PROPHYLAXIS PRACTICE AND INCIDENCE OF DEEP VEIN THROMBOSIS AMONG PATIENTS OPERATED FOR HIP FRACTURE AT MUHIMBILI ORTHOPAEDIC INSTITUTE, DAR ES SALAAM

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By

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A Dissertation submitted in (Partial) Fulfillment of the Requirements for the Degree of Master of Medicine Orthopedics and Trauma of the Muhimbili University of Health and Allied Sciences

Muhimbili University of Health and Allied Sciences
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CERTIFICATION

The undersigned certify that he has read and hereby recommend for acceptance by Muhimbili University of Health and Allied Sciences a dissertation report titled**; ‘‘Prophylaxis Practice and Incidence of Deep Veins Thrombosis among Patients Operated for Hip Fracture at MOI’’** in (partial) fulfillment of the requirements for the Degree of Master of Medicine (Orthopedics and Trauma) at Muhimbili University of Health and Allied Sciences.

_____

Dr. Kitugi Samwel Nungu

Supervisor

_____

Date

DECLARATION AND COPYRIGHT

I, **Michael Chacha**, declare that, this **dissertation** is my own original work and that it has not been presented and will not be presented to any other University for similar or any other degree award.

Signature……. **Date**…….

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My acknowledgement also goes to the entire Orthopedics and paramedical staffs, postgraduate students OT and my family for full support for the necessary assistance and cooperation towards the completion of this dissertation report.

May God bless you abundantly!

DEDICATION

This research study is dedicated to my wife Cyprina Anyango and my kids Irine, Achieng' and Rachel for their tireless encouragement, support and prayer during my study. Would like to wish them all the best in their life, spiritually, physically, mentally and socially upright. Their support socially and psychologically means a lot in the success of my study. The research is also a dedication to my late mom, Rahel O. Ajwala for having sacrificed a lot for my upbringing and her struggle to ensure I attain high level of education. May Almighty God rest her soul in peace!

ABSTRACT

Deep vein thrombosis is clot formed within the deep veins of the lower limbs or pelvis where it causes pain and swelling. When some or all of thrombus becomes detached and moves retrograde in the right side of the heart and lodge in one or more pulmonary arteries, pulmonary embolism occurs. Massive pulmonary embolism is fatal to life. Hip fracture and major lower injuries are risk factor for deep vein thrombosis. DVT prophylaxis is therefore important to hip fracture patients.

This was a facility based descriptive study which was conducted at MOI in DSM city from 2016-May to June 2017. The objective of the study was to determine the prophylaxis practice and incidence of DVT among patients operated for hip fracture at MOI.

Patients who sustained hip fracture and those who fulfilled the desired criteria for this study were selected by convenient non random sampling and enrolled day after their surgical treatment of the fracture.

A structured questionnaire was used in capturing baseline information of the patients including, name, age, mechanism of injury, immobilization duration before and after surgery, co morbid conditions, the type of DVT prophylaxis given and any associated clinical signs and symptoms suggestive of DVT.

Each patient was followed up for a minimum of 4 weeks from the day of discharge. During the follow visits clinical progress was assessed including evaluations of clinical signs and symptoms of DVT such limb swelling, redness, pain and tenderness. The informed obtained were entered in the research tools, processed and analyzed using SPSS computer software version 20.

The study results indicated comparatively low (23%) rate of DVT prophylaxis practice among 49 enrolled cases. And incidence of the DVT is also lower (6%) of the study group. Chemical prophylaxis was the commonest prophylactic agent used followed by emphasis on early

ambulation after operation. Mechanical prophylaxis such as graduated compression stocking and intermittent pneumatic compression were rarely used.

The emphasis should be put on screening of all patients at risk of DVT and provide DVT prophylaxis to all eligible patients. Further study is needed to establish the fundamental differences in rate and incidence of DVT observed in different racial groups.

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LIST OF ABBREVIATIONS

DCM	Dilated cardiomyopathy
DIC	Disseminated intravascular coagulation
DVT	Deep venous thrombosis
EMD	Emergence department
ES	Elastic stocking
GCS	Graduated compression stocking
HCM	Hypertrophic cardiomyopathy
HITTS	Heparin Induced Thrombocytopenia and thrombosis syndrome
IPC	Intermittent pneumatic compression
LDH	Low dose heparin
LMWH	Low molecular weight heparin
MOI	Muhimbili Orthopedic Institute.
OPD/IPD	Out/in patient department
OC	Oral Contraceptives
OT	Operating theater
PE	Pulmonary embolism
TTP	Thrombotic thrombocytopenia purpura
UFH	Unfractionated heparin
VTE	Venous thromboembolism

USS	Ultrasound scan
DSM	Dar es salaam
CT	Computed tomorgraphy

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background

Deep venous thrombosis (DVT) and pulmonary embolism (PE) are two aspects of one disease process known as venous thromboembolism (VTE). In DVT, a thrombus (blood clot) forms in the deep veins of the leg or pelvis where it may cause pain, tenderness and swelling of the leg. In PE, some or all of the thrombus becomes detached and moves in the vein through the right side of the heart to lodge in one or more pulmonary arteries. PE may cause shortness of breath, bloody sputum, chest pain, faintness and heart failure. Massive PE leads to death. Hospitalized patients are over 100 times more likely to develop a DVT or PE compared with the rest of the community.(1)

The majority of VTE cases requiring hospitalization are related to previous hospital admission for surgery or acute illness. Many of these cases are preventable. PE is one of the commonest causes of death in hospital, accounting for 10 percent of all hospital deaths. Other significant long-term morbidity, costs and consequences are also associated with the occurrence of PE. (2)

The options for thromboprophylaxis comprise pharmacological agents (anticoagulants) and mechanical methods, alone or in combination. The WHO recommends the use of heparins (low molecular weight heparin and unfractionated heparin sodium). Other agents include fondaparinux, danaparoid, warfarin and aspirin.

Mechanical prophylaxis options include thigh or knee length graduated compression stockings, pneumatic venous pumping devices that intermittently compress the calf muscles and devices that stimulate lower-limb muscle contraction(2)

Based on the above prophylactic agents used to prevent DVT, the study aimed at determining the prophylaxis practice and incidence of DVT among patients operated for hip fracture at MOI.

1.2 Statement of the Problem.

Researches and studies have reported up to 60% risk of DVT to patients undergoing major hip surgery if prophylaxis is not given. Pulmonary embolism as complication of DVT accounts for approximately 10% of total hospital deaths. Morbidity and mortality due to DVT can be prevented if thromboembolic prophylaxis is provided to the high risk patients undergoing major hip surgery. Some studies came up with 10-80% mortality rate inappropriately managed patients suffering from PE or lead to long term morbidity.

Therefore, hip fractured patients undergoing major surgery should be screened for eligibility for DVT d prophylaxis.

At MOI the information about the proportion of patients at high risk of DVT was lacking and prevalence of thromboembolic prophylaxis for DVT prevention also was not known. Furthermore there was no current data on the incidence of DVT among hip fractured patients.

The study responded to the above gaps and came up with suggestions for interventions in DVT prophylaxis practice aiming at reducing incidences of DVT among hip fractured patients.

1.3 Rationale of the study

This study aimed at determining the prophylaxis practice and incidence of DVT among hip fracture patients operated at MOI. The corresponding information obtained from this study is therefore crucial in providing the basis for planning appropriate practical and feasible DVT prevention strategies suited in Tanzania.

