

LESSON 4: BODIES BROKEN BY BULLETS

INTENDED AUDIENCE

High-school students; first- or second-year undergraduates in history, social studies, or science

LEARNING OBJECTIVES

- *Describe how Civil War surgeons treated gunshot wounds.*
- *Identify at least three complications that developed from gunshot wounds.*
- *Assess how Civil War surgeons viewed neurological problems associated with gunshot wounds.*
- *Evaluate the long-term emotional and physical impact of these battlefield injuries on Civil War soldiers.*

TIME REQUIRED FOR LESSON

The case study will occupy an hour. The preparatory exercise can be done as homework but may require class discussion in addition to the hour devoted to the case study. The debriefing question is intended as a supplementary exercise to provide broader context to the classroom discussion.

KEY TERMS/WORDS

conoidal ball, minnie (Minié) ball, amputation, wound, injury, surgery

MATERIALS REQUIRED

Readings that accompany this lesson.

BACKGROUND

Gunshot wounds produced ghastly injuries during the Civil War, largely because the bullet—called a minnie (or Minié) ball although it was a conical shaped missile—that was made of soft lead flattened out upon impact, shattering bone and ripping through tissue. The minnie ball made an entrance wound the size of a thumb; it made an exit wound the size of a fist. Rarely did a bullet pass through a soldier leaving a “clean wound.” Records only exist for Union armies and at least 175,000 soldiers were treated for gunshot wounds, but this figure does not account for the thousands whose minor wounds were not reported. Assessments of where men were hit have also been calculated. Thirty-one percent of all battlefield injuries were to the arms and hands—or the upper extremities—while 23% of the wounds were to the torso and trunk. Fifteen percent were struck in the head, face, and neck. Bayonet and saber wounds—despite Hollywood’s portrait of Civil War combat—almost never occurred as soldiers rarely got close enough to each other to wield such deadly implements.

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Civil War soldiers were also subjected to artillery fire, and the shells that rained down from the sky produced metal fragments and shot. These wounds were particularly gruesome. Removing particles of clothing, dirt, and bone fragments was critical to treatment. Surgeons were very concerned about cleaning the wound and when possible they would swab the area with an antiseptic like bromine.

The huge numbers of soldiers with gunshot wounds who appeared at battlefield aid stations led doctors to create triage, or a system of assigning priorities for treatment from most to least severe wounds. Antiseptic practices and germ theory were still a few years in the future, so bullet wounds of the chest and abdomen—which damaged internal organs—could not be treated because of the almost certain onset of lethal infection. Soldiers with such injuries were made comfortable: doctors could do nothing else for them. Wounds of the limbs could be treated, in severe cases, with amputation, but for lesser wounds doctors might have been able to locate and remove the bullet and bandage the wound.

Dressing the wound and sewing the rupture did not end the ordeal for the soldier. Often the wounds would become infected or neurological complications would develop. These problems were extraordinarily difficult to diagnose and even more challenging for Civil War doctors to cure.



Colored lithograph showing gunshot fractures of the cranium

Courtesy of Historical Medical Library of The College of Physicians of Philadelphia

PREPARATION FOR THE CASE STUDY

- *In the document below, have students identify the different kinds of gunshot wounds and the range of treatments recommended to surgeons. (Also see illustrations of wounds and Civil War minnie balls in the Medical and Surgical History of the Civil War.)*
- *Dr. Gross refers to a wound as a lesion. Research the meaning of the term “lesion” in mid-19th-century American medicine.*
- *Dr. Gross’s manual—which he wrote in under two weeks—reflects his own experiences with injuries and wounds in both civilian and military circumstances. A gunshot wound is not the only type of injury Gross discusses: what are the other kinds of injuries he discusses, and how prevalent would they have been in an army on campaign? What demands would non-gunshot injuries or wounds have on the medical infrastructure (first aid procedures, hospitalization)?*

S. D. Gross, *A Manual of Military Surgery* (Philadelphia: J. B. Lippincott & Co., 1861), 45-73. Note that the complete manual may be found on-line at: <http://jdc.jefferson.edu/milsurgusa/> <https://archive.org/details/manualofmilitary01gros>

[Lesson 4 Attachment 1]

Visual examples of wounds from *Medical and Surgical History of the War of the Rebellion* (Washington D. C.: Government Printing Office, 1876). All images from Part II, Volume II.

[Lesson 4 Attachment 2]

CASE STUDY

Civil War soldiers were supposed to confront emotional and physical pain with calm stoicism. Hand students a case study of a veteran who was not able to conquer his pain. Although this soldier was ultimately released, questions about whether the treatment inflicted unnecessary physical and emotional distress remain unanswered.

- *From the case study of Sergeant A. D. Marks, outline the treatment he received and identify what the doctors were able to uncover and what remained a mystery in Marks’s condition.*
- *What do students think Marks’s “patient rights” might have been as a soldier in a military hospital? Did his treatment respect his patient rights and his emotional as well as physical needs?*
- *The case report of Sgt. Marks appeared in print because its author, S. Weir Mitchell, MD, was particularly interested in pain and its connection to damaged nerves (neurology). Identify diagnostic and therapeutic techniques conducted on Sgt. Marks that were innovations or at least unusual or atypical. (This question may require further research to answer. Compare the methods outlined in Gross with those performed on Marks by Mitchell.)*

Case XXXI of A. D. Marks, in Austin Flint, ed. *Contributions Relating to the Causation and Prevention of Disease* (New York: Hurd and Houghton, 1867), 447-50. Complete text available on-line at:

<https://archive.org/details/contributionsrel00finuoft>

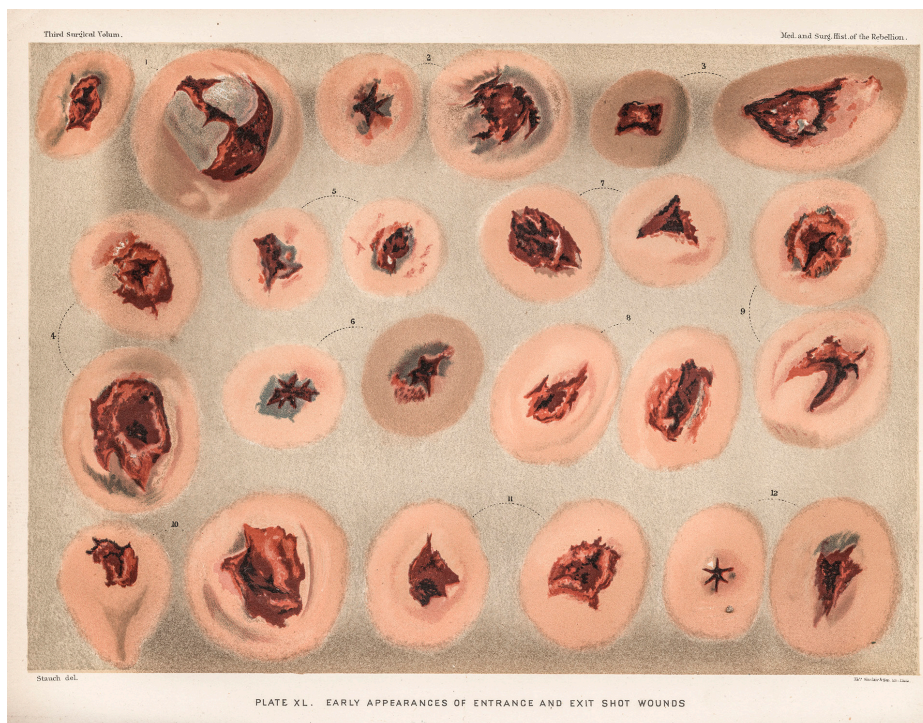
[Lesson 4 Attachment 3]

DEBRIEFING QUESTION

In trying to evaluate the long-term impact of gunshot wounds, have students assume that they been asked by the United States Military to evaluate questionnaires filled out by seriously wounded veterans after they returned home to civilian life. The original questionnaires are stored at the Historical Medical Library, The College of Physicians of Philadelphia. Students are reading transcripts of the originals. In your assessment, have students answer the following questions:

- *What are the health complications that have developed over time and affect the veterans participating in the survey?*
- *Do these surveys reveal anything hidden that the doctors missed and that might shed insight into the mental and physical condition of soldiers disabled by war?*

Veterans' medical surveys, MSS 2/0241-03, S. Weir Mitchell papers, College of Physicians of Philadelphia Historical Medical Library. [Lesson 4 Attachment 4]



