IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 23, Issue 4 Ser. 4 (April. 2024), PP 39-43
www.iosrjournals.org

Deep Venous Thrombosis In Burn Patients, In The University Of Port Harcourt Teaching Hospital (Upth); Port Harcourt, The Need For Continuous Surveillance; Our Nigeria Experience

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Abstract
Background
Deep Vein Thrombosis (DVT) is a common, yet challenging diagnosis, characterized by dislodgement of blood clot from the intima of a blood vessel. The dislodged blood may migrate to the lungs leading to Pulmonary Embolism (PE). Reporting and Diagnosis of DVT in burns is controversial and under reported.
Objectives*: The aim of our study is to update us on the factors responsible for the development of DVT and knowledge of the factors required for DVT Surveillance in burn patients in UPTH.*
Method: *This is a retrospective study eliciting the necessity for continuous surveillance in DVT burn patients, and the risk factors in burn patients who developed thromboembolism. UPTH, and her peripheral hospitals, biodata of the patients were collected from April 2018 to February 2024. Burn patients selected from the study were between the ages of two months and 78 years.*
Results*: A total of 655 burns were admitted during the study period, 335 were adult males, 180 were adult females and 140 were children. Nineteen(19) adults' twelve (12) males and seven (7) females with Female to Male ratio 1:1.2, no child was recorded with DVT, 10% were of lower extremities. The ages ranged between 22 and 78 years, mean 49.85±22.2years. Average time of diagnosis was 6 weeks post burn.*
Conclusion*: patients with incomplete healing and unresolved extremities edema should be suspicious of DVT. Significant risk factors for the development of DVT in serious burn patients include wound infection, extended bed rest, and previous surgeries.*

Date of Submission: 08-04-2024 Date of Acceptance: 18-04-2024

I. Introduction

Deep vein thrombosis (DVT) is a medical condition characterized by the formation of a blood clot in the body's deep veins. Less serious side effects from DVT are referred to as post-thrombotic syndrome, which is a condition where pressure and pain in the affected area can cause long-term discomfort and swelling[1]. This condition affects approximately 1 in 3 people who have had a DVT. DVT can also cause damage to the vein's valves. DVT is a serious illness that can be fatal. According to Fecher, et al.,[5] 25% of burn patients die within one month of receiving a DVT diagnosis, and up to 33% of burn patients die within one year of DVT. Furthermore, thirty minutes (30minues) after the onset of DVT, a fifth of deaths can take place. It is therefore somewhat unexpected when some Nigerian authors claimed that there had only been five incidences of deep vein thrombosis (DVT) in burn victims over the past ten (10) years. This suggests that routine surveillance is not necessary and that DVT is not a major problem in Nigeria. Consequently, further research on DVT in patients is necessary to refute these claims. Despite the fact that Bouillard and Rudolph Virchow initially described this medical condition in 1856 and 1862, respectively, there is still a lot of confusion regarding its identification in contemporary clinical practice. Thus, this study's conclusions are based on the experiences of its patients and its incidence among UPTH burn patients, both male and female. Wibbenmeyer et al.[10] state that continuous surveillance of DVT in burn patients enables long-term monitoring that aids in the identification and management of population trends, signs, and symptoms of this illness over a predetermined time. It can also provide information regarding the effects of interventions or treatments administered during that time.

Patients with burns are more likely to develop venous thromboembolism (VTE), a condition that is typically related to their hypercoagulable status[1]. The deep veins of the thighs and legs are the primary sites of venous thromboembolism, sometimes referred to as deep vein thrombosis (DVT). Clot fragmentation and embolus formation that results in pulmonary embolism (PE) are the primary concerns associated with the

occurrence of DVT.[3] All three of the criteria listed in Virchow's triad of thrombosis alterations in the blood's elements known as hypercoagulability[2], damage to the endothelium layer of the vessels, and abnormalities in blood flow are met by burn victims. Furthermore, the platelet count of burn patients is often markedly elevated[1]. But there was variation in some literature's reported on the rates of VTE among burn patients which were between 0.25–25%.3-5. Prophylactic anticoagulation for burn patients is still debatable because of some concerns about anticoagulation-related problems as well as the inconsistent reporting of its rates[1,6–10]
The aim of our study is to reveal our knowledge in DVT in burn patients in UPTH.

Methods

This is a retrospective study eliciting the necessity for continuous surveillance in DVT burn patients, and the risk factors in burn patients who developed thromboembolism. The study took place at University of Pot Harcourt Teaching Hospital (UPTH) and other private hospitals in Port Harcourt whose patients were referred to UPTH, biodata of the patients were collected from April 2018 to February 2024. Burn patients selected from the study were between the ages of two months and 78years. A total of 19 patient records met the inclusion criteria which was used to access the need for surveillance of DVT in burn patients in UPTH. percentages, mean and standard deviation were used to analyze the data.

