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- Forensics
- Sacral Nerve Stimulation
- History of Anesthesia for Circumcision

PRAETERITO DOCET

THE PAST TEACHES

About the Cover



The Cloisters Museum in Fort Tryon Park, New York contains more than 5,000 pieces of medieval domestic and religious art and represents the finest collection of Byzantine to early Renaissance masterpieces outside of Europe. Artwork had been originally collected by the eccentric American sculptor George Grey Barnard (1863-1938) and sold to John D. Rockefeller, Jr. (JDR)(1874-1960) in 1925 who envisioned a grand residence in the medieval tradition to permanently house these treasures. The grounds were designed by Frederick Olmsted, Jr. (1870-1957) and the building, designed by Charles Collens (1873-1956), incorporates designs and actual physical elements from French abbeys purchased, transported across the Atlantic, and reassembled in New York in the 1930s. Stained glass roundels were popular elements of many religious and secular windows as they were fairly easy to construct and install, and could be more easily replaced than the intricate glasswork involving hundreds of individually soldered pieces. The New York collector Roy G. Thomas sold a number of Upper Rhineland roundels from German c. 1480-1490 abbeys to JDR including a series on the life of Jesus. This month's cover of the International Journal of Urologic History features the

"Roundel with Circumcision" and the abbreviated inscription "Nunc dimittis [[se]r[v]um tuu[m] d[omi]ne" or "Lord, you release your servant" [Luke 2:29]. The roundel is installed in the resplendent 'Glass Gallery' overlooking the Bonnefont Cloister facing the southern. Artwork depicting the circumcision of Jesus was a popular motif throughout medieval and Renaissance Europe, one of which is featured in the article by Lutnick et al. exploring early uses of anesthesia. The inset to the left reveals that at even at a diameter of just over 7 inches, the unknown artist is still able to portray the expansive subtleties of human emotion expected at the solemn and ancient rite of passage of a *brit milah*.

Image Source: Metropolitan Museum of Art, New York, The Cloisters Collection, 1932: Acc. No 32.24.3

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Editorial Office: 40 Sunshine Cottage, 19 Skyline Drive, Suite 1S B45, Valhalla, NY 10595.
E-Correspondence: editor@ijuh.org

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Foreward

Nathaniel P Rathbun (1876-1949), the 25th President of the American Urologic Association, had long been recognized as representing the “brilliant talent so sorely needed in the profession” and had become a champion of education and training.(1) He often marveled at the history of the field once writing “if we but ponder for a moment over the accomplishments of the last thirty-five years, we cannot but stand in almost reverential awe before the marvels of our day, which we are prone now to accept almost casually.”(2) His presidential address, given in the spring of 1934 during the annual meeting in Atlantic City, was in part a plea to avoid “the smug complacency” that makes one prone to assume advances in the present may long last.

“It requires the wide perspective of years, many years, many decades perhaps, to properly evaluate the events of any given time. Many things which seem of minor importance may well assume major significance and other things which seems now of paramount importance may, in the course of time, be relegated to oblivion.”

The study of urologic history, then, is not only to celebrate the advances of the past that have propelled the field to greatness but to contemplate discoveries long discarded, from out-dated clinical approaches to techniques or technologies that may now only exist in a ‘gizmo graveyard’. This issue of the International Journal of Urological History includes articles that demonstrate how some urologic procedures have maintained their relevance for 5,000 years; others not so much. Lutnick et al. provide convincing evidence that as long as circumcision has been practiced, so have there been some efforts, perhaps with limited efficacy, for regional or systemic anesthesia. (3) Lay et al. write on the development of neuromodulation in urology which, while now a standard of care, is a descendent of efforts to harness the mysterious forces of electricity to combat misunderstood ailments that bordered on charlatanism. (5) Coiner et al. provide a compelling paper on battlefield trophy taking and forensics that demonstrate how far even military thought has evolved to honor the solemnity and autonomy of the war dead.(6)

Hugh Hampton Young, the founder of the Journal of Urology in 1917, had hoped to include the history of the field in every issue (See Locations, this issue, page 27). The business of modern publishing may limit the inclusion of history papers that generate less ‘impact factor’ value than clinical papers. Young’s philosophy about history, however, like Rathbun’s, was about the future. Rathbun himself reminded that Atlantic City audience of 1934 that “history and contemplation of our many unsolved problems must convince all of us that we have by no means reached the millennium”. Scholarship in urologic history will help fulfill that goal, to reflect upon the successes of the past while refining the objectives of opportunities to improve patient care that are yet to come.

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History of Sacral Neuromodulation in Urology

Raymond Lay, Adam Visca, Gareth Warren, Ronald Rabinowitz, Divya Ajay*

From the School of Medicine and Dentistry, University of Rochester, Rochester, NY (RL, AV); Department of Urology, University of Rochester Medical Center, Rochester, NY (GW, RR, DA)

*Correspondence: Department of Urology, University of Rochester Medical Center, 601 Elmwood Ave, Rochester, NY 14642;
email: divya_ajay@URMC.Rochester.edu

Introduction: Approximately 16.5% of the U.S. population is estimated to have overactive bladder (OAB), significantly impacting their daily life. Sacral nerve stimulation (SNS) has been a successful method of treating urge incontinence, urgency, frequency, and non-obstructive retention since its development. This article reviews the development of SNS from its inception to the procedure we know it as today.

Sources and Methods: We conducted a literature review using the PubMed database, Google Scholar, and JSTOR regarding the history of SNS and the discoveries leading to its development.

Results: As our ability to incorporate electricity into medical practice improved in the mid-1900s, the pressing question in urology was whether it could be used in treatment of the neurogenic bladder. Initial efforts focused on direct detrusor stimulation and pelvic nerve stimulation, with limited efficacy. In the 1970s, Drs. Emil Tanagho and Richard Schmidt found that stimulation of sacral nerves in dog models resulted in a detrusor contraction response, resulting in the voiding of urine. They focused on improving these techniques and published a paper in 1989 on the first use of SNS on human subjects, paving the way for our modern-day procedure. Eventually, Medtronic developed the InterStim system, which received FDA approval in 1997 for the treatment of urge incontinence. The basic SNS technique has since remained largely the same. In 2019, the Axonics Sacral Neuromodulation System was also approved for treatment of OAB symptoms as an alternative to the InterStim system. Given the efficacy of SNS in the treatment of OAB, further iterations of SNS devices were recently developed, such as devices with rechargeable batteries and prolonged battery life.

Conclusions: Since Tanagho and Schmidt first described its use, SNS has been and continues to be a successful method for treating OAB. Going forward, SNS will remain a viable option for the treatment of urge incontinence and retention.

Keywords: History, Sacral Nerve Stimulation, Electrical Stimulation, Bladder Control, Emil Tanagho

Approximately 16.5% of U.S. adults, or 1 in 6 people, are estimated to have overactive bladder (OAB) symptoms, with the prevalence increasing with age. (1) OAB can significantly affect quality of life, causing some to stay home and reduce their overall activity due to fear of losing control of their bladder function while in public. OAB is also known to increase the incidence of urinary tract infections, perineal skin infections, depression, falls and fractures. (2)

As our ability to use electricity improved, so too did our ability to incorporate it into medicine, eventually leading to the invention of sacral nerve stimulation (SNS) for the treatment of OAB as well as fecal incontinence. Currently, the American Urological Association guidelines for treatment of the condition consist of a three-tiered algorithm, with behavioral therapy as the first-line treatment, pharmacological

therapy with anti-cholinergics or beta-3 agonists as second-line treatment, and finally SNS, posterior tibial nerve stimulation, or botulinum toxin injection as the third-line treatment.(3) Here, we delve into the history of SNS and the developments that led to the technology we use today.

SOURCES

We conducted a literature review using the PubMed database (www.ncbi.nlm.nih.gov), Google Scholar (www.scholar.google.com), and JSTOR (www.jstor.org). PubMed and Google Scholar were used to identify contemporary medical literature on the use of electricity in medicine and urology, sacral nerve stimulation, and the relevant discoveries leading up to these topics. The digital storage site JSTOR was used to identify journal articles on the history of electricity in medicine. FDA



Figure 1. The Magneto-Electric Machine was available to both physicians and the general consumer, marketed to be able to cure a wide range of diseases, including tuberculosis, gangrene, and spinal deformities. (Courtesy of Lancaster Medical Heritage Museum, Lancaster, PA)

Establishment Registration & Device Listing database was accessed for device approvals.