Colored lithograph showing bullet wounds (early appearance of entry and exit shot wounds)

Courtesy of Historical Medical Library of The College of Physicians of Philadelphia

BIBLIOGRAPHY

Guy R. Hasegawa, *Mending Broken Soldiers: The Union and Confederate Programs to Supply Artificial Limbs* (Carbondale: Southern Illinois University Press, 2012) On-line at:

http://books.google.com/books/about/Mending_Broken_Soldiers.html?id=gpGAqAFjp0sC

Earl J. Hess, *The Rifle Musket in Civil War Combat: Reality and Myth*

(Lawrence: The University of Kansas Press, 2008)

Glenna R. Schroeder-Lein, *The Encyclopedia of Civil War Medicine* (New York: M. E. Sharpe, 2008) On-line at:

http://books.google.com/books/about/The_Encyclopedia_of_Civil_War_Medicine.html?id=fVZeGtxiMcYC

WEB LINKS

On the effects of Minié balls

<http://opinionator.blogs.nytimes.com/2012/08/31/the-bullet-that-changed-history/>

“Small Arms of the Civil War” by the Civil War Trust

<http://www.civilwar.org/education/history/warfare-and-logistics/warfare/smallarms.html>

Images related to the Civil War in the National Museum of Health and Medicine

<http://www.flickr.com/photos/medicalmuseum/sets/72157614294677868/with/5280245645/>

Background on Samuel D. Gross, MD

http://jeffline.jefferson.edu/SML/archives/exhibits/notable_alumni/samuel_gross.html

Life and Limb: The Toll of the American Civil War, on-line exhibit

<http://www.nlm.nih.gov/exhibition/lifeandlimb/exhibition.html>

Additional primary documents concerning black soldiers during the war

<http://www.history.umd.edu/Freedmen/sampdocs.htm>

Pennsylvania Education Standards (see <http://www.pdesas.org/standard/views>)

PA Core History and Social Studies standards

11TH GRADE

1.2.11.A-E; 1.6.11.A-B; 8.1.U.A-B; 8.3.U.A-D

12TH GRADE

1.2.11.A; 1.2.12.B-D; 1.6.12.A-B; 8.1.12.A-B; 8.1.U.A-B; 8.3.12.A-D

COMMON CORE 11TH-12TH GRADES

CC.1.2.11-12.A, B, I; CC.1.4.11-12.A, H, I; CC.1.5.11-12.A, D, G; CC.8.5.11-12.A-C, F, H; CC.8.6.11-12.H.



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WOUNDS

AND OTHER INJURIES

The injuries inflicted in war are, in every respect, similar to those received in civil life. The most common and important are fractures, dislocations, bruises, sprains, burns, and the different kinds of wounds, as the incised, punctured, lacerated, and gunshot. With the nature, diagnosis, and mode of treatment of these lesions every army surgeon must, of course, be supposed to be familiar; and I shall therefore limit myself, in the remarks which I am about to offer upon these subjects, to a few practical hints respecting their management on the field of battle and in the ambulance.

Most of the cases of fractures occurring on the field of battle are the result of gunshot injury, and are frequently, if not generally, attended by such an amount of injury to the soft parts and also to the bone as to demand amputation. The bone is often dreadfully comminuted, and consequently utterly unfit for preservation. The more simple fractures, on the contrary, readily admit of the retention of the limb, without risk to life.

In transporting persons affected with fractures, whether simple or complicated, the utmost care should be used to render them as comfortable as possible, by placing the injured limb in an easy position, and applying, if need be, on account of the distance to which they have to be carried, or the mode of conveyance, short side splints of binders' board, thin wood, as a shingle, or junks of straw, gently confined by a roller. For want of due precaution the danger to limb and life may be materially augmented. Permanent dressings should be applied at the earliest moment after the patient reaches the hospital. If the fracture be attended with splintering of the bone, all loose or detached pieces should at once be extracted; a proceeding which always wonderfully simplifies the case, inasmuch as it prevents, in great measure, the frightful irritation and suppuration which are sure to follow their retention. When this point has been properly attended to, the parts should be neatly brought together by suture, and covered with a compress wet with blood. As soon as inflammation arises—not before—water-dressings are employed. A suitable opening, or bracket, should be made in the apparatus to facilitate drainage and dressing.

Dislocations, accidents by no means common in military operations, are treated according to the general rules of practice; they should be speedily reduced, without the aid of chloroform, if the patient is faint or exhausted; with chloroform, if he is strong or reaction has been fully established. The operation may generally be successfully performed by simple manipulation; if, however, the case is obstinate, pulleys may be necessary, or extension and counter-extension made by judicious assistants.

Bruises, or contusions, unless attended with pulpification, disorganization, or destruction of the tissues, are best treated, at first, until the pain subsides, with tepid water impregnated with laudanum and sugar of lead, or some tepid spirituous lotion, and afterward, especially if the patient be strong and robust, with cold water, or cold astringent fluids. If the injury be deep seated, extensive, and attended with lesion of very important structures, the case will be a serious one, liable to be followed by the worst consequences, requiring, perhaps, amputation.

Sprains are often accompanied with excessive pain and even severe constitutional symptoms. They should be treated with the free use of anodynes and with warm water-dressings medicated with laudanum, or laudanum and lead. The joint must be elevated and kept at rest in an easy position.

Leeches may be applied, if they can be obtained; otherwise, if plethora exist, blood may be taken from the arm. By-and-by sorbefacient liniments and friction come in play. Passive motion should not be instituted too soon.

Among the accidents of war are burns, and, occasionally, also scalds. The former may be produced by ordinary fire or by the explosion of gunpowder, either casual or from the blowing up of redoubts, bridges, houses, or arsenals, and vary from the most trivial to the most serious lesions, involving a great extent of surface or of tissue, and liable to be followed by the worst consequences. Such injuries always require prompt attention; for, apart from the excessive pain and collapse which so often accompany them, the longer they remain uncared for the more likely will they be to end badly.

Various remedies have been proposed for these injuries. I have myself always found white—lead paint, such as that employed in the arts, mixed with linseed oil to the consistence of very thick cream, and applied so as to form a complete coating, the most; soothing and efficient means. The dressing is finished by enveloping the parts in wadding, confined by a moderately tight roller. It should not be removed, unless there is much discharge or swelling, for several days. If vesicles exist, they should previously be opened with a needle or the point of a bistoury. A liniment or ointment of glycerin, lard or simple cerate and subnitrate of bismuth, as suggested by my friend, Professor T. G. Richardson, of New Orleans, is also an excellent remedy, and may be used in the same manner as the white-lead paint. In the milder cases, carded cotton, cold water, water and alcohol, water and laudanum, or solutions of lead and laudanum, generally afford prompt relief. Amputation will be necessary when there is extensive destruction of the muscles, bones, or joints. Reaction must be promoted by the cautious use of stimulants; while pain is allayed by morphia or laudanum given with more than ordinary circumspection, lest it induce fatal oppression of the brain.

In burns from the explosion of gunpowder, particles of this substance are often buried in the skin, where, if it be not removed, they leave disfiguring marks. The best way to get rid of them is to pick out grain after grain with the point of a narrow-bladed bistoury or cataract needle.

The subject of wounds is a most important one in regard to field practice, as these lesions are not only of frequent occurrence, but present themselves in every variety of form and extent. Their gravity is influenced by numerous circumstances which our space does not permit us to specify, but which the intelligent reader can readily appreciate. In many cases death is instantaneous, owing to shock, or shock and hemorrhage; in others it occurs gradually with or without reaction, at a period of several hours, or, it may be, not under several days. Sometimes men are destroyed by shock, by, apparently, the most insignificant wound or injury, owing, not to want; of courage, but to some idiosyncrasy.

The indications presented in all wounds, of whatever nature, are—1st, to relieve shock; 2dly, to arrest hemorrhage; 3dly, to remove foreign matter; 4thly, to approximate and retain the parts; and, 5thly, to limit the resulting inflammation.

