

TRANSACTIONS
OF THE
PHILADELPHIA ACADEMY OF SURGERY

Stated Meeting held October 6, 1919

The President, DR. GEORGE C. ROSS, in the chair

**ADVANCED CARCINOMA OF BREAST; NO RECURRENCE SEVEN
YEARS AFTER OPERATION**

DR. ASTLEY P. C. ASHHURST presented this patient as an encouragement toward doing thorough and wide-spread excisions for carcinoma. If in such a case as the present cure can be obtained by such means, how much more certainly should cure be anticipated if the same type of radical operation were uniformly adopted in early cases? He added that he had had occasion recently to operate on a case of wide-spread local recurrence in a case of carcinoma of the breast, one year after another surgeon had done a very incomplete operation, although the clinical diagnosis had been carcinoma from the first. This fact seemed to indicate that some surgeons were still so skeptical of cure ever being attained that they considered it not worth their while to expend the time and skill necessary for a complete extirpation. In the case of recurrence to which reference had just been made, the surgeon at the first operation not only did not excise the pectoral muscles, but he did not expose the axilla at all, nor did he even remove all the glandular tissue of the breast; yet the clinical diagnosis, confirmed by histological study, had been carcinoma from the first! He desired also to make a plea for habitual röntgenization of carcinoma patients after operation. In the case of the patient now presented, post-operative röntgen therapy was continued a long time.

The patient, a woman, forty-five years of age, was admitted to the Episcopal Hospital, August 3, 1912. There was a typical "rose ulcer" 7.5 by 5 cm. in diameter in the upper outer quadrant of the right breast. This ulcer had commenced six months previously, and for two years before that time the woman had known she had a tumor in her breast. When examined there was a hard tumor, the size of a goose egg, beneath the ulcer. This tumor was freely movable in all directions. There was a palpable and visible mass of lymphatics in the axilla, which also was movable. The ulcer was covered with an adherent gray slough. No lymph-nodes were palpable above the clavicle. There was tenderness over the liver, but no evidence of metastasis to this organ. The left breast was normal.

Operation, under ether anæsthesia, was done August 5, 1912, including

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a clean dissection of the entire axilla, and removal of its contents, both pectoral muscles, and a wide area of superficial and deep fascia (beyond mid-line at sternum, and down almost to umbilicus) in one mass. It was possible to close all the wound except for a space 5 by 2.5 cm. below the clavicle. The time of the operation was three and one-half hours, and at its conclusion the patient received one litre of saline solution intravenously, being almost pulseless. (The excised specimen is illustrated in Plates V and VI of the speaker's text-book of surgery.)

By the second day after operation convalescence was established. Many of the sutures did not hold, some of the skin edges became necrotic, and six weeks after operation there was a clean granulating area the size of two palms. On September 30, this had contracted to an area the size of one palm, and this was covered with Thiersch grafts. Meanwhile röntgen ray treatment was pursued for a number of months.

The patient was kept under observation:

March, 1914: Her health was feeble, and she could not do much work. There was still an unhealed area, 2 cm. in diameter, which scabbed over from time to time. There was no swelling of hand or forearm, and only slight œdema of the upper arm; but the œdema increased if the arm was used much. She could get her hand to her head and back to her buttocks, but both motions were weak, and the latter painful. The extensive cicatrix sometimes caused a sticking pain in her lung, but there was no evidence of pulmonary metastasis.

August, 1915: Condition about the same.

September 24, 1919: Since the last note the patient's general condition has markedly improved. She does her own housework and looks after an epileptic son. The entire right anterior thorax is covered by skin tightly adherent to the ribs, but there is no evidence of recurrence locally or of metastasis. She has good use of her arm, raising her hand easily above her head, and putting it without difficulty to the small of her back. Except for slight weakness she thinks it as useful as her left arm. There is scarcely appreciable swelling of the hand and none of the forearm or arm. During the past year her appendix was removed at the Philadelphia General Hospital.

DR. D. B. PFEIFFER called attention to the picture circulated by Doctor Ashhurst in which the outline of the tumor is very sharply defined from the surrounding fat and breast parenchyma. If this is a fair representation of the growth it would indicate a rather different type of tumor pathologically from the kind that are ordinarily met with. It is well known that tumors which well merit the name of carcinoma still show the most remarkable variations in character, and particularly in the most important characteristics of infiltration and spread. He had seen many cases in which there was a comparatively huge primary mass and but little spread and *per contra* others that produced large and early metastasis from an insignificant appearing primary growth. He recalled one

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case with axillary metastasis so extensive as to defy complete removal, which required the most minute search through the breast before the primary growth could be found. It seemed to him—without wishing to detract from Doctor Ashhurst's excellent result—that the underlying pathology is more influential in the result than the completeness of the operation, for has it not been the lot of all surgeons to operate in earlier and seemingly more favorable cases only to find that they have not been able to get beyond the carcinomatous permeation? Of course, he believed, as does every one, that radical operation for carcinoma of the breast should be as extensive as possible, and this case teaches that we should not lightly consider any case as inoperable. It will be more unfortunate, however, if any should consider that by punctilious completeness of operation the handicap of late surgery could be overcome.

DR. J. STEWART RODMAN recalled two cases in which his father operated. One was a sloughing tumor and the patient when last heard from was well eleven years after operation. The other was one of a growth of each breast. This patient was well eight years after the first operation and seven years after the second. Undoubtedly cures do occur even in these advanced cases if the operation is carefully and thoroughly done.

