Soldiers With Empty Sleeves: The Minie Ball and Civil War Medicine

by

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In American history the Civil War (1861-1865) served as the division between the early republic and the modern nation. Politically, economically, and technologically the U. S. emerged from the carnage of war like a phoenix, changed if not always improved. The nation was preserved, but at the cost of over 620,000 lives, more than all other American wars combined.[1] Various technologies were unified into a war machine directed toward the single purpose of victory. But technological knowledge is not uniform in its progression and certain areas lag behind. Among the new technology used during the Civil War was a more highly effective bullet. Known as the minie ball, the missile proved to be the single most deadly weapon in the entire war, causing over 90 percent of all wounds.[2] The minie ball combined increased range and destructive force to outstrip the knowledge of medical personnel who had to deal with its consequences.

The medical field, the "old technology" in this equation, was old in the types of knowledge, techniques, and technology it utilized but new as a profession. Unregulated and with no guidelines, a doctor could be produced in a year either by apprenticeship or by attending one of the newly developing medical schools. Dissection was illegal and the importance of hands on training was just beginning to be considered as useful. In essence a physician could be produced who had never actually laid hands on a patient.[3] It is not surprising, then, to observe that the war found some surgeons holding the surgical saw for the first time and completely at a loss as to its use. The two primary results of the use of the minie ball and the existence of such a primitive medical community were infection and amputation. Antisepsis was unknown until 1882, which accounts for the terrible suffering and loss of life caused by infections which today could be controlled readily if they were to occur at all.[4]

This paper will look at the effects of the minie ball in causing bone injuries to the extremities and at some of the modes of infection to illustrate what had to be endured when old technology met new. The focus will be on bone injuries, as they represent the most common wounds of the war and demonstrate the uniquely destructive efforts of the minie ball. Its conclusions are supported by the Union surgical records of the war which were compiled from 1877-1888 under the guidance of Surgeon General Joseph K. Barnes. In twelve volumes, these records contain detailed statisical information on the types and numbers of injuries, diseases, and the techniques used to treat these and many other medical problems of the war. They represent the most comprehensive and detailed primary Federal record for research into the practices of the Medical Department of the United States Army during the war. Documentation of the southern side indicates that medical circumstances paralleled that of the North. This examination will provide a

better understanding of the ghastly medical situation the common soldier faced if wounded, as well as the gradual evolution of a relatively adequate medical technology.

The minie ball came into existence around 1850 while Captain Claude Minie of the French army was improving an earlier type of ammunition produced by a man named Delvigne.[5] The bullet was perfected by Master Armorer James H. Burton, at Harpers Ferry Armory in Virginia, and first recorded on the U. S. Ordnance records in 1856. The bullet was an elongated soft lead projectile with a cone shaped base, and was cast slightly smaller than the grooved rifle bore for easy loading. When fired, the exploding powder caused the soft lead of the hollow base to expand, coming into contact with the rifling grooves. The grooves caused the bullet to spin during flight, stabilizing it as well as increasing its range and accuracy.[6] The minie ball used in a rifled weapon was accurate to 500 yards as compared to the old smooth bore weapon with round ball which was effective to only 100-150 yards.[7] Fired from the .58 calibur Model 1855 rifle musket, the minie could penetrate 11 inches into white pine at 200 yards and 6.33 inches into white pine at 600 yards. This rifle, produced at the Springfield, Ill. Armory and used with the minie ball, represented the most used armament of the war.[8]

The bullet itself is large by today's standards and this is another reason for its destructive power. Caliber indicates the diameter of the bullet so .58 caliber means the bullet is over half an inch thick. The .58 caliber bullet weighed 43.3 grams making these bullets formidable by any standard. This mass, combined with a soft bullet traveling at a slower velocity than modern metal jacketed bullets (but faster than old round balls), was often reshaped, distorted, and enlarged by traveling through other objects before hitting the final target. Surgeons state that the minie with its "pointed apex aided by its rotation, gives it the mechanical advantages of the wedge and the screw."[9] All of this is in contrast to the modern steel jacketed bullet that travels at such a high velocity that it is sterilized by heat, and, rather than distorting, produces a "neat aseptic hole through tissue and bone alike."[10] Clearly the Civil War soldier faced a far grimmer prospect of injury from shot than does his modern counterpart.

