INTRODUCTION

Deep venous thrombosis is clotting of blood in a deep vein of extremity (usually calf or thigh) or pelvis. It results from conditions that impair venous return, lead to endothelial damage or dysfunction or cause hypercoagulable state (Virchow's triad).

Deep venous thrombosis occurring in the setting of risk factors is secondary deep venous thrombosis while occurring in absence of risk factors is termed primary or idiopathic deep venous thrombosis ***(Cogo et al., 1994)***

Risk factors for deep venous thrombosis includes prolonged immobilization, prolonged surgery, primary hypercoagulable state, pregnancy, oral contraceptive & hormonal drugs, varicose viens, cardiac causes, old age malignancy, previous deep venous thrombosis &trauma ***(Heit et al., 2000)***.

Thromboembolism in patients with malignancy may occur as first presentation of a hidden cancer (recurrent superficial thrombophlebitis or deep venous thrombosis) due to release of procoagulant derived from the tumor itself ***(Lieberman et al., 1961)*** or as a postoperative complication from prolonged surgery or bed rest ***(Hirsh et al., 1981)***.

A study was done over 2 months period, 40 patients with untreated malignancy was studied for protein C

(PRC), antithrombin III, fibrinopeptide A(FPA), routine haemostatic screen & presence of metastasis to determine pretreatment changes of haemostasis &relate them to subsequent development of thrombotic or hemorrhagic complications. These patients were observed for a mean period of 18 months. There were 23 males and 17 females with median age of 64 year .Nine patients had lung carcinoma, eight colon carcinoma, seven lymphoma, five breast carcinoma, five head and neck carcinoma, one adenocarcinoma of unknown primary & one sarcoma. Eight patients had liver metastasis PRC, antithrombin III. Fibrinopeptide A were measured & the results were collected revealing four patients had decreased AT- III, 28 had decreased PRC &39 had increased fibrinopeptide A. It also revealed that all patients with liver metastasis had decreased PRC level**.**

In this research we will try to focus the light on the risk of deep venous thrombosis in patients with malignancy, is there any biochemical changes predispose to development of deep venous thrombosis? Are there common malignancies associated with high risk of deep venous thrombosis & others associated with low risk? Is presence of metastasis will increase the risk or not?.

We will also try to discuss different measures of prophylaxis and treatment and is there any difference between management of deep venous thrombos in patient with cancer and patient without cancer?.

AIM OF THE WORK

To focus the light on:

- Why patient with cancer has high risk to develop deep venous thrombosis?
- Is there common malignancies associated with high risk of deep venous thrombosis?
- Biochemical changes in patients with cancer rendering them more liable to develop venous thrombosis.
- Is presence of metastasis will increase the risk or not?
- Prophylactic and curative measures in deep venous thrombosis specially in this group of patients.

ANATOMY

(A) The Veins of Lower Extremity

I. Superficial:

1- The long saphenous vein:

The longest in the body, begins in the medial marginal vein of the foot and ends in the femoral vein about 3cm below the inguinal ligament. It ascends about 2.5 to 4cm in front of the tibial malleolus, about a finger breadth behind which it ascends to the knee. It runs upwards along the medial side of the thigh and passes through the saphenous opening in to the femoral vein. The saphenous opening is about 2.5 to 3.25cm below and lateral to the pubic tubercle.it is often duplicated. The valves are more numerous in the leg than the thigh. Just before it pierces the saphenous opening, it is joined by three veins, the superficial epigastric, superficial circumflex iliac and external superficial pudendal) ***(Sinnatamby, 1999)***.

