

MILITARY, RAILWAY AND EMERGENCY SURGERY

GUNSHOT WOUNDS OF THE CHEST OBSERVED IN THE LATE TURKO-BALKAN WAR AND IN THE PRESENT EUROPEAN WAR*

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It is a fact that the resistance of the tissues, together with the sectional area and the high velocity of the projectile, are the determining factors in the destructive extent of such wounds. The humane features observed in a large percentage of gunshot wounds of the chest received at the base hospitals are due to the fact that the sectional area of the reduced calibre bullet is so small and that the lung tissues offer no resistance. But this does not take into account the very large number of destructive chest wounds from ricocheting bullets and shell fragments which cause death immediately or a few hours after injury.

As the distance between the opposing armies in the present war is much shorter than was the case in the Turko-Balkan War, firing is carried on in zones in which bullets have an excessive power; and I am sure statistics will show that the destructive effects of chest wounds are much greater in the present war than in the former.

In the Turko-Balkan War it was not possible to have an interpreter always at hand, and often our histories were indeed necessarily meager. In the present war, however, most of the soldiers were English. Out of 15,000 cases admitted to the hospital within nine months, 697 were wounded. Out of this 697 total wounded, 28 had gunshot wounds of the chest. It was my good fortune to have Sir William Osler examine many of these cases with me on his visits to the hospital.

Gunshot wounds of the chest may be divided into two groups: (1) non-pene-

trating and (2) penetrating. The former group includes contusions and lacerating skin wounds without involvement of the pleural cavity.

The symptoms of penetrating gunshot wounds of the chest are so extremely variable that it is frequent for a soldier not to realize that he is shot for some moments after injury. Again, he may immediately be overcome with profound shock. A number of soldiers told me that they had no idea that they had been shot until some blood came up into their mouths or until they began to cough and expectorated some blood. The pain that is usually caused by a bullet's penetrating the chest is often described as being not unlike the quick stroke of a whip. A number of soldiers ran for some distance after they had been shot and then faintness overcame them. Some vomited immediately and then fainted.

The clinical picture may be very alarming at first, as characterized by a pale and anxious face, cyanotic lips, labored respiration interrupted by frequent coughing, rapid and small pulse and a cold perspiration.

Complications. — Penetrating wounds of the thorax may be followed by hemoptysis, hemothorax, pneumothorax, emphysema, and some days later by pneumonia, bronchitis, pleurisy, abscess, gangrene or hernia of the lung.

Hemoptysis is common, occurring usually in about 60 to 75 %. In our series, it occurred in only about 55 %. The amount of blood coughed up was variable, depending upon the size of the injured vessel. In some, hemoptysis was immediate, while in others it did not begin until the next day, and even in some as late as the third day. The duration was variable, though usually from three to five days—in one case a month.

Hemothorax is a common complication and can be a most serious one when it is copious and persistent. It occurred in seven of our series. There is, doubtless, at least a slight hemorrhage in every

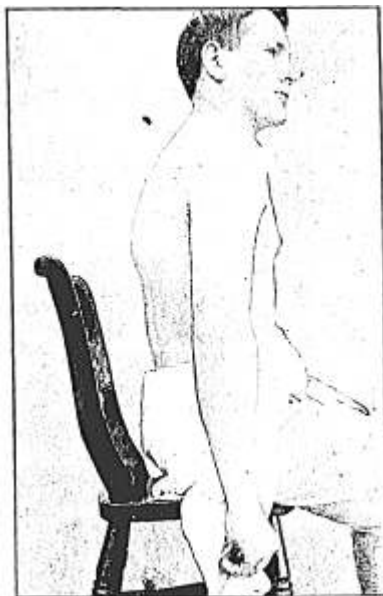
*Read before Southern Medical Association, Tenth Annual Meeting, Atlanta, Ga., Nov. 13-16, 1916.

penetrating wound of the chest, often with no discomfort and a speedy convalescence. With fracture of the rib, hemothorax is present in nearly every instance. In fact, La Garde states that large effusions of blood generally arise from wounds of the chest wall rather than of the lung tissue. There were rib fractures in four of our series. Fever developed in about 25 % of the cases, probably due to absorption of blood. It ran from 99.5 to

slightly decreased, tactile fremitus usually present, the percussion note higher pitched, grading into flatness at the base, breath sounds faint and tubular. The chance of infection has to be considered in every case of hemothorax. The wounded men should, therefore, be transported as soon as possible after the danger of hemorrhage has passed to a station where the infection can be properly and adequately dealt with. But it is highly important



Gunshot wound of the chest. Wound of entrance in side and exit in front.