The type of entrance and exit wounds the minie caused depended largely upon the integrity of the projectile upon striking its target. As already mentioned, the minie had the strong tendency to distort and fragment. Fragments from one bullet could produce multiple wounds of entrance and exit, striking different parts or limbs of the body. For flesh wounds the primary danger from shot was ragged flesh and damage to muscular structures that was frequently complicated by gangrene, tetanus, and pyaemia (a deadly wound infection causing horrible abcesses throughout the body). The ragged wound track contaminated with foreign matter became inflamed and frequently abcessed.[11] Of 133,940 cases of flesh wounds, 4,560 proved fatal, a mortality rate of 3.9%.[12]

Once a soldier was wounded, he faced what today would be considered an odyssey into hell. For although by the later part of the war a certain uniformity of purpose was developed with the establishment of the ambulance service and field hospitals, a soldier still risked being left on the battlefield for days.[14] If the wound was grave the soldier would be placed on a makeshift table, frequently a door torn from its hinges or a few planks, and the surgeon would probe the wound with his fingers to locate the track of the bullet and possibly remove splinters of bone and clothing. If the doctor decided on

surgery, the usual course for bone injuries, the patient would be given whiskey, or more frequently chloroform or a combination of chloroform and ether.[15] The surgeon would ". . . snatch the knife from between his teeth, wipe it against his blood stained apron, and the cutting began."[16] A skilled surgeon could perform an amputation in fifteen minutes.

Surgery such as this, before the adoption of aseptic techniques, was a dangerous proposition. It could be suggested that to have let nature taken her course might have been a more humane and successful choice. Describing this grim pursuit, Civil War surgeon W. W. Keene stated:

> We operated in old bloodstained and often pus stained coats, the veterans of a hundred fights. We operated with clean hands in the social sense, but they were undisinfected hands . . . . We used undisinfected instruments from undisinfected plush lined cases, and still worse used marine sponges which had been used in prior pus cases and had been only washed in tap water. If a sponge or an instrument fell on the floor it was washed and squeezed in a basin of tap water and used as if it were clean.[17]

Fingers were used to probe wounds since they were thought to be less destructive to tissue than metal probes. During amputation, the time pressed surgeon not infrequently recruited his assistant to utilize fingers to pinch off arteries until the surgeon completed his task.[18]

Since the existence of germs was not known, post-surgical infections and outbreaks of gangrene and tetanus were thought to be caused by "mysterious airborne noxious effluvia," to be treated with fresh air and deodorants. Ironically these deodorants were excellent antiseptics. Alcohol, carbolic acid, iodine, bromine, mercuric chloride, and sodium hypochlorite were all used. These chemicals were used to clean floors, beds, urinals, and virtually anywhere else to keep the hospital area smelling fresh---everywhere except on the patient, the surgeon's hands, and the instruments.[19]

Infection in cases where discharge was odorless was seen as part of the healing process. "Laudable pus" was a sign that dead tissue was sloughing off and the wound was progessing well.[20] It should be noted this was not the case for the horrible infections such as gangrene which produced a terrible odor with the affected tissue turning green and then black, and was seen clearly for what it was, deadly.

Gangrene is the rotting away of flesh caused by the obstruction of blood flow, or by bacterial invasion. Gangrene was the black death of the Civil War; of 2,642 reported cases 1,142 proved fatal, a fatality rate of 46 percent. The bacterial variety struck entire wards and was the one infection that promoted the surgeon to put down his knife, ceasing operations till the epidemic had passed. The treatment for those infections was either acid or amputation depending on the surgeon's choice. If acid was chosen, sulphuric, hydrochloric, or nitrous acids would be placed on the affected tissues to burn out the infection.[21]

Usually the first contaminant to a shot injury after the bullet itself would be the field dressings. Soldiers were not issued any type of bandages so it would usually by a dirty handkerchief or a soiled shirt that was placed on the wound. An unpopular policy of the

Sanitation Department was the required use of washed, recycled hospital bandages. One washerwoman actually lost a finger from an infection incurred while washing bandages. Lint was a favorite dressing. Used to help wounds clot, when it was wadded into the wound, it caked and dried in place. For a time some surgeons advocated the use of this method for the closure of chest wounds with resultant lung collapse. The chest was scaled with lint and camoline and left to heal.[22]

Bandages were nearly always supplied wet and kept wet with a constant drip. Cool water did tend to sooth the wound but also provided the perfect environment for bacteria growth. At times poultices were used in place of cold water dressing since they seemed to encourage "suppuration" or the festering of an infection which, as already mentioned, was felt to be part of the healing process.

One method of wound cleanliness was misunderstood. During the Napoleonic wars it was noted that maggots kept wounds clean. Promptly forgotten, Civil War medicos fought hard to keep these symbols of filth at bay with acids and chloroform. Ironically Confederate surgeons, not blessed with ample supplies, rediscovered that the undressed maggoty wounds cleared up quickly, while other demaggoted injuries succumbed to gangrene. Maggots are scavengers that eat only diseased tissue and leave the healthy tissue alone.[24]

