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Topical review

In praise of anesthesia: Two case studies of pain and suffering during major surgical procedures with and without anesthesia in the United States Civil War-1861–65

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HIGHLIGHTS

- Before 1846–47 no effective drugs for pain relief during surgery existed.
- Ether (1846) and chloroform (1847) made pain-free operations possible.
- Efficacy and safety of ether (1846) and chloroform (1847) is the most important discovery in medicine in the last 200 years.
- Amputation without and with anesthesia is dramatically illustrated in two case-stories of the American civil war (1863–65).

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ABSTRACT

Background: The United States Civil War (1861–1865) pitted the more populous industrialized North (Union) against the mainly agricultural slaveholding South (Confederacy). This conflict cost an enormous number of lives, with recent estimates mentioning a total mortality greater than 700,000 combatants [1]. Although sulfuric ether (ETH) and chloroform (CHL) were available since Morton's use of the former in 1846 and the employment of the latter in 1847, and even though inhalational agents were used in Crimean war (1853–1856) and the Mexican-American War (1846–1848), the United States Civil War gave military surgeons on both sides the opportunity to experience the use of these two agents because of the large number of casualties.

Methods: Research of historic archives illustrates the dramatic control of surgical pain made possible with introduction of two general anesthetic and analgesic drugs in 1846 and 1847.

Results: An appreciation of the importance of anesthesia during surgical procedures can be noted in the poignant and at times hair raising cases of two left arm amputations carried out under appalling circumstances during the United States Civil War. In the first-case the amputation was delayed for nearly five days after the wounding of Private Winchell who served in an elite sharpshooter brigade and was captured by the Confederate Army during battle. The amputation was performed without anesthesia and the voice of the Private himself narrates his dreadful experience. The postoperative course was incredible as he received no analgesia and survived a delirious comatose state lying on the ground in the intense summer heat.

Thomas Jonathan "Stonewall" Jackson was a famous ascetic Confederate General who helped defeat the Union forces at the Battle of Chancellorsville on May 2, 1863. In the ensuing near-darkness, Jackson was fired upon by his own friendly troops where he suffered multiple gunshot wounds on his right hand as well as a ball in the upper humerus of the left arm similar to that of Private Winchell. Transported to a field hospital about thirty miles away, the evacuation was carried out under artillery fire and the General dropped from the stretcher at least twice before arriving at the field hospital. There, a team of surgeons operated on "Stonewall", using open drop chloroform, the surgery taking 50 min, anesthesia times of one hour with General Jackson awake and speaking with clarity shortly after the termination of the anesthesia. A brief explanation of the use of anesthetics in the military environment during the Crimean, Mexican American and the United States Civil War is also presented.

Conclusion and implications: Two case stories illustrate the profound improvement in surgical pain made possible with ether and chloroform only 160 years ago. Surgeons and patients nowadays have no ideas what these most important improvements in modern medicine means, unless "reliving" the true hell of pain surgery was before ether and chloroform.

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With/Without Éclat
Inhumane:
IT cast no shadow
IT lies hidden in the
Pulsations through the
Circuits,
Betrayed by the mind
Oh Pain!
Oh Dolor!
Oh Schmerz!
Oh Doleur!
Oh Harbor of Madness!
God/Lord! Succor me with Lethe
Place me in the arms of a
Beneficent Aesculapius
To work his/her magic without a
TOLL
~CON PERMISO~
(Maurice S. Albin)
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1. Introduction

As anesthesiologists, we often lose sight of the incredible changes in the lives of humanity brought about by the introduction of anesthesia into the medical armamentarium. Conversely, we also forget the unbelievable suffering that can occur when one is subjected to surgical procedures bereft of the use of anesthesia. This is brought to mind by two exemplary experiences from the United States Civil War that will be presented below.

It is still a widely held belief that the sole anesthetic agent used during the American Civil War of 1861–1865, was contained in the whiskey bottle. Contrary to this assumption, it must be remembered that sulfuric ether (ETH) was used by Morton in 1846 at the Massachusetts General Hospital and a year later Simpson reported on the employment of chloroform (CHL) [2,3].

Historically, Crawford Williamson Long was the first to use ETH for a surgical procedure in 1842, although he did not publish his results until 1849 [4,5]. The use of anesthetics in military conflicts could be said to have started in the Mexican-American War (1846–1848) with the application of ETH, by Barton in 1846, on the U.S. side, and probable use of ETH by Pedro Van Derlinden in 1847 on the Mexican side [6]. The major use of anesthetics in the military took place during the Crimean War (1853–1866), when tens of thousands of surgical procedures were carried out using open drop chloroform [7,8].