1. *It is not necessary to describe minutely the symptoms of shock, as the nature of the case is sufficiently obvious at first; sight, from the excessive pallor of the countenance, the weakened or absent pulse, the confused state of the mind, the nausea, or nausea and vomiting, and the excessive bodily prostration. The case must be treated promptly; by free access of fresh air and the use of the fan, by loosening the dress or the removal of all sources of constriction, by dashing cold*

water into the face and upon the chest, by recumbency of the head, and by a draught of cold water, or water and spirits, wine or hartshorn, if the patient can swallow; aided, if the case be urgent, by sinapisms [mustard plasters] to the region of the heart, the inside of the thighs and the spine, and stimulating injections, as brandy, turpentine, mustard, or ammonia, in a few ounces of water. No fluid must be put into the mouth so long as the power of deglutition is gone, lest some of it; should enter the windpipe, and so occasion suffocation. Whatever the cause of the shock may have been, let the medical attendant not fail to encourage the sufferer by a kind and soothing expression, which is often of more value in recalling animation than the best cordials.

During an actual engagement, the medical officers, as well as their servants, should carry in their pockets such articles as the wounded will be most likely to need on the field of battle, as brandy, aromatic spirits of hartshorn, and morphia, put up in suitable doses.

- 2. The hemorrhage may be arterial or venous, or both arterial and venous, slight or profuse, primary or secondary, external or internal. The scarlet color and saltatory jet will inform us when it is arterial; the purple hue and steady flow, when it is venous. When the wound is severe, or involving a large artery or vein, or even middle-sized vessels, the bleeding may prove fatal in a few minutes, unless immediate assistance is rendered. Hundreds of persons die on the field of battle from this cause. They allow their life-current to run out, as water pours from a hydrant, without an attempt to stop it by thrusting the finger in the wound, or compressing the main artery of the injured limb. They perish simply from their ignorance, because the regimental surgeon has failed to give the proper instruction. It is not necessary that the common soldier should carry a Petit's tourniquet, but every one may put into his pocket a stick of wood six inches long, and a, handkerchief or piece of roller, with a thick compress, and be advised how, where, and when they are to be used. By casting the handkerchief round the limb, and placing the compress over its main artery, he can, by means of the stick, produce such an amount of compression as to put at once an stop to the hemorrhage. This simple contrivance, which has been instrumental in saving thousands of lives, constitutes what is called the field tourniquet. A fife, drum-stick, knife, or ramrod may be used, if no special piece of wood is at hand.*

The most reliable means for arresting hemorrhage permanently is the ligature, of strong, delicate, well-waxed silk, well applied, with one end cut off close to the knot. Acupressure is hardly a proper expedient upon the battle-field, or in the ambulance, especially when the number of wounded is considerable. The rule invariably is to tie a wounded artery both above and below the seat of injury, lest recurrent bleeding should arise. Another equally obligatory precept is to ligature the vessel, if practicable, at the place whence the blood issues, by enlarging, if need be the original wound. The main trunk of the artery should be secured only when it cannot be taken up at the point just mentioned. Lastly, it is hardly requisite to add that the operation should be performed, with the aid of the tourniquet, as early as possible, before the supervention of inflammation and swelling, which must necessarily obscure the parts and increase the surgeon's embarrassment, as well as the patient's pain and risk.

Venous hemorrhage usually stops spontaneously, or readily yields to compression, even when a large vein is implicated. The ligature should be employed only in the event of absolute necessity, for fear of inducing um due inflammation.

Torsion is unworthy of confidence in field practice, and the same is true of styptics, except when the hemorrhage is capillary, or the blood oozes from numerous points. The most approved articles of this kind are Monsel's salt, or the persulphate of iron and the perchloride of iron; the latter deserving the preference, on account of the superiority of its hemostatic properties. Alum and lead are inferior styptics.

Temporary compression may be made with the tourniquet, or a compress and a roller. It may be direct as when it is applied to the trunk of the vessel, at some distance from the wound.

Constitutional treatment in hemorrhage is of paramount importance. It comprises perfect tranquility of mind and body, cooling drinks, a mild concentrated, nourishing diet, especially when there has been excessive loss of blood, anodynes to allay pain, induce sleep, and allay the heart's inordinate action, fresh air, and a properly regulated light.

Internal hemorrhage is more dangerous than external, because it is generally inaccessible. The chief remedies are copious venescition, elevated position, opium and acetate of lead, cool air and cool drinks.

Exhaustion from hemorrhage should be treated according to the principles which guide the practitioner in cases of severe shock. Opium should be given freely as soon as reaction begins to quiet the tremulous movements of the heart and tranquilize the mind. When the bleeding is internal, the reaction should be brought about gradually, not hurriedly, lest we thus become instrumental in promoting or re-exciting the hemorrhage.

Secondary hemorrhage comes on at a variable period, from a few hours to a number of days; it may depend upon imperfect ligation of the arteries, ulceration, softening or gangrene of the coats of these vessels, or upon undue constriction of the tissues by tight bandages. In some cases it is venous, and may then be owing to inadequate support of the part. Whatever the cause may be, it should be promptly searched out and removed.

- 3.** *The third indication is to remove all foreign matter. This should be done at once and effectually; with sponge and water pressed upon the parts, with finger or finger and forceps. Not a particle of matter, not a hair or the smallest clot of blood must be left behind, otherwise it will be sure to provoke and keep up irritation.*
- 4.** *As soon as the bleeding has been checked and the extraneous matter cleared away, the edges of the wound are gently and evenly approximated and permanently retained by suture adhesive plaster, aided, if necessary by the bandage. The best suture, because the least irritating, is that made of silver wire; but if this material is not at hand, strong thin, well-waxed silk is used. The adhesive strips are applied in such a manner as to admit of free drainage. The bandage is required chiefly in injuries extending deeply among the muscles, when this is the case, its use should be aided by compresses arranged as to force together the deep parts of the wound.*
- 5.** *When the wound is dressed, the next duty of the surgeon is to moderate the resulting inflammation. For this purpose the ordinary antiphlogistic means are employed. In general, very little medicine will be required, except a full anodyne, as half a grain of morphia, immediately after the patient has sufficiently recovered from the effects of his shock, and perhaps a mild aperient the ensuing morning, especially if there be constipation with a tendency to excessive reaction. The drinks must be cooling, and the diet light and nutritious, or otherwise, according*

to the amount of depression and loss of blood. In the latter event, a rich diet and milk-punch may be required from the beginning. A diaphoretic draught will be needed if the skin is hot and arid, aided by frequent; sponging of the surface with cool or tepid water. General bleeding will rarely, if ever, be required; certainly not if the injury is at all severe, or if there has already been any considerable waste of blood and nervous fluid.

Much trouble is, at times, experienced both in civil and military practice, especially in very hot weather, in preventing the access of flies to our dressing. The larvae which they deposit are rapidly developed into immense maggots, which, creeping over the wounds and sores of the patient, and gnawing the parts, cause the most horrible distress. The soldiers in Syria, under Larrey, were greatly annoyed by these insects, and our wounded in Mexico also suffered not a little from them. The best prevention is bran, or light saw-dust, with which the injured parts should be carefully covered. The use of cotton must be avoided, inasmuch as it soon becomes hot and wet; two circumstances highly favorable to incubation.

The best local applications are the water dressings, either tepid, cool, or cold, according to the temperament of the patient, the tolerance of the parts, and the season of the year. Union by the first intention is, in all the more simple cases, the thing aimed at and steadily kept in view, and hence the less the parts are encumbered, moved or fretted, the more likely shall we be to attain the object.

The medical attendant should have a constant eye to the condition of the bladder after all severe injuries, of whatever character, as retention of urine is an extremely common occurrence, and should always be promptly remedied. Attention to this point is the more necessary, because the poor patient, in his comatose or insensible condition, is frequently unable to make known his wants.

Such, in a few words, are the general principles of treatment to be followed in all wounds; but there are some wounds which are characterized by peculiarities, and these peculiarities are of such practical importance as to require separate consideration. Of this nature are punctured, lacerated and gunshot wounds.

Punctured wounds are inflicted by various kinds of weapons, as the lance, sabre, sword, or bayonet. In civil practice they are most generally met with as the result of injuries inflicted by nails, needles, splinters, and fragments of bone. They often extend into the visceral cavities, joints, vessels, and nerves; and are liable to be followed by excessive pain, erysipelas, and tetanus; seldom heal by adhesive action; and often cause death by shock or hemorrhage. When the vulnerating body is broken off and buried, it may be difficult to find and extract it, especially when small and deep seated. When this is the case, the wound must be freely dilated, an eye being had to the situation of the more important vessels and nerves. In other respects, the general principles of treatment are similar to those of incised wounds. Opium should be administered largely; and, if much tension supervene, or matter form, free incisions will be necessary.

