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Dr. Ashutosh Aggarwal

Department of Paediatrics, Dr.
Baba Sahib Ambedkar Medical
College and Hospital, Rohini,
New Delhi, Delhi, India

Assessment of thrombotic events in children: A hospital based study

Dr. Ashutosh Aggarwal

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Abstract

Background: There is scarcity of information on the incidence of inherited thrombophilia from our country. The present study was conducted to assess thrombotic events in children.

Materials & Methods: The present study was conducted in the department of Pediatrics. It comprised of 38 children. Patients were subjected to complete hemogram, sickling test, immunological evaluation etc. Risk factors for thrombotic events were recorded.

Results: Out of 38 patients, 16 were of VTE and 22 were of ATE. The most common VTE was due to central venous catheter seen in 6 cases. Most common ATE was due to thrombophilia's seen in 5 cases. Other reasons in VTE were immobilization seen in 2, trauma in 1, infections in 2, dehydration in 2. Other reasons in ATE were immobilization seen in 2, trauma in 4, infections in 3, dehydration in 3 and unknown in 4 cases. The difference was significant ($P < 0.05$).

Conclusion: Thrombotic events in children are emerging problem. The most common reason for VTE was central venous catheters and in ATE was thrombophilia's.

Keywords: Arterial thrombo embolism, Thrombotic events, venous thrombo embolism

Introduction

Thromboembolic diseases in children have been portrayed as a new epidemic of tertiary pediatric care. The reported incidence of venous thromboembolism (VTE) is 2.09 per 100,000 person-years and is also increasing among hospitalized children. Central venous catheters (CVC), sepsis, immobilization, surgery, nephrotic disorders, malignancy, congenital heart disease, antiphospholipid syndrome (APS), renal disease and inherited thrombophilias are the major risk factors for thromboembolism in children. Secondary thrombosis is more common than inherited thrombophilia in children^[1].

There is scarcity of information on the incidence of inherited thrombophilia from our country. Also, grave outcomes might be related to thrombosis that incorporates embolization, recurrence, stroke, and death^[2]. Besides the greater awareness, an objective increase in childhood thrombosis is due to the medical progress in the treatment of critically ill patients. This seemingly contradictory observation is easily explained by the increasing use of central catheters and innovative interventional procedures in the treatment of premature infants, neonates and older children who are critically ill, suffering from complex cardiac defects, and from malignant disease, respectively^[3].

Therapeutic and prophylactic measures have subsequently become increasingly important, but in addition to the complexity of the clinical background and the heterogeneity in the pattern of acquired and inherited risk factors for TE among patients, the physiological significant differences of the coagulation system between newborns, young children and adolescents and differences in drug metabolism do not allow general recommendations for therapeutic interventions like thrombolysis and prophylactic anticoagulation for the different clinical conditions^[4]. The present study was conducted to assess thrombotic events in children.

Materials & Methods

The present study was conducted in the department of Pediatrics. It comprised of 38 children age ranged 3-12 years of both genders. Parents were informed regarding the study and written consent was obtained. Ethical clearance was obtained prior to the study.

Data pertaining to patient such as name, age, gender, a CVC, infection, immobilization, surgery, nephrotic syndrome, cancer, congenital heart disease, APS, renal disease and inherited thrombophilias were recorded. Patients were subjected to complete hemogram,

Corresponding Author:

Dr. Ashutosh Aggarwal

Department of Paediatrics, Dr.
Baba Sahib Ambedkar Medical
College and Hospital, Rohini,
New Delhi, Delhi, India

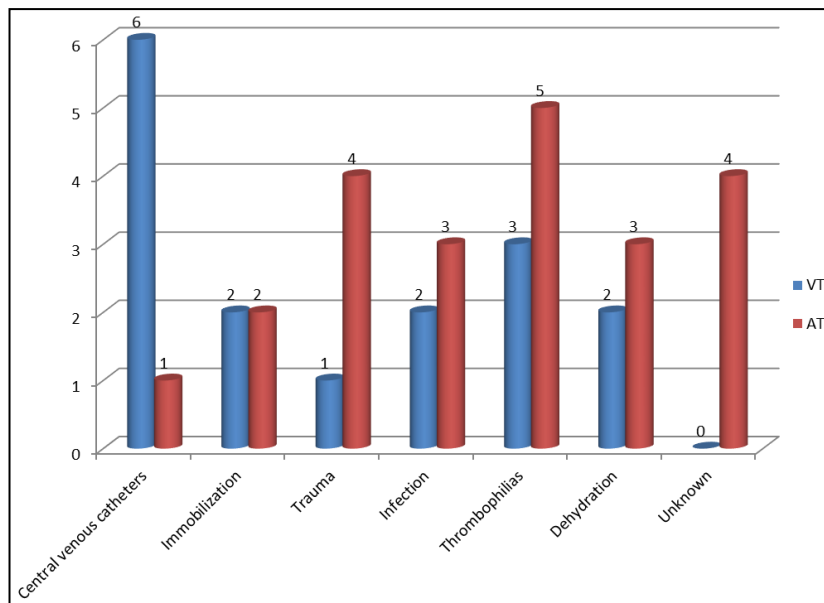
sickling test, immunological evaluation including anti-neutrophil antibody (ANA), anti-double stranded DNA (ds DNA), ant neutrophil cytoplasmic antibodies (ANCA), antiphospholipid antibodies (APLA), homocysteine levels and echocardiogram (ECHO) heart. All children with peripheral thrombosis are evaluated with ultrasonography (USG) Doppler and cerebral thrombosis was evaluated with either computed tomography (CT) or magnetic resonance imaging (MRI) angiography. Results were tabulated and subjected to statistical analysis. P value less than 0.05 was considered significant.

