Comparative Study between Medical Treatment and Intervention in Acute Iliofemoral DVT

A Systematic Review

Submitted for Partial Fulfillment of Master Degree in General Surgery

By

Saeid Hassan Saeid Elanany

M.B.B.CH

Under Supervision of

Prof. Khaled Hussein Gad

Professor of General Surgery

Faculty of Medicine – Ain Shams University

Dr. Mohamed Mahfouz Mohamed

Assistant Professor of General Surgery

Faculty of Medicine – Ain Shams University

Dr. Mohamed Ismail Mohamed

Lecturer of General Surgery and Vascular Surgery

Faculty of Medicine – Ain Shams University

Faculty of Medicine - Ain Shams University

2019

سورة البقرة الآية: ٣٢

Acknowledgment

First and foremost, I feel always indebted to **ALLAH,** *the Most Kind and Most Merciful.*

I'd like to express my respectful thanks and profound gratitude to **Prof. Dr. Khaled Hussein Gad,** *Professor of General Surgery Faculty of Medicine – Ain Shams University for his keen guidance, kind supervision, valuable advice and continuous encouragement, which made possible the completion of this work.*

I am also delighted to express my deepest gratitude and thanks to **Assist. Prof. Dr. Mohamed Mahfouz Mohamed,** *Assistant Professor of General Surgery Faculty of Medicine – Ain Shams University, for his kind care, continuous supervision, valuable instructions, constant help and great assistance throughout this work.*

I am deeply thankful to **Dr. Mohamed Ismail Mohamed,** *Lecturer of General Surgery and Vascular Surgery Faculty of Medicine – Ain Shams University, for his great help, active participation and guidance.*

Saeid Hassan Saeid Elanany

List of Contents

Title	Page No.
List of Tables	5
List of Figures	6
List of Abbreviations	7
Introduction	1
Aim of the Work	12
Review of Literature	13
Methodology	72
Results	78
Discussion & Conclusion	80
References	83
Arabic Summary	—

List of Tables

Table No.	Title	Page No.
Table (1):	Selected conditions and associated relative risks for venous thromboembolism.	21
Table (2):	Villalta PTS scale	28
Table (3):	The Wells score to assess the pretest probability in patients with suspected DVT.	38
Table (4):	Recommended Prophylaxis in Surgical Patients According to the Estimated Level of Risk in Patients Undergoing General Surgery	46
Table (5):	ACR/SIR guidelines.	71
Table (6):	Study Characteristics.	77

List of Figures

Fig. No.	Title	Page No.
Figure (1):	Deep veins of the legs	14
Figure (2):	The LET classification	18
Figure (3):	Venous color-flow Doppler	34
Figure (4):	Contrast venography	35
Figure (5):	CT venography	36
Figure (6):	MR venography. MR imaging demonstrating a focal thrombus in the left common iliac vein that was seen extending superiorly to the inferior vena cava	37
Figure (7):	Diagnostic algorithm for suspected DVT using compression ultrasound (CUS) examination, which does not include calf veins	39
Figure (8):	Management of Iliofemoral DVT	48
Figure (9):	Percutaneous mechanical and pharmacomechanical thrombectomy (PMT/ PMCT) devices used for treatment of venous thromboembolic diseases	70

List of Abbreviations

Abb.	Full term
ACCP	American college of chest physicians.
ACR	American College of Radiology
AIS	Acute ischemic stroke
AMI	Acute myocardial infarction
APSAC	Anisoylated purified streptokinase activator complex
aPTT	Activated partial thromboplastin time.
ASPIRE	Apspirin to prevent recurrent venous thrombosis study
AVF	Arteriovenous fistula.
BMI	Body mass index.
CDT	Catheter-directed thrombolysis.
CDT	Catheter directed thrombolysis
COPD	Chronic obstructive pulmonary disease.
COX	Cyclooxygenase enzyme.
CT	Computed Tomography.
CTV	Computed Tomographic venography.
CVADs	Central venous access devices
CVD	Chronic venous disease.
DVT	Deep venous thrombosis.
ELISA	Enzyme linked immunosorbent assay.
EPCR	Endothelial protein C receptor
FDA	Food and Drug Administration.
GCSs	Graduated compression stockings.
HIT	Heparin-induced thrombocytopenia.
IgG	Immunoglobulin G
INR	International normalized ratio.
IPC	Intermittent pneumatic compression.
ISPMT	Isolated segmental pharmacomechanical thrombolysis.
IVC	Inferior vena cava.
LET	Lower Extremity Deep Vein Thrombosis
LMWHs	Low-Molecular-Weight Heparins.