In lacerated wounds the edges should be tacked together very gently, and large interspaces left for drainage. A small portion will probably unite by the first intention; the remainder, by the granulating process. Such wounds nearly always suppurate more or less profusely, and some of the torn and bruised

tissues not unfrequently perish. The same bad consequences are apt to follow them as in punctured wounds. Warm water constitutes the best dressing, either alone or with the addition of a little spirits of camphor. Opium should be used freely internally, and the diet must be supporting.

Gunshot wounds, in their general character, partake of the nature of lacerated and contused wounds. They are, of course, the most common and dangerous lesions met with in military practice; often killing instantly, or, at all events, so mutilating the patient as to destroy him within a few hours or days after their receipt. The most formidable wounds of the kind are made by the conical rifle and musket balls and by cannon balls, the latter often carrying away the greater portion of a limb, or mashing and pulpifying the muscles and viscera. in the most frightful and destructive manner; while the former commit terrible ravages among the bones, breaking them into numerous fragments, each of which may, in its turn, tear up the soft tissues, in a way perhaps not less mischievous than the ball itself. The old round ball is a much less fatal weapon than the conical, which seldom becomes flattened, and which has been known to pass through the bodies of two men and lodge in that of a third some distance off.

When a ball lodges it makes generally only one orifice; but it should be remembered that it may make two, three, and even four, and at last bury itself more or less deeply. Such cases are, however, uncommon. Should the missile escape, there will necessarily be two openings; or, if it meet a sharp bone and be thereby divided or cut in pieces, as sometimes happens, there may be even three. The orifice of entrance and the orifice of exit differ in their appearances. The first is small, round, and often a little discolored from the explosion of the powder; the other, on the contrary, is comparatively large, slit-like, averted, and free from color. These differences, however, are frequently very trifling, particularly if the ball be projected with great velocity and it do not encounter any bone. The opening of entrance made by the round ball is often a little depressed or inverted, but such an appearance is extremely uncommon in wounds made by the conical ball.

It is often a matter of great importance to determine, when two openings exist in a limb, whether they have been made by one ball, which has passed out, or by two balls, which are retained. The question is of grave importance, both in a practical and in a medico legal point, of view; but its solution is, unfortunately, not always possible. Sometimes the openings of entrance and exit are materially modified by the introduction but non-escape of a foreign body, as a piece of breastplate, belt, or buckle, along with the ball, which alone passes out, or by the flattening of a ball against a bone, or its division by a bone into several fragments, each of which may afterward produce a separate orifice. Generally speaking, the missile, at the place of entrance, carries away a piece of skin, and rends the skin where it escapes, the former being often found in the wound.

Bullets sometimes glance, bruising the skin, but not penetrating it; at other times they effect an entrance, but, instead of passing on in a straight line, are deflected, coursing, perhaps, partially round the head, chest, or abdomen, or round a limb. Such results are most commonly causal by a partially spent bullet coming in contact with bones, aponeuroses, and tendons; and the round is more frequently served in this way than the conical.

Gunshot wounds bleed profusely only when a tolerably large artery has been injured, and in this event they may speedily prove fatal. During the Crimean war, however, many cases occurred in which there was no immediate hemorrhage, imperiling life, notwithstanding the limbs, lower as well as upper, were left hanging merely by the integuments. Under such circumstances, intermediary hemorrhage, as it is termed, is apt to show itself as soon as reaction takes place; generally within a few hours after the accident.

The pain is of a dull, burning, smarting, or aching character, and the patient is pale, weak, tremulous, nauseated, and despondent, often in a degree far beyond what might be expected from the apparent violence of the injury, and that, too, perhaps, when the individual is of the most undaunted courage and self-possession in the heat of battle. At other times a man may have a limb torn off, or be injured in some vital organ, and yet hardly experience any shock whatever; nay, perhaps be scarcely conscious that he is seriously hurt. The pain and prostration are always greater, other things being equal, when a bone has been crushed or a large joint laid open, than when there is a mere flesh wound.

The gravity of gunshot wounds of the joints has been recognized by all practitioners, both military and civil, from time immemorial. The principal circumstances of the prognosis are the size and complexity of the articulation, the extent of the injury, and the state of the system. A gunshot wound of a ginglymoid joint is, in general, a more dangerous affair than a similar one of a ball-and-socket joint. The structures around the articulation often suffer severely, thus adding greatly to the risk of limb and life. Of 65 cases of gunshot wounds of joints, related by Alcock, 33 recovered; but of these 21 lost the limb. Of the 32 that died no operation was performed upon 18.

Gunshot wounds of the smaller joints, even those of the ankle, often do very well, although they always require long and careful treatment. Lesions of this kind, involving the shoulder, are, frequently amenable to ordinary means. If the ball lodges in the head of the humerus, it must be extracted without delay, its retention being sure to excite violent inflammation in the soft parts, and caries or necrosis in the bone, ultimately necessitating amputation, if not causing death.

Gunshot wounds of the knee-joint are among the most dangerous of accidents, and no attempt should be made to save the limb when the injury is at all extensive, especially if it involves fracture of the head of the tibia, or condyles of the femur. Even extensive laceration of the ligament of the patella should, I think, as a general rule, be regarded as a sufficient cause of amputation. In 1854, Macleod saw upwards of forty cases of gunshot wounds of the knee in the French hospitals in the Crimea, and all, except one, in which an attempt was made to save the limb, proved fatal. Of nine cases which occurred in India not one was saved. Guthrie never saw a patient recover from a gunshot wound of the knee-joint; and Esmarch, who served in the Schleswig-Holstein wars, expressly declares that all lesions of this kind demand immediate amputation of the thigh.

When, in bad cases of these articular injuries, an attempt is made to save the limb, the patient often perishes within the first three or four days, from the conjoined effects of shock, hemorrhage, and traumatic fever. If he survives for any length of time, large abscesses are apt to form in and around the joint, the matter burrowing extensively among the muscles, and causing detachment of the periosteum with caries and necrosis of the bones.

Muscles, badly injured by bullets, generally suppurate, and are very apt to become permanently useless. Special pains should therefore be taken to counteract this tendency during the cure. Large shot and other foreign bodies sometimes lodge among these structures, where their presence may remain for a long time unsuspected.

Cannon balls often do immense mischief by striking the surface of the body obliquely, pulpifying the soft structures, crushing the bones, lacerating the large vessels and nerves, and tearing open the joints, without, perhaps, materially injuring the skin.

A very terrible form of contusion is often inflicted upon the upper extremity of artillerymen by the premature explosion of the gun while in the act of loading; causing excessive commotion of the entire limb, laceration of the soft parts, and most extensive infiltration of blood, accompanied, in many cases, by comminuted fracture, and penetration of the wrist and elbow joints. The constitutional shock is frequently great. If an attempt be made to save the parts, diffusive suppuration, and more or less gangrene will be sure to follow, bringing life into imminent jeopardy. An attempt in such a case to save the limb would be worse than useless, if, indeed, not criminal; amputation must be promptly performed, and that at a considerable distance above the apparent seat of the injury, otherwise mortification might seize upon the stump.

In the treatment of this class of injuries, the first thing to be done, after arresting the hemorrhage and relieving shock, is to extract the ball and any other foreign substance that may have entered along with it, the next being to guard against inflammation and other bad consequences.

In order to ascertain where the ball is, the limb should be placed as nearly as possible in the position it was supposed to have been at the moment of the accident. A long, stout, flexible blunt-pointed probe, like that [shown here], or a straight silver catheter, is then passed along the track and gently moved about until it strikes the ball. In many cases the best probe is the surgeon's finger. Valuable information may often be obtained by the process of pinching, or digital compression, the ends of the fingers being firmly and regularly pressed against the wounded structures, bones as well as muscles, tendons, and aponeuroses. Occasionally, again, as when a ball is lodged in an extremity, its presence is easily detected by the patient, who may make such an examination as he lies in bed.