Gunshot wound of the chest. Entrance in front, exit behind.

102 from several days to three weeks. Dyspnea is one of the early distressing signs and persists as long as there is a large effusion. Fracture of the rib naturally aggravates this condition. When the effusion is not extensive, it disappears in about three days. In only two of the cases was thoracentesis indicated. In one, we aspirated 1,000 c. c. and in another 500 c. c. at one time and 900 c. c. at another. It was interesting to note the uniform character of the physical signs. On the affected side, the expansion was

that this transportation should be as short as possible.

Pleurisy.—In addition to hemothorax, a serous pleuritis often develops. A few days after the injury, the dullness is no longer caused by the hemothorax alone, but by the serous exudate. This secondary pleurisy is the most frequent cause of cases of long-continued fever, which, however, subsides as the exudate is absorbed.

Septic Hemothorax.—On account of the frequent primary infection in this war,

every case of hemothorax with fever must be suspected of sepsis. Primary infection occurs in about 25 % of the effusions and is fatal in about one-third of the cases. Infection should be suspected in all cases not progressing favorably after the fourth day. It can not be diagnosed with certainty on the clinical features alone, but a sample of the fluid should be withdrawn and examined bacteriologically. Bradford and Elliot have enumerated the following points as indicating this condition:



Gunshot wound of the chest showing wound of entrance in front and wound of exit behind.

1. Progressive fever or sustained high fever or oscillating fever, showing no uniformity in the temperature curve.

2. Rapid pulse of 100 to 120 or higher. It should be remembered, however, that even with a severe infection, the pulse rate may be only 80 or 90.

3. Dyspnea out of proportion to the physical signs and increasing instead of decreasing.

4. A furred tongue.

5. Sleeplessness.

6. The appearance of tenderness.

The severest infection which we had was in a shrapnel wound case. The wound of entrance was one inch above the left nipple, with its course downward, making its exit posteriorly in the middle of the left dorsal region at the level of the tenth rib, which was fractured. The patient was admitted three days after injury with signs of an acute pleurisy. He ran a fever of 103°, had hemoptysis for ten days, and showed signs of fluid



Gunshot wound of chest. Entrance to left. Exit to right.

in the left chest. The left tenth rib was resected and about 300 c. c. of sero-sanguinous, purulent fluid evacuated and a rubber tube inserted. He soon gave evidence of an esophageal fistula, as particles of food were coughed out through the wound of exit. He ran a septic temperature and looked to be in a desperate condition, but gradually cleared up. This is the note that Dr. Osler dictated on his discharge, six months later: "The injection of bismuth shows no evidence of esophageal obstruction. The expansion of the left chest conspicuously less than the

right, and measures four and one-half inches less. The bony prominence of scapula is well marked over whole left back. There is a widespread area of cardiac impulse in the nipple line. Vocal fremitus is well marked over whole back. On percussion in front, there is flatness from second left rib down and considerable flatness at left base posteriorly. On auscultation, breath sounds much suppressed over left lung and over left base; behind, only a faint respiratory murmur is audible. The wounds have healed, patient has gained fifteen pounds and feels well."

Retained Foreign Bodies.—We had only one case of retained foreign body. The wound of entrance was over the third left rib, two and one-half inches above and to the left of the nipple. As soon as he was shot he vomited and then fainted. He had hemoptysis for two days and ran an afebrile course. This is the note made by Dr. Osler on fluoroscopic examination: "The retained foreign body is nearer the anterior than the posterior chest wall. It moves with the lung on respiration: on expiration going behind the heart shadow, and on inspiration moving about one and one-half inches upward and toward the left axilla."

Prognosis.—The prognosis of gunshot wounds of the lungs is comparatively good so far as immediate recovery is concerned, but there is no doubt that they leave the lung with a decreased functional capacity that tends to favor the development of tuberculosis later. A latent process, which perhaps the patient never knew of, may be awakened into activity by trauma. In order to prevent it, patients after gunshot wounds of the lungs should be given a period of heliotherapy.