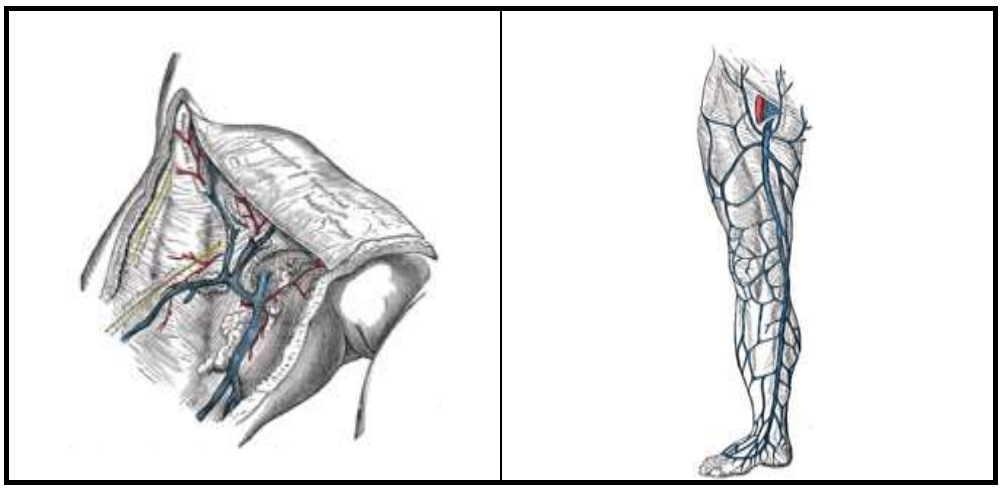


Fig. (1): The great saphenous vein.

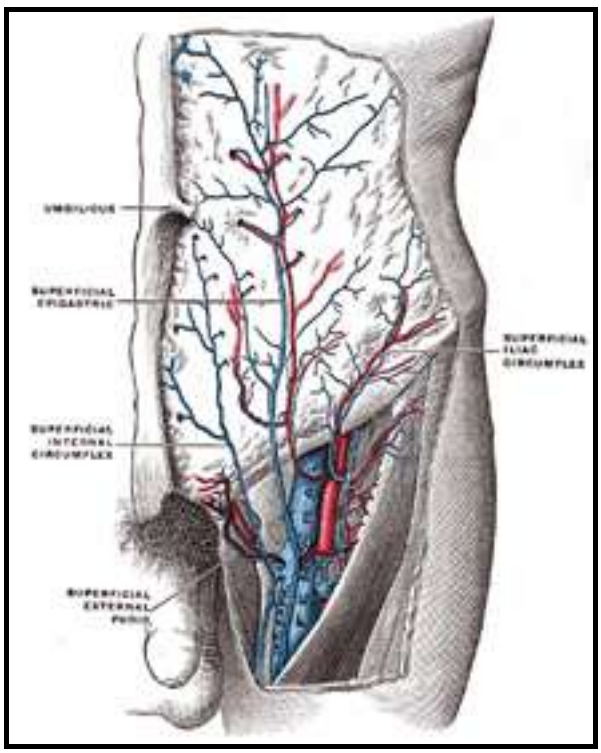


Fig. (2): Tributaries of great saphenous vein.

2- The short saphenous vein:

Begins behind lateral malleolus as a continuation of the lateral marginal vein of the foot. It ascends lateral to the tendocalcaneus, then along the middle of the back of the leg. It perforates the deep fascia and passes between the two heads of the gastrocnemius in the lower part of the popliteal fossa, and ends in the popliteal vein from 3 to 7.5cm above the level of the knee joint. The mode of ending of short saphenous vein is variable. It may join the great saphenous vein in the upper third of the thigh ***(Gabella et al., 1999***).

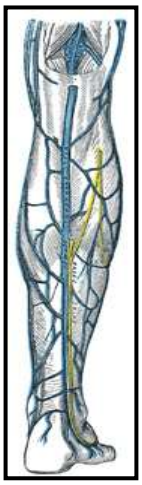


Fig. (3): The small saphenous vein.

3- Perforating Veins:

Many superficial collecting veins deliver their blood into the truncal greater and short saphenous veins, which deliver most of their blood into the deep system through the saphenofemoral junction (SFJ) and the saphenopopliteal junction (SPJ). However, the SPJ and SFJ are not the only pathways from the superficial system to the deep system.