RESULTS AND DISCUSSION

Combining Electricity and Medicine

Ancient Egyptians initially described electric shocks from fish and eels in 2750 BCE, and the first description of electrostimulation dates to 400 BCE, when Ancient Grecians placed electric eels in footbaths to soothe arthritic pain and promote circulation. In 47 CE, Roman physician Scribonius Largus described in his list of 271 prescriptions, *Compositiones*, the use of a bioelectric fish to relieve headaches and gouty pain. (4) Electrostimulation practices boomed with the discovery of static electricity in the medical era of Franklinism in the mid-1800s. Around this time, Guillaume-Benjamin-Amand Duchenne, fascinated by electrophysiology, created a portable device that was able to stimulate individual muscles to avoid the usual tissue damage and pain that electrostimulation was known to cause. Known as localized faradization, he was able to study a plethora of neuromuscular diseases with this method, with Duchenne muscular dystrophy ultimately being named after him.(5)

From the 1870s-1920s, the medical battery was created to treat pains through application of electricity to target tissue, similar to the Ancient Greeks. With such easy access to electricity, however, medical quackery ran rampant with the creation of electric products touted

as being cure-alls, claiming to treat anything from balding to obesity (Figure 1).(6) In 1937, building on the medical battery, Newman, Fender, and Saunders developed radio frequency induction, which called for the use of tuned primary and secondary coils to create a stimulating waveform. This allowed for better control of the amplitude so that multiple types of delicate biological tissue, including the bladder, could be stimulated with increased precision, thus creating a new interest in electrotherapy.(7, 8) However, this method was limited due to the bulkiness of the equipment. It was not until the late 1950s that the development of transistors allowed for smaller devices to be made, resulting in the creation of the cardiac pacemaker in 1958, along with the development of newfound interest in creating implantable bladder devices. (7, 9)

Electrophysiology work on the bladder

In 1950, Corey et al. described a method to measure electropotential changes in the healthy human bladder, demonstrating the average rate and duration of bladder contraction upon application of electric stimulation (Figure 2).(10)

This new method paired with the ability to implant devices allowed urologic researchers to begin evaluating the optimal location to induce bladder contraction in patients with neurogenic bladders: the bladder itself, the pelvic floor, or the spinal cord. Initial efforts focused on regaining bladder control in paraplegic patients

experiencing urinary retention.

In 1954, Dr. Edward J. McGuire studied the effects of direct electrical stimulation to the bladder on dogs using a variety of electrodes, stimulating multiple areas of the outer bladder and measuring the subsequent response, though high voltages were required for successful stimulation.(11) The same year, Boyce et al. implanted coils prepared by McGuire into the bladders of paraplegic patients with neurogenic bladder. The trial enrolled three subjects, only one of whom had a successful outcome. (12) Bradley, Chou, and French also tested implantation of a radio transmitter unit into the bladder in 1963, first in dogs (Figure 3, left), then in 7 patients who all had bladder incontinence. Overall, while electrostimulation led to bladder contraction, it did not correlate with actual bladder emptying in all but two of the patients, showing that direct bladder stimulation may not be the best approach for inducing micturition. This method also had intolerable side-effects, including fibrosis of the bladder. (13)

In 1959, Burghelle et al. attempted to promote micturition by direct stimulation of the pelvic nerves in dogs (Figure 3, right). It was found that while pelvic nerve stimulation did result in detrusor contraction, it also simultaneously stimulated the pudendal nerve, leading to contraction of the external urethral

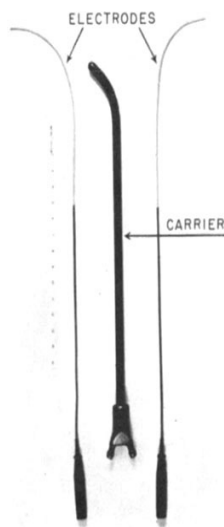


Figure 2. In 1950, Corey et al. inserted electrodes with a carrier and into the urethra to stimulate the bladder wall and subsequently measure parameters of bladder wall contraction. (10)

sphincter (EUS), preventing bladder emptying.(14) To prevent the activation of the EUS, Holmquist in 1968 described a method of severing the pudendal nerve to allow relaxation of the external sphincter while the detrusor muscle was being activated. He also suggested placing an additional electrode to stimulate the urethra until "fatigue stimulation" is achieved, allowing the EUS to relax after current discontinuation. However, Holmquist concluded that the use of pelvic nerve stimulation was limited in humans due to the need to perform a pudendectomy (essentially eliminating the ability to achieve erections), difficult access for electrode placement for that time period, and limited use in patients with neurogenic bladders due to nerve atrophy. (15)

Initial studies of SNS

In 1972, Nashold et al. electrically stimulated the sacral nerves of 36 dogs and cats with bladder paralysis, finding that the S1-S3 nerves produced the strongest bladder contraction. While only a portion of the animals successfully voided, this new method of bladder stimulation eventually paved the way for our current modern-day methods of SNS. The same year, Nashold et al. described a method in which an electrode was implanted to the S1-S2 region of 4 patients, and 3 of the 4 patients experienced adequate emptying of the bladder every 3-4 hours with stimulation. However, the patients also experienced uncomfortable autonomic effects, such as diaphoresis, erection, and fever. (16, 17) In 1975, Dr. Emil Tanagho and Dr. Richard Schmidt attempted to solve this issue by more precisely targeting the nerve fibers controlling micturition. Their first innovation was the discovery that the stimulation of the ventral portion of the S2 nerve root in dogs created the strongest detrusor contraction response, though this was also associated with external sphincter contraction. Aware of the inherent problem of sphincter contraction with general sacral nerve stimulation, they performed a dorsal rhizotomy to remove sensation that reflexively led to sphincter closure. They also divided the S2 ventral root to avoid stimulating somatic sphincter fibers. In these studies, however, they were unable to completely localize the detrusor contraction response, and they frequently got responses of defecation, pelvic artery dilation, and erections, limiting the utility of their results. (18-20)

In 1982, Tanagho and Schmidt refined their

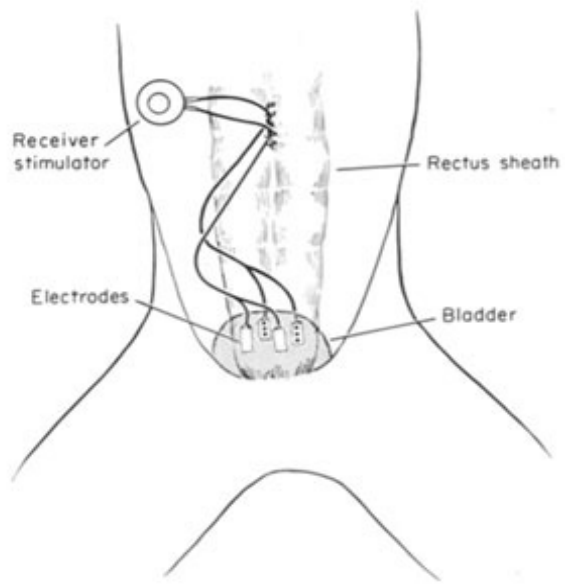


Figure 3. (left) Diagram of direct electrostimulation of the bladder in the dog, 1962-63.(13) **(Right)** 1959 X-ray showing electrodes implanted *in vivo* in the canine model by Burghele et al. (14)

technique of stimulating the ventral component of sacral nerves in dogs. This time, they performed a selective neurotomy of the somatic fibers in the sacral root before the fibers form the pudendal nerve. When testing this new method on paraplegic dogs with fully neurogenic bladders, they found that stimulation successfully caused bladder emptying for 4-10 months in several dogs. (21)

After many years of refining their SNS technique on dog models, in 1989, Tanagho and Schmidt compiled data from 22 patients who they treated from 1981-1987 using a combination of the previously described techniques of stimulation of the ventral S3-4, dorsal rhizotomy, and selective peripheral neurotomy. Like the results of their dog experiments, stimulation of the ventral portion of S2 combined with a dorsal rhizotomy and selective peripheral neurotomy significantly increased the ability to void successfully. Interestingly, the majority of patients treated did not have neurogenic bladder, but rather, OAB. Tanagho and Schmidt rationalized that because voiding dysfunctions commonly result from some degree of hyperactive bladder, the inhibitory effect of neurostimulation would reduce bladder spasticity, resulting in the use of SNS to treat urge symptoms. (22) Several of the patients in this study maintained continence during follow-up 4-5 years later, paving the way for modern-day SNS. (23) Eventually, with the development of smaller electrodes, Tanagho and Schmidt worked towards discovering a

less invasive method of bladder control. Dr. Steven Siegel in 1992 described this as consisting of several phases, similar to current techniques. In the acute phase, a spinal needle was inserted into the sacral foramen, and a current was applied to stimulate various responses. The desired motor response included contraction of the anal sphincter, perineum, and buttocks ("bellows" response) as well as plantar flexion. The patient was also able to provide verbal feedback on sensation, described as a tingling, vibration, or pulling of the rectum, vagina, or scrotum. Once the desired response was obtained, a temporary electrode was put in the needle's place. The following sub-chronic phase involved testing the temporary electrode's therapeutic value over 3-5 days. Criteria for implanting a permanent device consisted of $\geq 50\%$ improvement of 2 major symptom categories: pain, urinary frequency/urgency, voided volumes, and episodes/volumes of urinary incontinence. If successful, a permanent implant connected to a neurostimulator was then placed in a created subcutaneous pouch in the lower abdomen under general anesthesia. (24,25)

The Rise of Sacral Neuromodulation

Using this technique, Medtronic from Minneapolis, MN developed the InterStim system (Figure 4, left), eventually receiving European approval in 1994, Food and Drug Administration (FDA) approval in 1997 for treating urge incontinence, and FDA approval in 1999 for treating both urinary retention and urgency-frequency

symptoms. (26) The InterStim system quickly became an accepted method for treatment of OAB.

