

Astley Cooper: His Life and Surgical Contributions

Richard L. Hutchison, MD, Ghazi M. Rayan, MD

Sir Astley Paston Cooper (1768-1841) was a successful and influential British surgeon during the early decades of the 19th century. He was a dedicated anatomist, an accomplished researcher, an inspiring teacher, and a skillful surgeon. Cooper published about the cause and treatment of Dupuytren's disease 10 years before Dupuytren. His contributions were widespread and substantially advanced the understanding and treatment of breast disease, vascular aneurysms, and abdominal wall hernias, along with orthopedic, otologic, and hand surgery. His contributions to surgical science have endured and are being used today. (*J Hand Surg* 2011;36A:316–320. Copyright © 2011 by the American Society for Surgery of the Hand. All rights reserved.)

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SIR ASTLEY PASTON COOPER (1768–1841) was a pioneering surgeon and scientist. Cooper's contributions were widespread, including important innovations in hand surgery. His scientific accomplishments also advanced the understanding and treatment of breast disease, vascular aneurysms, and abdominal wall hernias, along with orthopedic and otologic problems. This article presents a brief biographical sketch along with a discussion of his lasting influence and contributions to the art and science of surgery.

HIS LIFE

Many informative publications about Sir Astley Paston Cooper's life were consulted for this article, including a biography written by his nephew and a recent biography by Burch^{1–5} (Fig. 1). Cooper was born in 1768 into a large family. His father was a prominent clergyman and his mother, a descendant of Isaac Newton, was a popular novelist. His paternal grandfather and uncle were both surgeons. Growing up in Norfolk and Yarmouth, he was a spirited and mischievous child who preferred horseback riding to schooling.

Cooper became interested in surgery at the age of 14 after witnessing a lithotomy for removal of a bladder stone. At that time in England, medical practitioners included apothecaries, surgeons, and physicians. Apothecaries and surgeons were trained through the apprentice system. Cooper was sent to London at the age of 16 to begin studying medicine with his uncle, William Cooper.

The center of surgical care and training in London was at the Borough Hospitals, an affiliation between Guy's Hospital and St. Thomas Hospital. Shortly after his arrival, Cooper became a formal apprentice of Henry Cline, Sr (1750–1826), a prominent surgeon at St. Thomas. Cline, a former student of John Hunter, was an accomplished anatomist, lecturer, and surgeon. Cline became the most influential teacher and guide to the young Cooper. Cooper roomed with the large Cline household, and eventually became an integral part of the family and later Cline's collaborator and partner.

Senior surgeons, in addition to having formal apprentices, educated students and supplemented their income by running their own dissecting theaters and provided subscription lecture series. The hospital work was unpaid, but the prominence of a senior position at these hospitals attracted lucrative private patients.

There was a chronic shortage of cadavers, and Cooper enthusiastically began procuring bodies for dissection. Later in his career, he had resurrectionists on retainer, and often supported the families of the grave diggers when they were jailed. He had a passion for

From the INTEGRIS Baptist Medical Center/University of Oklahoma, Oklahoma City, OK.

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Corresponding author: Richard L. Hutchison, MD, Division of Hand Surgery, INTEGRIS Baptist Medical Center, 3366 NW Expressway, Oklahoma City, OK 73112; e-mail: rlhutchison@gmail.com.

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FIGURE 1: Portrait of Sir Astley Cooper. (Reprinted with permission of Wellcome Trust.)

dissection and avoided the overcrowded dissection room by bringing specimens back to Cline's house. In addition to guiding his surgical studies, Cline sparked an interest in politics.

A crucial aspect of his early training was attendance at 2 lecture series given by John Hunter. Hunter emphasized the importance of searching for new knowledge and the value of experimentation. Regarding Hunter's ideas, Cooper wrote, "You must think for yourselves, only do not rest contented with thinking; make observations and experiments for without them your thinking will be of little use."⁶ Cooper remained an avid experimentalist throughout his career.

Cooper had a passion for dissection and teaching, and although still an apprentice, became head of Cline's dissecting room at the age of 21. He later wrote, "Operations cannot be safely undertaken by any man, unless he possesses a thorough knowledge of anatomy. This is the real groundwork of all surgical science; and it has ever been found that half anatomists are bungling practitioners."⁴ He began sharing the lecture responsibilities with Cline 2 years later, at the age of 23.

Cooper and Ann Cock, a like-minded woman who was a distant cousin of Cline, were married in 1791.

Cooper was so dedicated to teaching that he gave a lecture on their wedding day. The couple later took a working honeymoon to France but were forced to escape from the bloodshed and terror of post-Revolutionary Paris.

