
EMBOLISM FOLLOWING ABDOMINAL SECTION.

BY

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THAT form of metastasia in which insoluble substances are transported by the blood current and lodged in some part of the vascular system is known as embolism. The material transported is an embolus. The process may occur in lymph vessels as well as in blood vessels; although the latter, hematogenous embolism, is the more important form. Emboli may be gaseous, liquid or solid. The most common emboli are those composed of the products of coagulation of the blood and are usually derived from a thrombus.

Embolism which occurs in the direction of the normal blood current is of the most frequent occurrence. Retrograde emboli are more likely to occur in the lymph stream than in the blood and play a very important part in the lymphogenous metastasis of tumors.

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Emboli may be bland or infective. In the former case the thrombotic material does not contain toxic or infective agents and its effects are purely mechanical. The infective emboli contain pathogenetic microorganisms and there is added to the mechanical effect produced by these shown at the point of lodgment, the characteristic effect of the bacteria which they contain.

Fat embolism is more apt to occur in general surgery than in gynecologic work as the source of the fat is usually the bone marrow. Air embolism is generally produced by wounds or surgical operations about the neck and upper extremities.

The general symptoms of non-infective embolism depend upon the anatomical position and relations of the occluded vessel, the specific functions of the part supplied by it, and the degree of anemia produced by the obstruction.

According to Welch the order of frequency of arterial embolism is as follows: pulmonary, renal, splenic, cerebral, iliac and arteries of the lower extremities, celiac axis with hepatic and gastric branches, central artery of the retina, superior mesenteric, inferior mesenteric, abdominal aorta, and coronary arteries.

The subject selected is simply emboli following celiotomy. In a review by Dearborn (*Annals of Gynecology and Pediatrics*, Nov., 1904) of the work of twenty-five surgeons of Boston and vicinity it is shown that thrombosis and embolism are more common after operations in the pelvis than after operations in any other part of the body. Further, that it is possible that many cases of pleurisy, pneumonia and pulmonary abscess following operation are due to emboli. Large emboli almost always cause speedy death by syncope or asphyxia; very small emboli usually run a favorable course. Dearborn says that any sudden increase in pulse rate during convalescence, the temperature remaining about normal, should remind one of the possibilities of thrombosis, and that if there are evidences of phlebitis or of thrombosis, absolute rest in bed must be insisted on. Agnew observes that "after operations in which much blood has been lost, there is always more or less tendency to the formation of coagula. This may take place in the vessels of the extremities, and by forming an obstruction to the circulation, cause the limb to fall into a state of gangrene. From the same tendency to coagulation of blood a clot may form in the heart sufficiently large to destroy life. He has seen both these

accidents occur. Hence he says it is of the first importance that patients thus predisposed should be kept perfectly quiet and in the recumbent posture. Any considerable effort, such as sitting up in bed, when the power of the heart has been lessened and the vessels deprived of a large amount of blood by an operation, exposes the individual either to a fatal syncope, or to the formation of obstructive plugs of fibrin."

Literature on the subject of post-operative thrombosis and embolism is scanty and in all probability the fatal cases on record do not represent the full number of deaths from this cause. An interesting fact in almost all the cases recorded in full is that these cases of embolism have occurred almost uniformly when the patient was doing well, often when cure was considered complete.

Thrombosis may result: (1) After a prolonged or severe operation. (2) As the result of sepsis in the wound. (3) Where neither of the above conditions obtain. If thrombus due to stagnation of blood occurs, it occurs during the formation of the clot, most commonly about a week or ten days after the operation; though it may take place very much earlier than this, and it may occur as late as the third week.

In a résumé of 7,130 gynecological operations Schenck reports forty-eight cases of thrombosis. He points out that this complication is much more common after operations in the pelvis than after operations in any other part of the body.

Injury to the large venous trunks by too forcible use of retractors is a possible cause in some cases. Ligature of a vein close to the point at which it enters the main venous trunk may cause thrombosis in that trunk by extension of the clot. Anemia and cachexia accompanying malignant disease has been found to be a factor.

Among the processes which lead to pulmonary embolism, according to the frequency of their occurrence, the formation of thrombi within the venous system must be named in the first place; and the head of the list is thrombosis of the veins of the leg, as in protracted fever and in fractures. Next in order of frequency are those emboli which originate in thrombosis of a vein after pelvic and abdominal operations and after parturition.

The consequences of an embolism depend very much on the nature of the embolus, the area of the blood vessels occluded and the function of the organ disturbed. The branches of the

pulmonary artery in the lower lobe of the right lung are most frequently affected due to the power of the blood current and weight of the embolus according to Eichorst.

Death is sudden and often without warning, and it is not known how the heart ceases. The sudden non-appearance of blood in the vessels of one lung is very important. In other cases death is not caused by syncope but by asphyxia; such an attack always sets in suddenly. The patient has a violent sensation of suffocation, as though his throat were constricted, the face which at first is pale, speedily becomes cyanotic, the eyes may protrude and pupils dilate, the jugular veins swell, the respiration is accelerated, the heart action becomes tumultuous and irregular. At the same time the patient complains of a continuous, severe, painful feeling of oppression; the want of breath is very great, but cannot be satisfied because, although air enters the alveoli, the demand for oxygen cannot be relieved; for the required blood supply is wanting; the skin is cold and clammy. Death may follow in an hour or two. In other cases the fatal issue does not occur for a day or two. The first oppression subsides and the patient rests more easily; but soon a fresh attack of dyspnea and oppression sets in, which may be repeated several times with remissions until in one of these attacks life is extinguished. Pulmonary embolism may not cause immediate death but produce infarction accompanied by pleurisy and a temperature of 101-102. There may be an area of consolidation. Recovery depends upon the size of the embolus, the condition of the lungs and the presence of bacteria in the embolus.

