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Thrombophlebitis – incidence and risk factor evaluation

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Abstract

Objectives: The aim of this study was to explore the different risk factors and incidence of patients suffering from thrombophlebitis during and after cannulization.

Material and method: A descriptive cross-sectional survey was conducted on 150 patients admitted to various departments of Sir Syed Hospital from February to April, 2013. A questionnaire was distributed among them for the survey.

Result: Out of a total of 150 patients recruited for this study, 90 developed thrombophlebitis secondary to peripheral venous catheter insertion. Among various risk factors contributing to thrombophlebitis, female gender proved to be a significant risk factor in our study (58).

Conclusion: Catheters and cannulas that are left longer in situ have increased exposure to handling and infusion in addition to initial traumatization which may explain the higher rate of thrombophlebitis for longer duration of its insertion. Number of catheter placements was also found to be noteworthy and yielded similar results as duration in situ.

Keywords: Thrombophlebitis, risk factor, peripheral intravenous canulation

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Introduction:

Intravenous devices are indispensable and commonly used in the modern practice of medicine. The peripheral venous catheter is often inserted for the purpose of fluid, drug and blood product administration. The commonest complication of which is thrombophlebitis; which clearly could consume more healthcare resources. There have been many theories on the pathophysiology of Thrombophlebitis; currently accepted model suggests that catheterization of the vein leads to inflammation and thrombus formation. However, the exact mechanism remains unclear. Many risks factors of thrombophlebitis have been identified among which are immobilization, trauma, or surgery (particularly orthopedic surgeries, intra-abdominal and intrathoracic surgeries), pregnancy, estrogen therapy or oral contraceptive use, cancer,(particularly cancer of the pancreas, lungs, genitourinary tract), hypercoagulable states(resistance to activated protein C (factor V), antithrombin III deficiency indwelling venous catheters and infusions (superficial thrombophlebitis); associated with Staphylococcus or Enterobacteriaceae, varicose veins. Demographihc variations include age, being more common 30 years in general, female predominance, and certain racial and genetic factors.

Cardinal features of thrombophlebitis include unilateral swelling, warmth, erythema, sometimes associated with tenderness and a palpable cord. Two local studies on peripheral venous

catheter, namely, Patimah and Zahara were conducted. Patimah conducted a study on the quality of nursing care and placed emphasis on the need of a good nursing care protocol[9]. Zahara et. al highlighted the need for replacement of catheters every 72 hours[8].

We conducted this study to widen the scope of risk factors associated with Peripheral venous cauterization. We exemplified and therefore focus our survey upon individual factors such as patient and catheterization factors.

Methodology:
A descriptive cross-sectional survey was conducted on the patients admitted to various departments of Sir Syed Hospital from February to April, 2013. All patients above 15 years and those who have had at least one cannula insertion were invited to participate in the study. Patient factors like age, gender, parity (females), BMI, history of prolong immobilization, history of trauma/surgery, drug misuse and underlying disorders such as clotting dysfunction and metabolic disturbances like diabetes were recorded.

Among venous catheterizations factors, sources investigated were number of cannula inserted, position, incidence of repeated cannula usage and duration in situ were emphasized upon greatly. No grading scales for the symptoms were employed.

We analyzed the association between development of thrombophlebitis and risk factors and the influence of existing circumstances complicating the outcome. The data thus obtained was analyzed using SPSS version 21.0.

Results:
Out of a total of 150 patients recruited for this study, 90 developed thrombophlebitis secondary to peripheral venous catheter insertion. Among various risk factors contributing to thrombophlebitis, female gender proved to be a significant risk factor in our study (58). Among three risk groups explored, patients with thrombophlebitis majorly belong to the 30-50yr category. The middle aged factor has been a topic of debate in the previous studies.[10] We also investigated possible underlying causes contributing towards the disease; namely immobility was found to be most momentous factor (41 patients), followed by Diabetes (23 patients).

We found a major correlation between duration of a catheter left in situ and the development of thrombophlebitis. Patients who had catheters left in situ for more than 3 days were more likely to develop thrombophlebitis compared to those whose catheters were left for less than 3 days. Number of catheter placements on the patients exceeded for 57 of our patients under study and therefore formed a questionable connection with repeated infusion. The kind of fluid also forms a relationship with thrombophlebitis, however was not considered in the study.