Hemorrhage and sepsis are much more serious matters in the prognosis of chest wounds in this war than in any wars preceding it.

Injuries of the left lung are more serious than those of the right; perhaps because of pressure on the heart, or on account of pressure or traction on the large vessels.

Mortality.—It is interesting to compare the mortality in gunshot wounds of the chest in former and in more recent wars:

Crimean War (French).....91.5 %

Crimean War (English).....70.0 %
Civil War (United States).....65.5 %

With the introduction of the modern rifle, firing a steel-jacketed bullet, this high mortality began to lessen, as is shown in later wars, namely:

Spanish-American War27.5 %
Anglo-Boer War14.0 %
Russo-Japanese War3.6 %

In the present European War, a large mortality is expected, since the shell and sharpnel wounds are more frequent and the unstable Spitz bullet is in use. The causes of death in the infectious cases are empyema and pneumonia; and in the non-infectious cases, hemoptysis and pneumothorax. Up 'till the third day, hemorrhage is the principal cause of death, and after this time, sepsis.

Treatment.—(1) The first essential is rest, as quickly and as completely as possible. The patient should be put to bed in a position to favor expectoration. (2) Morphine should be administered at once and afterward with a free hand. The importance of this was impressed upon me five years ago in a gunshot wound of the chest with course downward, penetrating the diaphragm and probably the transverse colon, which was under my charge in Crile's clinic in Cleveland. The patient was admitted in apparently a moribund condition, with respirations 40. On Dr. Crile's suggestion to break up all association in this man and to put him completely at rest, I had this patient given a one-sixth to one-eighth grain of morphine hypodermically every hour for 48 consecutive hours, missing only three times in this period. Under morphine, the respirations were held at from 12 to 14, peristalsis ceased, and the patient made a complete recovery. (3) The affected side should be immobilized, preferably with adhesive straps.

Great care should be exercised in the transportation of these cases.

The general treatment of hemothorax should be expectant; puncture should be done only when the volume of the effusion threatens serious complications or when it shows signs of becoming purulent. For the first week, it is dangerous to puncture for fear of causing renewed hemorrhage; but after this time puncture may be done, and if there is marked dyspnea it should be done without fear, for the fluid at

this time is generally found to be more serous than sanguinous. Great caution should be observed in the amount removed. Some hesitate to remove more than 100 c. c. at first unless there are grave pressure symptoms. Afterward, as much as a liter or a liter and a half can be removed safely.

In the further course of these stubborn exudates, it is important that they should be punctured frequently, for if the lung is prevented from expanding for a long time, there is danger of chronic pneumonia.

A closed pneumothorax should be left alone or the air removed by suction; an open pneumothorax should be closed if possible. In the early stages of an infected pneumothorax, frequent puncture is preferable to operation because of the danger of hemorrhage and collapse following operation.

Septic Hemothorax.—Here, delay in diagnosis may prove disastrous. The patient's strength is reduced, more or less permanent injury to the chest from thickened, inflamed pleura is produced, and fatal septicemia may intervene. While infected fluid may be removed by aspiration, the entire removal of clot and pus is only effectually gained by resecting a rib or two and introducing thorough drainage. Therefore, a fully developed case of pyothorax always indicates a thoracotomy. Sauerbruch, however, claims that puncture is to be preferred to rib resection, even in most cases of hemothorax developing an empyema, operation being indicated only in a putrid empyema—the beginning of a gangrenous process.

In draining such cases, Schmerz in Von Hacker's clinic in Austria, where I worked a year, has developed a special apparatus which consists of a conical perforated rubber stopper 4 cm. wide at one end and 3 cm. at the other, and 4 cm. in length. Through the opening in the center passes a glass drainage tube, to one end of which is attached a rubber tube leading to a vacuum bottle. A plug of tissue, somewhat smaller than the stopper to be inserted, is cut out down to the rib. The rib is now resected and the pleura opened by a Paquelin cautery and the stopper immediately inserted before the pus has time to overflow the incised area. By

means of specially prepared straps, the stopper and tube are held firmly in place. This method has the following advantages: (1) All pus passes through the tube, therefore (2) the surrounding tissue is not infected; (3) as the small vacuum bottle is easily fastened to the chest, the patient is not confined to bed, but sits and walks around in the fresh air and sunshine all day; (4) the duration of drainage is much shortened. Of ten cases which had been handled by this method while I was there, in eight the discharge ceased on the eighth or ninth day—certainly a very rapid healing. In two very serious cases, the discharge lasted in one 18 days, and in the other four weeks.

