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THE PROPHYLAXIS AND TREATMENT OF POST-OPERATIVE PHLEBITIS.*

BY

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In order to properly study the prophylaxis of post-operative phlebitis—the portion of to-night's symposium assigned to me—it is essential that we briefly review its pathology and etiology.

Strictly speaking, we cannot dissociate phlebitis and venous thrombosis. Both together constitute the clinical entity which we ordinarily understand as post-operative phlebitis. An injury to a vein is the most frequent direct cause of phlebitis; whereas the absorption of septic fluids from contiguous structures that are septic is the common indirect cause. (Halloway.)

Thrombi, according to almost universal acceptation, result from alteration of the endothelium of the vein in the vast majority of cases. Conditions which tend to induce blood-coagulation may be regarded as accessory causes. These include the presence of microorganisms and their products in the blood: clots carried from some other point in the circulation and acting as foreign bodies; necrosis, gangrene; inflammatory and degenerative processes occurring in and about the vessel walls. Roswell Park, from

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whose textbook on Surgery the above is extracted, denies that mere slowing of the blood-stream without some such mechanical irritation is sufficient to induce coagulation.

Thrombo-phlebitis is regarded as the manifestation of a septic state and consists of an inflammation of one or more veins brought about by the presence therein of infected thrombi.

At the outset we are confronted with the following question: Is phlebitis dependent on thrombosis or is thrombosis dependent on phlebitis? In the eighteenth century John Hunter promulgated the theory that phlebitis was the primary and that thrombosis was an associated or secondary condition. This explanation was accepted by Cruveilhier and others. It prevailed undisputed down to the middle of the nineteenth century.

In the year 1856 Virchow began to teach the opposite—namely, that blood-coagulation and thrombosis preceded the changes in the vessel-wall. He regarded retardation of the blood-current as the primary and main factor in the causation of phlebitis.

Thirty years later (1885) we find that Billroth, while conceding that certain forms of phlebitis were independent of primary thrombosis, still taught that, in the majority of cases, a sluggish circulation was responsible for clot formation. He described thrombosis as being caused by compression of the wall of a vein; by rapid dilatation of a blood-vessel, as in aneurysm and varices, which resulted in retardation of the blood-current, and by marasmic conditions in which a similar result was explained by insufficient contraction of the heart and arteries, as occurs in persons debilitated by age or severe, exhausting disease.

About this time Birch-Hirschfeld, after a scholarly presentation of the subject based on personal observations and extensive reading, concluded that retardation of the blood-current is the chief condition which leads to the formation of thrombi. While recognizing that pathological changes in the intima of vessels favored adhesion of blood-plates and white blood-cells, he regarded the blood-separation and coagulation as caused primarily by the retardation of the blood-current and to a lesser degree by hyperinosis or conditions tending to increase fibrin and fibrin-ferment.

A dozen years later (1897) in the excellent and voluminous work on Surgery by Duplay and Réclus, we find that Quenu ascribes phlebitis to a microbic agency, acting on the endothelium

of a vein with the clot formation as a secondary process. He admits, however, the possibility of blood retardation as entering to a limited degree in the etiology of the pathological condition.

Probably most surgeons to-day accept this interpretation. Thus Brewer (1903) teaches that phlebitis in the majority of cases is due to the action of pathogenic microorganisms, the virulence of which is not sufficient to excite the ordinary evidences of inflammation. The intima of the vein becomes thickened or eroded, and a thrombus forms at the site of the lesion.

The impression left in the work on Surgery by the late Dr. Fowler, and published last year (1906), is that this author strongly favored the possibility and frequency of thrombus-formation irrespective and independent of pathological changes in the vein itself. Indeed, he describes one distinct variety under the name of "stagnation thrombi," which he defines as due to a retardation of the current of blood in the veins and resulting in thrombosis. Secord, Murphy, Richardson, Gerster, and the Mayos believe that inaction due to prolonged rest in bed, combined with low blood pressure, plays a very important rôle in the etiology of post-operative phlebitis.

From all this we are justified in assuming (1) that, in certain cases at least, blood retardation leads on to coagulation, thrombosis, and phlebitis; (2) that, in a larger proportion of cases, an injury to the intima of a vessel or the accumulation of microorganisms on its wall results in phlebitis with secondary clot formation and thrombosis.