The final devastation of the minie ball is to be seen in what it did to the bony structures of the extremities. A brief explanation of the six classifications of bone injuries used by Civil War surgeons will illustrate what surgeons actually faced in deciding a patient's fate. The first classification, a contusion, occurred when a nearly spent ball struck and flattened against the bone without breaking it. The bone surface would be bruised and give the appearance of only being a flesh wound. Infection of the bone, or osteomelytis, would then occur, which was fatal if not discovered in time and the limb amputated. Fortunately this type of injury was not that common. The next group were simple fractures. Equally uncommon, they were caused by large projectiles such as cannon balls. Partial fractures were caused by a bullet grazing the bone and taking a portion with it. The fourth classification, penetrations, were another uncommon injury associated with lodging of the bullet in the bone with little splintering or fissuring. Perforations were injuries where the bullet cleanly traveled through the bone, also with little splintering or fissuring. The last classification, complete fractures, represented the majority of bone injuries caused by minie balls. These wounds were, as suggested, complete breaks of the bones, usually with much splintering. Frequently, the bones were broken into fragments and driven into surrounding tissues. Ira Blanchard, a soldier with Sherman's army who was wounded in the shoulder during the battle of Atlanta, experienced the result of such a complete fracture as his infected wound gave up "twenty four pieces of bone . . . " This occurred after he was moved to a Marietta hospital in a wagon over rough roads, having already survived two weeks lying in the woods wounded. Blanchard, later moved to the Union hospital in Rome, Georgia, made a full recovery.[25]

Usually splintering like Blanchard's indicated a bone too destroyed to rejoin during the healing process. In cases such as these the surgeon was faced with making an immediate decision to either amputate or attempt to save the limb through the techniques of conservation and excision.[26]

Conservation meant non-interference beyond the basic tending and dressing of the wound. This would seem to be the best route to take if at all possible. Such a case is illustrated by the experience of Dr. John Gardner Perry, a Union surgeon whose leg was broken and who was taken to a field hospital for treatment. Removing his boot, the attending surgeon said "gangrene" and told Perry that the leg must come off. Dr. Perry refused, stating that it was only inflamed and dirty. As Perry put it, "I was determined to save that leg, and to avoid any serious conflict felt that I must, was it were, escape from the hospital."[27] The end result was that Dr. Perry signed his own passes to make his way back to New York, where he was unable to find a surgeon and was forced to set his own leg with the aid of his brother-in-law. The leg healed nicely. The date from Federal records does support Dr. Perry's extreme pursuit of conservation, but also indicates that only those cases that were the least severe were treated in this manner. In some cases conservation was attempted but subsequently abandoned in favor of excisions or amputations.[28]

A trend toward conservation developed as the war progressed and doctors became more familiar with shot injuries. It is safe to say that many limbs were saved in the latter part of the war that would have been lost during an earlier period.[29]

One reason conservation was not used more often was the inadequate means of splinting fractures. The splint, today seen as a basic medical appliance, was then fashioned out of whatever was available, including bunches of straw or planks. For shot fractures to heal, some method of isolation and support had to be used. Without immobilization, bones did not reconnect during healing, and if they did, gross deformities would result. In 1863, surgeon John T. Hodgen invented the Hodgen splint which offered a better extension of the limb and prevented contraction. Offering maximum comfort to the patient, it was constructed in such a way as to allow for the dressing of wounds without interference to the fracture. So successful was this splint that it is still used today.[30]

The next choice for the surgeon was excision, the removal of part of a bone in an attempt to preserve a limb. Technique was crude and, even if a limb was preserved, chances were very good that it would be a cosmetic gesture because arms and legs were shortened, and muscles destroyed. Reconstructive surgery did not exist, so that this procedure was only a grim attempt at modifying amputation. Of 4,656 documented cases of excision, 305 required a follow up amputation and 1,213 cases proved fatal. This procedure was usually attempted in the upper extremities since there seemed to be more emphasis placed on keeping useful upper limbs. Out of these 4,656 cases, only 815, or three percent, were excisions of the lower limbs. Another factor was the high fatality rate in those operations that were attempted. Excision of the arm had a fatality rate of about 20 percent, while the same operation in the thigh saw a fatality rate of 70 percent.[31] Contemporary speculation as to the cause of this is not given, but it could be suggested that larger amounts of tissue were involved as well as the increased difficulty of tending and keeping sanitary the lower portions of the body while lying prone.