DR. JOHN B. ROBERTS recalled one case of malignant tumor of the breast which he removed about 1899, in which the woman died about three years ago, making the period of cure somewhere about seventeen years. The tumor was not a sloughing growth, but was quite as big as a woman's fist. He did a thorough operation, removing the glands in the axilla and he thought above the clavicle. He did not remember whether the tumor was examined microscopically, but clinically it had every appearance of being a large malignant growth. The patient was about sixty to sixty-five years old.

DR. J. LEON HERMAN said that a tabulated list of the reported instances of late recurrence of carcinoma after radical amputation of the breast is given by Doctors Deaver, McFarland and himself in their book on "Diseases of the Breast." A period of thirty years was the longest interval of time intervening between the time of operation and the reappearance of the cancer. There were, of course, all varieties of carcinoma included in this series.

The excellent result obtained by Doctor Ashhurst in this case illustrates the possibility of cure in mammary cancer by radical operation, even though the local appearance of the tumor indicates an advanced state of the disease.

It is of interest to recall that Doctor Halsted devised the radical operation and advised its routine employment with the knowledge that Volkmann and others had obtained far better results in advanced cases by removal of the pectoral muscles, together with the breast, than had been obtained in early cases by simple amputation of the diseased breast.

DOCTOR ASHHURST, closing, said that he had no doubt that the malig-

HYSTERECTOMY FOR CHORIO-EPITHELIOMA

nancy of different specimens of cancer varies a great deal. He thought also that diminished lymphatic activity is to be taken into consideration. In patients nearly eighty years old it seems useless to do an extensive operation. If we merely amputate the breast there is not likely to be subsequent trouble. But it ought to be remembered how far the mammary gland extends beyond that which one sees. If one thinks the glandular tissue occupies a very small area, he shall be deceived: it extends nearly up to the clavicle, out into the axilla, and down toward the epigastrium. The entire mammary gland should be removed even in these incomplete operations on *very aged* patients.

HYSTERECTOMY FOR CHORIO-EPITHELIOMA; NO RECURRENCE SIX YEARS AFTER OPERATION

DOCTOR ASHHURST said that the two following cases were presented especially to emphasize the value of certain *measures of routine*:

1. Pathological examination of uterine scrapings in cases of abortion or miscarriage.
2. Removal of the cervix along with the uterus in abdominal hysterectomy. In 3 out of the last 17 hysterectomies he had done for fibroids there had been coincident carcinoma of the cervix.

Chorio-epithelioma, or deciduoma malignum (Sänger, 1888), is an exceedingly malignant tumor growing in the body of the uterus after pregnancy. The pregnancy frequently is terminated before term, and the most favorable cases are those in which the diagnosis is made by the pathologist from examination of retained tissues removed in such cases. Such examination never should be neglected. The tumor probably arises from the chorionic and not from the decidual tissues; it behaves like the most malignant types of sarcoma, giving early venous metastasis, especially to the lungs (78 per cent.) and vagina (54 per cent.), according to Dorland.

Agnes H., forty-two years of age, was admitted to the Episcopal Hospital August 9, 1913, for a recent abortion after a few weeks' pregnancy. The uterus was curetted, and the scrapings sent to the laboratory for examination, as a matter of routine. The pathological report (Dr. C. Y. White) showing a chorio-epithelioma, abdominal panhysterectomy was done August 19, 1913. The appendix vermiformis, and left tube and ovary, the latter being cystic, were removed with the uterus, but the right tube and ovary were left. The uterus was slightly enlarged, and when opened, a papillomatous tumor was found at the fundus. (The specimen is illustrated in Fig. 1031 of the speaker's text-book of surgery.)

The patient has been kept under observation since operation, and is still in excellent health. Examination in August, 1919, six years after operation, disclosed no evidence of recurrence or metastasis. She was forty-eight years of age, and for the last year had complained of symptoms of the menopause.

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Panhysterectomy for Fibroids; Carcinoma of the Cervix Discovered in the Laboratory; No Recurrence Three Years After Operation

Cora L., thirty-six years of age, negress, was admitted to the Episcopal Hospital September 18, 1916, for profuse metrorrhagia. This was checked in the Receiving Ward by twisting on its pedicle a polyp which was protruding from the cervix. The patient's hæmoglobin was only 25 per cent. On September 22, because slight fever persisted, she was etherized, the soft and dilated cervix was caught in volsellum forceps, drawn down to the vulva, and the pedicle of the polyp, about 0.75 cm. in diameter and 6 cm. long, attached just above the cervix, was divided with scissors. The polyp itself was about 6 cm. in diameter. Very moderate bleeding occurred from the attachment of the polyp. The uterus was the seat of numerous fibroids.

October 6, 1916, two weeks after removal of the polyp, the patient's fever having subsided, and her hæmoglobin having risen to 35 per cent., the abdomen was opened, and complete panhysterectomy was done (*i.e.*, the uterus including the cervix and both tubes and ovaries were removed). The uterus was of medium size, containing several subperitoneal fibroids the size of hen's eggs or larger. Recovery was uneventful.

The laboratory report (Dr. C. Y. White) was that the cervix was the seat of *advanced epithelioma*.

The patient has been kept under observation and now, three years after operation, pelvic examination discloses no symptoms of recurrence, nor is there any evidence of metastasis.

