

Incidence and Risk Factors of Catheter-Associated Thrombosis in Critically Ill Children

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Introduction

During the last decade, many authors have raised awareness concerning the increasing rate of venous thromboembolism (VTE) in critically ill children [1]. The presence of central venous catheter (CVC) is one of the most important risk factor for venous thrombosis in children [2].

The purpose of this study was to analyze incidence and risk factors for catheter-related thrombosis in children admitted in our Pediatric Intensive Care Unit (PICU).

Methods

All children aged less than 2 years, admitted in the PICU from January 2016 to June 2017, and receiving at least one tunneled CVC, were included in our retrospective study. Those with venous thrombosis unrelated to CVC placement were excluded. Catheter-associated venous thrombosis (CAVT) was confirmed using Doppler ultrasonography. The whole study population was divided into two groups, based on the presence or absence of CAVT. Demographic data (age, gender, weight), underlying diagnosis, catheter type and characteristics (number of lumen, diameter, insertion site), indication of CVC placement and occurrence or not of an infection, were collected and analyzed using IBM SPSS Statistics for Windows (Version 22.0). Pearson linear correlation coefficient was performed to measure correlation between catheter-associated venous thrombosis and risk factors. P-Value<0.05 was considered significant.

Results

Incidence rate of CAVT was 12 (15.79%). There was a significant correlation between CAVT and catheter infection ($p < 0.05$). This correlation has not been founded with regard to other risk factors (Table 1-3).

	Total (n = 76)	CAVT+(n= 12)	CAVT- (n = 64)	P
Age (days)	14 (0 - 540)	15 (0 - 120)	14.15 (0 - 540)	
Gender Male	47 (61.84%)	7 (58.3%)	40 (62.5%)	NS
Female	29 (38.16%)	5 (41.67%)	24 (31.57%)	
Occurrence of an infection	51(67.10%)	12 (100%)	39 (60.93%)	0.006

Table 1: Demographic of patients.

	Total (n=76)	CAVT+ (n = 12)	CAVT- (n = 64)	P	
Vein Locations				NS	
Jugular	72 (94.73%)	12 (100%)	60 (93.75%)		
Other	4 (5.27%)	0	4 (6.25%)		
CVC Size	2.7	33 (43.42%)	6 (50%)	27 (42.18%)	NS
	4.2	42 (55.26%)	6 (50%)	36 (56.25%)	
Indication of CVC insertion					
Parenteral Nutrition	47 (61.84%)	7 (58.30%)	40 (62.5%)	NS	
Vascular Filling	45 (59.21%)	9 (75%)	36 (56.25%)		
Medication administration	51 (67.1%)	11 (91.7%)	40 (62.5%)		
Transfusion	13 (17.10%)	4 (33.30%)	9 (14.06%)		
Lack of access	6 (7.9%)	2 (16.7%)	4 (6.25%)		

Table 2: Catheter characteristics.

	CAVT + (n = 12)	CAVT- (n = 39)	P
Pulmonary infections	0	26 (66.7%)	-
Catheter related infections	12	5 (12.82%)	0.006
Abdominal infections	0	14 (35.9%)	-
Blood stream infections	0	6 (15.38%)	-
Others	0	8 (20.5%)	-

Table 3: Correlation between CAVT and infections.

Discussion

The incidence rate of CAVT in our study (15.79%) was in the literature range which varies between 1.7 and 81% [3], this variation is due to differences in patient subpopulations studied (age, surgery, cancer or dialysis patients), type of CVC used (PICC vs. tunneled line) and diagnostic imaging modality (ultrasonography or venography). According to a systematic literature search of electronic databases until December 2013 [4], the pooled frequency of thrombosis was 0.20 (95% [CI] 0.16 - 0.24) on patients aged 0 - 18 years with central venous catheters. The high incidence in our trial can be explained by our population age range (0 - 2 years).

Studies evaluating pediatric thrombosis, reported risk factors for CAVT include cancer, sepsis, congenital heart disease, trauma, inflammatory disease and congenital prothrombotic disorders [1]. In our study correlation was found only with catheter infection. In patients with CVC-related infection, the risk of thrombosis increased markedly in comparison to those without infection (RR, 17.6; 95% CI, 4.1 to 74.1) [5]. There was a positive association between thrombosis and catheter associated blood stream infection (CABSI) in infants who did not have lines removed for infection (p < 0.05) [6].

Conclusion

We found higher incidence of CAVT in this trial, compared to previous studies, with a significant correlation to catheter infections. This might be explained by the higher rate of catheter infectious complication during hospital stay in our PICU.

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