List of Abbreviations Cont...

Abb.	Full term
MRI	Magnetic resonance imaging.
MRV	Magnetic resonance venography.
NICE	National institute for health and care excellence
NOACs	New oral anticoagulants
PAI-1	Plasminogen activator inhibitor-1.
PCD	Phlegmasia cerulea dolens
PE	Pulmonary embolism.
PMCT	Pharmacomechanical thrombectomy
PMT	Percutaneous mechanical thrombectomy
PTS	Post thrombotic syndrome.
PTT	Partial thromboplastin time
QoL	Quality of life.
Rt-PA	Recombinant tissue plasminogen activator.
SIR	Society of intervention radiology
ST	Superficial thrombophlebitis
THR	Total hip replacement.
UFH	Unfractionated heparin.
VKAs	Vitamin k antagonists.
VTE	Venous thromboembolic disease.
WARFASA	Warfarin and ASPIRE adjuvant

INTRODUCTION

The earliest case of DVT was described by Sushruta in his book Sushruta Samhita around 600–900 BC. In 1856, German physician and pathologist Rudolf Virchow published what is referred to as Virchow's triad, The triad provides the theoretical framework for the current explanation of venous thrombosis ***(Goodman, 2013).***

Venous thromboembolism (VTE), defined as deep vein thrombosis, pulmonary embolism, or both, affects an estimated 300,000-600,000 individuals in the U.S. each year, causing considerable morbidity and mortality ***(Bovill and van der Vliet, 2011).***

Major risk factors for thrombosis, other than age, include exogenous factors such as surgery, hospitalization, immobility, trauma, pregnancy and the puerperium and hormone use, and endogenous factors such as cancer, obesity, and inherited and acquired disorders of hypercoagulation ***(de Jong et al., 2012).***

Over a century ago, Rudolf Virchow described three factors that are critically important in the development of venous thrombosis: venous stasis, activation of blood coagulation, and endothelial vein damage. These factors have come to be known as the "Virchow triad" ***(López and Chen, 2009).***

Provoked DVTs occur in association with acquired risk factors, cases without acquired states are called unprovoked or

idiopathic. DVT that has no symptoms, but is found only by screening, is labeled asymptomatic or incidental ***(Lloyd et al., 2008).***

Common signs and symptoms of DVT include pain or tenderness, swelling, warmth, redness or discoloration, and distention of surface veins, although about half of those with the condition have no symptoms ***("What are the signs and symptoms of deep vein thrombosis?", 2012).***

Common complication associated with deep vein thrombosis are pulmonary embolism and postphlebitic syndrome(postthrombotic syndrome) ***(Barham and Shah, 2007).***

In those with suspected DVT, a clinical assessment of probability can be useful to determine which tests to perform. Almost all people who develop severe deep vein thrombosis have an elevated blood level of a substance called D dimer. Ultrasonography for suspected deep vein thrombosis has a sensitivity of 97% in detecting DVTs of the proximal legs. The gold standard for judging imaging methods is contrast venography ***(Hargett et al., 2008).***

Frequent walking, calf exercises, aspirin, anticoagulants (blood thinners), graduated compression stockings, intermittent pneumatic compression are the classical measures for prevention ***(Simes et al., 2014).***

Anticoagulation is the standard treatment for DVT. The ACCP recommended treatment for three months in those with proximal DVT provoked by a transient risk factor. Unprovoked DVT patients should be considered for extended treatment ***(Keeling et al., 2011).***

Inferior vena cava filters (IVC filters) are used on the presumption that they reduce PE. National institute for health and care excellence (NICE) recommends caval filters in settings where someone with an acute proximal DVT or PE cannot receive anticoagulation ***(Young et al., 2010).***

A mechanical thrombectomy device can remove venous clots, although the American college of clinical pharmacy (ACCP) considers it an option only when the following conditions apply: "iliofemoral DVT, symptoms for < 7 days (criterion used in the single randomized trial), good functional status, life expectancy of ≥ 1 year, and both resources and expertise are available ***(Kearon et al., 2012).***

Thrombolysis is the administration of an enzyme (intravenous or directly into the affected vein through a catheter), which acts to enzymatically break up clots. reducing the risk of post-thrombotic syndrome by a third, and possibly reduce the risk of leg ulcers ***(Watson et al., 2014).***

AIM OF THE WORK

The aim of this study is to review the literature comparing between conservative management of acute iliofemoral DVT and pharmacological and pharmacomechanical therapy of acute iliofemoral DVT as regards short and long term benefits.