In 2003, tined leads were introduced by Spinelli et al. to allow for percutaneous lead placement without incision or fascial anchoring, making the procedure much less invasive and reducing operation time. Since this discovery, the initial test phase can be performed using the temporary lead for percutaneous neuromodulation or permanent tined lead, producing better results due to reduced migration between testing and implantation. (27)

In 2006, InterStim II was developed, introducing a battery that was lighter and smaller by almost one half of the prior model, allowing for smaller incisions and pockets to be made (Figure 4, right). The production of smaller implants has served to further reduce operating times and post-operative pain. (28) Medtronic found other useful applications for this technology and in 2011, InterStim received FDA approval for the treatment of chronic fecal incontinence in patients who either fail or cannot tolerate conservative treatments. Other companies have followed suit. In 2019, Axonics' Sacral Neuromodulation System received FDA approval for treatment of urinary retention and OAB. The smaller Axonics system became the first rechargeable and MRI-compatible sacral neuromodulation device. In 2020, InterStim Micro was released to also introduce rechargeability and MRI-compatibility to the InterStim system. Finally, most recently in February 2022, InterStim X received FDA approval, providing a non-rechargeable battery lasting 10-15 years. (26)

Current adverse events include very low risk of infection, pain at the device site, uncomfortable

stimulation sensations, and a reintervention rate of approximately 38% due to failed treatment or device malfunction. (26, 29) When comparing the success rate of SNS versus standard medical therapy for OAB symptoms after 6 months during the InSite trials (defined by $\geq 50\%$ symptom reduction), SNS was found to be more effective for patients experiencing less severe OAB symptoms. With intent to treat analysis, the SNS group had a 61% success rate compared to 42% in the standard medical therapy group.(30) Additional benefits of SNS include therapeutic compliance, with low fall out rate of treatment as well as attrition rate for returning to clinic, thus offering a relatively safe and accessible option for patients. Future developments will only serve to improve the safety and efficacy of SNS as a treatment for OAB and urinary retention.

CONCLUSIONS:

Since the discovery of electricity, humans have attempted to adapt it to medical applications. Now a safe and effective treatment for OAB and urinary retention, SNS is the result of many trials and iterations since electrostimulation was first tested on the bladders of dogs in 1954. Since Tanagho and Schmidt first described the procedure, the overall technique for SNS has not changed significantly, yet it remains an effective treatment method. Going forward, SNS will continue to be a viable option for the treatment of urge and fecal incontinence, OAB, and urinary retention.

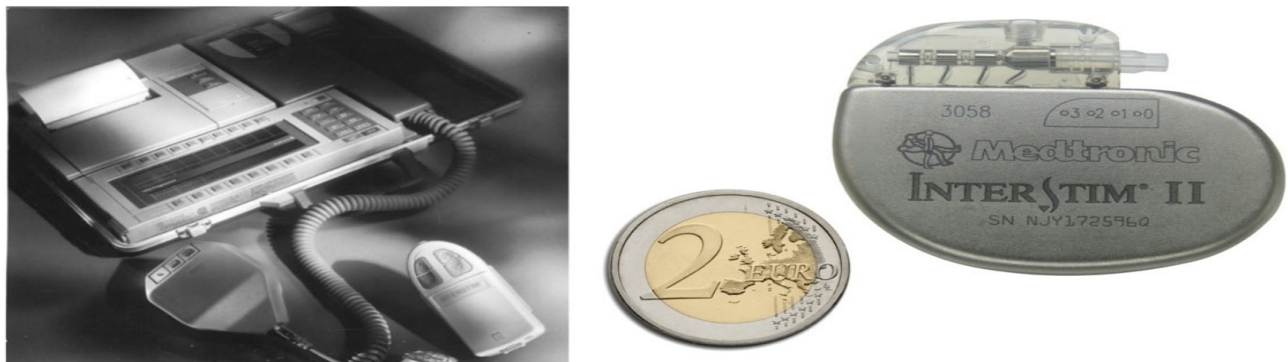


Figure 4. (left) The first InterStim System developed, 1990's (25) **(Right)** Modern-day (2006) InterStim II, with size comparison to a €2 coin. (WikiMedia Commons, Public Domain)

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A Cut Above the Rest: The Historic Perspectives of Circumcision and Anesthesia

Ellen Lutnick*, Kevin Pranicoff, Kyle M Waisanen

From the Jacobs Scholls of Medicine and Biomedical Sciences School of Medicine (EL) and the Department of Urology (KP, KMW) University at Buffalo, Buffalo, NY 14203

**Correspondence: Ellen Lutnick; University at Buffalo, Jacobs School of Medicine and Biomedical Sciences, Buffalo, NY 14203
e-mail: : ellenlut@buffalo.edu*

Introduction: Circumcision is the oldest known recorded surgical procedure dating to at least 4000 BCE and held religious, cultural, and military significance. Preputial resection connoted contrasting meanings among different cultures; in some, circumcision was and remains an important transition into infancy and then adulthood. In Bronze Age and early Egyptian cultures, however, circumcision was performed on vanquished enemies and improved upon the morbidity and mortality of phallic resection as a war trophy. The circumcision of Jesus was a significant subject for many Medieval and Renaissance artists who often portrayed the event as an allegorical commentary on contemporary socio-political events. While there has been much literature, anthropological analysis, and art on circumcision, little is known about the anesthesia provided to those undergoing the procedure, especially those for whom the act was not a punitive militaristic procedure. We aimed to identify descriptions of the anesthesia provided to patients or victims undergoing circumcision and how the anesthesia may have evolved into the modern techniques used in the modern era.

Sources and Methods: We performed a literature review via PubMed journal articles, texts, and historical discussions detailing the evolution of circumcision and accompanying anesthesia throughout history.

Results: Earliest records of circumcision described religious rather than scientific rationale, marking a boy's ascension to manhood. Documentation of the earliest practices of anesthesiology are relevant to urology through these traditions. Circumcision is first noted in Egyptian temple hieroglyphics dated to 4000 BCE, depicting young men restrained with a priest performing the cut wielding a knife. As early as 2500 BCE, circumcision in ancient Egypt was the first known surgical procedure utilizing anesthesia. A mixture rendered from calcium carbonate and acetic acid formed carbon dioxide on the prepuce resulting in the first rendition of cryo-analgesia. Egypt was not the only culture performing circumcision during this time period. Assyrian records dating back to 400 BCE describe a similar methodology, but also transcribed another primitive method of anesthesia. Assyrians utilized digital compression of the carotid arteries to produce anesthetic effects of both altered consciousness and decreased procedural pain. Carotid compression was commonplace enough that it influenced the language for which the carotid blood vessels are described in both Greek and Russian with translation as "The Artery of Sleep." The Jewish tradition of brit milah utilizes a few drops of wine in the mouth of the infant, both as a form of analgesia and symbolic of the sealed covenant. It is hypothesized that the sugar interacts with the opiate receptors in the brain which is enhanced by the suckling action, providing comfort.

Conclusions: Since their earliest documented history, anesthetic techniques have contributed to and been intertwined with the practices of circumcision.

Keywords: Circumcision; Anesthesia; History

The practice of ritual circumcision predates recorded history as one of the oldest surgical procedures practiced by mankind, hypothesized to have originated as a modification of penile amputation.(1, 2) In many ancient cultures, the erect penis was symbolic of fertility, wealth, and power; royal wands carried by kings were symbols of such, and represented the authority of

the governing patriarch.(2) In ancient times, victors in battle customarily brought back part of the body of the vanquished, the most prized part being the phallus, proving the virility of the victor and the emasculation of the vanquished.(3) The phallus was considered the most conclusive proof of the nature of the vanquished, and therefore conferred a greater title of bravery and skill

than collecting hands or scalps, which would not denote the sex of those slain.(4) According to wall inscriptions at the Karnak temple (dating back to 1212 BCE), it was estimated that Pharaoh Merneptah collected more than 13,000 penises as war trophies during his reign, proof of his many victories.(2) There are many references among bas-reliefs in the tombs of various Pharaohs, including that of Rameses II and those referencing The First Libyan War, that note the wartime tradition of collecting severed body parts of the slain, including hands, fingers, and phalli, as trophies of their victory. (5, 6)

Penile amputation and castration were later adopted as a method by which the Ancient Egyptians emasculated their captured enemies, serving as a physical sign of their subjugation as slaves.(4, 5) Such radical mutilation had a high mortality rate among those captured related to risks of hemorrhage, infection, and urethral stenosis; however, there was inherent value in keeping those conquered alive and enslaved. The practice of penile amputation was therefore modified to cutting the foreskin of slaves in primitive circumcision, to create a permanent mark of slavery.(2,3,5,7) At this point in history, circumcision served as the permanent and distinctive feature of the slave.(4) Our objective is to explore the origins of circumcision and the use of anesthesia as the procedure developed historically.

SOURCES We performed a literature review via PubMed of journal articles, texts, and historical discussions detailing the evolution of circumcision and accompanying anesthesia throughout history (Table 1). A MediData search of archives of the British Museum (London), Jewish Museum (New York), and the Metropolitan Museum of Art (New York) was conducted to analyze works on circumcision and determine whether any objects or materials were included that could be interpreted as part of the provision of anesthesia. The archives of the American Urological Association (AUA) (Linthicum) were contacted to provide evidence of early American and European urological instruments for circumcision under anesthesia.