1.4 Objective

1.4.1 Broad objective

- To determine the prophylaxis practice and incidence of deep veins thrombosis among patients operated for hip fracture at MOI

1.4.2 Specific objectives

i. To determine the factors for deep veins thrombosis among patients operated for hip fracture at MOI

ii. To determine the proportion of patients given DVT prophylaxis among patients operated for hip fracture at MOI

iii. To determine the incidence of DVT among patients operated for hip fracture at MOI

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Pathophysiology of DVT

Hip or/and pelvic fractures usually result from high energy trauma, associated with injury to vascular structures and oblige prolonged immobilization. High energy trauma mainly occurs in yough adult population compared to low energy resulting from simple fall in elderly population above 60 years. Comorbid conditions in association with prolonged immobilization increase the risk for DVT among elderly people. The classical triad of Virchow can explain the pathogenesis of venous thrombosis in these patients. This triad labels the three factors that are thought to generate the thrombosis: hemodynamic changes, endothelial dysfunction and hypercoagulability status.(20)

The normal laminar flow within the venous system may be disrupted by prolonged immobilization, traumatic radicular lesions, limb fractures and severe prolonged pain. These situations weaken the calf pump and contribute to vascular stasis. Vascular endothelial dysfunction may result from direct trauma or by the use of surgical techniques that may promote tissue necrosis or direct vessel damage. Hip fracture is a profound stimuli for the activation of the coagulation cascade(11)

2.2 Anatomy of the hip joint

Hip joint is an articulation between the femoral head below and the acetabulam above. The fracture of the hip joint may involve acetabulam , femoral head/neck or combination of the two. Hip fracture in this study was defined as of either a fracture at trochanteric or cervical area(3)

The vast majority of hip fractures occur in the elderly population as a result of low energy trauma, with 90% resulting from simple falls. A much smaller percentage of hip fractures occur in younger populations due to higher energy trauma such as automobile collisions.(4)

Osteoporosis is a major health problem, especially in elderly populations, and is associated with fragility fractures at the hip, spine, and wrist(5)

Hip fracture in association with comorbid conditions in elderly patients may cause morbidity or mortality. The demographics of world populations is changing with more elderly living in developed countries as a result of improved health and others social status. In this aged population it has been estimated that by 2050 half of all hip fractures will occur from this age group and main cause will be aging associated with degenerative changes (5)

A patient who sustains high energy hip fracture fall into two main categories; survivors and non-survivors. In non-survivors, mortality is a bimodal distribution. Early death is commonly because of hemorrhage or associated brain injury. Late death is usually because of overwhelming sepsis, pulmonary embolism or multi-organ failure. Survivors frequently experience the long-term medical and socioeconomic implications of hip fracture. These include mental health problems, chronic pain, pelvic obliquity, leg length or rotational discrepancy, gait abnormalities, sexual and urological dysfunction and long-term unemployment.(6)

Studies indicate that incidence of hip fracture is on the increase. Data available from the United Kingdom obtained after the enactment of mandatory seatbelt legislation in 1983, indicated the overall incidence of hip fractures was approximately 3 patients/100,000/year and has remained stable over the past few decades. Essentially, there has been minimal or no change in the number of fractures caused by motor vehicle accidents and falls from a height of10 feet; however, those resulting from falls from a height 10 feet has increased. (7)

In addition, the mean age of patients sustaining fractures of the hip appears to be increasing. In elderly patients (defined as more than 60 years of age), the most common mechanism of injury is a fall, as opposed to the situation for a younger patient, in whom a motor vehicle accident is the most common. These circumstances are consistent with the fact that the elderly patients more commonly present with hip fracture as an isolated injury due to visual loss, gait disturbances or stiffness (7).

2.3 Incidence of DVT in hip fracture patients

Hip and other lower limb trauma are significant risks factor for DVT. Comorbid conditions such diabetic, renal diseases, sickle cell disease, chronic heart diseases, morbid obesity and prolonged immobilization add significantly higher risk of DVT.(8)

While the true incidence of venous thromboembolism (VTE) is difficult to determine, autopsy studies have shown that 5–10 % of hospital deaths are attributable to pulmonary embolism. Major orthopedic surgery is associated with a very high risk of DVT: without thromboprophylaxis objectively confirmed deep-vein thrombosis may occur in up to 60 % of patients within 2 weeks after lower extremity orthopedic surgery.(9)

Between 10 and 30 % of symptomatic VTE events present as proximal deep-vein thrombosis, with the potential to lead to post-thrombotic syndrome or pulmonary embolism. As both symptomatic and subclinical thromboembolism are common in patients undergoing major orthopedic surgery, risk assessment and, where appropriate, thromboprophylaxis should be considered.(9)

Venous thromboembolism (VTE) encompasses deep vein thrombosis (DVT) and pulmonary embolism (PE). It is the third most frequent cardiovascular disease with an overall annual incidence of 100–200 per 100 000 inhabitants. VTE may be lethal in the acute phase or lead to chronic disease and disability, but it is also often preventable(10)

The study done by Fransisco et al to determine the association between hip fracture and incidence of DVT indicated 61% incidence of DVT among patients sustained hip fractures who received no prophylaxis(11)

2. 4 Risk Factors for DVT

Potential risk factors influencing DVT include age, gender, ethnicity, presence of medical and/or surgical co-morbidities, prolonged immobilization, the administration of corticosteroids, oral contraceptives, or hormone replacement therapy. Patients with spinal and hip/pelvic fractures secondary to high-velocity trauma have higher risks of developing DVT,

as these fractures are usually associated with injury to the vascular structures around the hip and require prolonged immobilization. Subsequent manipulation causes further damage to vascular endothelium and precipitates thrombus generation.(8).

The study done by Francisco et al to determine the incidence of hip fracture and occurrence of DVT indicated 61% incidence of DVT if prophylaxis is not given. This study was conducted in England involving at least 18 years of age who were scheduled for hip surgery. It was conducted in 99 canters and a total of 1711 cases were enrolled in this study. There has been ongoing research on the role of ethnicity, race and genetic differences that can influence the prevalence of venous thromoebolism among difference study population (11)

Surgical operations associated with a high risk of VTE include orthopedic and trauma procedures, coronary artery bypass surgery, surgery for abdominal or gynecologic cancer, major urologic surgery, and neurosurgery. (12)

Major orthopedic surgeries carried out on the lower extremities are associated with a higher risk of DVT, and a notable percentage of patients will develop a thrombosis if they are not given prophylaxis. These risks may reflect immobility of the lower limbs following such procedures. (13)

In a study of patients who underwent total knee replacement, venographic evidence of DVT was found in 84% of patients who did not receive prophylaxis.14 In a randomized, controlled, open-label trial of 76 patients undergoing elective hip surgery, venographic evidence of DVT was detected in 51% of patients not receiving prophylaxis. In another series of 7959 total hip replacements, the incidence of PE was 15.2% and fatal PE was 2.3% in the 1174 patients who received no prophylaxis. The most frequent time of onset of PE (75%) was in the second and third weeks after surgery, with ~10% of cases occurring within the first week.(14)

In a review of the American National Trauma Data Bank over the period 1994 through 2001, Knudson et al. identified an overall rate of VTE of 0.36% in 450,375 patients. Independent risk factors in this review included an age 40 years, the presence of lower-extremity fracture (Abbreviated Injury Score [AIS]), the presence of a major head injury , days requiring

mechanical ventilation greater than 3, the presence of a venous injury, and the need for at least one major operative procedure(7)

