Dominique Jean Larrey (1766–1842) and His Contributions to Military Medicine and Early Neurosurgery

Rebecca C. Ramdhan[1], Rabjot Rai[1], Katherine N. Brooks[2], Joe Iwanaga[2], Marios Loukas[1], R. Shane Tubbs[1,2]

Key words
- Biography
- Dominique Jean Larrey
- Emergency medicine
- History
- Military medicine
- Neurosurgery

From the [1]Department of Anatomical Sciences, St. George's University, Grenada, West Indies; and [2]Seattle Science Foundation, Seattle, Washington, USA

To whom correspondence should be addressed: Joe Iwanaga, D.D.S., Ph.D. [E-mail: joei@seattlesciencefoundation.org]

Citation: World Neurosurg. (2018) 120:96-99. https://doi.org/10.1016/j.wneu.2018.08.159

Journal homepage: www.WORLDNEUROSURGERY.org

Available online: www.sciencedirect.com

Dr. Dominique Jean Larrey was a pioneer in the field of military surgery. His creative innovation and drive to improve the quality of medical services available to those injured during war guided his achievements in medicine. Dr. Larrey has often been referred to as "the father of emergency medical services" and "the father of modern military medicine." His contributions to medicine continue to live on in common procedures and healthcare systems today, such as aspiration of pericardial effusion and drainage of hemothorax and empyema. Based on his own writings, he treated multiple cases of intracranial injury, making him an early, but often forgotten, pioneer of neurosurgery.

INTRODUCTION

Dominique Jean Larrey (1766–1842; Figure 1) was born in Baudéau Hautes-Pyrénées, a renowned French village that was known since Roman times for the medicinal qualities of its waters.[1,2] Larrey's father died when Larrey was 3 years old. He was then taken under the wing of the parish priest, l'abbé Grasset.[2] At 13 years old, he left his home village and traveled to Toulouse to join his uncle, Alexis Larrey—a surgeon-major and professor at the Hospital of Grave. Dominique Jean Larrey studied surgery and began honing his surgical skills, in a few years becoming house surgeon. When he turned 21, Larrey moved to Paris and was accepted as an assistant surgeon in the French Navy and was assigned to the frigate Vigilante.[1,3] Larrey's first sailing adventure to Newfoundland ended after only 6 months because he resigned owing to severe seasickness.[1]

On returning to Paris in 1789, the revolution was in full effect, and Larrey enrolled in a clinical surgery course at the well-known hospital, Hôtel Dieu.[4] After his training, he worked at Hôtel Royal des Invalides. The years he spent learning at these hospitals provided him with the skills and knowledge that would guide his surgical career.

His work and experiences in battlefield medicine were linked to the military efforts of Napoleon from 1797 to 1815. After Napoleon's downfall at Waterloo in 1815, Larrey spent the remainder of his life dedicated to civilian medicine and writing about his experiences.[5]

Larrey died of pneumonia on July 25, 1842 in Lyons, France at the age of 76. He had been given the title of baron a few years before his death.[1,3,6] A culmination of his innovations, accomplishments, and success earned him the titles of "the father of emergency medical services" and "the father of modern military medicine."[4,7] The sternocostal triangle of the diaphragm was named in his honor, and 2 monuments were built in dedication to his advancements in medicine: 1 at a military hospital in Paris called Val-de-Grâce court and 1 at the hall of the Academy of Medicine.[1,8]

LARREY'S WORK IN BATTLEFIELD MEDICINE AND CONTRIBUTION TO CURRENT MEDICINE

While serving as a surgeon in the Army of the Rhine (1792), Larrey witnessed the horrendous conditions of the wounded. He noticed that many injured soldiers died without receiving medical care.[9] The common ambulances that were assigned for wounded soldiers were often unable to arrive for days; thus, with no medical attention, soldiers died of wounds and injuries that could have been treated. Larrey's experience on the battlefield led him to create a system to triage patients and create the "ambulance volante," a flying ambulance.[1,3] This innovation consisted of horse-drawn vehicles equipped with padded mattresses, suspension, and essential medical tools that would help transport the critically injured to the base hospitals. This allowed soldiers to be transported more quickly to the base hospitals. This innovative contribution by Larrey is still recognized and practiced by the Red Cross.[1] As a medical professional, Larrey worked among the front lines in unrelenting battlefield conditions: rampant explosions, dry weather conditions, and the risk of infection. His overpowering humanity led him to act in the best interests of the wounded despite their rank in the army. He even showed the same devotion and compassion to enemy soldiers.[1]