RESULTS

Ancient Egypt:

Archeologic findings reveal that the Egyptian practice of circumcision date back to the 23rd century BCE with a depiction observed in a wall relief in the tomb of a minister of Pharaoh Teti, who ruled from 2393 to 2345 BCE.(3, 8) In Egyptian tradition, circumcision involved the individual undergoing the procedure while standing, sustaining a V-shaped dorsal cut that left the prepuce in place, allowing the foreskin to hang freely.(3) It was



Figure 1. Osiris, judge of the dead, sits in a throne holding a scepter symbolic of his authority. Behind Osiris stand Isis and Nephthys. (Image: British Museum/Public domain, <https://www.thegreatcoursesdaily.com/isis-and-osiris-death-and-rebirth-in-ancient-egypt/>)



Figure 2. Bas relief of a circumcision scene from the tomb of Ankh-ma-Hor at Saqqara, depicting one of the men restrained by another participant while undergoing the procedure. (Available at <https://www.bibleodyssey.org/en/tools/image-gallery/a/ankmahor-tomb> (Public Domain))

unlikely that these earliest circumcisions were performed with any attempt at ancient anesthetic given the class of people it was routinely used to mark; however, the Ebers Papyrus, one of the most comprehensive accounts of Egyptian medical practice written around 1550 BCE, describes an antidote for bleeding as a result of circumcision.(3) The remedy is described a mixture of honey, cuttle-bone, sycamore, and an unknown fruit applied to the prepuce.(8)

The practice of circumcision did not remain limited to conquest and marking captured slaves. Over time it was adopted by the priesthood and nobility in ancient Egypt, perhaps inspired by the mythology of Osiris and his dismemberment by his brother and enemy, Seth. According to lore, Osiris' wife, Isis, attempted to reconstruct him but could not find Osiris' phallus as it had been eaten by a mythical fish in the Nile. Isis instead ordered that a separate golden replica be made of her husband's penis, inspiring the origin of the phallic scepters of Egyptian royalty, symbolic of god-like authority.(2)(Figure 1)

The earliest known depiction of this rite of passage is described in a bas relief on the sarcophagus of Ankh-ma-Hor at Saqqara dating back to 2345–2182 BCE, illustrating what has been interpreted as male

circumcision in practice as a ritual prior to entry into the priesthood.(9) In this depiction, seen in Figure 2, one of the men appears to be forcibly restrained.(7) From this detail, it is unlikely that the circumcision illustrated was performed with any attempt at anesthesia; however, it is possible to imagine that the adoption of the practice of circumcision by the more esteemed religious class resulted in some of the most ancient development and use of anesthesia in the ritual process.

As early as 2500 BCE, circumcision in ancient Egypt was the first known surgical procedure utilizing anesthesia. Included among a bas-relief from the necropolis of Saqqara (circa 2400 BCE) is the depiction of a series of medical scenes, including a flint-knife circumcision with the inscription reading, "the ointment is to make it acceptable."(10) One source speculates that the famous 'Memphis stone' might be the key to the form of seemingly topical anesthetic described.(11) Composed of carbonates of lime and an acid, such as acetic acid or vinegar, upon contact between the stone and the moist skin, carbon dioxide would be released to act as a local anesthetic, the first rendition of cryo-analgesia.(11,12)



Figure 3a. (Left) Kenyan ceremonial circumcision gourd containing purportedly anesthetic powder from the Kikuyu peoples of the 19th century. (British Museum, Af1908,0616.18) **Figure 3b. (Right)** bamboo circumcision guide or knife, 19th century, 1.4 x 6.7 cm from the Maldives. (British Museum, As1972,Q.3159)

Africa

The ancient Egyptians were not the only culture to adopt circumcision practices, nor to utilize some form of anesthesia. Much of the earliest records of circumcision across cultural lines describe religious rather than medical rationale; in a time before aseptic surgical technique, any cutting of the flesh would have been extremely unhygienic, carrying a high risk of bleeding, infection and death. Various African tribes, as well as the Arabs, Jews, Muslims and Aborigines have themes of divine command, tribal identification, social role, respect for the ancestors, promotion of chastity and ascension to manhood prominently documented as explanation for the practice.(13) Male circumcision almost uniformly represented a rite of passage, typically performed shortly after birth or at any time up to and including early adulthood, related most frequently to ceremonies celebrating puberty or marriage.(13)

The earliest practices of anesthesiology were also relevant to the description of these traditions. (14) Assyrian records dating back to 400 BCE describe their traditional practice of circumcision including another primitive method of anesthesia, utilizing digital compression of the carotid arteries to alter consciousness and decrease pain. The use of carotid compression was so commonplace that it influenced the language with which the carotid blood vessels are described in both Greek and Russian, translating as "The Artery of Sleep."(15,16)

Among various African tribal nations, circumcision historically has been documented as a rite of passage from childhood to manhood. The Niger–Congo speaking peoples have circumcision traditions that occurred in young warrior initiation schools as a part of the ancestral society's culture.(17) Amongst the Gikuyu (Kikuyu) people of Kenya and the Maasai people of Kenya and Tanzania, historically circumcision has been considered

the graduation from an educational program that taught tribal culture, religion and history to youth on the verge of becoming full-fledged members of society. These circumcisions traditionally were performed in public ceremonies, requiring a display of courage to maintain a young man and his family's honor; the only form of anesthesia described was a bath in a cold river and a ceremonial "powder" to increase bravery (Figure 3a). The ceremony required youths to maintain a stoic expression, unflinching from any pain related to the procedure.(17) The circumcision was symbolic of the young men's obligation to each other and to their tribe. Upon completion, they were considered members of the warrior class, and allowed to date and marry. In the modern era there are still tribes that do not accept more modernized practices of circumcision, insisting on traditional group ceremony without anesthesia. This more traditional approach is common amongst the Meru and the Kisii tribes of Kenya.(17)

Judaism and Islam

From its earliest practice in Egyptian religion, circumcision was eventually adopted as part of the religious practices of Judaism and Islam as well.(2,9) Circumcision was a common practice in pre-Islamic Arabia. The language describing circumcision in Arabic has its roots in primitive Semitic language, leading to the conclusion that circumcision was a primitive custom of old Arabian tradition, and not initially introduced by Islam. In fact, there is no mention of circumcision in the Holy Quran; the practice is attributed first to the Prophet Abraham, the same roots as the origin of the practice of circumcision in Judaism.(18,19)

Islam

In Muslim culture, circumcision is symbolic again as a rite of passage.(13) Traditionally Muslim men have



Figure 4a. "Circumcision of Jesus", by Hendrick Goltzius (1558-1617), a masterpiece woodcut in the style of his contemporary, Albrecht Durer. Such scenes of allegorical realism were popular subjects throughout Renaissance Europe and in addition to the traditional onlookers of Mary and Joseph, in the doorway is Goltzius himself. (Metropolitan Museum of Art (MET), New York; Catalogue: H.12; D.IV.408.18-iii)

been required to be circumcised before they are allowed to complete their pilgrimage to Mecca, one of the five pillars of Islam.(9) In a footnote of the Arabian Nights, Sir Richard Burton makes note of the Islamic tradition, describing that "the varieties of circumcision are immense." He describes a particularly harsh variant "practiced in the province of Al Asir where it is called salkh."(7) The procedure itself was performed on a boy between ten and twelve years old holding a spear in

their hand, involving multiple small incisions in the lower abdomen and genitals culminating in foreskin removal. This tradition was one that specifically withheld any form of anesthesia: in a show of manhood, it was described that "the spear must not tremble." (7)

According to historical records referencing the circumcision of several sons of Islamic Sultans, the tradition of the circumcision of princes in Islamic culture involved celebrations that could last anywhere



Figure 4b. Inset of figure 3, showing ceremonial wine flask and serving cup on left, with a caption that reads, in part, "Cernis ut octava sit circumciscus Jesus..." or "See here how Jesus is circumcised on the eighth day...according to law... received and observed for many years." (MMA, New York)

from 10 to 55 days long. During these festivities, up to 10,000 boys of poor families also were circumcised by the surgeons, with the festivities culminating in the circumcision of the princes.(20) A treatment for the wound was described by Serafeddin Sabuncuoglu in 1465, consisting of egg yolk cooked in rosewater and ground with the oil of roses that was applied and kept on until the following day, after which it was dressed with other medicaments until it healed.(20) While it is unknown whether these medicaments included some form of pain control, his writing included a description of a primitive anesthesia containing mandrake root, which has similar properties to belladonna and was formerly used as a narcotic and sedative.(21)

In modern Muslim culture, the age of circumcision is not unanimous. In Pakistan, children born in hospitals are typically circumcised within a few days of discharge, while the procedure is typically performed in other children anywhere from 3–7 years of age, and commonly even after adolescence in more rural areas.(18) While circumcision is a practice that Islam has observed throughout history, it is not mentioned in the Quran and therefore does not constitute a part of a formal religious ceremony; therefore, it can be carried out by any appropriately qualified personnel.(19) In the modern era, 90–95% of circumcisions in Pakistan are performed by traditional circumcisers, village barbers, paramedical theatre staff and technicians; only 5–10% have access to medical facilities where the procedure is performed by a physician.(18) The technique most commonly used describes the child held in a seated position with both legs apart. In one analysis, the most frequently performed circumcision in this setting involves an open method using a blade with no suturing and no general anesthesia.(22) To this day, this open operation is commonly performed in more rural areas with no anesthesia, no sutures, and with unsterilized instruments, with the ashes of burnt wood used to stop any bleeding. The next most common method described is Plastibell circumcision, involving a disposable clamp.

