Intra-Arterial Tissue Plasminogen Activator for an Ischemic Stroke in a 21-Year-Old Hispanic Woman With Elevated Beta Human Chorionic Gonadotropin and Complex Clinical History

Nicholas M. Green

ABSTRACT

The following case report discusses a 21-year-old Hispanic woman who was brought to the emergency room for evaluation because of experiencing acute left-sided hemiparesis with anosognosia. Upon further assessment, the patient was found to have a positive blood test for methamphetamines, positive human chorionic gonadotropin for pregnancy, and a history of patent foramen ovale. Neurological examination of the patient revealed left hemiparesis, dysarthria, and homonymous hemianopsia of the left side with a National Institutes of Health Stroke Scale of 12. Given the patient's assessment and positive radiological findings of a clot located within the right M1 segmental branch of the middle cerebral artery territory through the use of computed tomography angiography, deployment of intra-arterial thrombolytics within 6 hours of symptom onset was utilized. The patient's clinical course was complicated by brain swelling requiring intubation. Return of neurological function was assessed with noninvasive and invasive neurological evaluation, which showed full cognitive and physical return of the functional baseline level at discharge.

Keywords: intra-arterial, ischemic, stroke, tPA

S tudies have shown an elevated stroke risk in Mexican American women since the early 1990s. The Brain Attack Surveillance in Corpus Christi (BASIC) Project revealed that elevated stroke risk was present in both younger and older Mexican American women compared with non-Hispanic White women. At younger ages (45–59 years), stroke risk was increased by 100%, whereas stroke risk between ages 60 and 74 years was increased by 57% (Liebson, 2010). The BASIC study showed no difference in stroke severity or stroke type as compared with their Caucasian counterparts. However, the study did conclude that the increased stroke risk in Mexican American women could be attributed to

Copyright © 2013 American Association of Neuroscience Nurses DOI: 10.1097/INN.0b013e318298629c increased hypertension and diabetes among this specialized population (Liebson, 2010). Consent to review the patient's medical record was obtained through the treating facility's institutional review board who deemed written informed consent was not needed for an individual case study.

Report of a Case Study

A 21-year-old woman with a history of gravida 3, para 2, and abortus 0 was presented to the emergency department with acute left hemiparesis, dysarthria, and anosognosia. At the time of examination, the patient's prior health history was unremarkable. The stroke team found the patient awake and alert but with a decreased gag reflex, dysarthric with acute left hemiparesis with no sensation in the left upper or lower extremities, and a left homonymous hemianopsia field cut. Initial National Institutes of Health Stroke Scale conducted by both emergency room physician and stroke team was found to be 12. Because of the initial evaluation with radiological evidence (Figure 1), it was decided that the patient was a candidate for intra-arterial thrombolytics (tissue plasminogen

CASE REPORT

Questions or comments about this article may be directed to Nicholas M. Green, MSN RN, at ngreen@unr.edu. He is an Alumnus and Assistant Professor at the Orvis School of Nursing, University of Nevada, Reno, NV.

The contributing author has no financial or funding interests attributed to the following manuscript and no conflicts of interest to declare.





activator [tPA]) because of arriving beyond the National Institute of Neurological Disorders' recommended 3-hour treatment window (Balci, Utku, Asil, & Celik, 2011; Jones et al., 2005; Lees et al., 2010; The National Institute of Neurological Disorders and Stroke [NINDS] rt-PA Stroke Study Group, 1995; Xavier et al., 2003). The patient met all inclusionary criteria for intra-arterial interventional therapy with the exception of a positive beta human chorionic gonadotropin (hCG) at 49.2 mIU/ml per the NINDS inclusion/exclusion standards (NINDS, 1995). Beta hCG is a hormone that is continuously released during gestation and is a continuous measurement between 0 and 300,000 mIU/ml (McPherson & Pincus, 2006), indicating the potentiality of pregnancy

as shown in Table 1. At this time, a perinatologist was consulted, who agreed that the benefits of the patient receiving interventional therapy outweighed the risks of not receiving treatment. All benefits and risks were discussed with the family, including hemorrhage, death, and fetal demise. The family also noted understanding that radiation during the procedure may be detrimental to the fetus as well. At this time, the patient and family agreed to the procedure. Utilizing standard procedure, a total of 20 mg of alteplase was administered for over 90 minutes with residual occlusion of an early inferior segmental branch of the right M1 territory (Figure 2). Hemostasis was obtained in the right groin by utilizing an Angio-Seal device. After the successful recanalization of the right M1 MCA territory, an immediate postinterventional computed tomography (CT) scan without contrast showed no acute hemorrhage. At the time of postthrombolytic intervention, the patient was noted to be awake and alert with movement to her left leg and with slight movement noted to her left hand. Progression of the patient's events during hospital day 1 is shown in Table 2. Serial beta hCGs throughout the patient's hospital course revealed continual elevation with 20-hour postsymptom onset. The patient was determined as not pregnant by the perinatologist because of the highest beta hCG reaching 510.9 mIU/ml with a negative intravaginal ultrasound (McPherson & Pincus, 2006), as shown in Table 3.