In a study of 577 patients with head injury AIS >3, a DVT incidence of 34% was identified when only mechanical prophylactic measures were utilized with weekly duplex ultrasound screening. In this series, the incremental risk of clinical VTE with other injuries was also noted. In patients with isolated head injury, the DVT rate was 26% compared to 35% in those patients with associated injury. In addition to head injury, advancing age, ISS >15, and the presence of a lower-extremity injury were strong predictors for developing DVT in this study(15)

In a retrospective review, Sems et al.59 evaluated 143 patients with bridging frames for an average of 18 days who received low-molecular-weight heparin (LMWH) as prophylaxis against VTE. In this group, there were only three cases of VTE and each was in a patient with multiple concomitant injuries. This review would suggest that under protection of appropriate prophylaxis, temporary bridging external fixation does not produce additive risk of DVT (10)

Geriatric hip fractures present another patient population at risk for VTE. The recognized effects of advancing age, immobility, and proximal femoral fracture are collectively causes for concern. DVT risk also increases with delay to surgery. In a review of 101 consecutive patients with 24-hour delay to surgery, Smith et al. 60 demonstrated a correlation between the length of delay and DVT identified by duplex ultrasound screening. Despite LMWH prophylaxis, the overall group demonstrated a DVT rate of 10% with those with a DVT averaging a 5.7-day delay and those without averaging a 3.2 day delay In addition, genetically determined protein abnormalities predispose to VTE. The most common of these are protein C deficiency, protein S deficiency, anti thrombin deficiency, factor V Leiden, and prothrombin mutations. In a review of patients presenting with VTE, one of these deficiencies was present in 35% compared to an incidence in the general population of 10%.45 Relative risk for these genetic tendencies range from 2.2 to 8.5 times higher than the unaffected population(7)

Another study indicated highest risk (surgery in patients with multiple risk factors (age > 40 years, cancer, previous venous thromboembolism): hip or knee arthroplasty, hip fracture surgery; major trauma spinal cord surgery.(16)

Lower extremity orthopedic operations carry a particularly high risk. Without prophylaxis, approximately half of the patients undergoing elective total hip or knee replacement develop DVT. However, only 5% of these patients manifest symptoms of VTE.(17)
Whereas calf vein thrombi tend to be evenly distributed between the 2 legs in patients recovering from hip replacement, 90% of proximal thrombi occur on the operated side.(17)

Patients undergoing arthroscopic knee surgery are at low to moderate risk, so VTE prophylaxis is optional.(14)

Pregnancy is also associated with high risk of DVT. A pregnant woman may be the victim of hip fracture thereby elevating the risk. A study done in Canada revealed an overall incidence of DVT and PE of 12.1 per 10 000 and 5.4 per 10 000 pregnancies, respectively.1 VTE occurs at a rate of 5.4 per 10 000 antepartum, 7.2 per 10 000 peripartum, and 4.3 per 10 000 pregnancies postpartum. These rates are consistent with published literature from around the world.(18)

2.5 Duration of the risk

Decreasing lengths of acute hospitalization (US), have prompted questions about whether the risk of VTE is decreasing because of shorter periods of bed rest in hospital patients. On the other hand, it has been suggested that patients sent home earlier after surgery may harbor continuing major risk factors, shifting a proportion of DVT from the hospital to the outpatient setting, where it is difficult to provide prophylaxis and where DVT may go undetected.(19)
Whereas DVT prophylaxis has generally been recommended for 7 to 10 days, recent studies have found that extending preventive treatment through the 4 weeks after hospital discharge is beneficial in patients undergoing surgery for cancer or total hip replacement. Additional data are needed to define the optimal duration of DVT prophylaxis in other high-risk(14)

2.6 DVT Prophylaxis

The WHO recommendation approved the use of LDUH or LMWH as chemical prophylaxis and IPC as mechanical prophylaxis against DVT"(21)

In an analysis of randomized controlled studies involving non orthopedic surgeries, graduated compression stockings and IPC were found to reduce the incidence of DVT, but the low numbers of placebo-treated patients overall precluded drawing conclusions regarding the impact of these interventions on PE. Both LDUH and LMWH have been found to significantly reduce the incidence of DVT and fatal PTE in general surgical patients as well as reduce the incidence of DVT in urologic surgical patients(22)

Although the optimal duration of thromboprophylaxis is not known for any orthopedic surgery group, extended prophylaxis for 14-35 days is recommended for patients undergoing hip and knee arthroplasty or hip fracture surgery(23)

2.7 Prophylactic agents

2.7.1 Mechanical Prophylaxis

Intermittent pneumatic compression devices (IPC) are used in the prophylaxis of DVT in both medical and surgical patients. They are mainly used in trauma patients when there is a contraindication to chemical prophylaxis, such as active bleeding, or added adjunctively to trauma patients receiving chemical prophylaxis. The devices work as by sequentially inflating and deflating, to provide an intermittent gradient of pressure to propel the flow of blood centrally. The mechanism is to prevent stasis, and activate the fibrinolytic pathway(21)

2.7.2 Chemical prophylaxis

Low dose unfractionated heparin (UFH) has been evaluated across numerous studies. UFH (Heparin 5000 units subcutaneously every 8 to 12 hours, with the high risk patients it is recommended to use the every 8 hours dosing) is usually started 2 hours preoperatively, and continued for 7 days postoperatively, or until patients are ambulatory.(21)

Overall incidence of DVT in postoperative patients with UFH has been shown to decrease three fold, from 25% to 8%. The overall risk reduction of fatal PE using heparin prophylaxis is 89%. However, this data on UFH is on surgery patients, and not the even higher risk trauma

patients. Low dose unfractionated heparin (LDUH) is not effective in trauma patients, and has been shown to be *equivalent to no prophylaxis* in high risk trauma patients.(21)

Therefore, LDUH should not be used as prophylaxis in trauma patients, unless a low molecular weight heparin (LMWH) is contraindicated. LMWH in major trauma patients, in the enoxaparin 30 mg subcutaneously every 12 hours dose, without intracranial hemorrhage, is superior to LDUH in preventing proximal DVT in trauma patients with a risk reduction of 58% . LMWH should be initiated when primary hemostasis has occurred, and is the method of choice to provide DVT prophylaxis in the high risk trauma patient(21)

CHAPTER THREE

3.0 METHODOLOGY

3.1 Study design

This was facility based descriptive prospective study which was conducted between May 2016 and June 2017. Patient's age, gender, comorbid conditions, ambulation status, mechanism of injury and prophylaxis status were evaluated and findings were entered in research instrument for further analysis.

3.2 Study area

This study was conducted at Muhimbili Orthopedic Institute (MOI) Dar-es-salaam, Tanzania. MOI is a specialized institute of Orthopedics, Traumatology and Neurosurgical care with a bed capacity of 350.It is the main referral center for patients with skeletal trauma serving both the city of Dar es Salaam and the country at large. The institute is also carrying out researches in these fields with the aim of improving patients' functional outcome.

3.3 Study period

The study period was one year from May 2016-June 2017.

3.4 Patient enrollment

Enrollment of the patient was done day one after surgical treatment of hip fracture. Before enrollment informed consent was completed.

3.5 Study population

At least 18 years patient (male/female) as per inclusion criteria.