Clark, furthermore, has recently assumed that, independent of microorganisms, and in perfectly aseptic laparotomies, a post-operative femoral phlebitis may result from backward extension from the deep epigastric vein of a clot resulting from violent traction of the wound edges in the course of operation. Coe also has called attention to the occurrence of post-operative phlebitis in the course of aseptic abdominal surgery, and I hope to-night to learn the explanation from the lips of our distinguished colleague. Grant believes in some general condition affecting the composition of the blood which is an essential factor in the cause of thrombophlebitis in these cases.

Excluding direct injury to a vein or its involvement as a result of cellulitis in its vicinity we ordinarily must face two conditions in the study of the prophylaxis of post-operative phlebitis, sepsis, and blood retardation.

Regarding the frequency and importance of sepsis I think there can be no doubt. During the past fourteen months, in about 400 operations—nearly all laparotomies—we met at Beth Israel Hospital six cases of post-operative phlebitis. Four of these cases occurred in connection with suppurative conditions of the appendix and Fallopian tubes. The fifth case occurred in a woman with a mitral murmur, who underwent the Alexander operation of shortening of the round ligaments. One of the incisions failed to heal by primary intention, although the wound disturbance was trivial. The sixth case occurred in a woman with a bicornate uterus, in whom it was necessary to remove the products of conception for an incomplete abortion. All of these cases were kept strictly confined to bed, and in none of them can the possibility of sepsis be excluded—although most of them were really only very mild cases. Five of the cases showed involvement of the veins of the left lower limb; the sixth case occurred on the right side. All recovered. The phlebitis developed in this series of cases between the seventh and the twenty-seventh day after operation.

The overwhelming importance of sepsis in the production of post-operative phlebitis is conceded by everybody, and it is hardly necessary to state that the first rule of prophylaxis is the rigid enforcement of asepsis and antisepsis—whether we are dealing with clean or suppurating conditions. This is neither the time nor the place to enter on a long description of how to proceed to accomplish this end. The surgeon must never relax his own watchfulness nor permit those about him to become careless. Indeed, it is wise every now and then to revise every item and review every detail. The dust of the operating room (if any is present), the dressings, the ligature material, the surgeon's and assistants' hands, rubber, tubing or hose, scrubbrushes—in short, everything should be subjected to occasional bacteriological examination.

Next to asepsis—on which all surgeons to-day are agreed—comes the question of the importance of rest in the prophylaxis of post-operative phlebitis. Given a case of suppurative appendicitis or adnexitis with a drained wound, we are again nearly unanimous in advising rest in bed. For we know that most cases of phlebitis after operation occur just in these patients. Beyond this point we reach the "parting of the ways."

If after an aseptic operation which permits of complete closure

of the abdominal incision without drainage the surgeon is convinced that phlebitis always precedes and induces thrombosis, whether through injury of some sort to the vein or mild infection, the only safe rule for him to follow is to insist on the time-honored practice of keeping his patient in bed during the period of time at which this complication is known to regularly occur—namely two to three weeks, or longer. He will thus avoid taking the chance of injuring a vein or its perivascular structures, and give his patient a sort of guarantee against possible damage from a congregation of bacteria clinging to some point along the interior wall of a vein.

If, on the other hand, one feels that, in this class of cases, retardation of the blood current does play an important rôle as one of the chief factors in producing first coagulation and later thrombosis with phlebitis, and questions the possibility of infection after aseptic work, then must his prophylactic measures proceed in the opposite direction. In such event, instead of absolute and prolonged rest in bed, the logical indications will be early movement and early removal from the bed. It is almost superfluous to remind this audience that the heart action and circulation are distinctly accelerated by sitting a patient up in bed or permitting her to turn from side to side at will, and still more so by getting the patient out of bed and permitting her at a very early period to make a few steps. Besides this, liberal nourishment, frictions and massage assist in quickening an otherwise sluggish circulation.

From the theoretical point of view, or even as the result of numerous laboratory experiments, this question has not yet been definitely settled. Nor is this necessary. The problem has been attacked and settled to the satisfaction of many from a purely practical and empirical method of procedure.

It is true that some operators have done a large number of aseptic operations, keeping their patients in bed during the usually prescribed period of time, without meeting a single case of post-operative phlebitis. Thus our distinguished fellow-member, William M. Polk, has done one hundred consecutive hysterectomies at Bellevue Hospital without a single instance of this complication being in the records. On the other hand, according to Grant, Cordier has collected 166 cases of post-operative phlebitis after hysterectomy for uterine fibroids. In 1,000 operations for appendicitis in Sonneburg's clinic, 14 cases

of thrombosis occurred in "internal" cases. Schenck refers to 25 cases of thrombosis after hysterectomy and 9 after ovariotomy in a series of 7,130 gynecological operations. In 1,140 laparotomies, 26 cases of thrombosis, according to Albans, occurred after "clean" operations.