(22) Keeping with tradition, the procedure is followed by a celebration of relatives and guests, varying in specifics according to the region and culture of different Muslim countries.(18)

Judaism

Judaism adopted the practice of circumcision as well, incorporated as part of their formal religious rites.(2) This tradition, similar to Islam, began with the circumcision of Abraham. According to the Torah (Genesis 17: 9–14), Abraham was commanded by God to circumcise himself and all male members of his household, including his descendants and slaves, symbolic of a covenant between God and Abraham. While it was written that Abraham circumcised himself at ninety-nine years of age, the Israelites adopted the practice of infant circumcision on the eighth day of life, differing from the Egyptian tradition of circumcision at puberty.(3)(Figure 4a and b) The transformation of this tradition is believed to be due to the risk of infant mortality, prioritizing the religious covenant before death, while precluding the risk of hemorrhagic death of the newborn.(23) Judaism acknowledges that God's ordinances were given such that one should live by them (Leviticus 18:5); therefore, the operation can be rightfully postponed for reasons of health, including familial history of a bleeding disorder.(23) One of the reasons cited for the earlier timing of this procedure includes the belief that the infant circumcision is less traumatic than adolescent circumcision in spite of more modern scientific evidence quite to the contrary.(24) However, we consider another possibility, that this shift originally may have been in part related to a pubescent male's ability to refuse the religious covenant on the basis of it being a painful procedure, while an infant is unable to object.

Sigmund Freud posited that Judaic circumcision might have been adopted from the Egyptians.(25) He hypothesized that Moses might have been based upon an Egyptian, possibly of noble birth, who adopted an Egyptian monotheistic religion that he passed to the



Figure 5. Circumcision Set, Netherlands, 1809-1814, showing ceremonial wine flask (back right) with middle cup specifying in Hebrew the "goblet for wine" and, the cup on the left, for the 'spitting' or *metzitzah*. Also shown are three matching *bris* 'shields' (middle of field), part of the *brit milah* ceremony still in use today. (The Jewish Museum, New York. Accession Number: JM 55-61a-l)

Jews. This form of monotheism, dedicated to the god Aton, existed for a brief seventeen-year period at the end of the Eighteenth Dynasty, ending in 1350 BCE after the death of the Pharaoh Ikhnaton in 1358 BCE, who had changed his name from Amenhotep to incorporate part of his new god's name. After his death, Egypt's traditional polytheistic system was re-established. Freud further considered that circumcision might have been adopted by the Jewish people to establish their equality to the Egyptians as well as for the biblical reasoning to "make them a holy nation." He admits that if this were true and if Judaic religious customs stemmed from Egyptian customs handed down by Moses, "the Jews had good reason to deny the fact; therefore, the truth about circumcision had also to be contradicted." (25)

There is also argument that the initial motivation for circumcision per Judaic tradition originated, similarly to that of the ancient Egyptians, during wartime. Remondino's "History of Circumcision from the Earliest Times to the Present" accounts one argument to this end, which cites the biblical incident when David brought two hundred prepuces to Saul as a mark of his being a worthy son-in-law, and evidence of his having slaughtered that number of Philistines. (4) Remondino notes, however, that Judaic religion is strictly opposed to any other form of bodily mutilation, which would seem antagonistic to this perspective on the origin and symbolism behind the religious tradition. Judaism considered emasculated animals imperfect, unclean, and unfit as religious sacrifice; emasculated men similarly were not allowed to enter the

priesthood or assist at sacrifices. Per Remondino, Judaic opposition to such mutilations proves that their tradition of circumcision could have in no way developed from practices in war. He hypothesizes instead that its origin was purely religious in nature, as symbolic of the covenant between God and man. (4)

In Judaism, circumcision is performed by a religious officiant with the title of *mohel*, derived from the term *milah*, meaning circumcision. (26) In a description from the 1500's, the *metzitzah b'peh*, or *brit Milah*, is practiced in which the *mohel* places his mouth on the infant's penis following circumcision to suck blood from the wound. (9, 23) This is known as *metzitzah* and is still practiced in ultra-Orthodox Jewish communities (Figure 5). In this case, the *mohel* first takes some wine or vinegar into his mouth before sucking the bleeding penis. In a slight variation, occasionally the *mohel* will place a sterile cottonwool-filled glass tube on the bleeding penis and give a perfunctory suck on the other side. (23) The Jewish tradition of *brit milah* additionally utilizes a few drops of wine in the mouth of the infant, both as a form of analgesia and symbolic of the sealed covenant. (27) The *mohel* typically places a drop or two of wine on the infant's lips reciting a blessing from Ezekiel 16:6, "I said unto thee, in thy blood live. Yea, I said unto thee, in thy blood live." (23)

This ritual practice involving wine may have some anesthetic effect. There is research to evaluate the hypothesis that the sugar interacts with the natural opiates in the brain, enhanced by the suckling action to provide comfort. (27) One study found that a concentrated

glucose solution administered orally does not provide significant analgesia for neonatal circumcision; however, it did reinforce the efficacy of a dorsal penile nerve block (DPNB) in infants undergoing circumcision.(28) Another trial demonstrated significantly decreased pain in infants undergoing circumcision with a sucrose solution administered using a pacifier.(29) Based on these findings, it is likely that the suckling was responsible for a degree of pain relief rather than the sucrose, meant to mimic the traditional wine. This hypothesis is supported by a third study, demonstrating that non-nutritive suckling (NNS) significantly decreases crying time and salivary cortisol levels of neonates during circumcision in addition to DPNB and oral analgesics.(30) However, this study demonstrated that there was no appreciable change in heart rate during the procedure between study arms.(30) These findings demonstrate that NNS may be useful as a comfort measure rather than analgesia in its own right. Beyond the use of ceremonial wine, circumcision is usually performed without anesthesia, in the home surrounded by family followed by a celebratory meal.(31) In modern times, many mohelim permit the parents to apply EMLA cream. Some qualified mohelim use dorsal penile nerve block anesthesia, especially in the USA where many are pediatricians or have medical training.(31)

Modern Era

In 2016, it was estimated that 37-39% of males aged 15+ worldwide were circumcised.(32) In the United States from 1979 through 2010, the national rate of newborn circumcision declined 10% during a period of changing medical guidelines regarding routine newborn circumcision.(33) In a religious ceremonial setting, circumcisions are not always performed by a medical professional, and the use of any form of anesthetic depends on the tradition in practice. Even when performed by a physician as a medical procedure, the use of anesthesia is not uniformly agreed upon. In one survey, only 45% of physicians performing medical circumcision in neonates chose to utilize anesthesia.(34) The 55% of physicians who chose not to utilize anesthesia most commonly cited concern over adverse drug effects, and the perception that the procedure did not warrant anesthesia.(34) However, attitudes with regards to the subject currently are under scrutiny by the medical community, with more information becoming apparent regarding infant perception of pain, the long term sequelae of the lack of use of anesthesia on the development of pain pathways in infants, as well as the development of efficient circumcision procedures that allow for convenient local anesthesia.(35-37)

CONCLUSIONS: Circumcision is an ancient procedure whose origins likely grew out of the practice of phallotomy of vanquished enemies. It has evolved into the various culturally appropriated procedures of today, used in many religious or tribal events to mark covenants or rites of passage. Some of the earliest documentation of anesthesia was for circumcision. While many neonatal procedures are still performed without anesthesia, this is rapidly changing in the western world.