Both the superficial collecting web and the superficial truncal veins are also connected to a variable number of perforating veins that pass through anatomic defects in the deep fascia to join directly with the deep veins of the calf or thigh. Perforating veins usually contain venous valves that prevent reflux of blood from the deep veins into the superficial system. A few named perforating veins are fairly constant in location and are named only as vague groupings ***(Sinnatamby, 1999)***.

II. Deep:

1) Deep Veins of the Calf

In the lower leg, three groups of deep vein exist: the anterior tibial vein (ATV), draining the dorsum of the foot; the posterior tibial vein (PTV), draining the lateral aspect of the foot. From the ankle, the anterior tibial vein passes upward anterolateral to the interosseous membrane, the posterior tibial vein passes upward posteromedially beneath the medial edge of the tibia, and the peroneal vein passes upward posteriorly through the calf. Venous sinusoids within the calf muscle coalesce to form soleal and gastrocnemius intramuscular venous plexi, which join the peroneal vein in midcalf. In most patients, each one of these is actually a pair of veins flanking an artery of the same name; thus there are actually six named deep veins below the knee in a typical patient. Just below the knee, the

four anterior and posterior tibial veins join with the two peroneal veins to become the single large popliteal vein.

The calf muscle pump

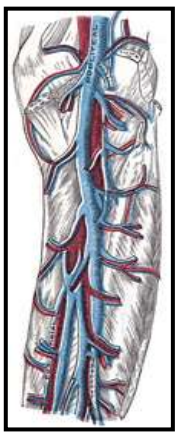
The passage of blood upward from the feet against gravity depends on a complex array of valves and pumps. Muscle pumps of the calf and foot provide the motive force forvenous return. This is frequently called the calf muscle pump or musculovenous pump and is thought to function as the peripheral heart. The calf muscle pump is easy to understand by simple analogy to the common hand-pump bulb of a sphygmomanometer. Before pumping starts, the pressure is neutral and equal everywhere throughout the system. When the hand bulb is squeezed, the intake valve is forced closed and the outflow valve is forced open. Air is pumped into the cuff at high pressure. When the hand bulb is allowed to relax, the bulb re-expands. The inflow valve opens to allow refilling of the bulb. Each segment of the calf muscle pump works in the same way as the hand bulb of the sphygmomanometer. Inflow to a segment of deep vein is through intake valves from perforating veins as well as from the deep vein segment below. Outflow is through an outflow valve to the deep vein segment above. Squeezing of the vein segment occurs when muscle contraction increases the pressure within a fascial muscle compartment. Just like a sphygmomanometer, the calf

muscle pump can achieve pumping pressures of several hundred mmHg before valve failure occurs.

2- The popliteal vein:

Ascends through the popliteal fossa to the aperture in the adductor magnus, where It becomes the femoral vein .in the lower part of its course it is medial to the popliteal artery; between the heads of gastrocnemius it is superficial to it; above the knee joint it is posterolateral to it.

Fig. (4): The popliteal vein



3- The femoral vein:

Begins at the opening in adductor magnus as continuation of the popliteal vein, and ending at the level of the inguinal ligament by becoming the external iliac.in the lower part of the adductor canal it is posterolateral to the femoral artery; in the upper part of the canal, and in the lower part of the femoral triangle, it is behind the artery at

the base of the femoral triangle it is medial to the artery ***(Sinnatamby, 1999)***.