GUNSHOT WOUNDS OF THE VASCULAR SYSTEM

DR. ASTLEY P. C. ASHHURST reported the following cases:

CASE I.—*Dry lesion of axillary artery from bullet wound; death ten hours after ligation.*

Tony P., twenty-six years of age, was admitted to the Episcopal Hospital December 31, 1916, immediately after having been shot, while an innocent bystander in a street fight. The wound of entrance was at the posterior edge of the right deltoid, close to its humeral insertion, and there was no wound of exit. X-rays localized the bullet lodged against the second right rib. His radial pulse was equal on both sides, and apart from slight pain and swelling in the axilla, there were no serious symptoms. On the day after admission, however, weakness of the muscles supplied by the median nerve and paralysis of those supplied by the musculospiral nerve were noted. It was determined to explore the axilla to ascertain the nature of the nerve lesions.

Operation, January 5, 1917, by Doctor Ashhurst. Ether anæsthesia.

An incision was made from the middle of the clavicle downward and outward, in the space between the deltoid and pectoralis major, exposing the pectoralis minor. A finger was then passed

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under the latter muscle, preparatory to its division, for exposure of the axillary plexus. As soon as the finger emerged at the lower border of the pectoralis minor a gush of arterial blood burst through at both borders of the muscle. It was evident that the bullet had injured the axillary artery and the primary bleeding had been checked by a clot, or that a slough in the wall of the artery had been separated only when the finger entered the axilla. The profuse hemorrhage was checked temporarily by the operator compressing the axillary artery with his left finger just below the clavicle, and with his right finger below the pectoralis minor. Removal of either finger released a perfect flood of arterial blood. Doctor Spruance, who was assisting in the operation, was then intrusted with digital control of the distal end of the artery, thus releasing the operator's right hand. Attempts were then made to clamp the artery above the lesion, but these proved ineffectual, owing to the depth of the wound and the inability to distinguish the structures. Doctor Spruance then compressed the subclavian against the first rib, controlling hemorrhage from the proximal end of the axillary, while the operator compressed the distal end and tried to clamp it; this also proved ineffectual at first, it being impossible to clamp the artery without pinching one or other of the nerve trunks; but finally the clamp was properly placed and the distal end ceased to bleed. Doctor Spruance then compressed the axillary just below the clavicle, while Doctor Ashhurst ligated (with a double strand of No. 2 chromic catgut) the third portion of the subclavian by the usual incision above the clavicle. This at once stopped the pulse at the wrist. After suturing the cervical incision, the axillary wound was again exposed and found to be dry. The axillary incision was then enlarged, dividing the tendons of the pectoralis major and minor. Removal of the hæmostats still in the axillary wound then was begun; removal of the last hæmostat was again followed by profuse hemorrhage which was not controlled by digital compression of the axillary below the bleeding point. It was now found that this profuse hemorrhage came as recurrent bleeding from the subscapular artery, there being a bullet hole in the axillary just opposite the origin of this artery (Fig. 1). Therefore the axillary artery was tied above and below the hole, and the subscapular artery was tied also. The axillary plexus of nerves was then examined: the median nerve had been bruised by hæmostats; the musculospiral nerve was contused, presumably by the bullet; the ulnar and musculocutaneous nerves were undamaged. The divided muscles were repaired and the wound closed. The patient was in a precarious condition as the result of hemorrhage, and died ten hours after operation, in spite of stimulation. It is possible that blood transfusion might have saved his life, but no donor was available.

CASE II.—*Recent bullet wound of right axillary artery, with diffuse traumatic aneurism; ligation of first portion of subclavian artery and of axillary artery above and below the wound. Recovery.*

Charles W., a private of the 104th Infantry, U. S. A., was hit by a

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machine-gun bullet in the Argonne Forest November 9, 1918, at 4 A.M. He was brought to Evacuation Hospital No. 6 at Souilly, and operated on twenty hours later. Fluoroscopic examination by Captain Angell showed the bullet superficially placed in the right pectoral region. The wound of entrance was over the right shoulder posteriorly. There was an immense pulsating hæmatoma occupying the entire right pectoral region, which was discolored by the extravasated blood. The bullet was palpable just beneath the skin, and the hæmatoma appeared on the point of rupture. There was no pulse at the right wrist.

Under ether anæsthesia, immediate operation was undertaken, with the skillful assistance of Captain Morse and Lieut. H. S. Kerchner. It was determined to do preliminary ligation of the first portion of the subclavian, as the immense size of the hæmatoma rendered the third portion inaccessible through healthy tissues, and then to expose the axillary artery where wounded. Accordingly an incision was made along the inner end of the right clavicle and downward for 7 cm. over the sternum, and the inner end of the clavicle (2.5 cm.) was resected. The pleura was accidentally punctured. The first portion of the subclavian artery was then exposed, and the pneumogastric nerve and its recurrent laryngeal branch were identified. Owing to the large size of the hæmatoma, these structures lay at an abnormal depth. A ligature of No. 2 chromic catgut was passed around the artery distal to the nerve (Fig. 2). On tying this ligature pulsation in the hæmatoma stopped at once, and the mass decreased in size. The operative incision was closed in layers, without drainage. A second incision was now made in the line of the axillary artery from the clavicle to the anterior axillary fold, dividing the pectoralis major and minor muscles. The bullet was removed from beneath the skin, and the clots evacuated. Free arterial bleeding then occurred from the proximal end of the axillary artery just distal to the clavicle, evidently recurrent through the thyroid axis and other branches of the subclavian distal to the ligature. This bleeding was checked by the finger and then by hæmostatic forceps, when it was seen that the bullet had clearly and completely divided the first portion of the axillary artery, without injuring the vein (Fig. 3). Both ends of the artery were ligated with No. 2 chromic gut and the wound was left wide open, and drained by rubber tissue. It was directed that the patient be not evacuated.