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TIME PERIOD	Use and Methodology of Anesthesia	Ref.
c 1212 BCE	Before circumcision is adopted into religious tradition in Ancient Egypt, penile amputation and castration are used to mark enslaved enemies, depicted in wall inscriptions at the Karnak temple showing Pharaoh Merneptah and more than 13,000 penises collected as war trophies. No evidence for use of anesthesia.	2
c 1550 BCE	An antidote for bleeding is described in the Ebers Papyrus specifically to be used after circumcision, including mixture of honey, cuttle-bone, sycamore, and an unknown fruit applied to the prepuce.	3,8
c 2345–2182 BCE	After circumcision is adopted into religious tradition in Ancient Egypt, males are forcibly restrained while undergoing ritual circumcision prior to entry into priesthood, depicted in a bas relief on the sarcophagus of Ankh-ma-Hor at Saqqara. No evidence for use of anesthesia.	7
c 2400 BCE	A bas-relief from the necropolis of Saqqara depicts a series of medical scenes, including a flint-knife circumcision with the inscription reading “the ointment is to make it acceptable,” hypothesized to be the first rendition of cryo-analgesia utilizing the famous ‘Memphis stone.’	10-12
c 400 BCE	Assyrian records describe their traditional practice of circumcision, utilizing digital compression of the carotid arteries as anesthesia.	15,16
Ancient-modern tradition: Africa	Circumcision as described as a rite of passage into manhood amongst the Gikuyu (Kikuyu) people of Kenya and the Maasai people of Kenya and Tanzania traditionally allows only the anesthetic provided by a bath in a cold river.	17
c 700 BCE	Per Islamic tradition described by Sir Richard Burton in a footnote of Arabian Nights, circumcision as practiced in the province of Al Asir is performed on an adolescent boy holding a spear in his hand, and involves multiple small incisions in the lower abdomen and genitals culminating in foreskin removal; this tradition specifically utilizes no anesthesia, and a show of bravery.	7
1465	Documentation of festivities celebrating circumcision of Islamic prince’s described by Serafeddin Sabuncuoglu include treatment for the wound consisting of egg yolk cooked in rosewater and ground with the oil of roses that was applied and kept on until the following day, after which it was dressed with other medicaments until it healed; this potentially contained mandrake root as primitive anesthesia	20,21
1500’s	The Jewish tradition of <i>brit milah</i> additionally utilizes a few drops of wine in the mouth of the infant, both as a form of analgesia and symbolic of the sealed covenant.	27
Modern Era: Islam	90-95% of circumcisions in Pakistan are performed by traditional circumcisers, village barbers, paramedical theatre staff and technicians, and in a rural setting most commonly involves an open technique with no anesthesia, only utilizing the ashes of burnt wood to stop any bleeding. The next most common method described is Plastibell circumcision, involving a disposable clamp.	18,22
Modern Era: Judaism	In modern times, many mohelim permit the parents to apply EMLA cream to anesthetic effect. Some qualified mohelim use DPNB anesthesia, especially in the USA where many are pediatricians or have medical training	31
Modern Era: West	An estimated 45% of physicians performing medical circumcision in neonates choose to utilize anesthesia, including DPNB* or EMLA cream. Physicians who chose not to utilize anesthesia most commonly cited concern over adverse drug effects, and the perception that the procedure did not warrant anesthesia	34

Table 1. Use and Methodology of Anesthesia for Circumcision throughout History.
*DPNB: dorsal penile nerve block

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A Critical Picture of Racism, Trophy Taking, and Forensics: Life Magazine May 22, 1944 “Picture of the Week”

Benjamin L. Coiner, Ronald Rabinowitz, Meghan E. Kapp, Jennifer B. Gordetsky*

From the Vanderbilt University School of Medicine, Nashville, TN (BLC); Department of Urology, University of Rochester Medical Center, Rochester, NY (RR); Department of Pathology, University Hospitals and Case Western Reserve University School of Medicine, Cleveland, OH (MEK); Department of Urology and of Pathology, Microbiology & Immunology, Vanderbilt University Medical Center, Nashville, TN (JBG)

*Correspondence: Jennifer B. Gordetsky, MD, Departments of Pathology and Urology, Vanderbilt University Medical Center, C-3321A MCN, 1161 21st Avenue South, Nashville, TN 37232; e-mail: jennifer.b.gordetsky@vumc.org

Introduction: The 2020 American Urological Association (AUA) Retrospectroscope Award winning presentation investigated the history of war trophies. Included was Life magazine’s May 22, 1944 “Picture of the Week” showing a young American woman gazing at a skull sent by her boyfriend serving in the Pacific theater of WWII. The caption claimed the skull was from a Japanese soldier “picked up on (a) New Guinea beach.” The displaying of human remains so casually in a magazine brings up the ethical considerations behind how we use human remains in medicine, art, museums, and collections. Identification and interpretation of bony characteristics and injuries from skeletonized human remains can help demystify medical history, reconstruct battles, and bring identity back to the faceless. We investigated what forensic and paleopathology techniques can tell us about battlefield human remains including the Life skull.

Sources and Methods: We reviewed the literature for information about the Life skull and characterization of physical traits and traumatic injuries that can be assessed from skeletal remains.

Results: Taking ‘trophies’ from human remains has occurred throughout human history. Anatomical trophy taking by US troops in the Pacific during WWII was fueled by rampant jingoism and anti-Asian racism of the time. Battlefield methods to remove soft tissue from bone included boiling, skinning, scrubbing, lye, and ants. Similar techniques are used by modern medical examiners. The tropical Pacific climate and lack of burial would have hastened natural decomposition of a fallen soldier. The bony pelvis and the skull are the two most useful parts of the skeleton for assessment of human remains. The pelvis is the most reliable bone in the human body for determining sex, followed by the skull. The pelvis and skull also aid in the determination of age at death. Estimation of likely ancestry primarily relies on the skull but is a challenging and increasingly controversial practice. Skeletal remains may show evidence of trauma to the pelvis and skull, providing clues as to cause of death. Pelvic injuries are associated with high rates of mortality from hemorrhage and disruption of the genitourinary system, and evidence of genital mutilation may be present. Forensic methods suggest the Life skull is consistent with male sex. Ancestry, age at death and age of the remains are unable to be determined from the photo. Publication of the Life skull led to public disapproval and an Army memorandum condemning the practice of taking enemy remains.

Conclusions: The pelvis and the skull provide useful, objective evidence when studying victims of past wars. Accurate determination of age at death, sex, and likely ancestry may be established from skeletal remains. Forensic methods and paleopathology can help restore the humanity lost by the faceless victims of war.

Keywords: History; War Trophies; Forensic; Paleopathology; Hate Crimes, Bioethics

The American Urological Association (AUA) Annual Meeting has included a History of Urology Forum since 1965. Organized by the AUA History Committee to celebrate and preserve urologic history, presenters at the History Forum may enter the annual contest for the best presentation and accompanying paper. The winner receives the AUA Earl Nation Retrospectroscope

Award, named in honor of former AUA president Dr. Earl Nation, which consists of a refurbished Brown-Beurger Cystoscope and a \$1000 honorarium supported by the William P. Didusch Center for Urologic History. The 2020 AUA Earl Nation Retrospectroscope Award-winning presentation titled, “War ‘Trophies’ & Phallotomy” with accompanying paper titled, “The (Not-So) Ancient

Practice of Anatomical Trophy Taking: An Emphasis on Penile Dismemberment" investigated the history of war trophies from antiquity to modern times with a focus on genital trophy taking and mutilation.(1) Included was Life Magazine's May 22, 1944 "Picture of the Week" featuring a trophy skull from World War II (WWII) (Figure 1)(Life magazine, (May 22 1944, p. 35)). While not a genitourinary war trophy, the picture is a striking example of human remains as trophies in modern warfare. The photograph is also a shocking example of a war crime fueled by the rampant jingoism, propaganda, and anti-Asian racism of the time.

We investigated the 'Life' skull and trophy taking in WWII. In doing so, we more broadly investigated what forensic and paleopathology techniques can reveal about skeletonized battlefield human remains. With genital trophy taking and mutilation common in historical conflicts, and pelvic trauma known to be

devastating, we sought examples of what forensic evidence might be retained on the bony pelvis. We further sought to apply forensic methods used on skeletonized human remains to help restore some of the identity taken from the faceless victim of a war crime shown in Life Magazine.

SOURCES

We searched the literature for information on the 'Life' skull, the nature of trophy taking in WWII, and the characterization of physical traits and traumatic injuries that can be assessed from skeletal remains. Searches of PubMed and Vanderbilt University's online library database were performed including the terms "trophy skull," "World War II," "Life Magazine May 22, 1944 Picture of the Week," "biomedical ethics," "museums," and "collections." Forensic pathology, paleopathology, and osteology textbooks were also searched.



Figure 1: "Picture of the Week", Life Magazine. Natalie Nickerson, 20, of Phoenix, Arizona purportedly writing "her lieutenant" in response to receiving the depicted skull he sent, as promised, by post from the battlefield beaches of New Guinea. Life editors added, "The armed forces dissapprove strongly of such things." Life Magazine, 5/22/1944, p35

RESULTS AND DISCUSSION

War Trophies in WWII

The acquisition of human remains from enemy dead as trophies and souvenirs has been documented throughout human history and continued to modern times.(2–4) During WWII, the practice of taking enemy body parts was especially common in the Pacific theater, the grim culmination of pervasive anti-Asian racism in the United States that allowed for the unjust incarceration of Japanese Americans, dehumanizing wartime propaganda that included disturbing hunting metaphors of Japanese soldiers, and hatred stirred by events at Pearl Harbor.(2,4–7) No comparable evidence of this practice has been documented in the European theater.(4,5,7) In fact, all known WWII trophy skulls in the forensic record have been identified as Japanese, illustrating an apparent ideologic difference between the two theaters.(4)

Human remains appear to have existed on a spectrum of WWII battlefield trophies, from weapons and uniforms to personal items and body parts. Although collecting equipment and personal possessions was more common, taking body parts including teeth, skulls, bones, ears, and noses was well-described in letters, diaries, memoirs, newspapers, and photos.(4,5,8) Up to 60% of the remains of WWII Japanese soldiers repatriated from the Mariana Islands in 1984 were reported to not have crania.(9) The desecration of fallen enemy soldiers in the Pacific was so common during WWII that the United States military denounced the practice, threatening disciplinary action for taking body parts of fallen Japanese soldiers, further supporting the widespread nature of this wartime atrocity.(4,5,7,8) Nevertheless, the practice continued, and Japanese remains have been documented in a range of settings, including display on military vehicles, home candle ornamentation, and a letter-opener given to President Franklin D. Roosevelt by a Pennsylvania Congressman, reportedly made from the arm bone of a Japanese soldier.(2,5)