The dowry supplied by the marriage gave Cooper the opportunity to continue his formal training and experimental work. Upon returning to London, Cooper began a popular subscription lecture series for students that blended practical surgical knowledge, patient and laboratory demonstrations, and medical theory. Up to 400 students were in attendance. He also became a professor of anatomy at the College of Surgeons, allowing him to perform occasional legal public dissections.

Cooper was tireless, performing daily dissection and experiments in addition to his clinical and teaching duties. He said, "If I laid my head on my pillow at night without having dissected something in the day, I should think I had lost that day."⁵ For 2 years he was professor of comparative anatomy for the Royal College of Surgeons, and dissected animals from around the world, once even dissecting an elephant on his lawn.¹ He was attractive, well-dressed, and quick to laugh, remained an active horseman, and was fond of bad puns and practical jokes.

In 1800, following the death of his uncle and after agreeing to temper his democratic political views, Cooper succeeded his uncle as a senior surgeon at Guy's Hospital. At this point his career progressed, with the rapid expansion of his private practice that allowed him to fund his dissections, research, and experimentation. He eventually became the most famous and highest-paid surgeon or physician in the country. On a typical hospital day, he awoke at 6 AM and performed dissections in a room above his stables with his assistant until around 7:30. Then he saw indigent patients at his home office before breakfast, and paying patients afterward. Minor procedures were often done at this time. At 1 o'clock, he would walk to the hospital and made hospital rounds for about an hour, followed by many students. Lectures began at 2, followed by more home visits for private patients until around 7. After a small dinner, he would either give additional lectures or visit more patients.^{1,7}

Cooper educated many of the surgeons in his day. One of his notable trainees was the poet John Keats, who served as a dresser, the equivalent of a house officer, at Guy's Hospital. Keats completed his training but decided not to practice medicine in favor of writing.

Cooper's reputation substantially grew after the publication of his treatise on hernias in 1804. As his practice progressed, a larger percentage of his practice was

spent caring for the wealthy and the aristocracy. This culminated in a surgical procedure performed on King George IV. Although he was not the court surgeon, the king specifically requested Cooper for his care. Owing to the high risk of postoperative infection, Cooper was hesitant to remove the sebaceous cyst from the King's scalp and was able to delay the surgery for 2 years. Finally, assisted by Cline, the surgery was successfully completed in 1820. This resulted in Cooper becoming a baronet and the official court surgeon to George IV, and eventually to William IV and Queen Victoria.^{1,3}

Cooper briefly retired after the death of his wife in 1827, but subsequently remarried and resumed his practice. He campaigned for the legalization of dissection, which resulted in the passage of the Anatomy Act in 1832. Cooper twice served as President of the Royal College of Surgeons and collected innumerable national and international honors.

Cooper died in 1841 at the age of 72, most likely from congestive heart failure. By his request, an autopsy was performed. Findings included his healed inguinal hernia, an umbilical hernia, and evidence of tuberculosis in his lungs and kidneys, which he acquired as a child and which was responsible for the death of many of his siblings. He was buried locked in a crypt beneath the chapel at Guy's Hospital.^{1,2}

SURGICAL CONTRIBUTIONS

Cooper's surgical accomplishments are remarkable, especially because anesthesia had not yet been introduced, and considering the high rate of postsurgical wound infection and sepsis.

Cooper's work was primarily published in his books, *The Anatomy and Surgical Treatment of Hernia* (1804), *A Treatise on Dislocations and on Fractures of the Joints* (1822), *Lectures on the Principles and Practice of Surgery* (1827), *Illustrations of the Diseases of the Breast* (1829), *On the Anatomy of the Breast* (1832), and *Practical Surgery* (1841). His surgical lectures were printed in early issues of *The Lancet* in the 1820s, first without his permission, then with his tacit approval. In total, Cooper published 6 books, including 1 on the thymus gland, 2 collections of essays, and 28 papers.⁸

HAND SURGERY

Palmar contracture, as is the case in many eponymous conditions, was not first described or treated by Dupuytren. The first report of the nature and treatment of this disease was published in 1822 by Cooper, 10 years before Dupuytren.^{9,10} The problem of contracture resulting from fibrosis of the palmar fascia was well known to Henry Cline. His only direct publication was

on comparative anatomy, but his lectures were often transcribed and later published by his students.⁵ Archived dissection notes show that Cline dissected 2 hands with contracture of the palmar fascia in 1777.¹¹ Incidentally, that was the year that Dupuytren was born. There are several mentions of palmar fascial disease in notes from the Cline/Cooper lectures, including suggestions of palmar fasciotomy as a treatment.⁹