3.6 Sampling and sample size

A convenient non random sampling technique was used to select the appropriate patients based on inclusion criteria. Unlimited number of patients as per inclusion criteria was required for enrollment. The study enrolled total umber 49 cases.

3.7 Inclusion criteria

i. At least 18 years old (male/female).
ii. Who sustained hip fracture
iii. Surgically treated hip fracture
iv. Consents to participate in the study

3.8 Exclusion Criteria

i. Mentally handicapped patient (incapable of appropriately responding during interview).
ii. A patient with ipsilateral poliomyelitis.(interfere with quantification of duration of ambulation before and after hip surgery).

3.9 Ethical clearance

The ethical clearance for conducting this study was obtained from the IRBs-MUHAS. Subsequent permission for data collection was obtained from MOI administration. The objective of study was explained to the patient. The participant was allowed to ask questions about the study. During and after the study period, the patient's confidentiality was maintained. The obtained information was for research purposes only. The participant signed a consent form after he/she had agreed to participate. The participant was free to withdraw at any time during the study period.

3.10 Pre-test of research tool

The pretest of study instrument was done at MOI IPD and OPDs. The purpose of pretest was to check for clarity and consistency of the questions. Then, the filled-in questionnaires were reviewed for necessary amendment during the exercise before finally undertaking mass production of the questionnaire.

3.11 Research instruments.

Questionnaires, Goniometer to measure total active motion, a camera, papers, rulers and pens/pencils and were used to capture the patient information.

3.12 Recruitment and training of the Research Assistant.

One research assistant with knowledge, ability and experience in research was recruited. One day training covering description of the study objectives, orientation to the tools for data collection with the emphasis on proper consent form completion before starting the interview.

3.13 Data collection procedures

A structured questionnaires and radiographs were used for data collection. Before enrollment consent was formally obtained. The patient's information requested included demographic characteristics, mechanism of injury, pre and post-operative ambulation status. Other relevant information needed were the associated medical condition, body mass index, type of prophylaxis give and the route of administration plus any clinical signs and symptoms of DVT. Enrollment of the patients in the study was accomplished for 7 months. Patient enrollment in the study was done day one after hip surgery. Clinical progress in the ward was assessed and subsequent follow was done at 2^{nd} and 4^{th} week after discharge. The information obtained at each visit was entered in the research tool for analysis later.

3.14 Data Management and Analysis

On daily basis, the researcher was checking the data collected in order to correct any error encountered during the interview with the patient. All questionnaires were given serial numbers and then coded prior to the data entry. Data entry, cleaning, validation and analysis were done using SPSS computer software version 20.Patients' information was assessed using a series of 30 questions. Answers were credited correct or incorrect if the patient provided any of list of the possible answers based on information required. No probing was done except repeating questions when necessary to enable the patient to understand. 2.12 Dissemination of the results

3.15 Dissemination of the results

The findings from this study were compiled into a dissertation and submitted in partial fulfillment for the award of Degree of Masters of Medicine in Orthopaedics and Traumatology of the Muhimbili University of Health and Sciences. One copy of the dissertation was submitted to the Department of Orthopaedics and Traumatology and one copy to the MUHAS library. The data of the study are also available for publication.

CHAPTER FOUR

4.0 RESULTS

4.1 Socio-Demographic characteristics of the patients.

The study enrolled 49 patients (males and females). Among 49 cases, **44.9%** were above 65 years, **32.7%** were between 46-65 years and **22.4%** between 18-45 years respectively.

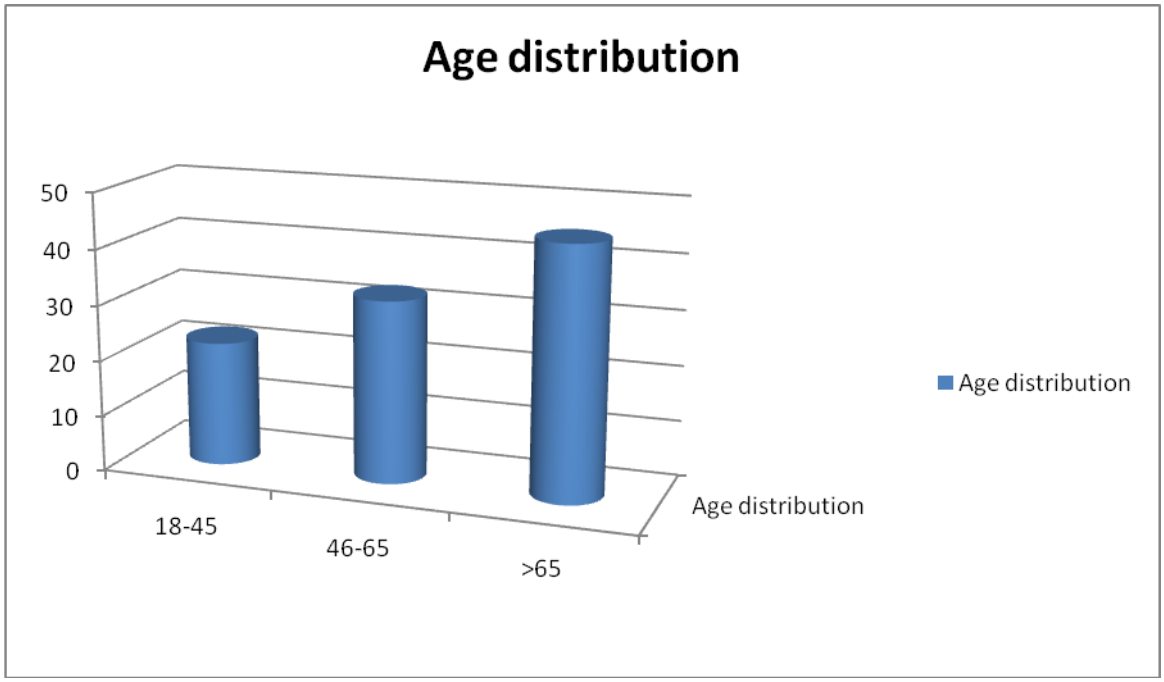


Figure 1: Age distribution

Sex distribution among patients enrolled in the study is shown in Table 1 as follows, 28(61.2%) were males and 19 (38.8%) females. Other socio demographic a characteristic of the patients enrolled in this study including level of education is also shown which indicates that 61% of patients completed primary education, 30.6% secondary and 8.2% college education.

Table 1: sociodemographic characteristics of the patients

Sex	**Frequency**	**Percent**
Male	30	61.2%
Female	19	38.8%
TOTAL	49	100%
Education	**Frequency**	**Percent**
Primary l	29	61.2%
Secondary	15	30.6%
College	5	8.2%
TOTAL	49	100.0%

29 (61.7%) of the enrolled patients completed primary school level of education, 15 (30.6%) secondary level and 5 (8.2%) college level of education.

4.2 Mechanisms of injury

The mechanism of injury was either high or low energy. High energy trauma was a of result motor traffic crashes (motor vehicle, motorcycle), gun short injury or fall from height etc while low energy trauma sustained mainly from simple fall or sport injury etc

Among 49 patients enrolled in this study, 27 (55.1%) sustained high energy hip trauma while 22 (44.9%) sustained low energy trauma.