Life Magazine “Picture of the Week”

One of the most high-profile cases of trophy taking during WWII was featured in the May 22, 1944 Life Magazine “Picture of the Week” by Ralph Crane (Figure 1). The magazine featured a full-page photograph of a

young woman seated at her desk looking at a human skull with signatures on the cranium captioned, “Arizona war worker writes her Navy boyfriend a thank-you note for the Jap skull he sent her.” The photo itself may not immediately elicit horror or conjure gruesome wartime images in the mind of the viewer, as the presentation of the human skull has long been seen in the media and art. The skull is a common motif representing death or meant to evoke the popular *memento mori* trope. Skulls and otherwise potentially shocking depictions of human anatomy are often seen in art related to anatomy or medicine. From Andreas Vesalius (Figure 2a), to 18th century Scottish surgeon John Hunter, to former Vanderbilt University Medical Center Department of Pathology Chairman John L. Shapiro M.D. (1956-1971) (Figure 2b), the portraits featuring prominent figures in medicine often also prominently feature a human skull. The following commentary accompanied the “Picture of the Week,” quickly offering macabre context and concisely demonstrating the inherent and casual anti-Asian racism of the era:

“When he said goodbye [sic] two years ago to Natalie Nickerson, 20, a war worker of Phoenix, Ariz., a big, handsome Navy lieutenant promised her a Jap. Last week Natalie received a human skull, autographed by her lieutenant and 13 friends, and inscribed: ‘This is a good Jap – a dead one picked up on the New Guinea beach.’ Natalie, surprised at the gift, named it Tojo. The armed forces disapprove strongly of this sort of thing.”

The publication garnered the attention of United States military leaders and led to a memorandum from the Army’s judge advocate general condemning the practice, which was a violation of the 1929 Geneva Convention on the sick and wounded.(5) Orders for military commanders to prevent this practice and appeals to the American media to cease publication of similar stories did not prevent the Japanese media from obtaining this information, sparking indignation and fueling anti-American sentiments.(5) As for the “big, handsome Navy lieutenant,” Naval investigation resulted in a letter of reprimand after finding that he demonstrated poor judgement.(5)

Cleaning and Decomposition of Human Remains

Most Japanese trophy skulls and other body parts

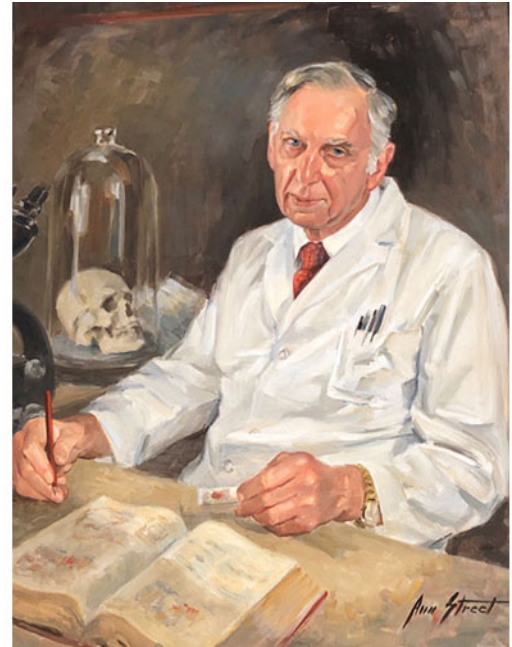


Figure 2a (Left): Lithograph of Andreas Vesalius (1514-1564) by Adolphe Mouilleron (1820-1881), c.1850, after Edouard Hamman (1819-1888) (Philadelphia Museum of Art). **Figure 2b (Right):** Portrait of John L. Shapiro M.D., Chairman of the Department of Pathology (1956-1971), Vanderbilt University Medical Center

were opportunistic acquisitions, not the trophy of one's own kill.(2,4,10) This appears to be consistent with the account the Navy lieutenant provided in the photograph's commentary, that it was "...picked up on the New Guinea beach." Yet how could the Life skull be in such a clean state if it was found in the field? Just as numerous accounts exist depicting the acquisition of human remains as wartime trophies in the Pacific theater, details of how soldiers removed the soft tissue from skulls and bones are available. Common forensic methods to remove soft tissue include scalpels, brushes, simmering, dish detergent, bleach, or dermestid beetles. (11) In WWII, soldiers removed soft tissue from war trophy bones by boiling, skinning, scrubbing, treating with lye, ants, and even a disturbing account of towing remains in the ocean behind a ship.(2,4,5,8) Given the historical accounts of soldiers cleaning Japanese skulls in the Pacific theater and the simplicity of effective methods, the 'Life' skull was likely cleaned in the field. Weathering and decomposition of human remains varies greatly across different locations around the world, with factors including temperature, access by insects or other scavengers, burial, humidity, rainfall, and individual characteristics like clothing and body size affecting decomposition rates.(12-14) In tropical locations such as New Guinea and the South Pacific, high temperatures, high humidity, and rainfall are known to

facilitate decomposition.(12,15,16) In the case of another purported Japanese trophy skull taken when securing an island in the Pacific, an American soldier found a crashed Japanese fighter plane with the skeletonized remains of a pilot in the cockpit, from which he took the skull.(10) Together, evidence supports accelerated surface decomposition in the South Pacific that could have aided cleaning of the 'Life' skull.

Human Remains in the South Pacific

Japanese soldiers are not the only remains that have been found on islands in the South Pacific. Humans have long inhabited islands of the Pacific, with prehistoric skeletal remains found on New Guinea and other islands in the region in a variety of burial contexts that date back thousands of years.(17-21) Space for land burial on many islands in the South Pacific is limited, with the same burial location often repeatedly used, and erosion of burial sites close to coastlines observed.(16,21) Happening upon more distant, even ancient, remains while stationed in the South Pacific is not unfathomable. Unfortunately, determination of time since death from skeletal remains is challenging. Bone decomposition is complicated by widely variable rates observed between different environments and burial conditions.(12,13,22) It is certainly possible that the 'Life' skull could have been from a soldier, prisoner, or even an inhabitant of New

Guinea who had died during or before WWII. Indeed, the same May 22, 1944 issue of Life Magazine reports on the Japanese military using Chinese and Javanese laborers on New Guinea.

Utilizing forensic and paleopathology techniques for the interpretation of skeletal remains

Upon reaching adulthood, the pelvis and the skull are the most reliable indicators of age at death and sex, and the skull is the most useful when determining ancestry.(23–28) Osteological features may be affected by both heritable and environmental factors, however, and significant variation exists between individuals and populations.(23–25,27,28) As such, no one feature is diagnostic of any age, sex, or ancestry, and assessment must not rely on any feature in isolation.(27,29)

Determination of sex from skeletal remains is well-studied and accurate.(27) The pelvis is the most useful skeletal element when determining sex. Numerous adaptations are present in the female pelvis to accommodate childbirth via creation of a wider pelvic inlet. Easily observable distinguishing characteristics include a larger subpubic angle, wider greater sciatic notch, and more triangular shaped obturator foramen.

(25,27) The overall size and robusticity of the skull strongly suggests sex, with larger skulls and more robust features indicative of male sex.(25,27,28) Robusticity is most easily visualized at sites of muscular attachment. The mastoid processes and temporal bones are among the more useful sites for evaluation, with robusticity presenting as wider and/or longer projections at these sites in males.(25,27,28,30) Males also tend to have more prominent superciliary arches with supraorbital tori present, described as more prominent brow ridges. (25,27,28)

Estimating age at death from the pelvis is commonly accomplished by assessing the pubic symphyseal surface. Well-described, age-related changes progressing from a rugged, billowing symphyseal surface in young adults to complete erosion of surface features in late adulthood have led to development of formal systems that estimate age at death within 5-10 years.(25) Assessment of age at death from the skull relies primarily on cranial suture closure, with increased suture closure suggesting increased age.(27,29) Similar to pubic symphyseal surface changes, the degree of suture closure is uniform across populations and scoring systems exist that estimate mean age with standard



Figure 3. Right acetabular carbine bullet wound in a 24-30 year old male found in a mass grave of 47 victims of the battle of Lützen, Germany during the Thirty Year's War, 1632. Photo by Andrea Hörentrup (LDA Sachsen-Anhalt) from Nicklisch et al. doi.org/10.1371/journal.pone.0178252.g010 (37)

deviations of approximately one decade.(25,27) Ancestry is consistently described as the most challenging information to derive from skeletal remains.(24,26–28,31) More importantly, and especially considering our discussion of the anti-Asian racism at play in the widespread anatomical trophy taking from Japanese soldiers in the Pacific theatre of WWII, modern forensic estimation of ancestry is a controversial realm. Most modern forensic anthropologists prefer to discuss “likely ancestry” as opposed to “race”—modern determination of ancestry is aimed at discovering useful identifiers as to how an individual would have likely identified or been classified in the context of their life, and attempts to avoid the implication of outdated racial typologies.(24) Forensic “likely ancestry” is based on geographic microevolutionary phenotypic human variation.(31–34) This is distinct from, but may be misinterpreted as, social race. Eugenics and the biological race concept, which makes attempts at scientifically justifying racism, have long been debunked.(31–34)

Though estimating an individual’s ancestry may indeed still offer useful information for anthropologists, medical examiners, and investigators, alike, the foundation of the practice is built from a categorization of ancestry that classically falls into three large groups, European, African, and Asian, which reflect remnants of colonialism and antiquated, over-simplified views of race.(24-17,31–34,35) It has become increasingly clear that modern estimation of ancestry must be undertaken with an understanding of implicit and explicit systemic racism, structural disparities, and ways in which a more productive paradigm might be developed.