Cooper's published description appeared in his 1822 book, *A Treatise on Dislocations and Fractures of the Joints*. He wrote:

“The fingers were sometimes contracted . . . by chronic inflammation of the thecae [flexor tendon sheath] and aponeurosis of the palm of the hand, from the excessive action of the hand, in the use of the hammer, the oar, ploughing, &c, &c. When the thecae is contracted nothing should be attempted for the patient's relief, no operation or other means will succeed; but when one aponeurosis is the cause of the contraction, and the contracted band is narrow it may with advantage be divided by a pointed bistory, introduced through a very small wound in the integument. The finger is then extended, and a splint is applied to preserve it in a straight position.”¹⁰

Cooper, and Cline, realized that the disease was due to fibrosis in the palmar fascia, rather than that of the flexor tendon as was the prevailing thought. Cooper emphasized the importance of differentiating between this superficial contracture and contracture at the deeper level of the underlying tendons. He realized that the palmar contracture, but not flexor contracture, was treatable by surgery. This issue was later obscured by Dupuytren, who repeatedly claimed that Cooper believed palmar contracture was untreatable. Owing to the risk of infection and sepsis, elective hand surgery was not commonly performed.^{9,12} Publications during that period reflected the focus on the emergency treatment of hand infections and trauma.¹³

Cooper treated palmar contracture by percutaneous fasciotomy, using a bistory, later known as a Cooper's knife (Fig. 2). One reason why a percutaneous rather than an open technique was used was the idea that infection was caused by exposure of opened tissues to the air.¹⁴ Currently, fasciotomy and its modifications, direct legacies of Cooper, are becoming widely used and gaining popularity in the form of needle fasciotomy.

Cooper traveled to Europe in 1825 and met Dupuytren, and they also corresponded several times¹⁵



FIGURE 2: Example of Cooper knife used for percutaneous fasciotomy. (Reprinted courtesy of Dr. Michael Echols.)



FIGURE 3: The meeting of Cooper and Dupuytren, with Dupuytren (face not seen) hugging Cooper. (Reprinted with permission of the Editor of *Guy's Hospital Gazette*.)

(Fig. 3). There is no direct record proving that they ever discussed palmar contracture.

GENERAL SURGERY

Cooper's large, well-illustrated treatise on hernias was published in 1804. This work detailed the anatomy of inguinal hernias, named the *transversalis fascia*, and provided the first description of the eponymous superior pubic ligament.^{8,16} Cooper had a personal interest in hernias. He wore a truss for 5 years during the early part of his apprenticeship, and his hernia gradually re-

solved.¹ Cooper's anatomical studies of the breast were the definitive work on the subject until this century.^{1,17} He detailed the anatomy of the lymphatic system and described the suspensory support system now known as Cooper's ligaments.

VASCULAR SURGERY

Cooper also made notable contributions to vascular surgery, developing an extraperitoneal approach to the iliac arteries for ligation of proximal femoral aneurysms and performed the first successful ligation of the carotid artery for the treatment of an expanding aneurysm.¹⁸ Cooper also performed the first ligation of the abdominal aorta, although the patient died 2 days later.¹⁸ The specimen can be viewed at the museum at Guy's Hospital. The first aortic ligation with patient survival did not occur until 1925.¹²

ORTHOPEDIC SURGERY

Through his experiments, Cooper recognized the danger of compromised blood supply to the femoral head after intracapsular fractures.¹⁰ For the treatment of an infected above-the-knee amputation, Cooper performed the first successful hip disarticulation.¹⁵ He was also the first to illustrate the "heel in axilla" method of reducing a dislocated shoulder.³ Through tracer experiments, he realized that metabolic changes led to bone fragility in the elderly, and correlated this with epidemiological studies of hip fracture.^{10,19}

OTHER SURGICAL ACCOMPLISHMENTS

In 2 published lectures given to the Royal Society, Cooper demonstrated that near-normal or normal healing was possible with a ruptured tympanic membrane, and he reported restoration of hearing after performing a myringotomy on a patient with eustachian tube blockage. This work led to his election as a Fellow of the Royal Society in 1802; he received the Copley medal, the highest honor bestowed by the Society.²⁰ Cooper published anatomical monographs on the testes, with the covering of the spermatic cord now known as Cooper's fascia. His physiologic experiments paved the way for modern vasectomies.²¹

In conclusion, Astley Cooper had a remarkable surgical career. He was a pioneer surgeon and scientist. His dedication to the study of anatomy, commitment to the experimental approach of acquiring new knowledge, and devotion to teaching and patient care were an inspiration while he was alive, and continue to be so today.

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