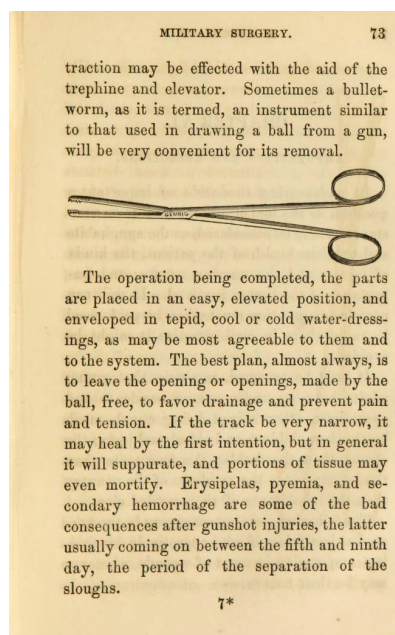
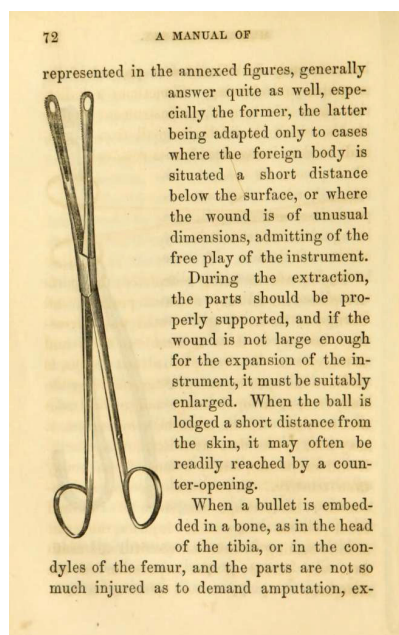
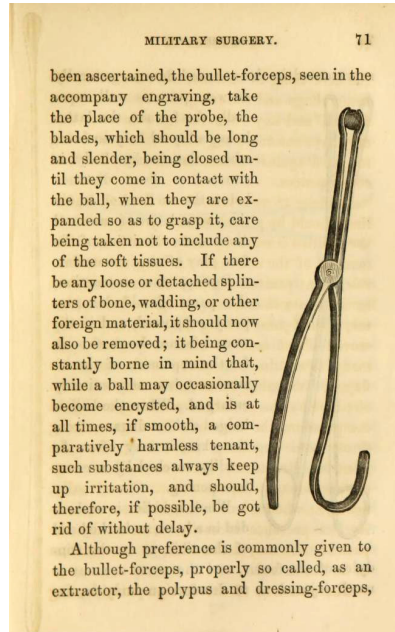
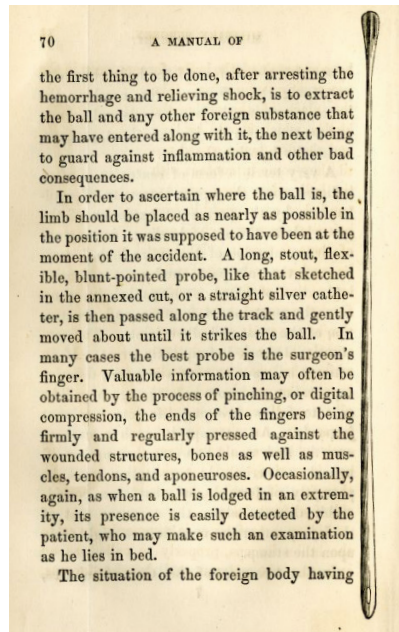
The situation of the foreign body having been ascertained, the bullet-forceps, seen in the [here], take the place of the probe, the blades, which should be long and slender, being closed until they come in contact with the ball, when they are expanded so as to grasp it, care being taken not to include any of the soft tissues. If there be any loose or detached splinters of bone, wadding, or other foreign material, it should now also be removed; it being constantly borne in mind that, while a ball may occasionally become encysted, and is at all times, if smooth, a comparatively harmless tenant, such substances always keep up irritation, and should, therefore, if possible, be got rid of without delay.

Although preference is commonly given to the bullet-forceps, properly so called, as an extractor, the polypus and dressing-forceps, represented [here] generally answer quite as well, especially the former, the latter being adapted only to cases where the foreign body is situated a short distance below the surface, or where the wound is of unusual dimensions, admitting of the free play of the instrument.

During the extraction, the parts should be properly supported, and if the wound is not large enough for the expansion of the instrument, it must be suitably enlarged. When the ball is lodged a short distance from the skin, it may often be readily reached by a counter-opening.

When a bullet is embedded in a bone, as in the head of the tibia, or in the condyles of the femur, and the parts are not so much injured as to demand amputation, extraction may be effected with the aid of the trephine and elevator. Sometimes a bullet-worm, as it is termed, an instrument similar to that used in drawing a ball from a gun, will be very convenient for its removal.

The operation being completed, the parts are placed in an easy, elevated position, and enveloped in tepid, cool or cold water-dressings, as may be most agreeable to them and to the system. The best plan, almost always, is to leave the opening or openings, made by the ball, free, to favor drainage and prevent pain and tension. If the track be very narrow, it may heal by the first intention, but in general it will suppurate, and portions of tissue may even mortify. Erysipelas, pyemia, and secondary hemorrhage are some of the bad consequences after gunshot injuries, the latter usually coming on between the fifth and ninth day, the period of the separation of the sloughs.



SOURCE

S. D. Gross, A Manual of Military Surgery (Philadelphia: J. B. Lippincott & Co., 1861), 45-73.

EXAMPLES OF WOUNDS

LACERATION OF THE BACK BY SHELL FRAGMENT

CASE 1228.—Private Frederick S—, Co. A, 149th Pennsylvania, aged 19 years, was wounded July 13, 1864, in the entrenched lines before Petersburg, on the Fifth Corps front, by a large shell fragment, which tore away the dorsal integuments over a space at least six by eight inches, and severely lacerated the subjacent muscles, without injury, however, to the ribs or spine. Surgeon W. R. DeWitt, U. S. V., rendered the first attention to the patient. There was no bleeding, and the shock was comparatively slight, and, taking restoratives and having the raw surfaces covered by a water dressing, the wounded man was taken to City Point. Here he was placed in the Fifth Corps Hospital, under the care of Surgeon W. L. Faxon, 32d Massachusetts. Here a colored drawing of the laceration was made by Hospital Steward Stauch, at that time detailed by Surgeon J. H. Brinton, at the hospitals of the Army of the Potomac, for the purpose of securing drawings of recent injuries. Only such tissues sloughed as were utterly disorganized by the projectile and the large lacerated surface soon granulated kindly, so that after a month the patient was in a condition to be transferred northward, and entered the Whitehall Hospital, at Bristol, Pennsylvania, on August 15, 1864. Cicatrization progressed rapidly, and Assistant Surgeon W. H. Forwood, U. S. A., reported that the patient was furloughed on September 12, and readmitted on October 4, 1864, fairly convalescent. On January 23, 1865, this soldier was sent for modified duty in the Veteran Reserves, and on June 24, 1865, he was mustered out of service. From the pension record, it is inferred that neither this man nor his relatives have made application for pension. The accompanying wood-cut is copied from the drawing by Stauch.

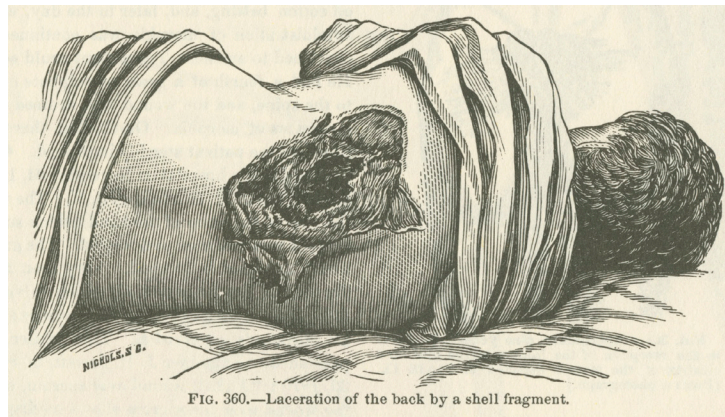


FIG. 360.—Laceration of the back by a shell fragment.

FOREIGN BODIES

CASE 40.—Private R. B. Seybert, Co. H, 11th Pennsylvania Volunteers, Second Bull M, August 30, 1862, converted his tin-cup into a pail by putting a hoop of sixteenth of an inch iron wire to it and slinging it to the right side of his belt. A conoidal musket ball struck the wire, twisting it, and entered the abdominal walls two inches in front of the right anterior superior process.