As the practice is today, determination of ancestry from skeletal remains relies heavily on visual assessment of subjective traits, including nasal, orbital, zygomatic, maxillary, and cranial morphology.(25–28) It must be noted that a significant amount of variation and overlap exist between groups due to the uniqueness of all individuals and the populations within which they live.(33) Many craniofacial features are assessed together when estimating likely ancestry of an unknown individual, and often entered into large databases and compared with skeletal measurements from individuals with known ancestry.(24,31,33)

Forensic Evidence Left Behind on Battlefield Skeletal Remains

Skeletal remains may show evidence of injury and provide clues as to cause of death. Evidence of trauma to the skull or pelvis found in skeletal battlefield human remains is particularly informative. Injuries to the head or pelvis are associated with high morbidity and mortality from damage to the brain, genitourinary system, and hemorrhage. Characteristic patterns of primary bone injuries include blunt force, sharp force, and gunshot injury.(27) Additional patterns of injury, such as bone warping, and evidence of healing can offer insight into the temporality of the trauma and whether the injury was distant, perimortem, or postmortem.(27,36) Modern examples include a series of 24 trophy skulls from WWII and the Vietnam War, where 8 skulls had evidence of perimortem, battlefield trauma (e.g. gunshot, shrapnel, blunt-force), offering insight into cause of death and supporting the classification as a war trophy.(2) Evaluation of skeletal trauma is especially important when studying historical warfare, where evidence of trauma provides objective information that may be used to reconstruct historical accounts of conflict or understand ancient violence where contextual information is absent.(36,37-39,40) King Richard III died in 1485 during the Battle of Bosworth Field. Historical accounts of his death exist but his remains were not discovered until 2012. Analysis of his skeleton revealed three potentially fatal perimortem injuries: one large penetrating cranial injury, one sharp force cranial injury, and one large penetrating pelvic injury.(41) A mass grave from the Battle of Lützen (1632) during the Thirty Years War shows handgun musket ball trauma to the skull, pelvis, and other bones in more than half of the soldiers, consistent with cavalry attack.(37)(Figure 3) Lesions found in the pelvic bones of two individuals from the Battle of Stoney Creek during the War of 1812 were determined to be consistent with buckshot ammunition, thus representing the first identification of this type of injury and adding objective evidence to battle conditions.(38)

As outlined in “The (Not-So) Ancient Practice of Anatomical Trophy Taking: An Emphasis on Penile Dismemberment,” genital trophy taking and mutilation were common in past conflict.(1) Evidence of these practices may be found in skeletal remains. In a collection of remains from Medieval Ireland (400 CE–1200 CE) one male individual was found to have a

pattern of sharp cut trauma to the pelvis that included several parallel cuts inferior to the pubic symphysis, suggesting phallotomy.(42) Investigation of remains found in a mass grave from the Massacre at Fort William Henry (1757) during the French and Indian War revealed a spectrum of cuts and trauma to the pubic region in all five men present, suggesting intentional genital mutilation. (39)

Who was the Victim Featured in Life Magazine?

Assessment of the 'Life' skull utilizes subjective skeletal features of a single view skull image without three-dimensional evaluation and therefore is severely limited. However, we are afforded good perspective of the facial region and other helpful cranial features. The photograph also offers useful size comparison to an adult female. Applying the osteological features described above, the skull's features appear consistent with male sex due to the large mastoid process, prominent browridge, frontal bossing, and overall size when compared to the woman in the photo. No determination can be made with respect to age, given the inability to assess cranial suture closure. No skeletal trauma is apparent in the limited photograph to determine cause of death. Finally, understanding the inherent challenges of determining ancestry and the inability to assess all craniofacial features, no definitive estimation of ancestry is possible. However, the contextual evidence strongly supports that this is a trophy skull from a male Japanese soldier, and is a conclusion supported by previous publications.(2,5) The potential identity of the 'Life' skull also includes New Guinean burial remains as well as Chinese and Javanese laborers.

The Ethics of Human Remains and Collections

The displaying of human remains so casually in Life magazine brings up the ethical considerations behind how we use human remains in medicine, art, museums, and collections.(43–46) Modern collections must recognize the complex ethical factors that deal with post-mortem human rights. While we use human remains to help further scientific endeavors, one must be respectful of the decedents' humanity and privacy when presenting their pathology to the public. The way in which an individual's remains are displayed can create misperceptions or incorrect conclusions regarding the pathology, which may lead to stereotypes. Factors to consider include the ethical display of the remains, consent for obtaining the remains and displaying them to the public, and the manner

in which the remains were acquired.(43–46) The trophy skulls taken during WWII represent a war crime and at least some have been repatriated to Japan in accordance with Rule 114 of the International Committee of the Red Cross's customary international humanitarian law, which pertains to the return of remains and personal effects of the dead.(2,4,7,47) It would be ethically inappropriate to display such remains to the public. While we have included the 'Life' skull image for the purposes of this paper and its discussion of history and bioethics, we have chosen to exclude other images of this type of atrocity for the reasons stated above.

It is important that all exhibits operate within an ethical framework. Ownership of human remains, especially those obtained without consent, can be controversial and ethical determination of whether those remains should be displayed is determined by the collection circumstances and connections to living persons.(43–45) The International Council of Museums has a code of ethics regarding the display of human remains.(46)

CONCLUSIONS:

The pelvis and the skull provide useful, objective evidence when studying victims of past wars. Accurate determination of age at death, sex, and likely ancestry may be established from skeletal remains. Evidence of trauma found in the skull or pelvis may offer clues as to cause of death and atrocities lost to time. Forensic methods and paleopathology can help restore the humanity lost by the faceless victims of war. The May 22, 1944 Life Magazine "Picture of the Week" reportedly features the skull of a fallen Japanese soldier "picked up on the New Guinea beach." Considered together with the widespread nature of anatomical trophy taking by US troops in the Pacific fueled by rampant jingoism and anti-Asian racism of the time, it is quite likely the skull featured in the May 22, 1944 Life Magazine "Picture of the Week" is truly that of a Japanese soldier. Although our investigation found no evidence to discredit the original claim that the skull belonged to a Japanese soldier, New Guinean burial remains and non-Japanese victims of war, such as Chinese and Javanese laborers, cannot be entirely excluded. Our investigation into anatomical trophy taking in WWII sheds light on one of the more reprehensible outcomes of the era's inherent racism, which contributed to countless war crimes in the Pacific theatre.

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LOCATIONS:

Burial Site, Hugh Hampton Young (1882-1945), Baltimore, Maryland



Figure 1. Young family plot, Druid Ridge Cemetery, Baltimore, Maryland

Among the list of pioneers of American urology, including Ramon Guiteras (1858-1917)(founder of the American Urological Association, 1902), Elisabeth Pickett (1918-2010)(first female diplomate of the American Board of Urology, 1962), and Milton Augustus Francis (1882-1961) (first African American diplomate of the ABU), may be included Hugh Hampton Young (1870-1945)(1,2). Young had never planned on being a urologist or pioneering the nascent field. The hallway-based episode in 1897 during which the immortal Dr. William Halsted (1857-1922), 25% of the Hopkins 'big Four', told Young he was now chair of the then non-existent department of Genito-Urinary surgery, has become the stuff of legend(3). Young's autobiography, which preceded HIPAA-requirements by a half century, makes for edge-of-seat page turning. Young, it may be said, put urology 'on the map', certainly in the United States, and was a revered presence at the 1st meeting in 1908 of the *Association Internationale d'Urologie*, of which he was a co-founder. Young 'stirrups' continue to be used today and his clinical presence is still felt in early descriptions and classification of congenital urethral valves, the earliest use of antibiotics in urology, and the first known radical perineal prostatectomy, the results of which may be soon re-achieved with a four million dollar robotic single-armed platform. The urologic confidante of the most powerful men in the western hemisphere (he was personal physician to Presidents of the United States' Woodrow Wilson (1856-1924), the Philippines' Manuel Quezon (1878-1944), and Hernando Vasquez (1860-1936) of the Dominican Republic), his care of 'Diamond' Jim Brady (1856-1917) led to the establishment of the Brady Urologic Institute in Baltimore and New York, philanthropic ventures that recently celebrated their centennials. Young began the *Journal of Urology* in 1917 with his own funds and its forward was dedicated to advancing urology and preserving its history.(4) He served as editor for 28 years, its longest serving head, until his death August 23rd, 1945 from cardiac disease. Although born and raised in Texas, he was buried not far from Baltimore, his adopted home, in Druid Ridge Cemetery (Figure 1). Urologists who pay homage to the site should take Park Heights Avenue (Route 129) south from the Baltimore Beltway. At the cemetery entrance on the right, travel beyond the welcome center and up the main drive, drifting slowly up the hill and to the left. The road crosses the ridge on the right and the Young plot is approximately 50 paces after the turn, just beyond a triangular intersection.

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