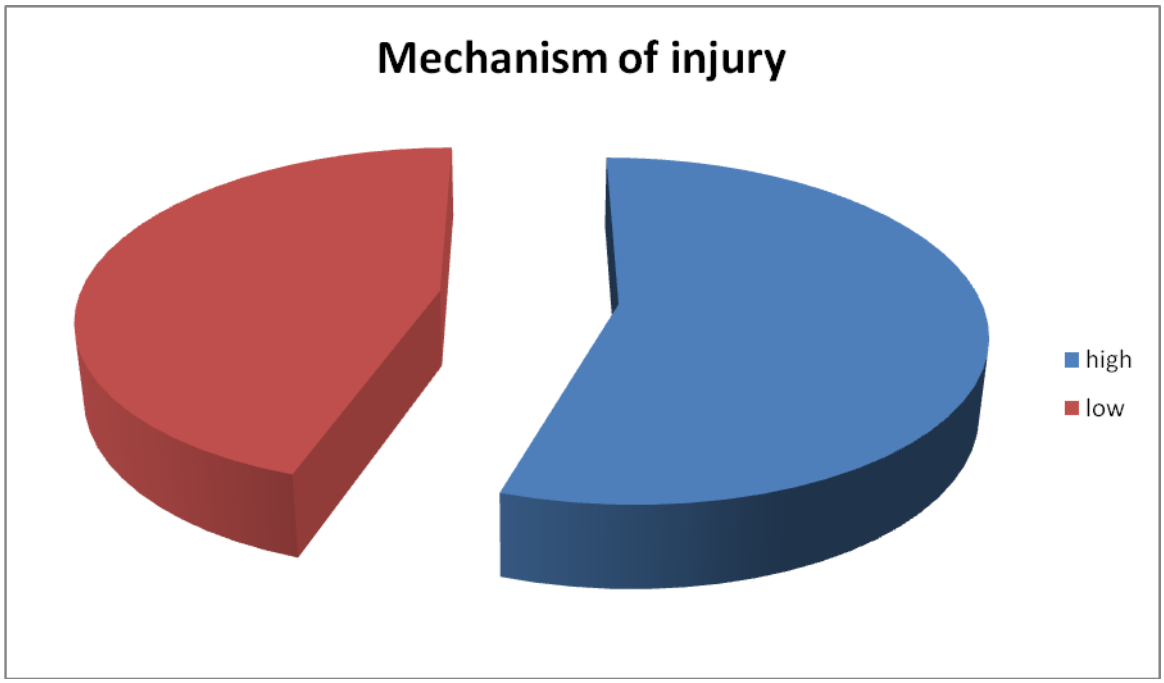


Figure 2: Mechanism of injury

Motor traffic crash was leading with significantly higher proportion of young and middle aged patients below 50 years who sustained hip fracture. Elderly patients over 60 years mainly sustained hip fracture due to simple fall caused by degenerative changes such as visual impairment, stiffness and/or gait disturbances.

4.3 Patient's mobilization

Table 2: Patient Mobilization

Immobilization pre operative		
one week	10	20.4%
beyond one week	39	79.6%
Total	49	100.0
Immobilization post operative		
less than 48 hrs	35	71.4%
over 48 hrs	14	28.6%
Total	49	100.0

Table 3 above shows that 39 (79.6%) patients were not ambulant for over a week before surgical management of hip fracture.

The study findings from table 3 above also indicate that, 35(71.4%) patients ambulated within 24-48 hours after surgical treatment of hip fracture while 14(28.6%) patients ambulated after 48 hours. Various reasons for prolonged immobilization before and after surgery were given in the discussion.

4.4 Patients' Co morbid conditions

In this study 25 (51.0%) patients were suffering from chronic heart diseases, 3(6.1%) diabetic and hypertensive, 1 (2.0%) sickler patient and 1 (2.0%) with active ca prostate. Other related risk factors are shown in table 3 below. The remaining 19(40.9%) patients reported insignificant co morbid conditions.

Table 3: Patient comorbid conditions, BMI, medication use

Comorbid conditions	Frequency	Proportion/percentage
Diabetic mellitus	3	6.1
Sickle cell disease.	1	2.0
Chronic heart diseases.	25	51.0
Active cancer or treated within 6mo	1	2.0
Prolonged corticosteroids use	0	0.0
Prolonged oral contraceptives use.	1	2.0
Obese based on BMI index.		
(i) <25Kg/m^2	37	75.5
(ii) >25kg/m^2	12	24.5
SUBTOTAL	49	100.0
Patients at high risk of DVT	39	20.4
Patients at low risk of DVT	10	79.6
Patients received DVT prophylaxis	9	18.4
Patients received no prophylaxis.	30	81.6

NOTE: High risk patient is the one who scores 3-10 as per WEEL'S criteria.

Low risk patient is the one who scores <3 Well's criteria.

Well's is obtained in appendix II

Table 3 also summarizes medication and BMI related risk factors. Among enrolled patients, the proportion of patients with normal BMI (18-24Kg/m^2) was 37**(75.5%)** and 12 (24.5%) were overweight with BMI between 26-35 Kg/m^2.

There was no patient who presented history of prolonged corticosteroids (OC) use and ONLY ONE patient had history of prolonged oral contraceptive drugs (OCDS) use. This is equivalent to 2.0%

4.5 Patients at risk of DVT

Among enrolled 49 patients 39(79.6%) were classified as having high risk of developing DVT as per **WEEL'S Score** (see appendix) and 10(20.4%) patients as low risk.

Figure.3.0

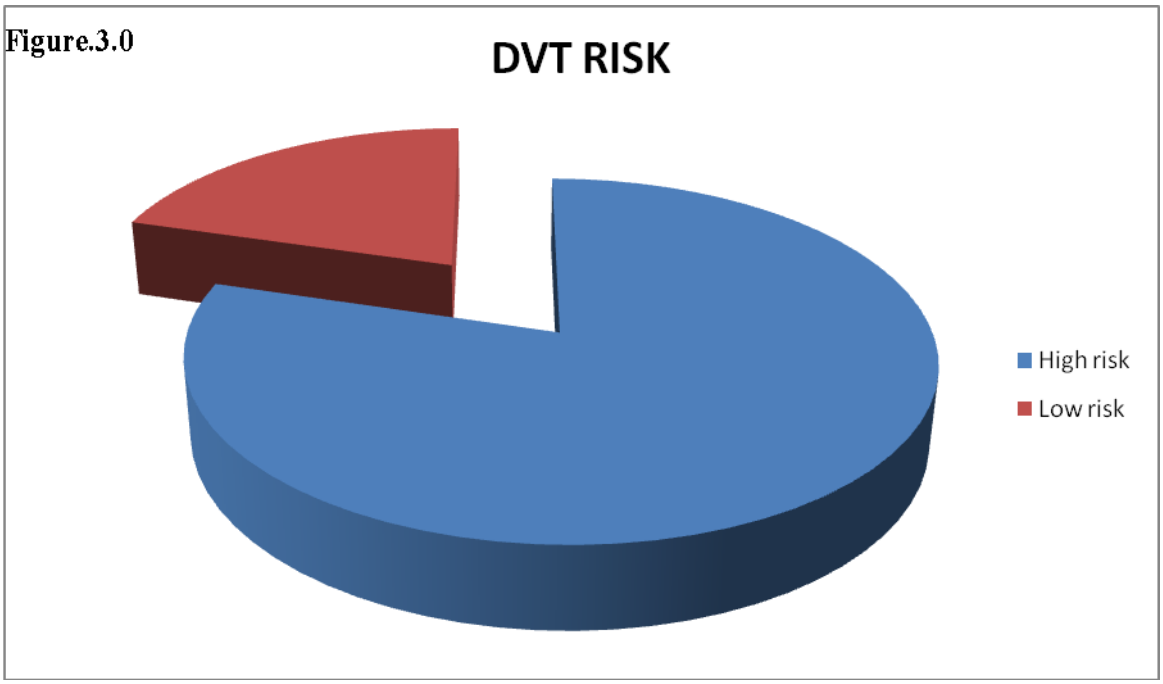


Figure 3: Indicates the proportion of enrolled patients at risk of developing DVT. High risk patients are eligible for DVT prophylaxis.