Results

Table I: Distribution of patients

Total- 38		
Events	Venous thrombo embolism (VTE)	Arterial thrombo embolism (ATE)
Number	16	22

Table I shows that out of 38 patients, 16 were of VTE and 22 were of ATE.



Graph I: Risk factors for thrombosis

Discussion

The increasing knowledge of exogenous and endogenous thrombophilic risk factors has initiated a number of studies to assess the impact of such factors with respect to their contribution to the thrombophilic state, both individually but also in concert with other factors.⁵ In addition to their impact on a first thrombotic event, much of the interest is now focused on their importance for thrombotic relapses. Only such studies will give us an answer to questions concerning the indications for treatment, prophylaxis and its optimal duration¹⁶.

The estimated incidence of pediatric VTE in developed countries ranges from 0.07 to 0.49 per 10,000 children. VTE rates are notably higher in hospitalized children, 4.9–21.9 per 10,000 hospital admissions. A bimodal distribution is evident. The most prominent peak is in early infancy accounting for up to 20% of pediatric VTE. A second peak occurs during adolescence with about 50% of VTE events occurring in children 11–18 years old¹⁷. The present study was conducted to assess thrombotic events in children.

Table 2: Risk factors for thrombosis

Factors	VTE	ATE	P value
Central venous catheters	6	1	0.01
Immobilization	2	2	1
Trauma	1	4	0.02
Infection	2	3	0.5
Thrombophilia's	3	5	0.06
Dehydration	2	3	0.8
Unknown	0	4	0.01
Total	16	22	

Table II, graph I shows that most common VTE was due to central venous catheter seen in 6 cases. Most common ATE was due to thrombophilia's seen in 5 cases. Other reasons in VTE were immobilization seen in 2, trauma in 1, infections in 2, dehydration in 2. Other reasons in ATE were immobilization seen in 2, trauma in 4, infections in 3, dehydration in 3 and unknown in 4 cases. The difference was significant ($P < 0.05$).

In present study, out of 38 patients, 16 were of VTE and 22 were of ATE. We found that most common VTE was due to central venous catheter seen in 6 cases. Most common ATE was due to thrombophilias seen in 5 cases. Other reasons in VTE were immobilization seen in 2, trauma in 1, infections in 2, dehydration in 2. Other reasons in ATE were immobilization seen in 2, trauma in 4, infections in 3, dehydration in 3 and unknown in 4 cases.

Van Ommen *et al.*¹⁸ found that out of 49 cases, 30 (61.2%) were due to venous thromboembolism (VTE) and 19 (38.8%) were of arterial thromboembolism (ATE). The cumulative average annual incidence for VTEs was found to be 38.2 (n = 30) and for ATEs it was found to be 24.2 (n = 19) per 10,000 hospital admissions over 2 y of study period. With total of 19 (38.7%), catheters were the leading cause of thrombosis followed by infection numbering to 10 cases (20.4%). Total 42.8% cases (n = 21) achieved complete resolution. Partial resolution was noted in 53.2% of cases (n = 26) and no resolution in 4% cases (n = 2). Total seven (14.3%) deaths were recorded during the study period.

Sharathkumar *et al.* [9] derived six independent risk factors and assigned points from beta coefficients in the logistic regression model: immobilization (3), LOS \geq 7 days (2), OCPs (2), CVC (1), bacteremia (1), and direct ICU admission (0.5). A cumulative score of \geq 3 yielded a positive predictive value of 2.45% for HA-VTE at a prevalence of 0.71% (27). Two separate risk-assessment models. Branchford *et al.* [10] showed independent risk with mechanical ventilation, systemic infection, and hospital stay \geq 5 days, and that these three factors co-occurring yielded a posttest probability of 3.1% for HA-VTE.

Conclusion

Thrombotic events in children are emerging problem. The most common reason for VTE was central venous catheters and in ATE was thrombophilias.

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