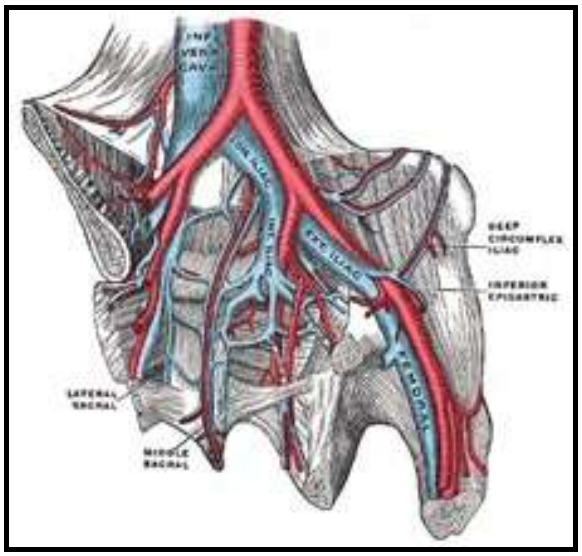


Fig. (5): Iliac veins

The deep femoral vein (DFV), is a short, stubby vein that usually has its origin in terminal muscle tributaries within the deep muscles of the lateral thigh, but may communicate with the popliteal vein in up to 10% of patients. In the proximal thigh, the femoral vein and the deep femoral vein join together to form the common femoral vein (CFV), which passes upward above the groin crease to become the iliac vein.

4- Iliac veins

The external iliac vein (*v. iliaca externa*), the upward continuation of the femoral vein, begins behind the inguinal ligament, and, passing upward along the brim of the lesser

pelvis, ends opposite the sacroiliac articulation, by uniting with the hypogastric vein to form the common iliac vein. On the right side, it lies at first medial to the artery: but, as it passes upward, gradually inclines behind it. On the left side, it lies altogether on the medial side of the artery. It frequently contains one, sometimes two, valves.

The common iliac veins (*vv. iliacæ communes*) are formed by the union of the external iliac and hypogastric veins, in front of the sacroiliac articulation; passing obliquely upward toward the right side, they end upon the fifth lumbar vertebra, by uniting with each other at an acute angle to form the inferior vena cava. The right common iliac is shorter than the left, nearly vertical in its direction, and ascends behind and then lateral to its corresponding artery. The left common iliac, longer than the right and more oblique in its course, is at first situated on the medial side of the corresponding artery, and then behind the right common iliac. Each common iliac receives the iliolumbar, and sometimes the lateral sacral veins. The left receives, in addition, the middle sacral vein. No valves are found in these veins ***(Sinnatamby, 1999)***.

(B) The Veins of Upper Extremity

I. Superficial:

1-The cephalic vein:

Winds upwards from dorsal venous network around the radial border of the forearm to its anterior surface, receiving tributaries from the both surface below the front of the elbow it gives off the median cubital vein which receives a communicating branch from the deep veins of the forearm and passes medially to join the basilic vein it ascends subcutaneously in front of the elbow superficial to the groove between the brachioradialis and the biceps. It crosses superficial to the lateral cutaneous nerve of the forearm. In the upper-one third of the arm it lies between pectoralis major and deltoid. It the pieces thr clavipectoral fascia, and ends in the axillary vein just below the level of the clavicle. The accessory cephalic vein arises from a small tributary plexus on the back of the forearm or from the ulnar side of dorsal venous network; it joins the cephalic below the elbow. In some cases it springs from the cephalic vein above the wrist and joins it again higher up ***(Gabella et al., 1999)***.

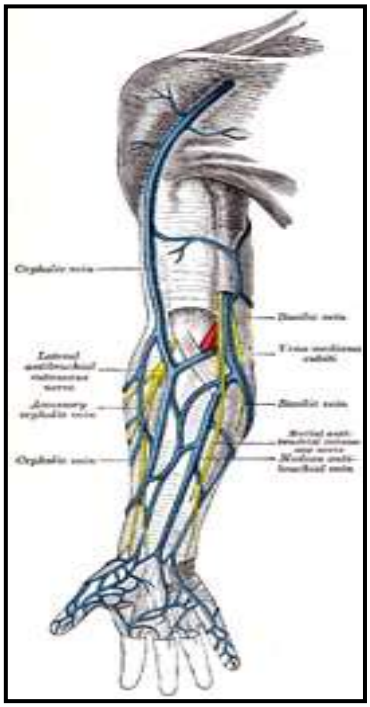


Fig. (6): The Superficial Veins of the Upper Extremity

2- The basilic vein:

