Coarctation of the Abdominal Aorta and Renal Artery Stenosis Related to an Umbilical Artery Catheter Placement in a Neonate

Raymond D. Adelman, MD*, and Rose Ellen Morrell, MD‡

ABSTRACT. Umbilical artery catheters have been associated with thrombotic complications, such as partial or complete occlusion in the aorta, the renal arteries, and other blood vessels. There have been few reports of the long-term consequences of either symptomatic or asymptomatic thrombi. We report a patient, now 22 years of age, born with a normal aorta, who developed hypertension at the age of 2 months after use of an umbilical artery catheter. An intravenous pyelogram and nuclear renal scan were compatible with occlusion of left renal artery and of the distal aorta. At 6 months of age, the patient presented with reduced femoral pulses. Angiography demonstrated an acquired coarctation of the abdominal aorta and renal artery stenosis. An abdominal ultrasound performed at 22 years of age revealed partial obstruction of the lower abdominal aorta and marked atrophy of the left kidney. This case underlines the importance of long-term follow-up studies of infants who have undergone umbilical artery catheterizations. Pediatrics 2000;106(3). URL: http://www.pediatrics.org/cgi/content/full/106/3/e36; coarctation, renal artery stenosis, neonate, umbilical artery catheter, thrombosis.

Umbilical artery catheters have been associated with thrombotic complications1–3 such as partial or complete occlusion of the aorta,4 the renal arteries, and other blood vessels. Although some patients are symptomatic with acute renal failure, hypertension, bowel infarction, or limb ischemia,5,6 many patients experience silent thrombi.1–3 The reported incidence of thrombi has ranged from 5% to 30% depending on the method of detection and such clinical variables as duration of catheterization, catheter type, and use of anticoagulant medications. No surgery or interventional angioplasty has been performed. An abdominal ultrasound performed in December 1999 revealed partial obstruction of the lower abdominal aorta and marked atrophy of the left kidney.

DISCUSSION

The use of umbilical artery catheters has been associated with numerous reports of catheter-associated thrombi.1–3 The reported incidence of thrombi has ranged from 5% to 30% depending on the method of detection and such clinical variables as duration of catheterization, catheter type, and use of anticoagulant medications. No surgery or interventional angioplasty has been performed. An abdominal ultrasound performed at the time of catheter withdrawal; only 13% of patients with thrombi had been clinically diagnosed. Seibert et al4 studied 81 neonates by serial ultrasonography. Twenty-six percent of patients developed aortic thrombi (most of which were large) yet 29% of these were asymptomatic, with an additional 24% manifesting only hematuria (diagnosed by Dipstix, Bayer

From *Phoenix Children’s Hospital, Phoenix, Arizona; and ‡Oakland Children’s Hospital, Oakland, California.

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Address correspondence to Raymond D. Adelman, MD, 909 E Brill St, Phoenix, Arizona 85006-2896. E-mail: radelman@phxchildrens.com

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Elkhart, IN). Hence, as many as one half or more of catheter-associated thrombi are asymptomatic.

Long-term studies of patients with thrombi have been few. For a mean of 15 months, Malin followed 3 patients with aortic thrombosis and renal artery occlusion associated with umbilical artery catheterization. At follow-up, all infants had unilateral renal abnormalities documented by ultrasonogram or renogram. Although not specifically addressed, none were reported to have signs or symptoms of coarctation. Adelman reported 12 neonates who were followed for 5.75 years for hypertensive attributes to renal artery or aortic thrombosis. Blood pressure was normal for all infants after discontinuation of antihypertensive therapy and creatinine clearance was normal for 9 of 10 survivors. However, 8 of 11 patients studied had abnormal renal morphology or function. Six patients had ischemic-appearing radionuclide scans, including 3 with normal renal morphology by intravenous pyelogram or ultrasound. No patients had clinical findings of coarctation. Caplan et al studied 15 patients with aortic thrombosis and renovascular hypertension for a mean of 26 months. Three patients had small or absent kidneys unilaterally by ultrasonogram, whereas 6 patients had absent or no flow unilaterally by renogram. However, no patient was reported with significant differences between blood pressure readings in upper and lower extremities. Seibert et al reported no aortic abnormalities in 10 neonates with aortic thromboses studied by ultrasonography at 36 to 42 months of age. Thus, although there are some reports of long-term sequelae of indwelling umbilical artery catheters, our report is the first case of an acquired coarctation of the abdominal aorta and renal artery stenosis secondary to a thrombus, which occurred during neonatal umbilical artery catheterization.

Coarctation of the abdominal aorta is very unusual in the pediatric population. Because we had angiographically documented a normal aorta in this patient at the time of catheter insertion, we can reasonably presume that the coarctation months later at the site of a thrombus was causally related to the thrombus and/or to vessel wall injury, with subsequent scarring and constriction. Tomizawa et al demonstrated endothelial cell detachment and internal elastic membrane destruction in animals undergoing acute aortic catheterization. Tyson et al, in an autopsy study of infants who had umbilical artery catheters, demonstrated fatty deposits in the intima and media, proliferation of medial smooth muscle cells, and fibrosis. The paucity of long-term studies of patients with catheter-associated thromboses makes determination of the types and incidences of sequelae difficult to assess. However, long-term consequences do occur. We recently reported an 18-year-old who was found to have an asymptomatic aortic aneurysm at the site of a neonatal catheter-associated aortic thrombus that had clinically resolved in infancy.

CONCLUSION

A patient presented with severe hypertension attributable to coarctation of the abdominal aorta and renal artery stenosis after apparent resolution of an umbilical artery catheter-associated thrombosis. This case underlines the importance of long-term follow-up studies of infants who have undergone umbilical artery catheterizations to assess the type and magnitude of various sequelae and to provide important clinical and prognostic information for physicians and families.

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