4.6 Patients given DVT prophylaxis

The study classified patients into two groups i.e high and low risk for DVT as per Well's criteria. The study identified 39(79.6%) high risk patients and 10(20.4%) low risks. High risk patients were eligible for DVT prophylaxis. Among 39 high risk patients, only 9(23.07%) received DVT prophylaxis and 30 (76.92%) didn't.

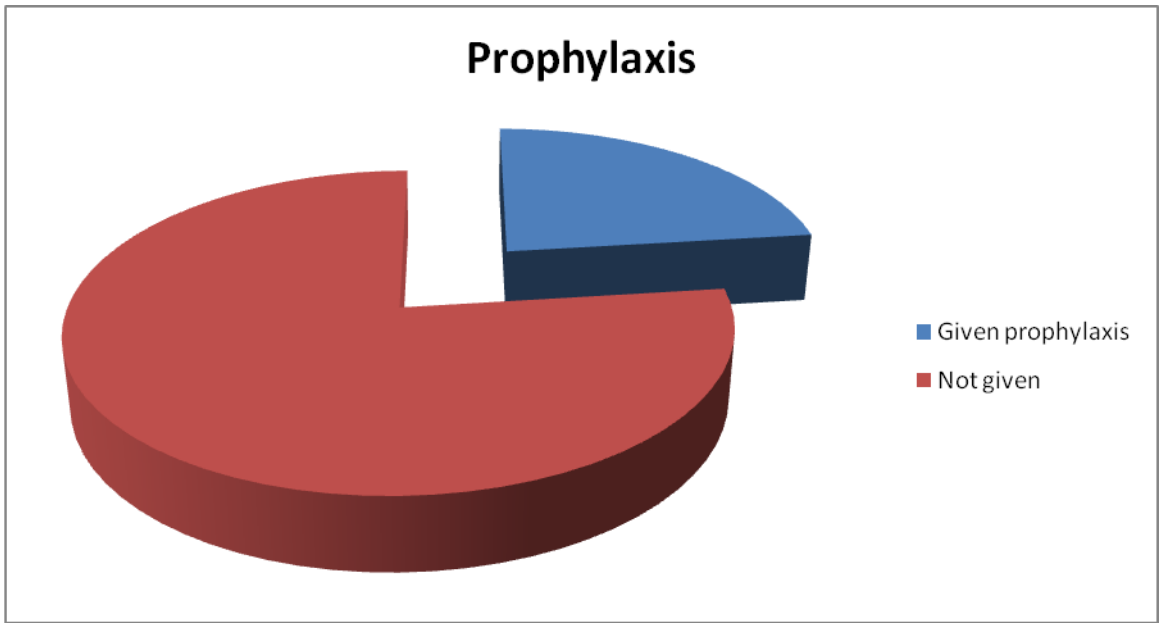


Figure 4: Shows the proportion eligible patients who were give DVT prophylaxis.

4.7 Patients who developed clinical signs and symptoms of DVT

In this study 3 patients developed clinical signs and symptoms of DVT. There was variation in symptoms from one case to another. All three cases developed pain, warmth, lower limb swelling. However, redness was not apparent to the 2 patients among the three.

Table 4: Patients developed Signs and Symptoms and confirmed DVT

Signs/Symptoms	Frequency	Proportion/Percentage
Calf, LL swelling	3	1.00
Redness	1	0.33
Pain	3	1.00
Warmth	2	0.67
Patients confirmed DVT +ve by angiogram/Doppler	3	1.00
DVT incidence	3	6.1

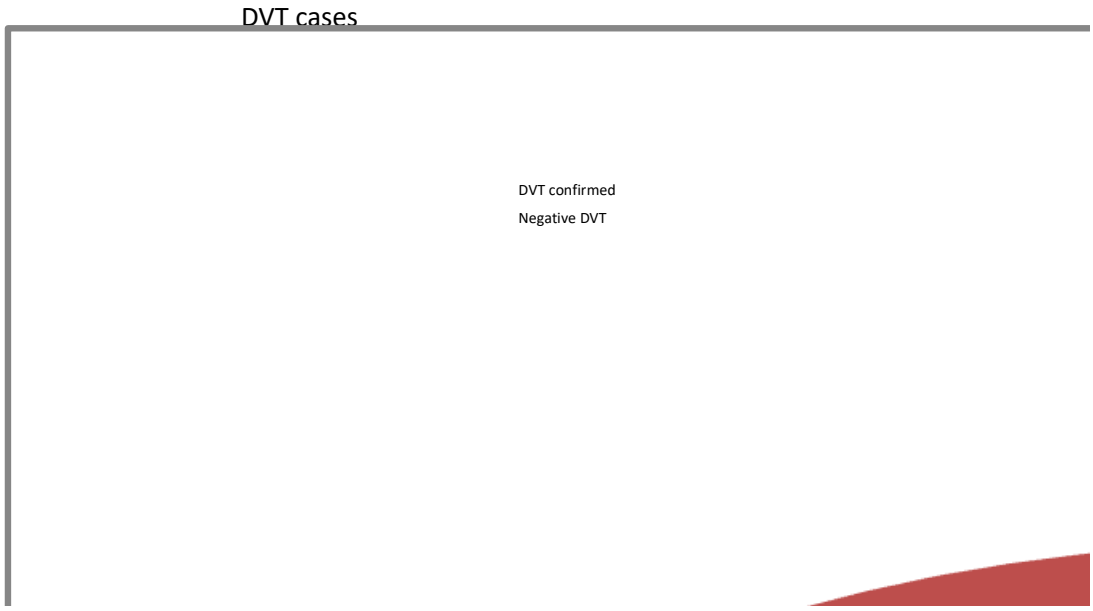


Figure 5: Indicates the proportion of patients who were diagnosed having DVT among the study group.

In this study, 3(6.1%) patients developed clinical signs and symptoms of DVT. These patients were also confirmed having DVT by computed tomography angiogram. The overall incidence of DVT among 49 enrolled patients in the study is approximately 6%. There was no patient who developed pulmonary embolism and no mortality reported.

NOTE: this was an observation study. The researcher was observing the routine practice for diagnosis and managing cases with DVT. All the 3 patients were confirmed by CT-angiogram, doppler ultrasound was not utilized.

CHAPTER FIVE

5.0 DISCUSSION

This study was conducted at Muhimbili Orthopedic Institute for one year from May 2016-June 2017. During this period 49 patients who sustained hip fracture were enrolled in the study as per inclusion criteria. Patient's enrollment was done day one after surgical treatment of hip fracture.

The study objective was explained to each participant and informed consent completed. Among enrolled patients in this study males and females were in 1.6:1 ratio. The age distribution were as follows; over 65 yrs 22 (44.9%), 16(32.7%) 45-65 and 11(22.4%) 18-45 years. Fig1.

