

Portal vein thrombosis following umbilical vein catheterization in neonates

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Abstract

Objective: To study the association of portal vein thrombosis in umbilical vein catheterized neonates. **Study design:** Prospective study. **Subjects:** Neonates in NICU with umbilical vein catheterization. **Methods:** Doppler ultrasound was performed for all neonates within 24-48 hours of catheter insertion, followed by 48-72 hours after its removal and weekly until hospital discharge or clot resolution. Diagnosis of Portal vein thrombosis was made, its extent, location and size was noted. **Result:** 30 newborns were screened for portal vein thrombosis. Among them, 17 (57.2%) babies had clinical sepsis, 14(46.7%) had blood transfusion and 7 (23.3%) had calcium infusion through the umbilical vein. Portal vein thrombosis was observed in 3 out of 30 babies (10%). 2 babies had the umbilical tip in inferior vena cava and one baby had in main portal vein. Color Doppler revealed, two babies had partial non-occlusive thrombus in the left portal vein and one baby had in the main portal vein. On follow up, the thrombus of all the babies had resolved by 1-2 weeks. All the 3(100%) neonates with thrombosis received calcium infusion through the umbilical vein and its association was found to be statistically significant with a P Value of 0.086. **Conclusions:** Calcium transfusion through umbilical vein catheterization is associated with term portal vein thrombosis, though most of them are clinically silent and resolve spontaneously. Ultrasound can be used as effective tool in early detection of the thrombus and hence as a guide for catheter removal.

Keywords: Newborns, Portal vein thrombosis, Umbilical vein catheterization.

Introduction

Umbilical vein catheterization may be a life-saving procedure in neonates who require vascular access and resuscitation. An umbilical vein catheter provides a good alternative to a peripheral venous catheter that reduces the need for multiple procedures to maintain venous access [1].

In spite of the potential hazard of sepsis and thrombus formation, UVC remains the best route for monitoring and treatment of critically ill babies. Portal venous thrombosis in neonates who have had umbilical venous catheters can lead to portal hypertension and associated complications [2]. Majority of the portal vein thrombosis go unnoticed as they rarely become symptomatic [3]. This study was done to assess the utility of Color Doppler Ultrasonography as a safe, non invasive, and a relatively non expensive method to detect thrombus at an early to avoid probable long term sequelae [4,5].

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Materials and Methods

Primary objective: To study the association of portal vein thrombosis in umbilical vein catheterized neonates

Study setting: This study was conducted in the neonatal unit of JSS hospital Mysuru between December 2012 to August 2014. JSS hospital is a tertiary care hospital with approximately 3000 deliveries per year offering tertiary level neonatal care.

Eligibility Criteria: Babies with umbilical vein catheter in situ for > 6 hours duration. Babies having AV malformation were excluded.

Study Design: This was a prospective observational analytical study. Data regarding the gender, birth weight, location of tip of catheter by X-ray, duration of catheterization, drugs given through the umbilical vein were collected from the recruited babies. Colour Doppler Ultrasound examination was performed within 24-48 hours of catheter insertion, followed by 48-72 hours after its removal and weekly until hospital discharge or clot resolution. The diagnosis of PVT was made by documenting the echogenic intraluminal thrombus at gray scale ultrasound and absence of flow

on colour Doppler images. The location, extent and size of the thrombus if formed were noted. Local Ethical committee clearance was obtained and also written consent was taken from all subjects.

Statistical Analysis: The demographical, clinical, laboratory and radiological data was recorded into a spreadsheet and was used for the analysis. All the statistical analysis was carried out through the SPSS for Windows (version 16.0) software. Variables are expressed as proportions and Fischer exact test is used to calculate the statistical significance.

Results

30 newborns, 14 females and 16 males with umbilical vein in situ were screened for portal vein thrombosis and the data were analysed. The position of the UVC tip was traced by USG and noticed that 25 babies had in inferior vena cava, 3 babies in main portal vein, one baby in umbilico portal confluence and for one baby in umbilical vein.

Umbilical vein was used for institution of fluids, transfusion exchange, calcium infusion, parenteral nutrition and medications. Among the 30 neonates, 17 (57.2%) babies had clinical sepsis, 14(46.7%) had blood transfusion and 7 (23.3%) had calcium infusion through the umbilical vein.

Portal vein thrombosis was observed in 3 out of 30 babies, which constituted to 10% of the study population. 2 babies had the umbilical tip in inferior venacava and one baby had in main portal vein.

Of the 3 babies, who had portal vein thrombosis, 2 were females and 1 was a male neonate. Color Doppler revealed two babies had partial non-occlusive thrombus in the left portal vein and one baby had in the main portal vein. On follow up, the thrombus of all the babies had resolved by 1-2 weeks

All the 3(100%) neonates with thrombosis received calcium infusion through the umbilical vein and its association was found to be statistically significant with a P Value of 0.086. (table)

Discussion

It is a belief that UVC plays a causative role in the development of PVT. Mechanical and chemical damage to the vessel wall by the catheter and the infusate (inotropes, calcium, intravenous fluids) was believed to initiate the thrombotic process. This belief was based on the retrospective observation that the infants who

developed portal vein hypertension had history of umbilical vein catheterization in neonatal period. Because portal venous thrombosis seldom causes clinical problems during neonatal period, the majority of cases remain unrecognized and are fortuitously found later [3].

In our study, umbilical vein catheterization was done for various reasons as explained earlier. Term babies were catheterized for exchange transfusion and for the institution of high osmolar fluids like high concentration of dextrose in babies with persistent hypoglycemia.

10% (3 of 30) of the babies with umbilical vein catheterization developed portal vein thrombus. Out of these, 2 babies had their tip in Inferior venacava and in one baby had in portal vein, which was used inadvertently. A wide range of incidence for PVT has been reported from as low as 1.3% to 43% and its association with umbilical vascular catheterization may be due to different tools used, varied methodology in time schedule of first assessment and follow up [2,6].

On contrary to the study by Kim et al, the mean duration of umbilical vein catheterization in babies with portal vein thrombosis was 3.7 days, as compared to 4.7 days in babies without portal vein thrombosis in our study and was not found to be statistically significant [6].

Among the 3 babies with portal vein thrombosis, 2 babies developed clinical sepsis, 2 babies had transfusion through the catheter but the association was not found to be statistically significant. A positive association was found between Portal vein thrombosis and calcium transfusion with a P value of 0.086. On follow up, all the babies with portal vein thrombosis has spontaneous resolution which was concurrent with other studies [7].

Conclusion

1. Calcium transfusion through umbilical vein catheterization is associated with long term portal vein thrombosis, though most of them are clinically silent and resolve spontaneously.
2. Ultrasound facilitated the early detection of the portal vein thrombus and hence can be used as a effective tool and also as a guide for catheter removal.

Limitation: There was no long term follow up and controls were not considered

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