In shell and shrapnel injuries, conservatism often proves inadequate and operative measures must be substituted.

For the convalescent patients, respiratory gymnastics should not be overlooked.

Heart.—Gunshot wounds of the heart usually end fatally within a few moments after injury. However, there are not infrequently cases reported of gunshot wounds of the heart and pericardium with recovery, and one marvels at the escape. These injuries or apparent injuries from shots traversing the cardiac area have been the source of comment by nearly all observers in recent wars. We had only one case—a man wounded at Neuve Chapelle. The bullet entered the sternum half an inch from the junction of the third right costal cartilage and made its exit through the lower end of the scapula. Judging from its course, it must have traversed the right auricle. The man had hemoptysis and an irritating cough for some days which gradually disappeared.

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THE DIAGNOSIS OF TRAUMATIC NEUROSIS*

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A specialist does not need to apologize for presenting a psychological subject to you surgeons. This neurosis has been the bugbear of medical men for over half a century now, and it promises to continue to be the bugbear of medical men for a long time to come, until, eventually, the courts and the juries can be educated to the medical man's point of view of the psychological origin of the conditions.

You remember how the work of Erichsen first laid the foundation for the organic theory for the traumatic neurosis, and with it his idea of spinal concussion which has contaminated our literature and courts, and which has made this subject the big legal element it is today. And then, later, the work of Charcot, who considered these terrible functional disturbances of the nervous system. Later came this psychological school wherein neuroses were looked upon as purely mental. This is the modern view.

In the traumatic neurosis we are dealing not with an organic condition, but rather with a state of mind. As for the condition itself, we no longer attempt to differentiate between a traumatic hysteria and a traumatic neurasthenia. In reality the trauma has but little to do with the causation of the condition. Whether or not an individual receiving an injury, often a very slight one, develops a traumatic neurosis or nothing at all, depends not in the least upon the nature or severity of the injury, but rather upon the personality of the one injured. Thus

we make no attempt to differentiate between these two conditions and lump them all together under the "traumatic neurosis."

It is necessary for one to understand the nature of the neuroses before one can hope to go on to diagnosis.

In the first place, in the business of being sick there are three separate and distinct things any one or more of which may exist independently of the others. The first is being sick; the second feeling sick, and the third acting sick. These things do not always exist together, and there our difficulty of diagnosis comes in. For instance, a man with a lobar pneumonia is sick—he feels sick, and he acts sick. The neurotic is not organically ill, but he feels sick, and often much more so than one with an organic lesion. The malingerer, on the other hand, is one who is not sick, who does not feel sick, but who acts sick. We can see the other side of the picture in many of our walking typhoid cases, and in other severe diseases in which the individual refuses to go to bed. Here we have a man who is sick, and feels more or less sick, but he does not act sick. Now, the mistake is made in assuming that one can state that any man is sick simply because he feels sick and he acts sick.

That is the reason for our psycho-therapeutical cures, for those of Christian Science and other religious cults. They handle individuals who are not sick, but who feel sick and when, through a psychological process they cease to feel sick, they are cured.

The diagnosis, then, of this condition depends upon the understanding of the symptoms and the physical signs that the patient presents. The symptoms we include under the heading of feeling sick, and physical signs come under the heading of acting sick; and what I mean by being sick is pathology.

In the central nervous system the feeling and acting sick of organic conditions are absolutely consistent with what we know of the anatomy, physiology and pathology of nerve tissue. The symptoms and clinical signs of neuroses are not consistent with our knowledge of physiology and the anatomy of the nervous system unless the patient has a knowledge of these subjects. Every man builds his

*Read in Section on Railway Surgery, Auxiliary to Southern Medical Association, Atlanta, Ga., Nov. 13, 1916.