In this study, a significant proportion of patients (44.9%) who sustained hip fracture were in the age group above 65 years and the main mechanism of hip injury was a result of simple fall. Several reasons were given during the interview. Aging associated with degenerative joint diseases such joint stiffness, gait disturbances, visual impairment and excessive alcohol consumption. This observation has been supported by a study done to determine the association between mechanism of hip fracture, age and incidence of hip fracture which indicated that low energy type of hip fracture was sustained by the majority of elderly population in the similar age group of above 65 years (40), (42). Fig2.

From this study finding, the enrolled participants who were in the age range below 60 years the mechanism of injury was mainly due to high energy trauma as result of motor traffic crash and few patients sustained hip fractures due to fall from height. These study findings were supported by the above studies which revealed significant higher proportion of young patients who sustained hip fractures as a result of traumatic events. (40), (42). Fig.2

This study reported that 6.1% of patients who developed clinical signs and symptoms of DVT sustained high energy trauma and the mechanism of injury were due to motor traffic crush. This finding is supported by another study conducted to determine the association between

high energy lower limb skeletal trauma and risk of DVT which revealed 48% incidence of high energy trauma among patients who sustained hip fracture. (43). Fig 3

This study finding also revealed that 39 (79.5%) patients were not ambulant for more than a week before surgical treatment of hip fracture was done and after surgical treatment 14 (28.6%) among them ambulated between 48-72 hours. Several reasons were given for delayed surgery in the study group and these reasons were the leading cause of prolonged bed stay such as co morbid condition, occasional surgical implants scarcity, anemia, long waiting queues, delay in payment of surgical treatment bills etc. Among 3 patients who developed DVT, two were operated after 2 weeks of hip fracture. However, these patients ambulated within 24-48 hours after hip surgery. One patient was operated within a week after sustaining hip fracture and ambulated within 24 hours after surgery. From this study finding, prolonged bed rest before surgical treatment has been associated with risk of DVT occurrence in the study group. Other studies conducted to identify risk factors associated with DVT in orthopedic trauma surgery indicated significant impacts of prolonged bed stay pre/post operative as a strong predictor of DVT occurrence.(26),(44). Fig. 3

In this study medical conditions associated with DVT such as chronic use of steroids, oral contraceptives, sickle cell disease, obesity, heart diseases, malignancies, renal and diabetes were screened. The study findings revealed 25 (51.0%) patients who were suffering from chronic heart diseases, 3(6.1%) patients who were both diabetic and hypertensive, 1 (2.0%) patient with sickle disease, and 1 (2.0%) patient who had an active cancer. The remaining 40.9% reported insignificant co morbid condition. Patients who were suffering from the above medical conditions required medical optimization before hip surgery. Generally, anemia and heart diseases were the leading cause of delay in hip surgery. The study finding revealed that among 3 patients who developed DVT one was diabetic and hypertensive, 1 patient was an obese with BMI > 30kg/m2 and 1 patient reported insignificant co morbidity. This finding has linked association between medical co morbidities and occurrence of DVT. These associations were supported by other studies which were conducted to determine the influence of co morbid conditions on the development of DVT which revealed that being obese accompanied

by hip fracture surgery, diabetes, renal diseases, heart diseases and prolonged steroid use result in a significant proportion (60%) of patients who develop DVT in the various study groups if prophylaxis is not given. Despite the low incidence (6%) of the DVT in study group however, almost 66.67% of them reported various significant risk factors for DVT occurrence. Further study is needed to find out the protective factors for DVT occurrence in this study population. (3),(26), (42),(43),(44). Table 4

Therefore, from this study after screening the enrolled patients, a significant proportion (79.6%) of high risk patients for DVT and (24.4%) low risk patients were identified. High risk patients were eligible for DVT prophylaxis and therefore were supposed to be given DVT prophylaxis within 24 hours before surgery and had to continue with prophylaxis for a minimum of 2 weeks as per WHO guideline (2),(9).

The frequency of prophylactic use among the high risk hip fractured patients was assessed. Among 39(79.6%) high risk patients enrolled in this study, small proportions (23.08%) were given DVT prophylaxis. Low utilization of DVT prophylactic services at MOI was identified to result from inadequate screening of high risk patients. The study finding significantly differs from other studies conducted in developed worlds to determine the prevalence of prophylaxis in lower limb skeletal trauma patients which revealed the overall, 89% of eligible patients in Scotland and 92% in England received prophylaxis and the proportion varied from 71% in general medicine to 100% in orthopedics (32). Fig. 4

The type of prophylaxis given to the high risk patients was also determined. At MOI, baseline principle is early patient ambulation after surgery. However, pronged bed stay after a surgical procedure at MOI was shown to occur due patient's clinical condition or as ordered by the surgeon for some technical reasons. Pharmacological type of prophylaxis was another common DVT prophylaxis which was given to high risk patients. Among 23% of patients who were given DVT prophylaxis as subcutaneous injection of enoxaparan 40mg daily for 2 weeks and a combination prophylaxis was rarely used except to the patients who develops DVT. These findings differ from the studies from other health facilities in a developed world conducted to determine the common practice in DVT prophylaxis and revealed up to 60% of

high risk patients were given combination prophylaxis such as mechanical, pharmacological and physical prophylaxes (32). Fig. 4

This study also investigated the common clinical signs and symptoms of DVT to risk the risk patients. The aim was to identify common signs and symptoms of DVT to the patients who develop DVT. Clinical signs and symptoms such as cuff/LL swelling, pain, warmth, redness/discolored skin were assessed. The finding revealed that 2 patients among the 3 developed three clinical signs and symptoms of DVT such as lower limb swelling and pain, and 1 patient developed additional symptom i.e discolored skin. Redness/discolored skin was only evident to one light skinned patient and was not apparent to the other 2 dark skinned individuals. This observation is important in clinical diagnosis of DVT which emphasis that some clinical signs and symptoms of DVT may not be evident and should not be the justification to rule out the risk of DVT. Thus, confirmatory test by Doppler Ultrasound or Computed- angiogram is important to all suspected individuals. Despite the variation in clinical signs and symptoms in the study group, DVT was confirmed by CT-angiogram to all 3 patients and this finding has been supported by a study which indicated that there were variations in severity, signs and symptoms among patients who develop DVT. (31). Table 4

This study determined the incidence of DVT among hip fractured patients. The incidence of DVT among patients enrolled in this study was 6.1%. The study finding revealed significant small proportion (6%) of patients who developed DVT among the enrolled cases. This finding differs from other studies conducted in developed world to determine the incidence of DVT in hip and other lower limb skeletal trauma which indicated that without prophylaxis the incidence of DVT among hip fractured patients is approximately 61%. The reason for low incidence can be contributed to by small number of enrolled cases or by variation in genetic constitution of individual patient or race/ethnicity as supported by several researches with evidence that prevalence of DVT varies significantly among different ethnic/racial groups, the genetic, physiologic and clinical basis of these differences remain largely undefined.

Therefore, further study is needed in order to establish the fundamental differences between genetic or racial/ethnicity that explain the observed disparity in prevalence of DVT across different ethnic groups (42). Fig5.

