

Review of Treatment of Gunshot Wounds to Head in Late 19th Century

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Key words

- Civil war
- Gunshot wounds
- Head injury
- Surgery

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INTRODUCTION

Gunshot wound mortality during the late 19th century was extremely high. Major wars such as the American Civil War (1861–1865) brought the rapid development of new and more accurate ballistic technology. Inventions such as the Minie ball caused massive compound fractures in any part of the body struck.¹ Fatalities from penetration by one of those bullets were 87% in the abdomen and 62% in the chest.² To make matters worse, physicians during the American Civil War had limited experience in battlefield trauma and there were long delays between time of injury and surgery.^{3,4} Furthermore, surgical procedures were extremely unsanitary; most were performed outside in the sunlight without gloves or adequate disinfectant techniques. Not until 1863 were bromine and potassium bromide used for dressings.⁵ Treatment involving surgical gauze with carbolic acid, and iodine was also a major advance in preventing deaths from microbial infection.⁶ Nevertheless, although these techniques were available, they were seldomly used on the battlefield owing to the large

■ **INTRODUCTION:** During the late 19th century, the seeds of modern neurosurgery were planted to bloom into what it is now known. Wars such as the American Civil War and Crimean War drove the need to find better ways of preventing mortality from gunshot wounds to the head. However, the mortality rate from all major surgical procedures to the head, neck, and face remained staggering. Herein, we describe the surgical treatments for head and neck injuries in order to improve our understanding of neurosurgical procedures performed during the late 19th century.

■ **METHODS:** A literature search was conducted using PubMed and Google Books for available articles pertaining to treatment for gunshot wounds to the head during the 19th century. Search terms included “Gunshot wounds, Treatment, Civil War,” “Gunshot wound, Treatment 19th century,” and “Gunshot wounds, Treatment, 1800s.” Literature was excluded if not in English or if no translation was provided. Most of the information was taken from the International Encyclopedia of Surgery Volume II.

■ **RESULTS:** Surgical care for gunshot wounds to the cranium were based on depth and involved finding the bullet, controlling the bleeding, and preventing further brain injury. Surgical treatment for a gunshot wound to the face or neck involved controlling the bleeding, with a focus on maintaining the airway.

■ **CONCLUSIONS:** Because of improved understanding of infectious processes and technologic advances in surgical equipment, the late 19th century was a major milestone in creating modern day neurosurgery. The methodology behind today's treatments is no different from that of the late 19th century.

number of injuries and lack of skilled Army physicians.¹

Despite all these limitations, the physicians were able to perform surgical procedures that were complex for the day. Neurosurgical procedures were especially common on the battlefield because of the large number of gunshot wounds to the head and spine. Remarkably, for this time period, neurosurgeons still had some significant successes. Although surgeons were heavily criticized at times for being too quick to operate, the foundation for modern neurosurgery was laid on the battlefields of the 19th century.

The most common surgical procedure for a gunshot wound in the late 19th century was amputation,⁷ which was obviously not an option for gunshot wounds to the head. New surgical techniques had to be developed, and new detailed procedures

had to be designed to treat such patients. The focus of this treatment was on preventing further neurologic injury, controlling bleeding, and minimizing the risk of meningoenitis, or brain fever, as it was commonly referred to during that era.⁸

Herein, we describe the surgical treatments for head and neck injuries, as mostly described in The International Encyclopedia of Surgery Volume II, in order to improve our understanding of neurosurgical procedures performed during the late 19th century, while also comparing the field of neurosurgery during those times to today's practices.⁸

METHODS

A literature search was conducted using PubMed and Google Books for available

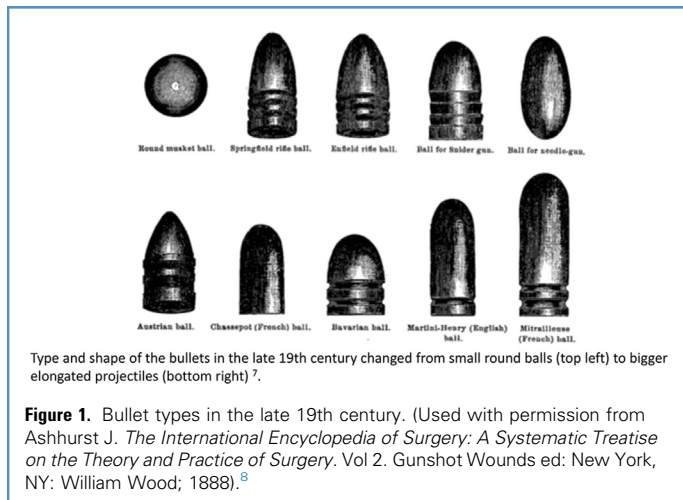


Figure 1. Bullet types in the late 19th century. (Used with permission from Ashhurst J. *The International Encyclopedia of Surgery: A Systematic Treatise on the Theory and Practice of Surgery*. Vol 2. Gunshot Wounds ed: New York, NY: William Wood; 1888).⁸

articles pertaining to treatment for gunshot wounds to the head during the 19th century. Search terms included “Gunshot wounds, Treatment, Civil War”, “Gunshot wound, Treatment 19th century”, and “Gunshot wounds, Treatment, 1800s.” Literature was excluded if not in English or if no translation was provided. Most of the information was taken from the International Encyclopedia of Surgery Volume II.