The next day the patient's hand was warm, and the circulation appeared to be reëstablished. He could flex his fingers, and the axillary plexus of nerves apparently had escaped injury. He has been very hoarse since the operation, perhaps from operative injury of the recurrent laryngeal nerve. The wounds were dressed: the sternal wound was healthy, but the pectoral wound smelled of gas gangrene, and a smear showed the presence of the *B. aërogenes capsulatus*. It is to be remembered that the tissues in the axilla were widely lacerated by the escaping blood and had been under increasing pressure from the hæmatoma for twenty hours before opera-

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tion, and after operation were still deprived of their normal blood supply. At the time of operation the patient's condition did not warrant an excision of all the muscles which were infiltrated with blood. French anti-gas gangrene serum was administered, and the wound was treated with Dakin's solution according to Carrel's technic.

On the third day the patient was still very hoarse, but the pectoral wound looked better, though the muscles were still very spongy. It was noted that he was unable to extend his fingers or wrist, but it was not determined whether this was due to weakness or to a nerve lesion.

Five days after operation the patient appeared convalescent; though he was still very hoarse, and had a little cough; the wound was doing very well.

Six days after operation he was evacuated in good condition: the sternal wound had remained clean, and the pectoral wound was doing well.

Inquiries from the War Department as to the patient's subsequent history have been unanswered.

CASE III.—Direct arterio-venous fistula of the axillary vessels following wound by shell fragment. Excision of vein, suture of artery. Recovery.

George W., private, 39th Infantry, U. S. A., sustained a penetrating wound by a shell fragment August 1, 1918, in France. The wound of entrance was in the left deltoid region. He was taken to a hospital and put to bed. No operation was done. He did well, presenting no noteworthy symptoms. After a few days he got out of bed, and soon began to work about the ward. One night (about 2 A.M.), eight or ten days after injury, he was awakened by pain in the left subclavicular region and down the left chest. Examination by the ward surgeon revealed a blowing murmur in the left subclavicular region. Previous examinations, he said, had shown a heart murmur, but nothing abnormal in the axillary region.

This patient first came under Doctor Ashhurst's notice seven months after his injury, in the Walter Reed General Hospital, Washington, D. C., where he was in the service of Major E. M. Jones, who asked Doctor Ashhurst to operate. The disability consisted in inability to raise the arm above the head, this motion being only two-thirds of normal. There was a buzzing and whirring on palpation below the left clavicle, but the radial pulse on the two limbs was equal and synchronous, and the blood-pressure was normal on both sides. Skiagraphic examination showed a shell fragment 3 cm. anterior to the vertebral end of the fourth left rib. This fragment, of medium size, was producing no symptoms and its removal was not indicated.

On March 27, 1919, with the skillful assistance of Major Jones and Lieut. J. C. Lawlor, Colonel Ashhurst operated under ether anæsthesia; as the site of the lesion evidently was high in the axilla, it was determined first to control the circulation by clamping the third portion of the subclavian artery, which was done through the

classical incision. Next an incision was made, convex toward the greater tuberosity of the humerus, from the middle of the clavicle to the anterior axillary fold near the chest wall. After ligating the cephalic vein, the tendon of the pectoralis major was divided, and the axillary artery was clamped just proximal to the origin of the subscapular artery. The tendon of the pectoralis minor was then cut, and the clavicular origin of the pectoralis major divided for about 3 cm. The lesion could then be identified, after dissection of scar tissue, as a direct arterio-venous fistula of the axillary vessels, involving the first portion of the axillary artery. The outside diameter of the fistula was about 1 cm. (Fig. 4). Artery clamps were now applied just proximal and just distal to the lesion, and the clamps which for about one hour had been on the subclavian and on the third portion of the axillary were removed. The axillary vein was carefully cleared, ligated above and below the lesion, cut across between the respective ligatures and the lesion, and dissected free as a pouch attached to the artery (Fig. 4). A grooved director passed across the venous pouch through the fistula into the lumen of the artery, demonstrated completely the nature of the lesion. Three interrupted sutures of fine linen were now passed through the arterial wall at the site of the fistulous opening, and were tied after cutting away the venous pouch from the artery. Then a continuous through-and-through linen suture was applied to the artery, and the arterial clamps were removed. There was absolutely no leakage from the suture line as the artery filled out and pulsated, but a branch of the acromio-thoracic artery below the lesion spurting actively and was tied. The pectoralis major (not the minor) and the skin were closed separately with chromic gut, a small tube being left at the lower angle of the large wound. The neck wound was closed without drainage. The duration of the operation was three hours.

Recovery was uneventful, no abnormal symptoms of any kind being observed, and function of the arm being gradually restored. The patient returned to his home and has recently been carefully examined by Dr. Lucian H. Landry of New Orleans, one of Doctor Matas's associates, who courteously wrote to me September 15, 1919, that after a careful examination he considered the result a complete cure.