The enrolled patients in this study were followed up for up to 4 weeks after discharge. There was no loss to follow. All 49 patients enrolled in this study were followed up to 4 weeks after the discharge and non developed clinical signs and symptoms of pulmonary embolism and there was no reported case of mortality due to complication of DVT (21). Whereas DVT prophylaxis has generally been recommended for 7 to 10 days, recent studies have found that extending preventive treatment through the 4 weeks after hospital discharge is beneficial in patients undergoing surgery for cancer or total hip replacement. Additional data are needed to define the optimal duration of DVT prophylaxis in other high-risk(14)

5.1 Limitation of the study

i. Few number of enrolled cases can limit statistical comparison
ii. Delay in hip surgery delayed patient enrollment and thus few enrolled cases.
iii. Incomplete medical investigation for confirmatory diagnosis of DVT interfered with final diagnosis of DVT some patients leading to small incidence of DVT among enrolled cases.

CHAPTER SIX

6.0 CONCLUSION AND RECOMMENDATION

6.1 Conclusion

- In this study, medical co morbidities have been shown to be among the risk factors for the DVT occurrence. Patient's screening for associated risks for DVT is important for improved outcome in hip fracture patients.

- In this study, the rate of prophylaxis practice among the enrolled cases was very low compared to other studies. Emphasis should be put on screening and isolate patients at risk of DVT and then provides appropriate DVT prophylaxis to all patients at risk of developing DVT.

- The incidence of DVT among the enrolled patients in this study was comparatively low. Limited number of enrolled patients in this study may be one of the reasons to explain the observed variation. There is also the observed role of genetic and race/ethnicity influencing the occurrence of DVT. Further study is needed to establish the fundamental differences in genetic and racial/ethnicity that can explain the disparity in DVT occurrence among difference study populations.

6.2 Recommendations

1. This study identified lower DVT prophylaxis practice at MOI. There is a need of ongoing emphasis on screening of patients at risk of DVT and provide prophylaxis to all eligible patients.

2. The institutional factors such occasional scarcity of appropriate implants or blood and its products which delay patient surgical management of hip fracture should be addressed. Therefore, timely implant purchase and established stand-alone blood bank and screening center is highly recommended at MOI as a trauma facility. This will minimize the immobilization time before surgery.

3. This study identified comparatively small proportion of patients who were diagnosed having DVT despite observed inadequate prophylaxis practice. Further study using adequate sample is needed to establish the fundamental differences in incidences of DVT among study different study groups

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APPENDICES

Appendix I: Research Questionnaire

A. Patient demographic characteristics

1. Name of the patient……
2. Registration number…….
3. Sex. M/F
4. Age …….
5. Residence……..
6. Date of Admission…….

B. Radiological findings

7. Admission diagnosis (X-ray report)……
    a. acetabular fracture
    b. trochanteric
    c. cervical fracture

C. Clinical history

8. Mechanism of injury
    a. High energy trauma
    b. Low energy trauma

D. Surgical related risks factors of DVT:

9. Type of surgical procedure done
    a) acetabular reconstruction
    b) Hip surgery

10. Duration of immobilization before surgical procedure
    a) One week
    b) More than one week
11. Duration of immobilization after surgical procedure
    a) 48 hrs
    b) more than 48 hrs

11. Duration of immobilization
    a. less than 48 hrs
    b. above 48 hrs

12. Duration of surgical procedure
    a. Surgical procedure < 2hrs
    b. Surgical procedure >2hrs

E. Co morbid condition risks factors

13. Significant medical related risk factor.
    a) DM YES/NO
    b) SCD YES/NO

c) Cardiomyopathy(DCM,HCM) YES/NO

14. Pitting edema greater in the symptomatic leg
    a. yes
    b. no
15. Collateral non varicose superficial veins
    a. yes
    b. no
16. Active cancer or cancer treated within 6 months
    a. yes
    b. no
17. Medication related risk factors:
    a) Oral contraceptives YES/NO
    b) Prolonged corticosteroids YES/NO
18 . Other acquired risk factors
    a. BMI <25kg/m2
    b. BMI>25kg/m2

19. Clinical signs and symptoms
    a) Calf swelling YES/NO
    b) Tenderness YES/NO
    c) Warmth YES/NO
    d) Redness/discolored skin. YES/NO
20. Final patient risk score(Well's score)
    a) Low risk
    b) High risk

F. DVT prophylaxis

21. DVT prophylaxis given pre op:
    A) YES
    b) NO
22. Type of prophylaxis give:
    a) Pharmacological
    b) Mechanical
23. Type of pharmacological prophylaxis:
    a) LMWH
    b) LDUH
24. Type of mechanical prophylaxis given:
    a) GCS
    b) IPC
25. Duration of prophylaxis pre op:
    a) <2 hrs
    b) >2hrs
26. Duration of prophylaxis post op:
    a) <2 wk
    b) ≥2 wk

G. Follow up visits

27. First visit(after 2 week)

a. calf swelling YES/NO

b. redness and/or discolored skin YES/NO

c. warmth YES/NO

d. tenderness YES/NO

e. Use of prophylaxis YES/NO

28. 2nd visit follow (4th week)

a. calf swelling YES/NO

b. redness and/or discolored skin YES/NO

c. warmth YES/NO

d. tenderness YES/NO

e. swelling of entire leg YES/NO

H. Mortality and morbidity related to DVT

29. History of acute onset of:

a) Chest tightness

b) Chest pain

c) Coughing of blood

d) Confusion

30. Doppler USS results

a. DVT confirmed

b. Not Confirmed

Appendix II: DVT Probability: Well's Score System

1. Paralysis, paresis or recent orthopedic casting of lower extremity (1 point)
2. Recently bedridden (more than 3 days) or major surgery within past 4 weeks (1 point)
3. Localized tenderness in deep vein system (1 point)
4. Swelling of entire leg (1 point)
5. Calf swelling 3cm greater than other leg (measured 10 cm below the tibial tuberosity) (1 point)
6. Pitting edema greater in the symptomatic leg (1 point)
7. Collateral non varicose superficial veins (1 point)
8. Active cancer or cancer treated within 6 months (1 point)
9. Alternative diagnosis more likely than DVT (Baker's cyst, cellulitis, muscle damage, superficial venous thrombosis, post phlebitic syndrome, inguinal lymphadenopathy, external venous compression) (-2 points).
10. Intravenous drug use (3 points)

Results: Total Criteria Point Count:10

DVT Risk Score Interpretation

Score	**Probability**
2-0	Low probability
1-2	Moderate probability
3-10	High probability

Appendix III: Consent Form

A STUDY ON PROPHYLAXIS AND INCIDENCE OF DEEP VENOUS THROMBOSIS AMONG PSTIENTS OPERATED FOR HIP FRACURE AT MUHIMBILI ORTHOPAEDIC INSTITUTE, DAR-ES-SALAAM, TANZANIA.

INVESTIGATOR: DR. MICHAEL CHACHA M,

P.O BOX 65001.

MUHAS,

DSM.

I…….....P.O. BOX…….(Residential area)……

Mobile phone……hereby give informed consent to participate in this study at MOI. The study has been explained to me clearly by Dr. Michael Chacha M (or his assistant) of P.O BOX 65001 MUHAS. I have understood that to participate in this study, I shall volunteer history of injury and accept to undergo medical examination and radiological imaging. I am aware that I can withdraw from this study anytime without prejudice to my right of treatment at MOI now or in future. I have been assured that no injury shall be inflicted on me from my participation in this study directly or indirectly and that all information shall be manage and treated with utmost confidence.

Name of participants……

Signature…… Date……

Name of witness……

Signature…… Date……