Summary

Study of central venous catheter associated thrombosis in critically ill patients

Thesis

Submitted for partial fulfillment of master degree in Critical Care Medicine By

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2019

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Introduction:

Central venous catheters (CVCs) have an essential part in the management of critically ill patients .They are useful for hemodynamic monitoring as well as for administration of specific medications like vasopressors, parenteral nutrition and hemodialysis. These are associated with substantial risk of complications which can be mechanical, septic and thrombotic. *(J Thromb Haemost 2015 Dec)*

Deep vein thrombosis and pulmonary embolism are evolving and becoming well known to the public. They are both conditions that are recognized to have life-threatening consequences. The focus for deep vein thrombosis and pulmonary embolism has been mostly on the lower extremities. Upper extremity thrombosis is normally viewed as a more benign entity, but recent data suggested that the significance of morbidity and mortality is equal to that of the lower extremities. The prevalence of upper extremity thrombosis has increased due to the increase in usage of central venous catheters.Although, a majority of patients present with pain, swelling or prominent veins throughout the upper extremity, many patients will present as asymptomatic. *(Altawan A,et al. 2017Jun)*

Several factors appear to be associated with (CVC). While some of these characteristics may be non-modifiable, future studies that target potentially modifiable variables to prevent this adverse outcome are promising. *(Mino JS,et al. 2014 Jul).*

Upper limb DVT is a well-known complication of thrombosis associated with (CVCs) especially in patients with certain diseases like malignancy

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and autoimmune diseases which, in its fatal form, can sometimes lead to life-threatening pulmonary embolism. . *(Boddi M,et al.2015 Nov.)*

Using ultrasound (duplex) is very important in early detection of subclinical venous thrombosis. Also it is useful in detection of site and size of the thrombus. *(Squizzato, Alessandro,et al.2015 Apr.)*

Accurate diagnosis of (CVC) associated thrombosis is essential for planning prophylaxis and tailoring management for (CVCs) associated thrombosis patients to achieve better ICU outcome.*(Del Principe MI,et al. 2012 Dec).*

Duplex helps early usage of thrombolytic agents, thus increases the recovery rate and reduces the problems caused by these thrombi. *(Wang, Hsin-Kai,et al. 2015 Jun).*

The aim of the study:

The aim of this work is to study the prevalence of central venous catheter associated venous thrombosis in ICU patients using venous Doppler.

Patients and Methods:

Patients

This descriptive study was conducted over 80 patients admitted to Critical Care Department, EL-Fayoum University Hospital from December 2017 to December 2018. The study is approved by the Ethics Committee of the Faculty of Medicine, Fayoum University.

Inclusion criteria:

All patients with inserted CVC for various indications during the course of ICU admission were included in the study.

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Exclusion criteria:

1-Discharge or demise before 10 days of CVC insertion.

2-Concurrent use of anticoagulant therapy.

All patients were subjected to:

1-Full history

It included age, sex, HTN, DM, malignancy, autoimmune diseases, chronic liver and kidney disease, cause of admission and type of CVC.

2-Full clinical examination

3-**Laboratory survey including** CBC, kidney function tests, liver function tests, blood sugar, D-dimer,INR, Lipid profile and other investigations as needed.

4-Radiological imaging as indicated.

5- Real- time ultrasound and venous duplex study:

a) All patients were subjected to real-time ultrasound with venous duplex of IJV and SCV at the site of catheter for early detection of catheter related deep venous thrombosis. Ultrasound and Duplex study were done before,on the 5th day and the 10th day of the CVC insertion.

Ultrasound and Duplex study were conducted using a PHILIPS Doppler machine equipped with a 7.5 MHz linear array transducer. Both longitudinal and transverse views were obtained. Direct pathological findings were documented in the two perpendicular planes. Compressibility of vein, site and size of thrombus were also assessed. Reduced venous velocity assessment was provided by Doppler study of IJV and SCV.

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Interpretation of Ultrasound-Doppler study:

A-Normal findings:

-Normal veins appeared anechoic, compressible, normal thin walls with complete homogenous color filling upon color Doppler technique.

- Preserved normal respiratory phasisity.

B-Abnormal findings:

-Non compressible with intra-luminal thrombosis with mural thickening.

-Color Doppler showed partial or complete absent color filling.

Results:

The incidence of thrombosis was 22.5 %(18 cases); 61.1% (11 cases) of them developed at 5th day and 38.9 %(7 cases) developed at 10th day of using central line.

Regarding thrombosis character: it was hypoechoic, homogenous and adherent to the wall of the internal jugular vein.

Diameter: transverse diameter which was encroaching the lumen ranged from 5 to 11 mm and longitudinal diameter which was adherent to the vessel ranged from 16 to 32 mm. Lumen obstruction ranged from 25% to 55%.

Regarding gender, there was no significant statistical difference in the incidence of thrombosis between the two groups.

Regarding age, there was no significant statistical difference in the incidence of thrombosis.

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There was statistically significant difference between groups regarding presence of autoimmune disease, and malignancy with higher percentage of thrombosis among patients with autoimmune disease (5 cases) (27.8%), and malignancy (7 cases) (38.9%).Autoimmune diseases carried significant high risk of thrombosis (Risk Ratio: 7.5) and malignancy carried risk ratio 7.25 for catheter related thrombosis.

On the other hand there was no statistically significant difference regarding presence of hypertension and diabetes mellitusThere was higher incidence of thrombosis among patients with Mahurkar insertion (55.6%) versus (44.4%) among patients with central line insertion.

Regarding specific types of malignancy, bladder cancer was associated with the most significant high risk of catheter related thrombosis (risk ratio is very high and can't be calculated).It also may be due to the usage of large caliber dialysis catheters i.e. Mahurkars. There was statistically significant difference between study groups with higher percentage of thrombosis (16.7%).

Other malignancies i.e. bronchogenic carcinoma, lymphoma and patients associated with brain metastasis also carried high risk (risk ratio: 3.7, 3.64, 3.64 respectively) although this risk was not statistically significant.

There was statistically significant difference between study groups regarding presence of chronic kidney disease with higher percentage of thrombosis (27.8%) among patients with CKD and shocked patients on vasopressors.

On the other hand there was no statistically significant difference regarding presence of other comorbidities.

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There was statistically significant difference between study groups regarding using vasopressor with higher percentage of thrombosis (55.6%) among patients who used vasopressor.

There was statistically significant difference between study groups regarding types of central line with higher percentage of thrombosis among patients who used Mahukar type (35.7%) compared to patients who used central venous line catheter (15.3%) with p-value 0.05.

The calculated risk ratio for occurrence of catheter related thrombosis revealed that Mahurkar catheters carried 3.1 more risk of thrombosis than using central venous catheter

There was statistically significant difference between study groups regarding kidney function test (urea, and creatinine), and also regarding hemoglobin level; with high mean of urea, and creatinine , and low mean of hemoglobin level were noted among patients who developed thrombosis.

On the other hand there was no statistically significant difference regarding liver function test (ALS, and ALT) or INR level.