Statistical Analysis

Microsoft Excel was used for data entry, and the data were analyzed by accordingly. Frequencies and percentages were used for categorical data, for example sex and gender. Mean and standard deviation were used for numerical data, such as age. The level of significance in this study was <0.05.

II. Results

A total of 655 burns were admitted during the study period, 335 were adult males, 180 were adult females and 140 were children. A total of nineteen (19) adults' patient were diagnosed with DVT (10%) of lower extremities. They were twelve (12) males and seven (7) females with Female to Male ratio 1:1.2, no child was recorded with DVT case. The ages ranged between 22 and 78years, mean 49.85±22.2years. Average time of diagnosis was 6weeks post burn. Most common presentation were limb swelling and pain, DVT of Rt Femoro-iliac Vein from iatrogenic ligation during surgery and DVT from repeated femoral puncture for dialysis. Confirmation was with Doppler Venous Ultrasound. Treatments included DVT thrombectomy, sinus histiocytosis of groin nodes, DSWI, review & wound dressing, tunneled dialysis catheter insertion, thrombolysis, and anticoagulation. Mortality was 0% from the various DVT diagnosis made in this study.

Table 1: Summary of Demographic Characteristics of Burn Patient with DVT in UPTH

S/No	Age (yrs)	Sex	Diagnosis/Disease	CVC in burn extremity	Time of DVT diagnosis	Treatment	Outcome	Additional Info
1	22	F	DM, ESRD, Rt Femoral DVT	Yes	6	DVT thrombectomy	Successful	Nil
2	32	F	Rt femoral DVT from repeated femoral puncture for dialysis	Yes	6	femoral DVT thrombectomy	Successful	Nil
3	36	M	left femoral DVT	Yes	6	Femoral DVT Thrombectomy, DSWI, review & wound dressing	Successful	Nil
4	36	M	left femoral DVT	Yes	6	Femoral DVT Thrombectomy, DSWI; review, removal of wound drain & wound dressing	Successful	Nil
5	38	M	Lt ilio-femoropopliteal DVT	Yes	6	Femoro-popliteal venous thrombectomy with extraction of a kidney dish-sized filled clots/thrombus	successful	Nil

6	44	M	Lt femoro-popliteal DVT	Yes	6	Lt Femoro-popliteal DVT Thrombectomy using thigh Incision alone	successful	Nil
7	45	M	left lower limb femoropopliteal DVT	Yes	6	venous thrombectomy; sinus histiocytosis of groin nodes	Successful	CA esophagus
8	46	F	Left ilio-femoropopliteal-popliteal DVT	Yes	6			Nil
9	47	M	Lt femoro-popliteal DVT	Yes	6	DVT thrombectomy for Lt femoro-popliteal DVT	successful	Nil
10	47	M	Lt femoro-popliteal DVT	Yes	6	DVT thrombectomy for Lt femoro-popliteal DVT	successful	Nil
11	48	M	Rt ilio-femoral DVT	Yes	6	DVT thrombectomy		Nil
12	53	M	Acute left femoropopliteal DVT	Yes	6	DVT thrombectomy	Successful	Nil
13	58	F	Rt femoro-popliteal DVT	Yes	6	DVT thrombectomy of Rt SF Vein	Successful	Nil
14	60	M	DVT of Rt Femoro-iliac Vein from iatrogenic ligation during surgery	Yes	6	thrombectomy of Rt EIA, Repair of Rt external Iliac Vein, Rt EIV, redo inguinal hernia by Nylon Danning		Nil
15	61	F	Rt Femoro-popliteal DVT	Yes	6	Femoral DVT Thrombectomy	Successful	Nil
16	62	M	left ilio-femoral DVT secondary to pressure from prostate CA & full bladder	Yes	6	Ilio-Femoral vein Thrombectomy		Nil
17	63	M	RT Ilio-femoral DVT	Yes	6	Rt Ilio-femoral DVT thrombectomy	Successful	Nil
18	71	F	Lt Femoro-popliteal DVT	Yes	6	Lt lower limb DVT (from thigh to leg/foot)	Successful	on warfarin Rx
19	78	F	left lower ilio-femoral to popliteal DVT	Yes	6	thrombectomy		Nil

CVC: Central Venous Access F: Female, M: Male, Nill

Table II: Burn Associated Risk Factor

No of Patients	CVC	CVC in DVT Extremity	Ventilator	Immobility	Wound Infection	DVT in Burn Extremity	Etiology (flame)
19	103±58.4	1(20%)	nill	19(100%)	3(60%)	19(100%)	19(100%)

Study limitations

The study is limited by its retrospective nature and the small number of patients. Furthermore, conclusions cannot be broadly applied since they are based solely on patient data from a single center.