CASE IV.—*Circumscribed traumatic aneurism of sural artery following wound by shell fragment; obliterative endo-aneurismorrhaphy; recovery.*

Richard B., first lieutenant, twenty-four years of age, U. S. A., suffered a perforating wound of the right popliteal space by a minute shell fragment September 26, 1918. The punctured wounds of entry and exit healed without any operative treatment, but after some weeks, while walking, he felt a sudden sharp pain in the bend of the knee and a pulsating tumor appeared. He came under Doctor Ashhurst's notice, more than five months later, in March, 1919, at the Walter Reed General Hospital. Low in the right popliteal

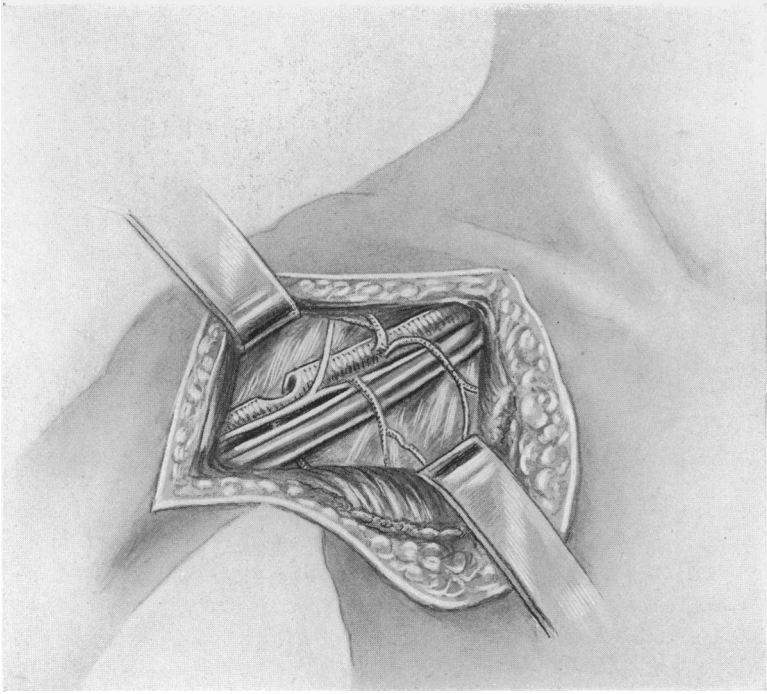


FIG. 1.

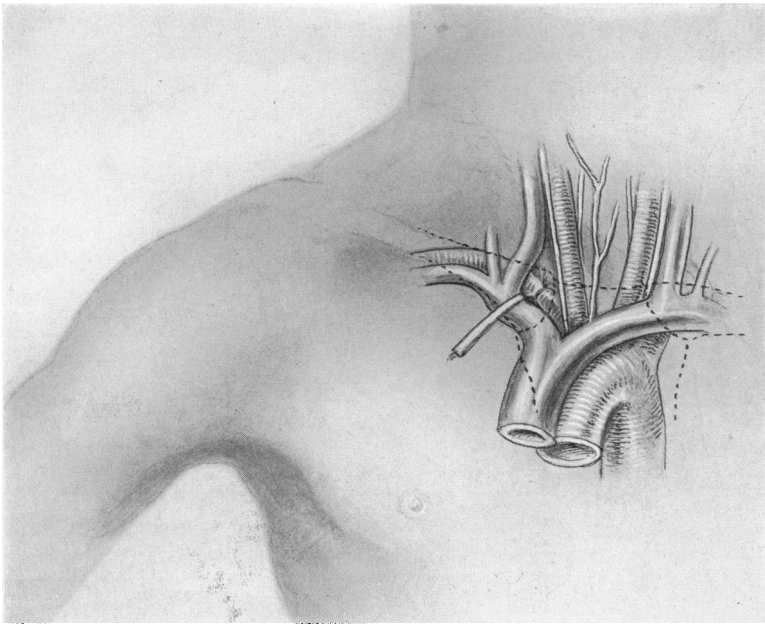


FIG. 2.

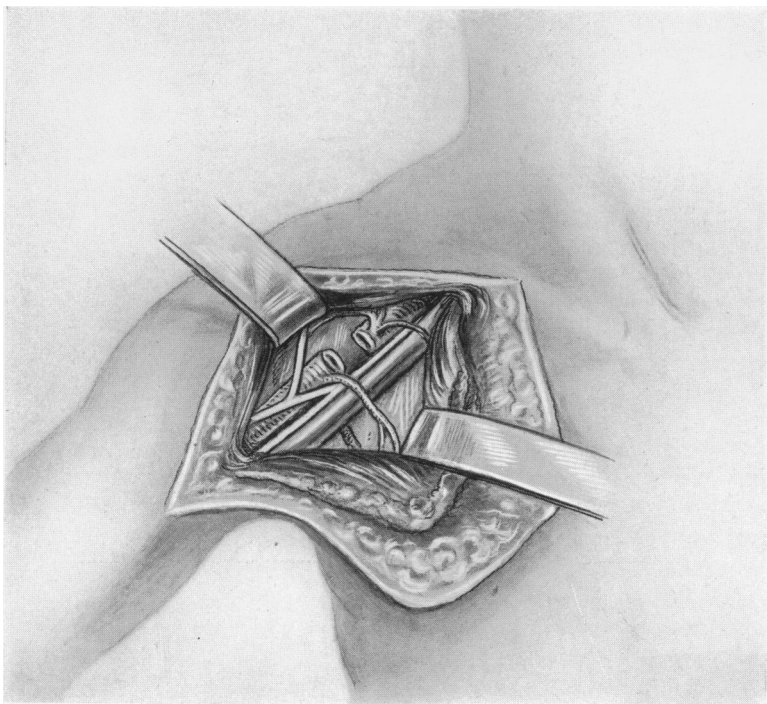


FIG. 3.

