THROMBOPHLEBITIS

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THE prevention, recognition, and early treatment of thrombophlebitis is important because of its relation to two significant medical conditions: (1) pulmonary embolism; and (2) chronic venous insufficiency. Thrombophlebitis may complicate medical, surgical and obstetrical cases. The incidence of thrombophlebitis during recent years appears to be on the increase which probably is due to the greater number of patients undergoing surgery and also to the extent of surgical procedures.

Certain types of thrombophlebitis do not cause the serious complications mentioned; therefore it is desirable to outline a simple classification so that the more serious types can be readily differentiated.

Classification

(1) **Local Thrombophlebitis.** In this classification we include thrombophlebitis involving the superficial veins, resulting from the injection of intravenous materials which have acted as an irritant. The mercurial diuretics, arsenicals, and materials used in x-ray diagnosis may result in a local chemical thrombophlebitis when injected. Superficial thrombophlebitis may follow trauma to an extremity. Large varicose veins may become thrombosed and areas of phlebitis ensue.

In the presence of inflammatory and suppurative lesions, local areas of thrombophlebitis secondary to these conditions may occur. Where severe arterial occlusion exists, local areas of thrombophlebitis may develop, particularly if there is a gangrenous condition and an area of demarcation. These forms of thrombophlebitis are usually local in nature and secondary to some specific condition. They do not usually result in complications other than local distress.

(2) **Primary Thrombophlebitis.** In this group we classify recurrent idiopathic thrombophlebitis or thrombophlebitis migrans, the etiology of which has not been determined. We also include a thrombophlebitis frequently associated with thromboangiitis obliterans. Thirty to 40 per cent of cases of thromboangiitis obliterans have, at some time during the course of the disease, superficial migrating thrombophlebitis. This may be one of the earliest clues to the diagnosis.

(3) **Secondary or Complicating Thrombophlebitis.** This group is the most important, inasmuch as it includes complications of pulmonary embolism and chronic venous insufficiency. Secondary thrombophlebitis may occur postpartum, postoperatively, and following medical illnesses of infectious or

non-infectious nature. This type of thrombophlebitis may be associated with blood dyscrasias, particularly polycythemia and leukemia, and in addition, with neoplastic disease.

Etiology of Thrombophlebitis

The specific cause or causes of thrombophlebitis of the secondary or complicating type have not been determined. There seems to be a greater incidence of this condition during winter months and in the Northern states. A familial or constitutional tendency and obesity frequently appear to be influencing factors. Thrombophlebitis of this type is more prevalent in patients over 40 years of age.

Three main theories exist concerning the development of thrombophlebitis:

(1) Patients confined to bed for any length of time experience increased pressure on the veins of the calf and the endothelial cells of the vein wall may adhere. These injured cells become roughened and act as a nidus for a thrombus.

(2) Patients recumbent during the course of an illness or postoperatively, undergo retardation of the blood flow. This may be increased by the patient assuming certain positions in bed, such as Fowler's position, whereby the pressure in the groin is increased and the retrograde flow of blood decreased. It is assumed that certain degrees of vasospasm induced by the use of tobacco may further retard the blood flow.

(3) Certain changes in the chemical nature of the blood occur particularly postoperatively. There is an increase in viscosity, fibrinogen and calcium content, as well as an increase in members of white cells and thrombocytes. There is a tendency to agglutination and changes in the protein chemistry, all of which may be important in the cause of thrombophlebitis.

Diagnosis of Secondary Thrombophlebitis

The diagnosis of secondary thrombophlebitis is often difficult, but if certain features are observed early precautionary measures may be taken. Mild general constitutional reactions may occur from six to fourteen days postoperatively and include an unexplained rise in temperature, pulse, and respiration. Following the onset of these reactions the patient may complain of some localized pain in the calf area and tenderness to palpation. A positive Homan's sign may be present although this is not always the case. Slight edema may exist and there may be minimal dilitation of the superficial veins.

Laboratory aids are of little assistance. A slight elevation in the sedimentation rate and leukocyte count may be present and there may be changes in the clot retraction time. These indications are not diagnostic but are helpful adjuncts in questionable cases. Venography may be used in cases of doubt.