The short end of the wire protruded an inch to the left and a little below the umbilicus. With some difficulty, and a slight enlargement of the wound, the foreign body was extracted. The man recovered without the occurrence of peritoneal inflammation and was returned to duty January, 1863, from Fairfax Seminary Hospital. Surgeon H.W. Ducachet, U.S.V., contributed the specimen and notes. August 16, 1871, the Pension Bureau, at Philadelphia, reports this pensioner as complaining of pain and loss of muscular contraction, and expresses the opinion that the tenth rib was fractured at the entrance cicatrix. There was no aggravation of the disability, which was last rated at three fourths. His age is given as 26 years, and weight 125½ pounds is avoirdupois. He was last paid on March 2, 1872.

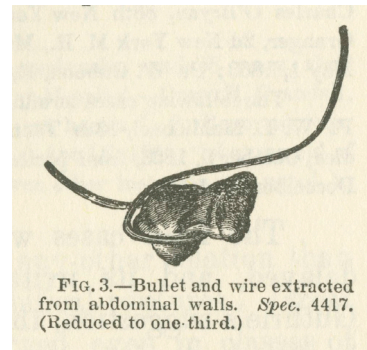


FIG. 3.—Bullet and wire extracted from abdominal walls. *Spec.* 4417. (Reduced to one-third.)

CASE 41.—Private Theodore Lozar, Co H, 15th New Jersey, shot, at the battle of Chancellorsville, May 3, 1863. A conoidal musket ball entered at the cartilage opposite the left external rib and lodged. The man was conveyed to Washington, and entered Douglas Hospital on May 7th. On May 11th, Assistant Surgeon W. Thomson, U. S. A., discovered the projectile (FIG. 4) in the right transverse muscle opposite the wound of entrance, and removed it through a counter incision. The patient contracted variola, and was transferred to Kalorama Hospital on June 7, 1863, where he died.

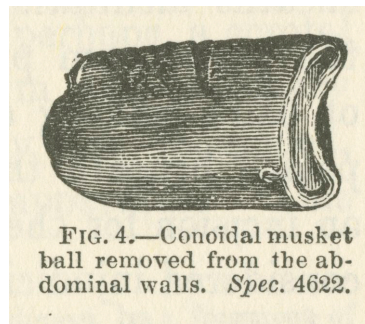


FIG. 4.—Conoidal musket ball removed from the abdominal walls. *Spec.* 4622.

PENETRATING WOUND OF THE ABDOMEN

CASE 235.—Private Franklin Harsh, Co. G, 7th Ohio, was wounded at Chancellorsville, May 3, 1863, and was taken to the hospital of Twelfth Corps, where Surgeon H. E. Goodman, 28th Pennsylvania, recorded the injury as a “gunshot penetrating wound of the abdomen and hip.” The field record gives no details of the symptoms of treatment. The patient was sent to Aquia Creek by rail, and thence, on a hospital transport, to Washington, and was admitted into Armory Square Hospital. There he remained for a long time, with fecal fistula; but no report of the particulars of the case was made. The case arresting the attention of Surgeon J. H. Brinton, U.S.V., he directed Hospital Steward Stauch to make the colored drawings from which the chromolithograph opposite is copied. The drawing appears to have been finished September 13, 1863, at which date, in a letter to Dr. Brinton, Surgeon D. W. Bliss reports that “a minié ball passed through the right hypochondriac region, making its exit through the ilium, near the posterior fourth of the crest. The posterior opening permits the passage of small quantities of fecal matter and of gas. The patient is improving daily, the opening into the gut contracting

steadily, and the cases promises a favorable termination.” On April 28, 1864, the register of Armory Square Hospital shows a certificate from Dr. Bliss that Harsh was “discharged for artificial anus from gunshot wound, incidental to the service, —disability total.” On March 15, 1867, Examining Surgeon J. Holloway, Wabash, Indiana, reports of this pensioner: “His wound is on the right side, fluid, frequently pass out of both orifices made by the ball. He is entirely incapacitated for manual labor, his disability total.” On June 6, 1866, Harsh’s pension was increased to fifteen dollars monthly, and from June 8, 1872, to eighteen dollars monthly. It cannot be learned that any operative interference, with a view of closing the fistulae, has been attempted.

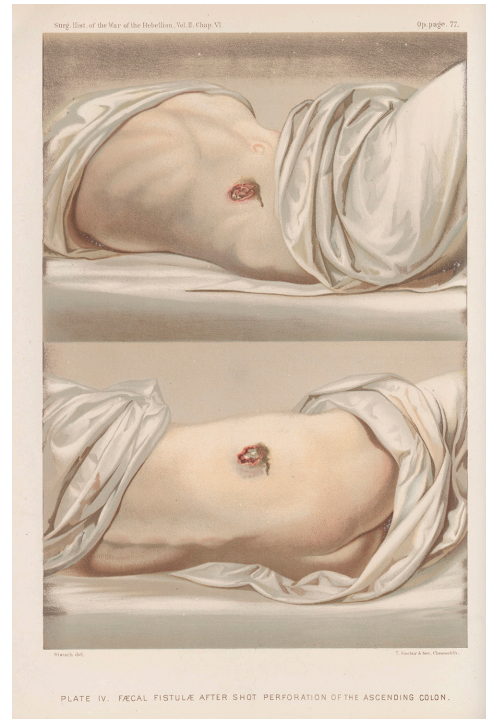


PLATE IV. FÆCAL FISTULÆ AFTER SHOT PERFORATION OF THE ASCENDING COLON.

SOURCE

Medical and Surgical History of the War of the Rebellion (Washington D. C.: Government Printing Office, 1876). All images from Part II, Volume II (Surgical History).

CASE OF

BURNING PAIN

Case XXX I. Gunshot Wound of the Left Brachial Plexus; Paralysis of Motion and Sensation; Muscular Hyperaesthesia; Intense Burning in Hand and Arm; Nutritive Changes; Atrophy; Contracted Extensors; Relief; Discharged.

A. D. Marks, sergeant, Company C, 3d Maryland Volunteers, aged 48, enlisted August, 1861. Previously healthy. May 3d, 1863, at Chancellorsville, he received two wounds; one in the neck and one in the chest. The first ball passed in below the anterior boundary of the left armpit, through the margin of the great pectoral muscle, the arm being raised at the moment. The missile glanced on the neck of the humerus and made its escape anterior to the coracoid process, apparently wounding the plexus. As he turned to leave the field, a second ball entered the right side of the back, to the right of the eighth dorsal vertebra, and, crossing behind the spine, entered the left chest. The first wound caused palsy of motion and feeling in the left arm. The second gave rise to cough, spitting of blood, dysphagia, etc. It finally caused pleurisy, and large escape of pus during breathing. The wound is now closed, July 4, 1863, but the lower half of the lung is consolidated. The second wound brought him to the ground. He was taken prisoner, exposed a good deal to weather, and finally exchanged, and sent to West Philadelphia, Satterlee General Hospital, June 10, 1863.

During the first week, the arm, though palsied, was painless. Then he began to feel a knife-like pain from the wound down the inside of the limb, and also on its front, and on the ulnar side, half way to the wrist. With these pains came a tingling and burning sensation, as when the blood returns into a limb said to have been asleep, but more severe. Soon afterward this extended to the hand also, and he began to be able to feel the touch of foreign bodies.

PRESENT STATE, JULY 5, 1863 He lies on his back, anxious looking, and pain-worn. The left arm rests on a pillow. It is cold, mottled, and swollen. The skin of the hand is thin, and dark-red, but presents no eruption. Tactility, nowhere absent, is dull on the dorsum of the hand and fingers. Except in these parts, localizing sensation is good. The whole arm and hand, except its back part, is, as he says, alive with burning pain, which warmth and dependence of the limb increase, and which cold and wetting ease considerably. It is subject to daily exacerbation: about midday.

MOTION The shoulder muscles act well. The deltoid is feeble. There is no motion below the elbow. The fingers are half flexed, and their joints swollen, sore, and congested. The deltoid is atrophied one half. The extensors in the fore-arm are flabby, but the general oedema prevents us from telling whether the fore-arm muscles are wasted or not. Pressure on the cicatrix gives no pain.

While at Satterlee Hospital, Dr. Walter F. Atlee used ice to the arm, and on the shoulder a blister dressed with morphia. These measures relieved the arm for the time without aiding the hand.

JULY 5 Ordered hypodermic injections of the fourth of a grain of sulphate of morphia, near the scar, twice a day. This relieved the arm; the hand growing daily worse, so that even ice ceased to afford ease, and he constantly prayed us to amputate the arm.