REVIEW OF LITERATURE

Deep iliofemoral vein thrombosis

Anatomy of lower extremity veins

Three sets of paired venae comitantes paralleling the course of three named arteries begin in the distal calf. The paired veins join in the mid-calf. The anterior tibial vein drains the anterior compartment, the posterior tibial vein drains the posterior compartment, and the peroneal vein drains the lateral compartment of the leg. They join to form the popliteal vein in the popliteal fossa.

Distally, the popliteal vein proceeds medially to the artery, and in proximal portion, it is lateral to the artery. In the distal thigh in the abductor canal, the popliteal vein becomes the femoral vein. The deep femoral vein drains the soft tissues of the thigh and is the major collateral venous drainage when the femoral vein is occluded. The deep femoral vein joins the femoral vein laterally in the proximal femoral triangle to form the common femoral vein. At the inguinal ligament, the common femoral vein becomes the external iliac vein. The external iliac vein joins the internal iliac vein in the pelvis and becomes the common iliac vein, which drains into the vena cava.

There are hundreds of deep venous valves, the majority of which are located in the distal veins, with progressively

fewer in the larger proximal veins. Venous sinuses are located in the soleal muscles, which drain into the posterior tibial vein. The gastrocnemius veins, an interlacing valved venous network in the gastrocnemius muscle, drain into the popliteal vein ***(Comerota and Thakur, 2013).***

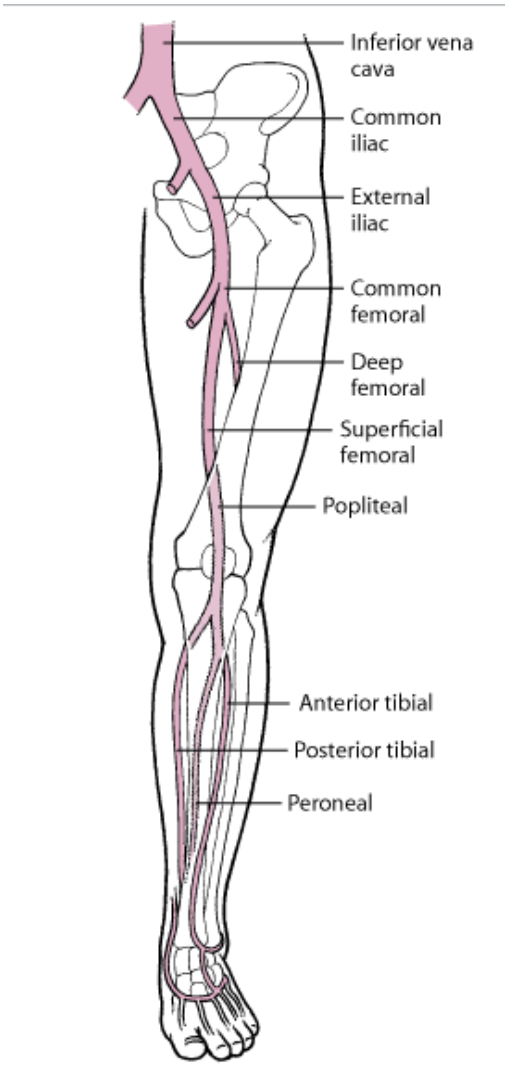

Figure (1): Deep veins of the legs ***(Douketis, 2018).***

Description of DVT

It is of paramount importance to understand that the location of DVT is a predictor of long-term morbidity. DVT involving iliofemoral veins is much more hazardous as compared with thrombus involving distal venous segments. It is because the iliofemoral venous segment is the main venous outflow of the lower extremity and therefore, patients with iliofemoral DVT are at a substantially higher risk of developing PTS and DVT recurrence. Hence, patients with iliofemoral DVT represent a subset of patients with DVT, who benefit the most from treatment strategies focused on elimination of thrombus burden ***(Aziz & Comerota, 2013)***.

Iliofemoral DVT represents the most severe form of DVT and should be treated aggressively to avoid long-term sequelae of PTS.

Epidemiology

It has been estimated that the yearly incidence of deep venous thrombosis (DVT) is as high as 250 000 cases in the United States alone and as many as 100 000 patients die annually from pulmonary embolism (PE). In addition to early risk of PE, late morbidity may develop from recurrent thrombosis and the postthrombotic syndrome ***(Augustinos and Ouriel, 2004).***