Because the levels of hCG did not rise (exceeding 1000 mU/ml) past day 4, the perinatologist could not exclude ectopic pregnancy because of the gestational sac not being generally visible.

A cryptogenic stroke work-up was ordered along with a carotid doppler study, 24-hour telemetry monitoring,

		FIGURE 2	Arteriogram of a Patient With
TABLE 1. Re	ference Levels of Serum		Acute Right M1 Segment
Be	ta hCG		Occlusion: (A) Arteriogram
Last Menstrual Per	iod Serum Beta hCG Levels		Demonstrating Right M1
3 weeks	5–50 mIU/ml		Segment Occlusion Betore Intra-Arterial Intervention: (B)
4 weeks	5–426 mIU/ml		Arteriogram Demonstrating
5 weeks	18–7,340 mIU/ml		Right M1 Segment
6 weeks	1,080–56,500 mIU/ml		Recanalization Post
7–8 weeks	7,650–229,000 mIU/ml		Intra-Arterial Intervention
9–12 weeks	25,700–288,000 mIU/ml		
13–16 weeks	13,300–254,000 mIU/ml	A	B
17-24 weeks	4,060–165, 400 mIU/ml		A CONTRACTOR
25–40 weeks	3,640–117,000 mIU/ml	11 25	A BAT
Nonpregnant wome	en <5.0 mIU/ml	NL Sel	
Postmenopausal we	omen <9.5 mIU/ml	A. K. F.	1 Contra
		and the	
<i>Note.</i> hCG = human	chorionic gonadotropin.		





223

Time	Clinical Finding(s)	Test/Diagnostic Procedure(s)	Outcome/Result(s)
10:00	Last time ''known well'' per patient's family	N/A	Paramedics notified
13:19	Patient arrived at the emergency room	N/A	N/A
13:55	3:55 Patient evaluated by the emergency room physician and found to have an NIHSS of 12 because of left hemiparesis, dysarthria, complete hemianopia, partial facial paralysis, and mild loss of sensation to left side.	1. CBC a. WBC b. Bandemia	Stroke team activated based on time of symptom onset and NIHSS of >5 per hospital protoco
compl paraly side.		2. CMP	1. a. 12.0 (mm ³⁾
		a. Na+	b. 13%
		b. Bilirubin	2. a. 13.2 mEq/L
		c. Glucose	b. 16 mg/dl
		3. INR	c. 105 mg/dl
		4. Beta hCG	3. 1.10
		5. Toxicology screen	4. 49.2 mIU/ml
			5. (+)methamphetamines
13:55–15:22 Patient evaluated by stroke team and	Patient evaluated by stroke team and	1. CT head	1. Negative
	NIHSS confirmed to be 12. Diagnostic	2. CTA head	2. (+) Right M1 segmental

	NIHSS confirmed to be 12. Diagnostic tests being performed.	 CTA head Cerebral perfusion 	 (+) Right M1 segmental occlusion of the right MCA Cerebral perfusion shows cerebral volume and cerebra flow mismatch
15:00–16:00	Findings of radiological evidence discussed with patient and family. Risks and benefits discussed with patient and family who wished to continue with IA-tPA procedure.	N/A	N/A
16:00	N/A	IA-tPA initiated	N/A
18:00	N/A	1. IA-tPA procedure ended	
		a. 20-mg of Alteplase administered	CT: head (-) for post recanalization hemorrhage
19:00	N/A	N/A	Patient transferred to ICU

Note. CBC = complete blood count; WBC = white blood cells; CMP = complete metabolic panel; INR = international normalized ratio; hCG = human chorionic gonadotropin; CT = computed tomography; CTA = computed tomography angiography; IA-tPA = intra-arterial tissue plasminogen activator; MCA = middle cerebellar artery; NIHSS = National Institutes of Health Stroke Scale.

and echocardiogram with bubble study because of a history of patent foramen ovale. The patient was aware of a "heart problem" diagnosed during previous pregnancy but was unable to explain why the testing had been conducted. On day 2, follow-up CT scan obtained at 03:00 AM showed some loss of the sulci in the right hemisphere with no physical or cognitive changes noted on the reassessment of the patient post-CT scan. As day 2 progressed, the patient's right pupil became dilated to 5 mm from baseline with noted paresis reoccurring on the left side. Emergent CT showed increased swelling and obliteration of the basal cisterns consistent with the patient's clinical symptoms of becoming more lethargic.

The patient was prophylactically intubated because of impending herniation and was treated with Mannitol with favorable results. On day 5, the patient remained intubated, remained lethargic, but was aroused easily, and followed commands, with movement noted to all four extremities. Follow-up head CT on day 7 revealed a right anterior division MCA infarct with left shift, with the basal cisterns appearing to be normal. As hospital day 7 continued, the patient become more alert, ultimately extubated, and fully awake later that day, following all commands. At hospital day 12, the patient was progressing with activities of daily living, being able to independently get out of bed, ambulate, and climb the stairs.