JULY 7 Erysipelas set in about the seat of the injections, and they were discontinued for a time, morphia being used internally, and lead water locally.

On the 9th, the disease had left him, and two drops of conia were injected into the shoulder. This was thrice repeated, but gave no relief. Atropia, one twenty-fifth of a grain, was next assayed, three times successively at intervals of two hours. It caused dilatation of the pupils, flushed face, giddiness, and dry tongue. The only valuable result was a relaxation of the of the fingers, which had become contracted, but which never afterward became so rigid as they had been. The patient himself called attention to this singular effect. Again morphia, one third of a grain, was injected into the arm without aiding the hand.

JULY 15 TO JULY 20 Injections of morphia were made into the hand twice a day. They gave so much ease that the ice was temporarily abandoned.

JULY 21 For the first time we were able to examine the limb with electricity.

Tactile sensation was good in the arm and absent in the ulnar distribution. In all other parts of the hand tactile sensation existed. In the portions insensitive to touch, deep pressure and pinching caused pain, which was very severe, but was indistinctly localized by the patient

Electro-muscular contractility was absent in the whole hand and forearm. The currents caused everywhere great pain, so that we could not tell if it were muscular or not. Probably the muscles still had sensation, since pressure on them was agonizing. Every electric examination necessitated the immediate subsequent use of morphia injections.

AUGUST 14 The recent warm weather has increased the pain, so that he moans and weeps incessantly.

Up to September 9, various means were employed. The injections have been so numerous that the part is dotted with punctures, and their irritation has aggravated his sufferings to such a degree that they have been permanently laid aside for the internal use of narcotics. As local agents, we have had recourse to laudanum, lead-water, ice, oil, poultices with and without soda, and poultices of carbonate of soda, with vinegar to release carbonic acid. Of these, the soda poultice did best; but in this, as in every instance, the ease lasted but for a day or two. In despair, leeches were placed about the cicatrix, and blisters were applied over it and kept open, and also over the nerves which were tender on pressure; neither aided him.

Meanwhile the pain increased, but became limited to the palm and fingers and lower fore-arm, with darting pains up the arm. The tactility improved, and the muscular tenderness lessened. The general oedema disappeared, and the atrophy was seen to be extreme, while the finger joints remained sore and swollen. Every motion or vibration caused pain.

OCTOBER 18 A blister on the palm failed to draw, but a blister on the dorsum of the hand acted well, and gave very marked relief. It was followed up with ammonia blisters on the palm and arm. These were repeated with, finally, cantharidal blisters. And now for the first time the ease was complete. Incessant blisters gradually ameliorated the pain. They were continued every few days for two months, until every trace of burning left him. He was so sure of the relief from this application that he was unwilling to allow the hand to heal before using a new one.

DECEMBER 1 Slight pneumonia of right lung.

DECEMBER 10 Electricity ordered. Immediate return of pain. Ceased its use.

Up to January 6th, his arm and hand were shampooed [massaged] daily, passive motion was employed, and he began to sit up, and move about.

JANUARY 6, 1864 Careful reexamination. Arm gaining flesh. Cicatrix shrinking. Atrophy general; worst in the extensor group, in the fore-arm. ... Sensation good throughout, but not quite perfect.

VOLUNTARY MOVEMENTS Shoulder abductions, one third; other actions perfect. Elbow extension complete. Flexion, by biceps alone, two thirds. Supination effected only by biceps. Pronation one third. Wrist extension and flexion about one sixth of usual range. Passive extension to line of fore-arm, where the flexors, which are contracted, limit the motion. Thumb everted, and flattened like that of a monkey. Slight flexion and adduction. Muscles utterly wasted. The finger joints are no longer swelled, but are excessively rigid, and have no movement.

ELECTRIC TEST Below the shoulder no muscle has any electric contractility, and the sensibility to induced currents is also diminished. Again the electricity brought on the burning and was abandoned.

Ordered daily etherization, and the fingers to be then freely moved. Shampooing to be continued, and the douche twice a day, with occasional blisters.

JANUARY 29, 1864 Electricity no longer renews the burning, and is to be daily employed. The gain was now rapid. Flexor power over the fingers came back, but no extension. and no thumb motion.

FEBRUARY 23 Supination and improving. Atrophy lessening. Ordered a roll of bandage to be placed on the palm, the fingers to be bound down over it, to overcome the extensors, which, within a month, have been contracting.

On April 10, 1864, he was discharged, free of pain, and having only three fourths of the fingers, without power to extend them. All the other motions were improving, and the thumb-muscle: begun to respond to the will. Sensation perfect.

SOURCE

Case XXXI of A. D. Marks, in Austin Flint, ed. Contributions Relating to the Causation and Prevention of Disease (New York: Hurd and Houghton, 1867), 447-50.

TWO

QUESTIONNAIRES

COMPLETED BY VETERANS

- | | |
|---|--|
| 1. <i>Name and address:</i> | Henry A. Kircher, Belleville Illinois |
| 2. <i>Age:</i> | 52 November next |
| 3. <i>Date of amputation of limb:</i> | November 27, 1863 |
| 4. <i>Character of wound:</i> | both gun shot |
| 5. <i>Interval between wound and amputation:</i> | 4 to 5 hours |
| 6. <i>Symptoms during this period:</i> | Kept head level or would have gone to ----- |
| 7. <i>Operation:</i>
<i>Nature of flaps, if known:</i> | leg flap + arm circular.
_____ |
| 8. <i>Symptoms following operation – shock?</i> | felt pretty cheap |
| <i>duration of, if known?</i> | A day or 2; |
| <i>hemorrhage?</i> | Arm considerable leg more |
| <i>Pain – character?</i> | Of course it hurts; |
| <i>extent?</i> | in the stump; |
| <i>severity? (This answer as fully as possible.)</i> | I was wounded through the knee cap + joint and elbow joint and for arm both be minnie balls. |
| <i>Suppuration-extent?</i> | Arm healed in 19 days; |
| <i>duration?</i> | Leg took longer |
| <i>recurrence?</i> | Never had any trouble with either stump after and healed ----- |
| <i>Healing when complete?</i> | Arm in 19 days leg longer [and] parts of bone had to be discharged first! |
| <i>When was artificial limb first worn?</i> | never wore any on arm, stump too short Leg has been worn constantly since July 1864 |
| 9. <i>Has the loss of your member altered the general health?</i> | I enjoy good health cannot say that loss of limbs made any changes in health |

<i>Have there been any alterations of pulse?</i>	Do not know
<i>Body temperature? Near[?]</i>	keeps 96 degrees Yes my digestion is not as perfect as formerly that is certain articles do not agree with me as formerly
<i>Intellectual powers?</i>	no
<i>Disposition?</i>	Quick temper
<i>or habits?</i>	Pretty regular, eat and drink as my appetite dictates avoiding such as I know does not agree viz. Pikels[?] bananas—pork + c
<i>Has there been any change in the acuteness of the special senses, i.e., hearing, sight, sense of taste?</i>	Not to my knowledge
<i>What reasons have you for ascribing such alterations, if they are notes, to the injury or operation?</i>	no
<i>Is there any alteration in the amount of sleep or of solid or liquid nourishment required?</i>	Yes I think I require more sleep than formerly
<i>Was the amputation followed by any marked change in your ability for mental or bodily exertion?</i>	no—bodily of course to same extent
10. <i>Record any increase in strength and size of remaining limbs if such has been noticed.</i>	I think both remaining limbs are rather stronger than formerly but do not think changes in size never
<i>Has the ability to use the remaining limbs been increased?</i>	Yes in so far as making more different use of service
11. <i>Does the skin of the stump differ from the rest of the body? (1) As to texture?</i>	no
(2) <i>Color?</i>	no.
(3) <i>Temperature?</i>	Leg rather warmer being constantly encased in artificial leg
(4) <i>Growth of hair?</i>	no.
<i>Does it sweat more or less than other surfaces of the body?</i>	Yes – since the leg stump is encased