The experience of those who allow their patients to move about early after intraperitoneal operations is that post-operative phlebitis or thrombosis very seldom occurs. Thus, in more than 1,000 cases of abdominal section done by Ries, Boldt, Chanler, and myself, we can record only two or possibly three cases of this complication, and they were of a very mild character.

The movement of early mobilization after abdominal section was started by Ries of Chicago and Boldt of New York, and is spreading rapidly throughout this country and Europe. Moynahan, in his recently published work on abdominal surgery, strongly advocates early feeding and early mobilization. Hertog has just published a report from Landau's clinic in Berlin, in which 39 patients were permitted to leave their beds in periods of time ranging between one and nine days. Krönig and Döderlein are enthusiastic supporters of this movement. My own personal experience during the past eighteen months with the method embraces between 50 and 60 cases, and, although I have met instances of phlebitis during this time, the complication did not involve any of the patients who were got out of bed at an early period after operation.

It is true that post-operative phlebitis, even after aseptic operations, may occur as late as the end of the second or third week. This is used as the strongest argument in favor of prolonged rest in bed. With the greatest respect for the opinions of my colleagues, I regard this as the weakest argument of all. From my view-point prolonged rest in bed tends to increase debility, and certainly does not tend to improve blood circulation. If thrombus formation is favored by a sluggish circulation, then I must insist that one of the best means of prophylaxis is early mobilization of the patient.

No rule should be too sweeping, and every rule should carefully note exceptions. Personally, I have put myself on record as being opposed to the extreme position taken by Ries and my respected friend, Dr. Boldt, by which patients are urged to leave the bed in twelve to twenty-four hours after operation. On the other hand, I consider it absurd to keep patients in bed for two or three

weeks after a simple, aseptic abdominal section. I again repeat that the likelihood of the occurrence of a post-operative phlebitis in clean abdominal work is more probable when this latter plan is followed than when the patients are permitted to move about early. It is my firm conviction that 80 per cent. or more of all abdominal sections will in the near future be ordered out of bed at the end of the first week. That it is perfectly safe for many of these cases to sit in a chair after two to four days has been proven to my complete satisfaction in my own work.

The exceptions, however, should be borne in mind. The magnitude of an operation is in itself no contraindication to early mobilization. Pus cases which require drainage through the abdomen should be kept in bed; in these cases we know that post-operative phlebitis is most apt to occur as a result of septic absorption. The same is true of all cases showing febrile disturbances and for the same reason. Senile and exsanguinated patients require the lesser degrees of motion, friction, or massage, although it is surprising at times to note how quickly convalescence proceeds even in these patients when put in a chair before the end of the first week. In the presence of organic disease—cardiac, pulmonary, or renal—early removal from bed is contraindicated. The danger of embolism is great in many of these patients. The surgeon must always be more or less of the physician. He should be guided by associated conditions, and should be always ready to make exceptions.

Without attempting to be dogmatic, I respectfully ask for a fair hearing, and beg you to put all preconceived notions to one side and to ignore all theoretical considerations. I ask you to select your cases and then give this method of early mobilization an unbiased and impartial trial. Only by collective experiences will the prophylactic value of early mobilization as a preventive of post-operative phlebitis be determined.

The prophylactic treatment, then, may be summarized in two paragraphs:

1. Careful attention to every aseptic and antiseptic detail in every operation. Adequate drainage in purulent or infected conditions. In gynecological abdominal surgery, this implies the use of the vagina or lower portion of the abdominal incision, or even the removal of the uterus for purposes of efficient drainage. The Fowler elevation of the bed is a useful post-operative adjunct to carry out this end. Some operators, even in this class

of cases, will urge their patients early out of bed with a view of preventing post-operative phiebitis.

2. In aseptic, nonpurulent intraabdominal conditions which are submitted to other than fixation operations the occurrence of post-operative phlebitis will be reduced in frequency by getting such patients out of bed before the end of the first week.

In regard to the treatment of phlebitis when actually present all surgeons are agreed. Rest of the most absolute character, with elevation of the affected limb, is the prime indication. It is customary to wrap the extremity in cotton and keep it in place by means of a loose bandage. An ice-bag over the most tender area will give comfort and relieve signs of inflammation. Frictions and massage are advised by some authors, but I believe that the best interests of the patient—particularly in avoiding the danger of breaking the clot prematurely and distributing emboli throughout the circulation—are subserved by omitting these measures.

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