Copyright © 2013 American Association of Neuroscience Nurses. Unauthorized reproduction of this article is prohibited.

Volume 45	٠	Number 4	٠	August 2013	3
-----------	---	----------	---	-------------	---

\bigcirc	
SA	
Π	
フ	

225

TABLE 3.	Patient's Serial Beta hCG Throughout Hospitalization		
Day(s)	Test/Diagnostic Result(s)	Outcome Result(s)	
1	beta hCG	40.9 mIU/ml	
2	beta hCG	61.1 mIU/ml	
3	beta hCG	134 mIU/ML	
4	beta hCG	510.9 mIU/ml	
5–7	N/A	N/A	
8	Intravaginal ultrasound	Negative	
9–19	N/A	N/A	
<i>Note.</i> hCG = human chorionic gonadotropin.			

After a 17-day stay in the ICU, the patient was transferred to the neurological unit and was ultimately sent home with all neurological functions intact.

Conclusions

The ability to rapidly identify acute cerebral occlusions through the utilization of stroke teams, hospital protocols, and advancements in radiological imaging has led to many successful cases in the treatment of MCA occlusion through the administration of intra-arterial tPA. Recent studies are beginning to evaluate stroke treatment in the young patient, even younger than 18 years old, the age limit used in the original NINDS trial (Golomb et al., 2003). In this case study, a 21-year-old Hispanicspeaking woman presented with multiple comorbidities was identified as having a developing large righthemispheric stroke. As neuroscience nurses, we now see that stroke can no longer be considered discriminatory in the age and gender as it was once thought to affect. Gone are the days of conservative thinking in which stroke affects primarily the elderly male population. Implications for care not only affect the older population, now, but also the younger generation as the disease process of stroke becomes more complex. Through collaborative efforts among the medical team, improved diagnostic technology, and comprehensive neurological examination from the nursing staff, the outcomes for those who experience stroke may have a chance for an improved quality of life. Little to no research has been done on the prevalence of pregnant women who are treated with tPA because of the limitations of the National Institutes of Health Stroke Scale. Suggested exclusionary criteria recommend that pregnant woman should not receive interventional therapy. Future studies should assess this treatment option in differing age and gender groups, including those patients who are suspected of being pregnant. As the stroke patient becomes increasingly complex, knowledge built on the foundational studies from the PROACT I and PROACT II trials, which show the success of recanalization (del Zoppo et al., 1998), should be further evaluated.

References

- Balci, K., Utku, U., Asil, T., & Celik, Y. (2011). Ischemic stroke in young adults: risk factors, subtypes, and prognosis. *Neurology*, 17(4), 16–20.
- del Zoppo, G., Higashida, R., Furlan, A., Pessin, M., Rowley, H., & Gent, M. (1998). PROACT: A phase II randomized trial of recombinant pro-urokinase by direct arterial delivery in acute middle cerebral artery stroke. *Stroke*, 29, 4–11.
- Golomb, M., Rafay, M., Armstrong, D., Massicotte, P., Curtis, R., Hune, S., & deVeber, G. (2003). Intra-arterial tissue plasminogen activator for thrombosis complicating cerebral angiography in a 17-year-old girl. *Journal of Child Neurol*ogy, 18(6), 420–423.
- Jones, M., Nogajski, J., Faulder, K., Harrington, T., Ng, P., & Storey, C. (2005). Intra-arterial thrombolysis in acute ischaemic stroke. *Internal Medicine*, 35, 300–302.
- Lees, K., Bluhmki, E., von Kummer, R., Brott, T. G., Toni, D., Grotta, J. C., ... Byrnes, G. (2010). Time to treatment with intravenous alteplase and outcome in stroke: An updated pooled analysis of ECASS, ATLANTIS, NINDS, and EPITHET trials. *Lancet*, *375*, 1695–1703.
- Liebson, P. (2010). Cardiovascular disease in special populations III: Stroke. *Preventive Cardiology*, *13*(1), 1–7. doi:10 .1111/j.1751-7141.2009.00041.x
- McPherson, R., & Pincus, M. (2006). *Henry's clinical diagnosis and management by laboratory methods* (21st ed.). Philadelphia, PA: Saunders.
- The National Institute of Neurological Disorders and Stroke rt-PA Stroke Study Group. (1995). Tissue plasminogen activator for acute ischemic stroke. *New England Journal of Medicine*, 333(24), 1581–1587.
- Xavier, A., Siddiqui, A., Kirmani, J., Hanel, R., Yahia, A., & Qureshi, A. (2003). Clinical potential of intra-arterial thrombolytic therapy in patients with acute ischaemic stroke. *CNS Drugs*, 17, 2113–2224.