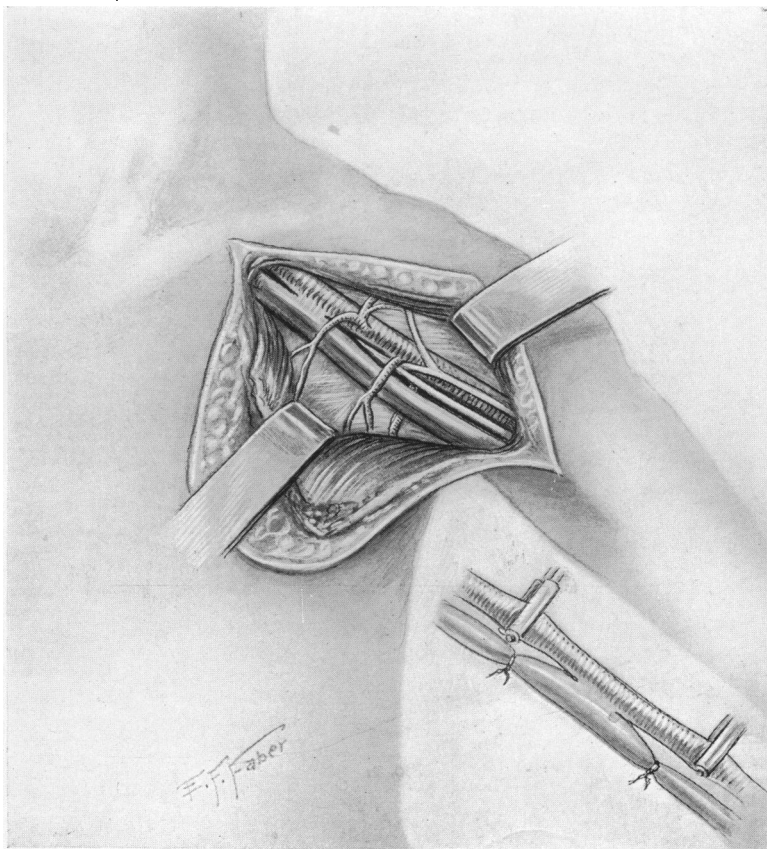


FIG. 4.

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space was a tense, hard, not tender swelling, 7 by 5 cm., its long axis corresponding to that of the limb. This swelling exhibited distinct expansile pulsation and bruit. There was no appreciable difference in the pulse below the knee in either leg.

Operation was undertaken March 6, 1919. Under Esmarch anæsthesia a longitudinal incision, 16 cm. in length, was made over the popliteal space, and the deep fascia and heads of the gastrocnemius muscle, as well as the internal popliteal (posterior tibial) nerve, were dissected off the sac, all of these structures being densely adherent. The sac was opened on its median side, and some well organized clots were evacuated. The sac was found to be of the size of a large hen's egg: its walls were formed of organized granulation tissue, except for an area about 3 by 2 cm. on the median and anterior surfaces, which was white and glistening, representing the original intima of the wounded artery, now spread out to form part of the sac wall. This patch of typical intima contained two minute orifices—one proximal, the other distal—about 2.75 cm. apart, evidently representing the afferent and efferent channels for the blood. The proximal opening bled a little. There were no other openings in the sac. Most of the posterior wall of the sac was dissected free and excised; the arterial orifices were closed by linen sutures; and the remainder of the sac, which was too adherent to be excised easily, was obliterated by No. 000 chromic gut sutures. The fascia and skin were closed separately. The time of the operation was about one hour.

Recovery was uneventful, all the symptoms being relieved.

PERFORATING GUNSHOT WOUND OF THE ABDOMEN WITH INVOLVEMENT OF LIVER, KIDNEY AND SECONDARY INFECTION OF PLEURA

DR. JOHN H. JOPSON reported the following case: B. R., private, Company L, 61st Infantry, was admitted to Evacuation Hospital No. 1, A. E. F., on September 6, 1918, at 3.30 P.M., with the diagnosis of gunshot wound, perforating, of the right abdomen. He had been wounded at 5 A.M. of the same day. On admission he was suffering from the effects of hemorrhage and was in poor condition. He presented on examination a large wound, probably of entrance, below the lower border of the thorax, about the nipple line on the right side, and a wound somewhat larger at a corresponding point posteriorly. Preparations were made for immediate operation. To render this possible blood transfusion was necessary, and was started at the commencement of the operation. The anterior wound first received attention, and was débrided, and the abdomen opened by a free incision. There was an extensive laceration of the right lobe of the liver, which was bleeding freely, and was the source of most of the abdominal hemorrhage. This was packed. The tract of the éclat was followed backward through the posterior peritoneum and the retroperitoneal space was opened widely. The right kidney was pal-