Another practice investigated was repeated use of used cannulas. A surprising 68 complained the employment of used cannulas. As Patimah emphasized upon the need for quality control and nursing care for the practice, the issue of malpractice is largely reasoned with lack of knowledge and awareness, education of the health personnel, shortage of medical supplies and plain ignorance. As a standard practice, the hospital avoids placing catheters in the lower limb unless deemed absolutely unavoidable.

Discussion:
Catheters that are left longer in situ have increased exposure to handling and infusion in addition to initial traumatization which may explain the higher rate of thrombophlebitis for longer duration of its insertion. Number of catheter placements was also found to be noteworthy and yielded similar results as duration in situ. The catheter being foreign to the human body traumatizes vein which stimulates an inflammatory response and hence predisposes to the development of thrombus and subsequent phlebitis.

The duration a catheter is left in the vein was clearly labeled as a risk factor but the size of the catheters used were not studied as studies conducted in the past denied disease response[4]. The

risk of developing thrombophlebitis with variations in fluids like antibiotics and crystalloids was also not considered the main focus of our study owing to the sample size and the fact that most patients received different fluid through the same catheter. However previous studies conducted in the same context proved a higher risk with antibiotics[3].

Female gender as a risk factor was confirmed by our analysis as high incidence of females patients developing thrombophlebitis secondary to catheterization were found among all age groups. The age of a patient and lack of influence upon the development of thrombophlebitis among the patients has been observed and reported in other studies[10]. However, according to our results, most individuals falling in the middle aged category had revealed thrombophlebitis.

The location of catheter placement has been found by previous studies to influence the outcome the most. As mentioned earlier, catheters placed on the lower limbs have been found to have higher incidence of developing thrombophlebitis than upper limb and therefore, hospitals improvise to operate on the upper limb rather than lower limbs. We studied preference and incidence of the disease distribution in the upper limb. Both dorsum and brachium were tested. This result is contrary to the results tabulated in other studies. The CDC recommends that placement of catheter on brachium veins is superior to dorsal veins and upper limb is preferable to veins of the lower limbs[5]. The practice of vigilant selection of catheter type and size, electively replacing catheter every 72 hours is recommended for all adult patients coupled with examination for the signs of thrombophlebitis at least once daily.

The CDC guideline is based upon the prevention of intravascular catheter related infections[5]. All departments therefore should have an observation chart to document signs of thrombophlebitis.

Conclusion:

CDC guidlelines for prevention of intravascular catheter related infections should be used to avoid Thrombophlebitis:

In adults, use an upper-extremity site for catheter insertion. Replace a catheter inserted in a lower extremity site to an upper extremity site as soon as possible. In pediatric patients, the upper or lower extremities or the scalp (in neonates or young infants) can be used as the catheter insertion site. Select catheters on the basis of the intended purpose and duration of use, known infectious and non-infectious complications (e.g., phlebitis and infiltration), and experience of individual catheter operators. Avoid the use of steel needles for the administration of fluids and medication that might cause tissue necrosis, if extravasation occurs. Use a midline catheter or peripherally inserted central catheter (PICC), instead of a short peripheral catheter, when the duration of IV therapy will likely exceed six

Table 1: *Risk Factors of Thrombophlebitis, 2013 (N= 150)*

Risk Facotors	Thrombophlebitis Positive (n= 90)
Gender	
Female	58
Male	32
Age	
30	16
30-50	46
50	28
Co-existing Condition (s)	
Obesity	09
Diabetes	23
Immobility	41
Trauma	17
No. of Catheter Placements	
1-3	33
More than 3	57
Site of Catheter Insertion	
Upper Limb: Dorsum	35
Upper Limb : Brachium	55
Duration of Situ	
1-3 Days	42
More than 3 Days	48
Repeat usage of the same Catheter	
Yes	68
No	22

days. Evaluate the catheter insertion site daily by palpation through the dressing to discern tenderness. Remove peripheral venous catheters if the patient develops signs of phlebitis (warmth, tenderness, erythema or palpable venous cord), infection, or a malfunctioning.

Role and contribution of authors:

Dr Yousuf Lakdawala, Associate Professor, Surgery Department, Altamash Institute of Dental Medicine supervisor, topic selection, and did proof reading.

Dr Syeda Maria Fakhar, M.B.B.S, Senior Medical officer, Surgery Department, Altamash institute of Dental Medicine, article writing, data compilation

Dr. Eman Khaled, Medical Officer, data Collection and result compilation

Dr Arooj imtiaz, data collection and references

Conflict of Interst: none

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