysm; AVM, arteriovenous malformation; MCA, middle cerebral artery; N/A, Not available; NIHSS, National Institutes of Health Stroke Scale; PCA, posterior cerebral artery; PFO, patent foramen ovale; rt-PA, recombinant tissue plasminogen activator.

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