pated, and found to be badly lacerated. It was delivered through the opening into the peritoneal cavity, the pedicle ligated, and thus removed transperitoneally. The patient was then turned on his face, after partially closing the abdominal wound and packing the remainder down to and through the posterior peritoneum. The wound in the back, from which much of the blood which we had been pouring into the vein was meanwhile pouring out, was then widely débrided, exposing in the process a comminuted fracture of the eleventh rib, fragments of which were removed, and a large wound thus established traversing the entire upper abdomen. The posterior wound was also packed, the two packs, anterior and posterior, meeting, and the operation concluded. Contrary to expectations, the following day found the patient in very fair condition, and with undiminished pluck and cheerfulness. There were no evidences of peritoneal infection, and he was suffering from the effects of hemorrhage only. In spite of this, however, his after-course was most stormy, and not lacking in complications. It was not deemed wise to remove the packs after twenty-four hours, and begin Carreling as was our custom in ordinary gunshot wounds not permitting of primary suture. We have not been in the habit of using this method of treatment in wounds with a wide communication with the abdominal cavity, and it was decided to leave the packs in place for a longer time. Some of the gauze was removed on the third and the remainder on the fifth day, the latter date gas being administered. The anterior wound was found infected, and all sutures were removed. The general condition was good; there was a superficial infection of the posterior wound, as well as the anterior, streptococcal in nature, and two days later the wounds were Carreled. Under this treatment they cleaned up rapidly, and the wound was steadily reduced in size by granulation. The temperature, however, gradually rose after a few days, and on the 5th of October he had a chill and a fever of 102°. He was still decidedly anæmic, and an annoying symptom appeared in the form of vomiting at intervals of once or twice a day, of a considerable amount of bile-stained fluid. At the time there appeared evidences of effusion in the lower part of the right chest, which aroused suspicion of an ascending subphrenic infection, for which there was ample explanation. The first aspiration of the pleural cavity was negative, but the second, on October 9, was positive, and 600 c.c. of light brown but sterile fluid were withdrawn. On the same day an exploration of the subphrenic space was made. A vertical incision across the twelfth rib exposed the same, and it was resected for three inches. The edge of the diaphragm was divided, underlying adhesions separated, and the subphrenic space exposed without opening the pleura. The wound of the liver, still gaping and covered with lymph and granulations, was uncovered, and the right upper abdomen, above and below the liver and over as far as the stomach, was examined, but with negative results. After this operation he was somewhat depressed, and my assistants, who

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were all deeply interested in the soldier, and pessimistic and hopeful by turns, were correspondingly lugubrious. Carrel again after two days. By the fifteenth the pleural fluid had reaccumulated and its presence was confirmed by examination of Lt. Col. George W. Norris. Aspiration at this time yielded a fluid, which while still amber colored, showed the presence of streptococci, and on the following day the patient was again sent to the operating pavilion, and the chest drained by resection of the eighth rib in the mid-axillary line, and the insertion of drainage tubes. Following this procedure there was a slow but steady improvement marked by subsidence of temperature, cessation after a time of the vomiting, which we had been inclined at one time to view as a possible result of duodenal obstruction by some collection, and a slow improvement in the general condition. About this time, however, the patient developed a most harassing and troublesome cough which resisted all medication, but which, like the vomiting, finally subsided. A small fecal fistula had appeared, possibly as a result of the second operation, but by the first week in November this, too, had closed. Slight elevation of the temperature persisted from time to time until December. Finally, on January 13, as the thoracic sinus still persisted, and improvement seemed slow in the local findings, as far as the chest was concerned, although the abdominal wounds were by this time long cicatrized, the seventh rib was resected under gas-ether anæsthesia, and eight days later he was evacuated.

After leaving the evacuation hospital, he passed through two base hospitals, was sent back to the United States in March, and after another transfer was sent to the Walter Reed Hospital, from which he was discharged on October 4, 1919. The drainage tube was removed and replaced several times during this period of his hospitalization, but when examined on October 6 the wound was solidly healed, and had been so since May.

At present there is slight discomfort in the right side on deep breathing. Hæmoptysis, slight in amount, has been noted after unusual exertion. There is some limitation of expansion on the right side, no râles, a slight lateral curvature, a much depressed scar over the site of resection of the seventh rib, the other scars, anterior and posterior, solid and showing no signs of hernia. The man weighs nine pounds more than on entering the service, and looks to be in splendid health.

That this man survived was mainly due to the fact that in him we were dealing with a type of patient that unfortunately, while the rule in the army, is not the consistent type in civil life, as one quickly finds when one resumes wonted work. The healthy young male human animal, with unimpaired organs, and a marvellous reacting power, is possibly the nearest approach to the laboratory animal in responding to all of the measures for the treatment, operative or otherwise, for traumatic conditions and their concomitant complications of shock, hemorrhage and infection. We are enabled to follow the problem to its solution in a far

larger percentage of cases than we can in an equal number of adults representing a cross-section of the community in general. In their ability to react completely and rapidly from an apparently hopeless state due to pure shock or shock and hemorrhage combined, they resemble a healthy child, while able, of course, to take an amount of physical punishment far in excess of the latter. With them it is much less frequently a case of the operation being a success but the patient dying, their undamaged viscera and whatever portion of the nervous mechanism or undiscovered physiologic reservoir which is called into action in the production and the reaction from shock *per se*, standing them in good stead at every step in the pathway from the time the injury is inflicted until convalescence is complete.

