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Short Report

Portal venous thrombosis after umbilical vein catheterization

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Purpose: Portal vein thrombosis has been associated with umbilical venous catheterization. This prospective study was done to determine the incidence of neonatal portal venous thrombosis associated with catheterization of the umbilical vein. **Methods:** Neonates who had undergone umbilical vein catheterization for exchange transfusion between March 2003 and March 2004 in Children's Hospital of Tabriz, Iran, were included. Doppler ultrasonography was performed within 1-2 weeks after the removal of the catheter. In the cases with portal venous thrombosis, subsequent serial ultrasonography was performed at intervals of every 1-2 months until clot resolution. Risk factors, if any were identified and correlated with catheter-related thrombi. **Results:** Ultrasonography detected clinically silent portal venous thrombosis in 17 (34%) of 50 neonates. Follow-up ultrasonography was available in 13 of 17 babies, and revealed complete or partial resolution in all the cases. Sepsis was identified as a significant risk factor ($p < 0.001$). **Conclusion:** Umbilical venous catheter-associated thrombosis is common, and spontaneous resolution occurs in most cases. [*Indian J Gastroenterol* 2007;26:283-284]

Extrahepatic portal vein obstruction (EHPVO), usually due to portal vein thrombosis (PVT) is a common cause of portal hypertension in young children.^{1,2} Umbilical vein catheterization (UVC) has been suspected as a cause of this condition; however, data on subject are limited. Ultrasonography (US) is a reliable tool for evaluation of the splenoportal venous system.^{3,4,5} We looked at the frequency, outcome and risk factors associated with PVT in infants undergoing UVC.

Methods

Neonates with hyperbilirubinemia admitted to a major pediatric teaching hospital in Tabriz, Iran and undergoing UVC for exchange transfusion (ET) between March 2003 and March 2004 were enrolled. Those with a concomitant major congenital malformation (such as cardiac abnormalities, abdominal wall defect, hiatal hernia) needing referral to other institutions and those with coagulation dis-

orders were excluded. Gestational age was assessed from the mother's last menstrual period, or the Ballard's score.⁶ Efforts were made to identify septicemia using blood cultures.

All infants underwent US examination by an expert radiologist using a 7.5 MHz probe (Hitachi model 525) within 1-2 weeks after removal of UVC. At US, patency of the splenic, superior mesenteric vein and portal veins, and intrahepatic branches of the portal vein was assessed. PVT was diagnosed in the presence of echogenic intramural thrombosis; in such cases, the location and extent (occlusive or non-occlusive) of the thrombus were recorded. Infants with PVT underwent serial US at intervals of 1-2 months until resolution of the thrombus.

Statistical analysis was done using the χ^2 test and alpha value of 0.05. The protocol was approved by the ethical and research review committees of Tabriz Medical University.

Results

During the study period, 103 neonates underwent UVC; of these, 33 were excluded because of lack of parental consent ($n=27$), major congenital malformations ($n=5$, cardiac abnormalities in 4, abdominal wall defect in 1), or protein C deficiency ($n=1$). In addition, 20 infants were excluded because the initial US procedures in them had been done by different radiologists.

The gestational age of the 50 infants studied was 32 to 42 weeks (mean [SD] 36.0 [3.6]), and their weight was 1800-4000 g (2900 [283]). The duration of UVC was up to 7 (2 [1.12]) hours and the first US was done 7-15 (9 [2.1]) days after removal of UVC. Three infants underwent multiple sessions of ET (2 sessions each in 2, 3 sessions in 1). Blood culture was positive in 15 of the 41 infants in whom it was done.

Initial US showed PVT in 17 (34%) neonates, including small non-occlusive thrombi in the left intrahepatic portal vein in 16 and an occlusive thrombus in the left branch of portal vein in one child. Follow-up US was done in 13 of these 17

infants; all infants showed recanalization of the thrombus, which appeared at two months in 9 infants, at 3 months in 3 infants and at 5 months in one infant.

The risk of thrombosis was significantly higher in the babies with sepsis (11/15 vs. 6/35; $p < 0.001$). The frequency of thrombosis in children with low birth weight and prematurity (3 /10) was similar to that in those without these conditions ($p = ns$). The number of ET sessions was similar between patients who developed thrombosis versus those who did not.

Discussion

PVT is idiopathic in the majority of cases (65%), but it could be secondary to neonatal omphalitis and/or catheterization of the umbilical vein (4.8%).¹ Many investigators believe that UVC and umbilical sepsis play a causative role in the development of PVT.²⁻⁷

The reported incidence of catheter-related thrombosis in infants and children was 1.3%-67%.^{3,8,9} The wide variation between studies probably is due to the method used to study thrombosis, the time schedule of examination, and catheter variables such as size, location, and duration. In general, prospective ultrasonography examination, starting shortly after catheterization, revealed a 17%-44% incidence of thrombosis associated with use of UVC.¹ One long-term (5 years) sonographic and clinical follow-up of 47 patients with fluoroscopically positioned UVC, for exchange transfusion was reported;¹⁰ the splenic vein could not be initially visualized in five of seven neonates who had septicemia, and in five of 15 newborns who had no umbilical sepsis. On follow up ultrasonography, splenic vein was patent and splenic flow was visualized in all 21 neonates who followed up.

Kim *et al* found PVT using USG in 43 (43%) of 100 neonates. Follow-up US revealed complete or partial resolution in 20 (56%) of 36 babies. Correlation was found between the initial size of the thrombus and spontaneous clot resolution.¹

Our results indicate that clinically silent por-

tal thrombosis is frequently associated with catheterization of the umbilical vein in neonates, and spontaneous resolution without any treatment is expected to happen in many cases. Risk of thrombosis was increased in babies with sepsis, but was not affected by gestational age and birth weight.

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