III. Discussion.

The relationship between thromboembolism and burns has been recorded in some literatures over the years. Claudine Schaller[11] and colleagues recorded (8.1% incidence), while this present study recorded about (10%) of DVT level which varies respectively. The risk factors associated with this present study are comparable to results from the study by Mullin et al[4]. Patients that developed DVT while on prophylaxis had associated risk factors-Table II. All the patients had unilateral limb swelling as the major symptom accompanied with pain. Dimer assay were elevated in 60% of the patients. Thrombolysis with streptokinase was administered to patients with proximal DVT while others had therapeutic anticoagulation with LMWH. Swollen limbs with associated pain in burns calls for more research. Adequate method should be adopted to reduce its occurrence. In this study most common presentation were limb swelling and pain, DVT of Rt Femoro-iliac Vein from iatrogenic ligation during surgery and DVT from repeated femoral puncture for dialysis. Confirmation was with Doppler Venous Ultrasound. Treatments included DVT thrombectomy, sinus histiocytosis of groin nodes, DSWI, review & wound dressing, tunneled dialysis catheter insertion, thrombolysis, and anticoagulation. Mortality was 0% from the various DVT diagnosis made in this study.

Haven understood that surveillance is the methodical, ongoing observation of a patient, frequently carried out at a hospital. Its critical role in tracking and controlling the daily rise in DVT cases cannot be understated. DVT surveillance is carried out to make sure that no DVT instances are overlooked, particularly following surgery[4]. Deep vein thrombosis (DVT) instances that are missed after surgery may result in a cascade of emboli that often appear in the initial hours following the diagnosis of DVT. The emboli have the potential to be lethal and can significantly reduce the amount of oxygen that is transported via the bloodstream. If DVT is closely monitored, such incidents can be prevented. For individuals suffering from severe burns, it is crucial to conduct ongoing surveillance using DVT diagnostic techniques and clinical scores, particularly in an environment with restricted resources as UPTH. First, it is best to discourage the use of intermittent DVT monitoring techniques. These techniques don't track the development of the condition over the evaluation period; they just assess the existence of venous thrombosis at predetermined intervals[10]. On the other hand, based on the results of this ongoing surveillance, it guarantees that a venous thromboembolic event's progression is continually tracked, documented, and relevant therapies are implemented. Plethysmography and the Impedance Method are two examples of novel continuous surveillance techniques that have been adopted in the United States. These techniques have significantly improved the identification of DVT and, consequently, the risk of embolism following surgical procedures has been seen[5].

In a setting with limited resources like Nigeria, the importance of ongoing observation with these techniques should be emphasized. 'Continuous' and ‘surveillance' are not the terms that need to be underlined all the time. It is the possibility and advantages that come from the process of meticulous and ongoing clinical surveillance, which are frequently life-saving. This will make it possible to allocate funds, time, and resources for carrying out these monitoring operations in an appropriate and accurate manner.

In this study, the University of Port Harcourt Teaching Hospital (UPTH), located in Port Harcourt Rivers State, Nigeria, examines the significance of ongoing surveillance for deep vein thrombosis (DVT) in burn patients. An overview of DVT is given in the beginning, along with a focus on the necessity of surveillance for burn patients. Additionally, this study emphasizes how important ongoing surveillance is, particularly in Nigeria. Research on DVT surveillance has been done at the National Orthopaedic Hospital in Enugu, Nigeria. A prospective study has been conducted to determine the true incidence of DVT in burn patients[2]. During the first year of the trial, a 60-bed burn unit's regular surveillance, which included a physical examination every two weeks and a single baseline Doppler ultrasonography, resulted in the diagnosis of 12 cases of DVT. This would suggest that burn victims probably have a rather high rate of DVT. These individuals might have experienced post-thrombotic syndrome and other late DVT consequences if surveillance had not been carried out. This illness causes venous stasis ulcers and persistent leg edema in the patient. Even more uncomfortable than the original deep vein thrombosis, post-thrombotic syndrome might cause limits in one's range of motion. If Nigerian patients and their families are informed about the symptoms and indicators of deep vein thrombosis (DVT), perhaps an early diagnosis can be achieved since medical attention will be sought sooner. Then, to stop the disease from developing in people who are at risk, basic modalities like routine anticoagulation and mechanical prophylaxis can be used before the situation gets out of control, which might likely result to death of the patient.

IV. Conclusion:

Hence, there is a place for continuous surveillance and research in DVT in burn patients in Nigeria.

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