STAB WOUND OF DIAPHRAGM AND STOMACH

DR. JAMES H. BALDWIN reported this case to emphasize a fact well known to all surgeons, but not so well known to those who do not do surgery—that the earlier an abdominal perforation is treated, the more likelihood that the patient will recover and that most patients operated on in the first few hours after a perforation do recover.

E. B., aged twenty years, was admitted to the Methodist Hospital at midnight, August 26, 1919, with a history of having received a self-inflicted stab wound of the left chest at the eighth costal cartilage region, about one-half hour previously. The patient, on admission, was intoxicated, vomited freely, with a report of "no blood in the vomitus." The temperature was 98°; pulse, 80; respiration, 20. The wound, from which very little blood came and which did not look dangerous, was dressed by the interne, Doctor Harding, and orders given to watch the patient, making frequent chart records. In a short time the pulse rate began to increase, upper abdominal rigidity with marked pain and tenderness developed. I was sent for and operated at once, four or five hours after the receipt of the wound. A left rectus incision was made from the costal margin downward. On opening the peritoneal cavity, there was a gush of air and blood and the whole abdominal cavity seemed filled with bright red blood. This obscured the field, but with the use of large wet packs, the field could be cleared sufficiently to see a wound about one inch long in the greater curvature of the stomach, a few inches from the cardiac end. This was easily closed and the hemorrhage controlled. No other wound was found in the stomach or intestines. There was an opening through the diaphragm about one inch in length. By retracting the abdominal wall, this could be sutured and was closed with catgut. The abdominal wall incision was then closed as usual with two cigarette drains at the upper angle. The chest wound was then examined and it was found that the knife had severed the cartilage of the eighth rib.

The post-operative recovery was uneventful. Hot water was given in small amounts about twelve hours after the operation. The tempera-

STAB WOUND OF DIAPHRAGM AND STOMACH

ture and pulse were slightly elevated for a day or two, but soon dropped to normal, and the patient was discharged on the sixteenth day fully recovered.

DR. JOHN H. JOPSON said that transthoracic penetration of the abdomen is a frequent injury in war surgery. Most of the cases are due to high explosives. He recalled four cases on which he operated, in which the missile or weapon went through the pleura and diaphragm, and in which he operated through the same route. In three of the cases the wounds were produced by shell fragments; in the fourth the injury was a bayonet wound, and in this case there were some points of similarity with the one reported by Doctor Baldwin. The soldier was going up to the trenches at night with a small group of men in a new area. They were mistaken in the darkness for Germans by another party of Americans, and in the mêlée this soldier received two penetrating bayonet wounds in the right chest, one in the second interspace, nipple line, and the other in the eleventh interspace, behind the post-axillary line. He was brought into the hospital in a few hours later in good condition. The upper wound in the front of the chest was first sutured. The lower and posterior wound was then explored. The chest was widely opened in the eleventh interspace, débriding the wound in this procedure, and a wound of the diaphragm discovered one and a half inches from its costal attachment. This was easily reached and sutured. The lung was collapsed, but not bleeding. Air-tight closure of wound was made. The patient was then turned on his back, and the abdomen opened through the right rectus muscle. Little blood was found in the abdomen; there was no injury of the hollow viscera, but another wound of the diaphragm was discovered near the mid-line and behind the dome of the liver, and so far back as to be inaccessible to suture through the abdominal wound. We therefore closed this wound, and reopened the wound in the thorax, resecting the eleventh rib to give a better exposure. The bayonet had gone through the diaphragm, probably wounding the liver slightly on the retroperitoneal surface, and re-entered the pleural cavity near the mid-line, passing along the arc of the diaphragmatic curve. By pushing down the diaphragm and liver, after excision of the rib, we were enabled, with some difficulty, to suture the oval opening in the diaphragm and without the aid of negative pressure. The patient breathed well in the prone position, except when the downward pressure was made as described. Air-tight closure of the pleura for a second time. The man developed a streptococcic infection of the pleura, which demanded re-opening of the chest on the sixth day, and the insertion of Carrel tubes. Chest irrigation was not well borne, and simple drainage was substituted for it. The patient reacted well to this plan of treatment, and was evacuated in good condition five weeks after admission, with a sinus remaining. Such experiences were rare, and we seldom saw bayonet wounds of any kind, and these usually accidental. The advantages of the transthoracic route for certain lesions in the subphrenic space is well recognized.

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Two cases of shrapnel wounds of the liver with lodgment of the foreign body in that organ were treated in this way. In another case the wound in the liver was exposed transpleurally and packed; no foreign body was found, although the abdomen was opened again from in front, and explored. All of these cases recovered.

DR. MORRIS BOOTH MILLER said that in the spring of 1917 he had a case similar to Doctor Baldwin's, except that the stab wound was farther to the left and hence an interspace higher up. There was a transpleural wound of the abdomen. He opened the pleura and sutured the diaphragm from above. The wound was made by a stiletto in the hand of an Italian who had evidently meant to make a thorough job by turning his hand as he struck. This gave a substantial slash of the diaphragm. After suturing the diaphragm he opened the abdomen but found no visceral perforation; one or two little cuts had been made in the omentum. He was not so fortunate as Doctor Baldwin, because his man developed a virulent infection of the colon bacillus type and in spite of the fact that early drainage of the pleura was instituted the patient succumbed to the infection.