The differential diagnosis of acute iliofemoral thrombophlebitis, acute arterial occlusion, and acute lymphangitis must be considered. These points are summarized in the table.[1]

Differential Diagnosis

	Acute Ilio-Fem. Throm. Phlebitis	Acute Arterial Occlusion	Acute Lymphan-gitis
Size of Limb	Enlarged	Shrunken	Enlarged
Color	Normal Slightly Cyanosed	Pale-Mottled	Red
Temperature	Normal	Low	High
Sup. Veins	Prominent	Collapsed	Normal
Arterial Pulses	Normal	Absent	Normal
Chills	Rare	Absent	Usual
Fever	Moderate	Absent	High

Treatment of Secondary Thrombophlebitis

In summarizing the treatment of secondary thrombophlebitis we must consider measures for the prevention of this condition. Careful surgical technique is, of course, one of the most effective. The incidence of phlebitis is much higher following extensive surgical procedures where there has been, either by necessity or carelessness, considerable trauma to the tissue. Pressure on the legs, particularly, should be avoided postoperatively, and the patient urged to move his limbs frequently during the day and take breathing and leg exercises. The extremities should be lightly massaged unless contraindicated by some other condition. Abdominal compression and abdominal binders are better avoided, and the patient should not be kept in Fowler's position for any length of time unless necessitated by other complications. The fluid intake should be adequate and any complicating infection treated promptly.

Early postoperative ambulation is advised and generally advocated. This should be construed as standing and taking a few steps as early as possible.

Immediate Local Care of the Extremities

When secondary thrombophlebitis occurs the extremity involved should be elevated. Care should be exercised in the use of pillows as they frequently slide underneath the knee and create an additional obstruction.

We recommend the continuous use of moist heat as the most effective application. Before applying heat the arterial circulation should be evaluated as heat may be harmful in the presence of arterial insufficiency. Heat should be applied and the extremity elevated for a period of forty-eight hours after which motion may be initiated. A supporting gum rubber bandage is the most practical type of support and should be worn for a minimum period of three months, regardless of whether or not residual edema is occurring.

Proper follow-up care should include adequate rest, support, the correction of obesity, if present, and the exclusion of tobacco.

Anticoagulant Therapy

This type of treatment should be incorporated immediately upon making the diagnosis of secondary thrombophlebitis. The intermittent method of heparin administration can be used, prescribing 50 mg. of heparin intravenously every three to four hours for a period of forty-eight hours. Immediately upon starting treatment, 300 mg. of dicumarol may be given orally the first day and 200 mg. the second day.

Daily prothrombin studies must be made at least three hours after an administration of heparin in order that a true prothrombin concentration time be determined. If the prothrombin concentration is above 30 per cent, an additional 100 mg. is given daily. The daily dose if required may vary from 50 mg. to 300 mg. Body weight is not related to dosage in the adult. About 5 per cent of patients are resistent to dicumarol. If prothrombin concentration is between 20 and 30 per cent, dicumarol is withheld. Anticoagulant therapy should be given for a period of three weeks and then discontinued if there are no complications.

Contraindications

The contraindications for using dicumarol must always be clearly recognized. They may be summarized:

1. In renal disease the effect of dicumarol may be abnormally prolonged and difficult to control and therefore should not be used.

2. In ulcerative lesions and open wounds including ulcerative colitis, and also in patients undergoing tube drainage of viscera.

3. In patients with recent operations on the brain or spinal cord hemorrhage might be disastrous.

4. In deficiency of vitamins C or K; in liver disease with prothrombin deficiency; and in blood dyscrasias or purpura.

5. In subacute bacterial endocarditis because the hemorrhagic tendency is increased.

6. In patients with hypertension having retinopathy.

Treatment for Hemorrhage

If the prothrombin concentration falls below 10 per cent, 20 to 40 mg. of vitamin K should be given intravenously at once and dicumarol withheld until the prothrombin concentration rises to 30 per cent; then it should be used in smaller doses.

If bleeding occurs 60 mg. of vitamin K and 500 cc. of fresh citrated blood should be given intravenously.

Vein Ligation and Thrombectomy

Surgical procedures have been widely used in the prevention of pulmonary embolism. If an exact differential diagnosis between phlebothrombosis and thrombophlebitis could be made, it would seem logical to employ vein ligation and thrombectomy in phlebothrombosis. In our experience, this differentiation has not been possible and excellent results have been obtained using the anticoagulant method. Therefore, we have preferred this to vein ligation. However, final conclusions on the relative merits of these procedures are not yet possible.

Perivertebral Nerve Block

Lumbar sympathetic nerve block with procaine hydrochloride has been used in the treatment of thrombophlebitis. It has been thought to be helpful in relieving vasospasm and pain. It is difficult to evaluate the merit of this procedure. It should not be used when anticoagulant therapy is being employed, as serious complications may ensue.

Summary

A simple classification of thrombophlebitis stresses secondary thrombophlebitis as the essential cause of two serious medical complications, namely pulmonary embolism and chronic venous insufficiency. If secondary or complicating thrombophlebitis can be diagnosed early and precautionary measures taken, a large majority of the complications can be prevented.

Reference

1. Allen, E. V., et al.: Peripheral Vascular Disease (Philadelphia: W. B. Saunders Company 1946).