GUNSHOT WOUNDS TO THE HEAD

Superficial Scalp Wounds

Superficial gunshot wounds to the scalp carried a favorable prognosis in the late 19th century, with only a 2% mortality rate.⁸ However, any break in the skin was considered a serious risk for infection.⁴

Little effort was required to detect scalp wounds as palpation sufficed. Exceptions to this were when bullets traveled up from the neck or face subcutaneously; birdshots or small pistol bullets (Figures 1 and 2), which could be flattened and not easily palpated, were used; or shots to the temporal fossa were being addressed. Shots to the temporal fossa could often be located or diagnosed by moving the jaw to elicit focal or referred pain.⁸ Larger bullets were removed through the impact hole or the counter opening, while small bullets were often left in place because it was thought they would either be revealed later, as the underlying wound healed, or remain harmless. It was recommended at the time that superficial wounds be left open as they would readily heal, as is a common practice

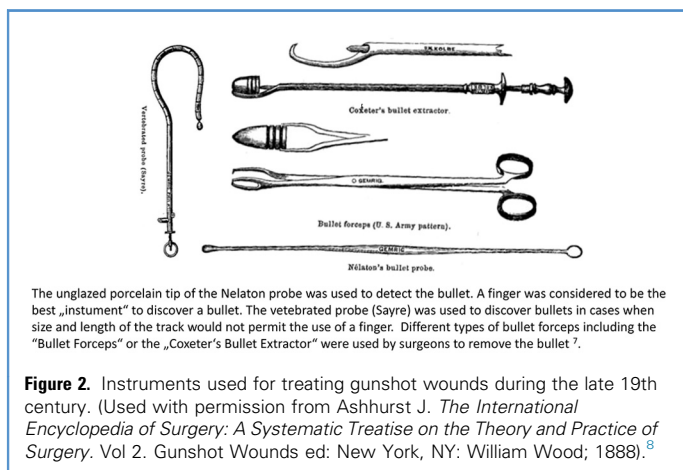


Figure 2. Instruments used for treating gunshot wounds during the late 19th century. (Used with permission from Ashhurst J. *The International Encyclopedia of Surgery: A Systematic Treatise on the Theory and Practice of Surgery*. Vol 2. Gunshot Wounds ed: New York, NY: William Wood; 1888).⁸

today. The recommended treatment for deep scalp wounds was sutures. Sutures were also recommended for large scalp wounds, which is similar to today’s standards.⁸

Cranial Contusions

The treatment for cranial contusions was rest, and “cooling” was recommended in the event of inflammation, using either ice or a coil of rubber tubing called the mediate-irrigation coil of Petitgand (Figure 3), through which cold water was continuously infused. In the event of suppurative subperiostitis, the pericranium would be exposed using a saw or trephine and completely removed.⁸ Exposure and denudation of the bone (Figures 4 and 5) were similar to the procedures used today. The hair was shaved, followed by a semilunar incision that allowed the dissection to be performed.⁹

Trephining was a practice that had been around for centuries before becoming readily accepted in neurosurgery. It was first recommended by surgeon Barry Larrey and subsequently Sir Victor Horsley.¹⁰ One major problem with trephining was the risk of middle meningeal artery rupture, which often caused large epidural hematomas requiring additional surgery.⁴ Middle meningeal artery rupture was treated by placing lint inside the cranium to compress it. Today’s practice entails complete ligation of the vessel. It was also recommended that the artery be indirectly compressed with a plate of lead bent to hug both sides of the bone harboring the artery or by using a wax seal, which is similar to today’s bone wax that is used to essentially seal off bony trabecular bleeding.⁹ When there was suspected bleeding due to a ruptured venous sinus or meningeal vessel, trephining was recommended rather than the use of a saw, as it was believed that overall blood loss would be less as trephining was less likely to damage the underlying blood vessels.⁸ In the vast majority of reported cases, the mortality rate from this technique was still high even after adequate antiseptic treatment. However, the procedure was still performed because untreated cases were presumed to be most certainly fatal. One general critique of neurosurgical procedures in the 19th century was the

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