Dr. J. C. Warren reports two cases, one following hysterectomy and the other operation for cancer of the breast. Both were fatal.

Dr. M. H. Richardson reports ten or twelve cases, the probable source of embolism being the exterior and interior iliac veins. Mortality 100 per cent. Death was instantaneous, with no time for treatment. All were cases after abdominal operations as hysterectomy, ovarian tumor, hernia, etc.

Dr. H. H. A. Beach writes: "I have seen it sufficiently often to make me very guarded in the prognosis of any abdominal operation. I am always on the watch for it in cases of high leucocytosis. One is most apt to see it in the cases in which he is especially anxious for patients to make a good recovery. As nearly as I can remember I have seen more cases after appendix operations than from any other source."

Dr. J. C. Munro thinks autopsy necessary to diagnosis of embolism. He reports two cases, both of which recovered. One was appendectomy, the other cholecystotomy.

D. E. W. Cushing reports three cases. One was vaginal hysterectomy with embolism in the third week and recovery of the patient. Second was also a case of vaginal hysterectomy with embolism in the third week and sudden death. Third, abdominal hysterectomy and death on the second day from embolism.

Dr. J. C. Irish has had six cases, all fatal.

Dr. Malcolm Storer reports two cases, both hysterectomies, with 50 per cent. mortality.

During twelve years of rather active gynecologic work I have had an opportunity of observing five cases of embolism, four of which resulted fatally.

CASE I.—Miss B., school teacher. The operation was dilatation and curettement of the uterus with resection of the right ovary. Six hours after the operation the patient suddenly expired with the characteristic symptoms of pulmonary embolism. The abdominal wound was reopened and a small broad ligament clot was found on the right side. No further autopsy was permitted. The notes in this are rather incomplete.

CASE II.—Mrs. J. G., aged 41 years, was operated upon for a four-pound fibroid uterus, on October 6, 1904. The patient was extremely anemic before operation and several weeks were spent in improving the blood condition. She bore the operation well and her condition was absolutely normal until the morning of the fifth day when while eating her breakfast she suddenly became blue, complained of severe pain and expired before the resident physician could reach her room from another part of the hospital.

CASE III.—Mrs. L. W., a German, aged 43 years, had been suffering for three years with irregular and painful menstruation with severe pain in both inguinal regions. She was operated upon for double pyosalpinx, November 2, 1904. Both tubes were firmly adherent and filled with pus. Double salpingo-oophorectomy was performed and the pelvic cavity drained with iodoform gauze through the vagina. The patient was very ill for three days after the operation, but she gradually improved, and was able to sit up in bed. On the thirteenth day, while eating her dinner, she expired with symptoms of pulmonary embolism.

CASE IV.—Miss D., aged 44 years, admitted to Samaritan

Hospital September 21, 1905, and operated on September 30, 1905 for a fibroid uterus the size of a cocoanut. The patient was extremely anemic on admission, and rest in bed and forced feeding were employed for two weeks prior to operation and the vagina was kept tamponed with renewed packings of iodoform gauze to prevent further hemorrhage. The blood count was markedly improved by the time of operation. Supravaginal hysterectomy was performed and the uterus found to contain a large degenerating submucous fibroid. The patient made an uninterrupted recovery until two weeks after the operation when, after sitting up out of bed for a short time, she developed symptoms of embolism and expired in a few minutes in spite of energetic stimulation.

CASE V.—Mrs. M. S., aged 37 years, was operated upon April 12, 1904, for uterine prolapsus of the third degree. The uterus was dilated and curetted, the cervix repaired; anterior colporrhaphy, perineorrhaphy and ventral suspension performed. The patient had an absolutely normal convalescence and sat up on the twenty-first day after operation. On the twenty-second day while sitting in a chair by her bedside she was taken with a fainting attack, and became unconscious for a few moments. She recovered consciousness with an extremely weak pulse and a severe pain beneath the sternum. Her face was cyanotic; respiration between 40 and 50; pulse 168; temperature 95. Atropine, strychnia, digitalin were administered hypodermically; external heat was applied and oxygen given. The patient was in an extremely critical condition for two days, the pulse varying from 130 to 150; but she gradually improved, made a good recovery and left the hospital in good condition thirty-nine days after admission.

The symptoms in all these cases as nearly as could be observed were very similar. The attack was characterized by precordial distress, severe pain and dyspnea associated with quickened pulse. The patient has an extremely anxious expression, gasps for breath with the aid of all the auxiliary respiratory muscles, the face becomes cyanosed, cold, clammy sweat occurs, the mind remains clear as a rule, and death occurs in a few minutes in spite of energetic stimulation. The fifth case reported manifested all these symptoms and yet recovered.

Mahler, aside from the clinical symptoms, lays great stress upon a persistent frequency of the pulse rate which is out of all proportion to the elevation of temperature.

Kelly says "the fact that these cases occur teaches anew the important lesson that the surgeon is never warranted in guaranteeing the recovery of the patient even after a seemingly simple operation. Patients whose vitality is depressed and those who are anemic should be watched with especial solicitude."

When these accidents occur the surgeon feels powerless because there is practically no treatment for the severe cases. It is probably possible by a careful study of the blood before operation and the avoidance of excessive loss of blood during the procedure and the use of saline infusions after the procedure to diminish the number of these cases. In anemic cases a longer rest in the absolutely recumbent position with the avoidance of all exertion or straining for a longer period than is customary is also to be advised. This latter seems to be the lesson which I have learned from these sad experiences.

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