Many soldiers during this time experienced hypothermia-related injuries that often resulted in death. Through his time spent observing such soldiers, Larrey recognized that those who remained on duty in snowy environments with temperatures of −15°C had no complaints but that an increase in temperature to ≤18°C or 20°C resulted in piercing sensations, numbness, and rigidity of the muscles. Noticing these changes in temperature led

Figure 1. Drawing of Baron Larrey.

him to hypothesize that the variability in the temperature, not the actual cold itself, predisposed the soldiers to develop gangrene.[2] It was later established that after being affected by hypothermia, the rewarming of the body must occur steadily at 0.5°C–1°C/hour to prevent the developed of gangrene and permanent damage.[10] Additionally, Larrey recognized the beneficial medical effects of cold weather, including decreased bleeding with snow or ice applied and a greater tolerance for pain. He applied this knowledge to lower extremity amputations and to improve the treatment of frostbite.[10]

Larrey was a fast surgeon who believed that timing was imperative for performing effective amputations. Many surgeons preferred to wait until the injured could be transported from the battlefield; however, Larrey performed amputations as soon he could after the injury.[11] Without concern for his own safety, Larrey provided medical attention to the severely injured during battles. He drained penetrating wounds, reduced fractures, and minimized the risk of infection through debridement.[11] Larrey advanced the debridement technique by creating an "inverted cone-like cut," which permitted the drainage of fluids from the wounded area.[11,12] Larrey was also the first to cauterize injuries using a burning piece of iron over necrotic tissue.[11,12]

Under Napoleon Bonaparte's command in 1794, Larrey served as a chief surgeon of the Army of Italy for 2 decades. Impressed by Larrey's dedication and skill, Bonaparte described Larrey as "the most virtuous man I have ever known."[6,13] Larrey performed 1 of the earliest methods of cardiopulmonary resuscitation; he created artificial respiration by blowing air into the lungs and then compressing the chest to promote exhalation.[12] Following in the footsteps of Francisco Romero, Larrey became the second surgeon to perform pericardial interventions in 1810.[1] Clinical experience with several patients led him to realize the need to use cadavers for medical research, and his research made him a pioneer in techniques such as aspiration of pericardial effusion and drainage of hemothorax and empyema.[11]

Larrey had exceptional clinical skills and documented his findings. He made the connection between the consumption of salt-free snow water and the likelihood of the development of goiter and cretinism.[2] Serving Napoleon in 25 different campaigns and 60 battles, Larrey always took the time to document his experience and clinical observations, including his experiences with endemic diseases such as syphilis, leprosy, typhus bubonic plague, rabies, tetanus, aneurysms, and elephantiasis scrota.[8,14]

LARREY'S INFLUENCE ON EARLY NEUROSURGERY

During his time as a military surgeon, Larrey treated soldiers with brain and skull injuries from bullet wounds, cavalry sabers, and atraumatic causes such as infection.[5] Surgeons understood the severity of these injuries and immediately saw soldiers who survived the initial effects of traumatic wounds, such as bullets and penetrating objects.[3]

In his own writing, Larrey stated in his memoirs that wounds complicated with cranial fractures were managed with trepanation to prevent bony fragments from injuring the brain matter.[5] He described the case of a soldier shot in the right temple, fracturing the squamous portion of the temporal bone, with the bullet fragmenting into 2 pieces—1 into the cranium and 1 buried within the temporal muscle. Larrey wasted no time in dilating the wound and beginning the operation, stating, "I soon discovered one piece of the ball [bullet] in the muscle, and easily removed it. By means of an elevator I raised up a large scale of the cranium, and was so fortunate as to seize the other piece of the ball with a pair of dressing forceps, and extracted it from its nidus, between the dura mater and the cranium."[3]

After the surgery, the patient had an extensive open wound, which gradually diminished and healed to the point at which he was discharged on the 45th day after his injury. However, underneath the