The final choice the surgeon faced was amputation. Much comment was made during the war of the "butcher surgeons" performing needless mutilations, but the military surgeons, not surprisingly, disagreed. The Union surgical records do support the

doctors' views since the likelihood of death increased by 11 percent if amputation was postponed. In fact, the surgeons writing in the Union surgical records noted that in many cases too few amputations were performed. They admit to an early proclivity of untested surgeons to wield the knife but that, as the war progressed, the surgeons and Medical Department gained more experience in making such decisions.[32]

The surgery itself was broken into 3 divisions of time, primary intermediary, and secondary, although in some documents it is only classed as primary and secondary. Although primary surgery represents a majority of operations, it is necessary to explain the distinctions between the three groups, since they represent divisions of time that were devised and seen as important by the Civil War surgeons. As already stated, primary surgery, operations performed within 48 hours of injury, was preferred. This type of operation accounted for two-thirds of all amputations.[33] This was the best time frame in which to operate because swelling and infection had not set in yet. In many cases surgery that could not be done while in the primary stage was delayed until healing had begun in the secondary stage.[34]

The intermediary stage was the third to thirtieth day after injury. This period was dangerous with a fatality rate reaching 35 percent, while primary operations had a fatality rate of 24 percent.[35]

Secondary stage operations, which were the most frequently done operations after primary, were those performed after thirty days after the initial injury. The fatality rate for those cases was 29 percent.[36]

As already stated, two-thirds of all shot injuries were to the extremities. The "Surgical History" recorded 174,206 such cases. Of these, 60,266 represent bone injuries of which 12,861, or 22 percent, proved fatal. Amputations were performed 48 percent of the time in those 60,266 cases.[37]

Once again as was evident in excision, a disparity in fatality rates is seen when looking at the breakdown of figures for upper and lower amputations. Though fairly equal in number (32,992 cases for upper extremities and 27,274 cases for lower extremities), 16,992 amputations were performed on the upper extremities with 1,971 fatalities, while 13,833 amputations on the lower extremities involved 5,488 fatalities.[38] The amputation of a leg was more than twice as likely to be fatal than the loss of an arm.

The use of the minie ball prompted much refinement in amputation technique during the war, and is another area much discussed in the "Medical History". The two primary methods of amputation were the flap method and the circular method. The flap method entailed cutting a **U** shaped flap of skin or muscle below the point of amputation. This flap would then be drawn back over the stump and sutured to provide for a neat, well cushioned stump which would lend itself to the use of an artificial limb. This was the most used method since it took less time and did provide for a better stump.[39] The disadvantages were that it sacrificed more of the limb and made a larger wound. On the other hand the circular method required less skill. The surgeon made a straight cut through the limb slightly below where the bone would be severed. This done, the wound would be stitched in as though a bag had been closed by a string drawn together. Some inexperienced surgeons began surgery by the flap method, but resorted to the circular method when they did not leave enough tissue for the flap, or left a conical stump with

the bone protruding.[40] Surgical inexperience such as this caused horrific suffering and was but one of the realities facing the wounded Civil War soldier.

Every war serves as a testing ground for new techniques in medicine. Unfortunately, during the Civil War, a brutal modern war, new techniques were not yet honed and refined. An entire profession had to discover itself, adapt and invent techniques in an age before antiseptics. The minie ball helped make warfare modern by making death more efficient. Ironically, two of the ways in which we as a nation measure progress is the efficiency by which we can cause death and the expertise by which we save life.

NOTES

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3. Mary Roth Walsh, Doctors Wanted: No Women Need Apply, (New Haven: Yale University Press, 1977), 5, 9.

4. Stewart Brooks, Civil War Medicine, (Springfield, Ill.: Thomas Books, 1966), 94.

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6. Robert Held, ed., Arms and Armor Annual, (Northfield, Ill.: Digest Books, Inc., 1973), 22.

7. McKee, 10.

8. Ibid., 23.

9. Barnes, 8:709.

10. George Washington Adams, Doctors in Blue: The Medical History of the Union Army, (New York: Collier Books, 1961), 102.

11. Barnes, 8:711, 713.

12. Barnes, 12:870.

13. Brooks, 39.

14. Ira Blanchard, I Marched With Sherman: Civil War Memories of the 20th Illinois Volunteer Infantry (San Francisco: J. D. Huff and Company, 1992), 140.

15. H. H. Cunningham, Doctors in Gray: The Confederate Medical Service, (Baton Rouge: Louisiana State

Univ. Press, 1958), 227.

16. Brooks, 90.

17. Adams, 111.

18. Dammann, 5.

19. Brooks, 77-78.

20. Brooks, 81.

21. Dammann, 55; Brooks, 81; Barnes, 2:313.

22. Adams, 104, 112; Brooks, 88.

23. Adams, 112-113.

24. Brooks, 87.

25. Barnes, 8:713, 718-719, 723; Blanchard, 141.

26. Margaret Derby Perry, John Gardner Perry: Letters from a Surgeon of the Civil War, (Boston: Little, Brown and Company, 1906), 52.

28. Barnes, 8:872, 874.

29. Ibid., 874.

30. Adams, 118.

31. Barnes, 12:870, 872, 874-75.

32. Ibid., 870.

33. Ibid., 878-879.

34. Adams, 119.

35. Barnes, 12:878.

36. Ibid., 879.

37. Ibid., 877.

38. Ibid, 871.

39. Adams, 119.

40. Barnes, 12:880.