Begins in the ulnar part of the dorsal venous network of the hand. It ascends for some distance on the posterior surface of the ulnar side of the forearm, but inclines foreword to the anterior surface below the elbow. it is joined by the median cubital vein and ascends obliquely and superficial between the biceps and pronator teres, the medial cutaneusnerve of the forearm passes in front of and behind, it then runs upward medial to biceps, perforates the deep fascia alittle below the middle of the arm, and ascends medial to the brachial artery to the lower border of the teres major, continuing as thr axillary vein ***(Agur and Lee, 1999).***

II. Deep:

1- Venae comitantes:

These veins follow the arteries as their companions (venae comitantes). They are generally in pairs, flanking the corresponding artery, and connected at intervals by short transparent branches (radial, ulnar and brachial) ***(Sinnatamby, 1999)***.

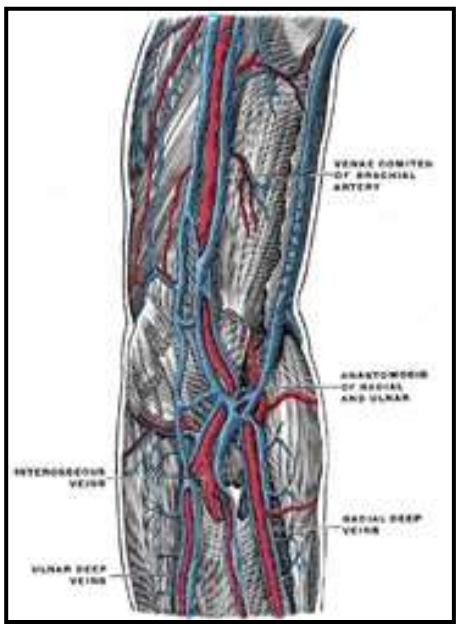


Fig. (7): The deep veins of the upper extremity.

2- The axillary vein:

Begins at the lower border of the teres major, as the continuation of the basilic, and ends at the outer border of the first rib where it becomes the subclavian vein. Near the lower border of the subscapularis it receives the brachial vein and close to its termination, the cephalic vein. iy lies medial to the axillary artery.

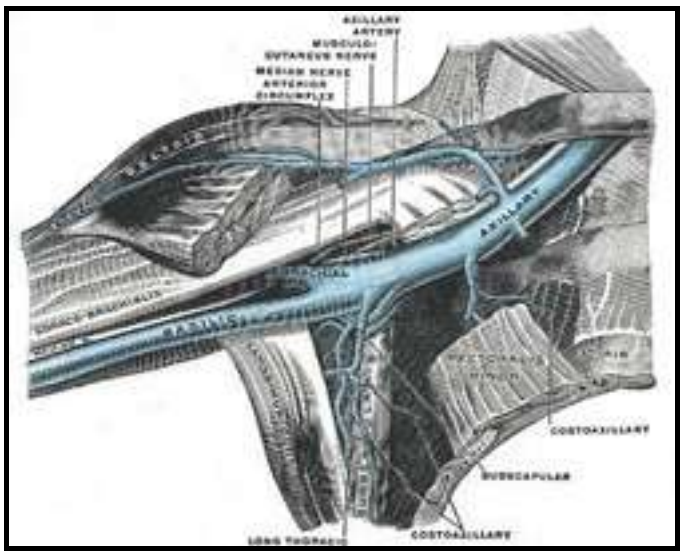


Fig. (8): The veins of the right axilla, viewed from infront

3- The subclavian vein:

This extends from the outer border of the first rib to the medial border of scalene anterior, where it unites with the internal jugular vein to form the brachiocephalic vein.the subclavian artery is the posterior relation separated from it by scalenus anterior. Its tributaries are the external jugular, the dorsal scapular and sometimes the anterior jugular, and others. The left subclavian vein receives the right lymphatic duct ***(Gabella et al., 1999).***

4- The external jugular vein:

It begins just below the angle of the mandibleby union of the posterior division of the retromandibular vein with posterior auricular vein, and runs down the neckfrom