During the United States Civil War, the overwhelming majority of the surgical procedures consisted of extremity amputations carried out under field conditions often near open lantern flames and since portability was also a consideration, the anesthetic agent of choice was CHL, with ETH being used preponderantly in the rear echelon hospitals in both the Union and Confederate Armies [9].

Interestingly, the U.S. Army Medical Corps did publish statistical data on the use of anesthetics during the U.S. Civil War in a landmark six volume publication of more than 6000 pages entitled, *"The Medical and Surgical History of the War of The Rebellion"* (MSHWR), in which it was indicated that at least 80,000 anesthetics were employed, the main source material being the Union Army Medical Corps Records [10]. Based on the relationship of the number of casualties to surgical procedures, Albin has estimated that that at least 125,000 anesthetics were given to both the Union and Confederate Armies [11].

Actually, the MSHWR contains a prospective study of 8900 procedures where chloroform was used in 6784 cases (72.2%), ether in 1305 cases (14.7%) and a mixture of chloroform–ether in 811 cases (9.1%). Surprisingly, the mortality rate was low, being 0.54% (37 cases) for chloroform, 0.3% (4 cases) for ether, and 0.24% (2 cases) for the CHL-ETH mixture. The United States Civil War was important in indoctrinating many thousands of Union and Confederate Physicians in the use of anesthetics, many of whom had limited or no experience with these agents.

Although the first use of ether predated the Civil War by more than 15 years, there was still resistance on the part of the surgeons to the idea of using anesthetics in the healthy American male, based in part on the concept of *"manliness"* and that men do not cry since their inherent masculine characteristics allows them to suffer pain [12]. This psychosocial state is emphasized in the first Civil War tale mentioned in the title. Another factor was the concept that since a surgical procedure may bring about a depression of the vital signs, the *"stimulation"* caused by the knife can indeed be beneficial [13].

2. Two cases dramatically illustrating amputation without and with pain-free surgery

2.1. Arm-amputation without anesthesia

Private James Winchell belonged to Company D of Berdan's First United States Sharpshooters, an elite Union unit that participated in many of the important United States Civil War engagements and also suffered extensive casualties [14]. He was captured by Confederate forces during the Battle of Gaines Mill on June 27, 1862, a battle where the Confederate General "Stonewall" Jackson also participated. Winchell suffered a wound in his left arm where a musket ball struck his humerus between the elbow and shoulder passing through the bone and *"splintering it up fine"* [14]. A physician told him that his arm would be amputated at the shoulder. Since Winchell was in a group of captured prisoners, with but one surgeon and one assistant to take care of more than 500 wounded, he was told he had to wait, since many of the wounded were worse off than he was.

The structure used as a field hospital where he was taken prisoner was the basement of a brick house about three feet below ground and under artillery and small arms fire where shells and the *"balls came clicking through the windows utterly regardless of the hospital flag on top"* [14]. A surgeon came by and examined him by also *"putting his thumb through the hole [wound] and bandaged splints on the arm"* [14]. Winchell was then carried out of the basement and put on the ground near the doorway in the sun and alongside three dead Union soldiers. Feeling the hot sun, he went *"into the yard to a scrub oak tree, where, picking up some scattering straw and stone for a pillow, I lay hours among vermin, fleas, mosquitoes, maggots and*

flies and oh! The last mentioned was the worst. I can feel my arm ache yet, so tired was I keeping them away" [14].

The next day a detail of 20 Confederate soldiers appeared to take charge of the Union prisoners. Nearly five days had now elapsed since incurring his wound and he gave up hope of having his condition treated. Every time he would approach the surgeons, they would say he could have his operation as soon as they had triaged the more serious cases. Aside from not having his amputation, Pvt. Winchell had little to eat except for a small morsel of a biscuit and a handful of raspberries. About noon on July 1, 1862, his fortune changed when a surgeon, Dr. White, approached him and said, "Young man, are you going to have your arm taken off, or are you going to be here and let the maggots eat you up?"[14].

I will now let Private Winchell's narrative carry on in full:

> "*I asked if he had any chloroform or quinine or whisky, to which he replied 'no, and I have no time to dilly-dally with you.' I finally said it was hard, but to go ahead and take it off. He got hold of my arm, pulled the bandage off, pushed his thumb through the wound and told me to 'come on,' and helping me up we walked to the amputation table where they were taking off a young man's arm near the elbow. He lay there like a man, and when they had finished, Surgeon White asked if I could keep as still as he did that 'he is a soldier, every inch of him.' I replied that we could tell better, when this job was through. They put me on the table, cut off blouse and shirt sleeves filled with maggots, and after a lot of preliminary (cruel) poking and careless feeling around my arm and shoulder – it appeared rough to me – they made me sit up in a chair, and wanted to hold my legs, but I said 'no, I won't kick you, but steady my shoulders,' then set my teeth together and clinched my hand into my hair, and told them to go on. After cutting the top part of my arm and taking out the bone, they wanted me to rest and hour or so; to which I refused; as they had mangled my arm I wanted but one job of it for I was just as ready, I said to kick the bucket then as in an hour. To this they replied: 'He's pretty spunky, let's make a good job of it*.'
>
> *Then they finished it, while I gasped for breath and the lower jaw dropped in spite of my firm clinch. I was then led away a short distance and left to lie on the hot sand – like a bake oven – and could feel the hairs crawl on my head as large apparently as my fingers. Burning with fiery pain, flushed with the fiery hot bed of sand, I arose wild with the pain and extreme heat and began to look for a cooler place to lie down to die, as I then thought I would; went up a stairway nearby and entered a room where men were lying on the floor. There was one bed and one man lying on it, and I sat on the foot of it pulled off my shoes and crawled beside him. Neither spoke, but if I had just entered into a furnace I would not have burned with more pain or fever. I lay here but a few moments, wild and nearly delirious, when I got up and went out, not stopping for my shoes, to the little oak tree and my old straw nest, where I rolled and groaned with burning pains until a captain of the 14th Regulars told me to take a little of his advice, to lie down and keep still, that the rolling only made me feel worse. I at first wouldn't be consoled, but cried in my agony that, "I wished to God I never had my arm taken off, I could stand it but a short time longer." He said then: "Young man, I wish I had as good a chance to get well as you have, for I am shot clear through the body*" [14].

Private Winchell was eventually sent back to the Union lines, then to a military hospital in Philadelphia, after which he was discharged to civilian life with a pension.

2.2. Arm-amputation with anesthesia

The appalling suffering by Private Winchell can be compared to the wounding and treatment of the famous General Thomas J. "Stonewall" Jackson, who was wounded during the Battle of Chancellorsville, Virginia, on May 2, 1863, where he was mistakenly shot by troops of the Confederate 18th North Carolina Regiment [15]. Jackson received multiple wounds, one ball entering the palm of his right hand, fracturing two of the bones and coming to rest under the skin on the back of the right hand. Jackson suffered a wound similar to that of Private Winchell with the left arm receiving a ball in the upper humerus severing the brachial artery and fracturing the bone.

The second wound occurred when a ball entered the outside of the left forearm, an inch below the elbow, exiting in the opposite side, just above the wrist. Complicating these wounds was that right after the fusillade wounded him, Jackson's horse baulked, and running between two trees, he hit his head on a low lying bough, which almost unseated him. Bleeding profusely from his wounds, his aides removed him from the saddle, and one dressed his injuries, binding one handkerchief above and one below the wounds. He could not be evacuated by ambulance since the field was under artillery fire. He was then lifted up and dragged towards the Confederate lines.

Finally placed on a litter, one of the litter-bearers was killed by exploding shrapnel and he was then again dragged until another litter was found. Unfortunately, one of the litter-bearers stumbled and General Jackson suffered a painful fall which probably had fateful consequences. Finally, he was placed in an ambulance and moved 30 miles to a field hospital at the Wilderness Tavern and attended by Hunter Holmes McGuire, the famed surgeon to the Stonewall Brigade. He was a personal friend of General Jackson and one of the Confederate surgeons with a great deal of experience in the use of anesthetics, particularly chloroform.

Dr. McGuire informed Jackson that his left arm would have to be amputated and Jackson concurred. A number of other surgeons were present and a reconstruction of the surgical procedure indicates the anesthetist was a Dr. Colman, the surgeon was Dr. Hunter Holmes McGuire assisted by Dr. Walls and who also assisted Dr. McGuire in holding the light above the table where the surgery took place. Chloroform was the anesthetic used with the agent being dropped on a piece of cloth in the shape of a cone. *"As the chloroform was being administered and with it the relief of the pain he was suffering, Jackson exclaimed, "What an infinite blessing, and continued to repeat the word "blessing" until he became unconscious"* [15].

Anesthesia was started about 2:00 AM on May 3rd, 1863, the surgery starting about 2:10 AM and finishing about 3:00 AM with termination of anesthesia about 3:10 AM. A circular amputation technique was employed and General Jackson returned to the awake state rapidly after the termination of the anesthesia. Unfortunately, after a seemingly rapid recovery, "Stonewall" Jackson developed pneumonia and died a week later, his death thought to be due to a pulmonary contusion and pneumonia suffered when he fell off the litter while being transported to an ambulance.

3. Conclusions

The triumph over pain and suffering afforded by the use of anesthesia is indeed a signal accomplishment in the history of Medicine and should be borne with pride by those in our practice of Anesthesiology.

Conflict of interest

None declared.

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