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Research Study on Portal Vein Thrombosis 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 were 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

Neonatal patients who need vascular access and resuscitation may benefit from umbilical vein catheterization. A peripheral venous catheter can be replaced with an umbilical vein catheter, which eliminates the need for additional procedures to maintain venous access [1]. The best method for monitoring and treating severely unwell newborns is still UVC, despite the risk of infection and thrombus development. Portal venous thrombosis can cause portal hypertension and other problems in newborns who have undergone umbilical venous catheters [2]. Most portal vein thromboses are not identified because they rarely cause symptoms [3].
This study was conducted to evaluate the effectiveness of Colour Doppler Ultrasonography as a secure, non-invasive, and reasonably priced technology to identify thrombus early and prevent any long-term consequences [4,5].

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 at DVVPF Medical College and Hospital which has a tertiary level neonatal care unit.

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

Study Design: This investigation was prospective, observational, and analytical. The babies who were recruited provided information on their age, gender, birth weight, catheter tip position by X-ray, length of catheterization, and medications administered through the umbilical vein. Doppler in colour Within 24 to 48 hours of catheter placement, 48 to 72 hours after removal, and then every week until hospital discharge or clot clearance, ultrasound evaluation was done. Grey scale ultrasonography findings of an echogenic intraluminal thrombus and colour Doppler images without any flow were used to confirm the diagnosis of PVT. If a thrombus did form, the position, scope, and size were noted. The local ethical committee gave its approval, and all subjects provided written consent.

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

The umbilical veins of 30 neonates, 14 girls, and 16 males with portal vein thrombosis were examined for the condition. USG traced the position of the UVC tip and found that 25 babies had it in the inferior vena cava, 3 kids had it in the main portal vein, 1 baby had it in the umbilico portal confluence, and 1 baby had it in the umbilical vein. Fluid administration, transfusion exchange, calcium infusion, parenteral feeding, and pharmaceutical administration all took place through the umbilical vein. Thirty neonates were examined; 17 (57.2%) had clinical sepsis, 14 (46.7%) required blood transfusions, and seven (23.3%) required calcium infusions through the umbilical vein.

10% of the study's population, or 3 out of every 30 infants, had portal vein thrombosis. One baby and two babies had the umbilical tip in the major portal vein, respectively. Two of the three neonates with portal vein thrombosis were female, and one was a newborn boy. Two newborns had partial non-occlusive thrombus in the left portal vein, and one baby had one in the main portal vein, according to colour doppler results. Following treatment, all of the babies' thrombi had disappeared by 1-2 weeks.

The umbilical vein was used to administer calcium infusion to all three (100%) neonates who had thrombosis, and this association was shown to be statistically significant with a P value of 0.086.

Table 01- UVC Tip placement

Results. Total babies:30				
UVC tip placement.	Portal vein:03	Inferior vena cava -25	Umbilical vein-01	Umbilico-portal confluence-01

Table 02- Outcome from the results.

Outcome (Total babies-30)	Male baby	Female baby
Portal vein thrombosis -03	01	02
Position of UVC	Umbilical vein	Portal vein
Calcium infusion given	Yes	Yes

Table 03- Other Results.

Other results	Number of babies affected
Partial non occlusive thrombus in left portal vein.	02
Partial non occlusive thrombus in main portal vein	01

DISCUSSION

It is believed that UVC contributes to the emergence of PVT. It was thought that the catheter and the infusate (inotropes, calcium, intravenous fluids) caused mechanical and chemical damage to the vascular wall, which started the thrombotic process. This assumption was supported by the discovery that newborns who later developed portal vein hypertension had previously undergone umbilical vein catheterization. Most occurrences of portal venous thrombosis go undiagnosed and are only accidentally discovered later since it rarely produces clinical issues during the newborn period[3]. Umbilical vein catheterization was used in our investigation for a number of the previously mentioned reasons. For exchange transfusions and the administration of high osmolar fluids, such as high concentrations of dextrose in infants with chronic hypoglycemia, catheterization of term neonates was performed.

Of the infants who had umbilical vein catheterization, 10% (3 of 30) developed portal vein thrombosis. Two of these infants had their tips in the inferior vein, and one baby's tip was accidentally placed in the portal vein. PVT incidence has been found to range widely, from 1.3% to 43%, and its correlation with umbilical vascular catheterization may be brought on by the use of various techniques and methodologies during the initial assessment and follow-up periods [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 an effective tool and also as a guide for catheter removal.

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

Declaration by Authors

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