<i>Is it more sensitive than other surfaces of the body as to pain; for instance, the prick of a pin?</i>	Yes a little.
<i>How extensive is the area of altered sensation?</i> _____	
<i>Is it more sensitive than other surfaces of the body to touch?</i>	A little
<i>How far does the altered sensation extend?</i>	Mainly only in front of bone
<i>Does a touch give a sensation of pain?</i>	no.
<i>Is there excessive sensibility to extremes of heat and cold?</i>	no
(a) <i>When applied to the part, as hot or cold water?</i>	Not more than other parts
(b) <i>When dependent upon general changes in the temperature of the atmosphere, as in summer and winter?</i>	Not particularly
(c) <i>Is there excessive sensibility to changes in the weather, as at the approach of a storm or during the prevalence of certain winds?</i>	yes Yes storm – snow and other changes in weather feel more sever in left than arm
12. <i>What power of movement remains in the stump?</i>	Leg amputated above knee shot in through knee joint – stump is sound arm strong
13. <i>What artificial appliances have been tried?</i>	Dr. Bly pat. Wooden leg used wh 3 now
14. <i>Which has been satisfactory?</i>	my old bone + flesh leg
15. <i>What inconveniences have attended the wearing of artificial appliances?</i>	mainly the belt and straps keeping leg in place
<i>Can they be worn continuously (excepting at night)?</i>	Yes, I have not been without leg except at night since July 1864
16. <i>Give length and shape of stump.</i>	19 inches – natural shape some very hot days, when I take off leg for convenience tasks--- I perspire very easily
17. <i>What alterations have taken place in its appearance since operation?</i>	Of course not being used the muscles have decreased and the constant pressure of artificial leg redness [?] the stump in thickness

-
18. *Are there any involuntary twitchings or spasmodic movements at the stump?* At times
- What is the character of such movements?* Nervous twitchings caused sometimes by overexerting leg walking standing too long or if I get the stump ney[?] cold fluid [?]
19. *When were they first noted?* Ever since amputation
- How often do they recur?* No regularly
- What causes them?* Overexertion, colds
- Are they accompanied by pain?* Yes, nervous twitching causes sleeplessness
20. *Do you still feel the lost part?* yes
- If you do not feel it now, how long did you feel it after the amputation?* At first more acute especially in arm
21. *How much of the limb do you feel now, and how does the feeling differ from what it would be if the member were present?* Mainly the hand and fingers similar sensation so holding a pretty hot iron
22. *Does the limb feel as if shortened?* Some.
- Does it feel as if in one fixed position?* Yes,
- If not, does the apparent posture change from time to time?* I can move my fingers more
23. *Has this apparent position any relation to the position of the stump?* no [but] clinch them to make a fist nor strengthen the fingers altogether –when I attempt these movements the muscles in stump move

Gentlemen:

Should you really find any interest as to how we cripples [sic] get along can say that I think my general health has not suffered on [account] of my wounds Still this inconvenience and being deprived of free bodily actions of course I constantly feel and therefore have to live accordingly. Should you want any particular description of my wounds would refer you to our former regimental Surgeon Dr. Joseph Spiegelhalter at St Louis Missouri S.E. corner Lafayette and Missouri Avenue who at this time amputated both limbs for me, and thank him for his knowledge kind heart and my saved constitution all of which combined brought me through all right.

Hoping to have satisfied you as to answers –
 Your very respectful
 Henry S. Kircher

1. <i>Name and address:</i>	Clark A. Gardner. Richville St, Law. Co USA
2. <i>Age:</i>	54 Yrs, 3 mo, + 23 days
3. <i>Date of amputation of limb:</i>	Lt Arm Aug. 24th-1864. Right Leg May 24 1879
4. <i>Character of wound:</i>	Fistulous opening from necrosis of bone caused by using calomel
5. <i>Interval between wound and amputation:</i>	4 mos in the arm 14 yrs + days in leg
6. <i>Symptoms during this period:</i>	Chills a fever and severe pain at intervals with shortness of breath and general prostration
7. <i>Operation:</i>	Single flap in both.
<i>Nature of flaps, if known:</i>	not known
8. <i>Symptoms following operation – shock?</i>	Yes;
<i>duration of, if known?</i>	About 10 hours on 4th day;
<i>hemorrhage?</i>	Very little
<i>Pain – character?</i>	Build after 4th day;
<i>extent?</i>	About 4 days;
<i>seat?</i>	About the stump principally;
<i>severity? (This answer as fully as possible.)</i>	The pain was sharp + laucerating [sic] in the bones after each operation, until after the shock or reaction, then suffered no pain.
<i>Suppuration-extent?</i>	Considerable;
<i>duration?</i>	From the time the necrosis presented itself until the operation, in both instances.
<i>recurrence?</i>	_____
<i>Healing when complete?</i>	About 8 weeks in such instance
<i>When was artificial limb first worn?</i>	6 months after amputation
9. <i>Has the loss of your member altered the general health?</i>	No – not from that which I enjoyed before going into the U.S. Service
<i>Have there been any alterations of pulse?</i>	Caut stole [sic] – now is 72

<i>Body temperature?</i>	Normal now - 102° just before
<i>amputation digestion?</i>	Poor before, good since
<i>Intellectual powers?</i>	Unchanged
<i>Disposition?</i>	Less irritable
<i>or habits?</i>	Unchanged
<i>Has there been any change in the acuteness of the special senses, i.e., hearing, sight, sense of taste?</i>	No appreciable change other than from age
<i>What reasons have you for ascribing such alterations, if they are notes, to the injury or operation?</i>	-----
<i>Is there any alteration in the amount of sleep or of solid or liquid nourishment required?</i>	Sleep natural and appetite is good
<i>Was the amputation followed by any marked change in your ability for mental or bodily exertion?</i>	No not to any extent
10. <i>Record any increase in strength and size of remaining limbs if such has been noticed.</i>	-----
<i>Has the ability to use the remaining limbs been increased?</i>	Somewhat
11. <i>Does the skin of the stump differ from the rest of the body?</i>	
(1) <i>As to texture?</i>	no
(2) <i>Color?</i>	Yes. More of a pink.
(3) <i>Temperature?</i>	Normal
(4) <i>Growth of hair?</i>	Unchanged.
<i>Does it sweat more or less than other surfaces of the body?</i>	Rather more
<i>Is it more sensitive than other surfaces of the body as to pain; for instance, the prick of a pin?</i>	Yes.

<i>How extensive is the area of altered sensation?</i>	It is more sensitive over the entire self + stump
<i>Is it more sensitive than other surfaces of the body to touch?</i>	Yes
<i>How far does the altered sensation extend?</i>	For 6 inches above the stump
<i>Does a touch give a sensation of pain?</i>	Yes (slight).
<i>Is there excessive sensibility to extremes of heat and cold?</i>	There is to cold
(d) <i>When applied to the part, as hot or cold water?</i>	Yes with cold water
(e) <i>When dependent upon general changes in the temperature of the atmosphere, as in summer and winter?</i>	Yes in cold weather
(f) <i>Is there excessive sensibility to changes in the weather, as at the approach of a storm or during the prevalence of certain winds?</i>	There is an aching sensation in the bone.
12. <i>What power of movement remains in the stump?</i>	Nearly normal
13. <i>What artificial appliances have been tried?</i>	Tried Tuppens leg at Potsdam NY and Geo. R. Fullers leg, which I wear and have tried Selphos wrist + hand but can't wear
14. <i>Which has been satisfactory?</i>	The leg above described
15. <i>What inconveniences have attended the wearing of artificial appliances?</i>	A heavy disagreeable feeling, in the artificial hand tried.
<i>Can they be worn continuously (excepting at night)?</i>	The leg can
16. <i>Give length and shape of stump.</i>	That of arm is 5 ½ inches tapering thinly covered with integument. Leg is about 8 inches and more generously covered
17. <i>What alterations have taken place in its appearance since operation?</i>	Somewhat shrunken

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18. *Are there any involuntary twitchings or spasmodic movements at the stump?* Not now
- What is the character of such movements?* -----
19. *When were they first noted?* When first the leg was removed
- How often do they recur?* Not at all unless I hit the arm or leg
- What causes them?*
- Are they accompanied by pain?* Yes
20. *Do you still feel the lost part?* Yes
- If you do not feel it now, how long did you feel it after the amputation?*
21. *How much of the limb do you feel now, and how does the feeling differ from what it would be if the member were present?* Cant explain.
22. *Does the limb feel as if shortened?* Yes.
- Does it feel as if in one fixed position?* Where the artificial leg is out it does.
- If not, does the apparent posture change from time to time?* -----
- Has this apparent position any relation to the position of the stump?* Not that I can see.

SOURCE

Veterans' medical surveys, MSS 2/0241-03, S. Weir Mitchell papers, College of Physicians of Philadelphia Historical Medical Library.