A Brief History of Appendicitis: Familiar Names and Interesting Patients

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ONSIDERING THE FREQUENCY with which appendiceal pathology is diagnosed and treated today, it is surprising that the term "appendicitis" and the recommendation for cure by removal of the appendix were first proposed by Dr. Reginald Heber Fitz (Fig. 1) a mere 125 years ago. This does not however imply that the cause of right lower quadrant pain and its appropriate treatment had not been sought for a long time. From ancient times through the first half of the 19th century, almost all inflammatory conditions localized to the right lower quadrant were mistakenly attributed to the cecum. As one prominent surgical historian noted in the 1920s, "so many times does it appear that acute observers stumbled on the very threshold of the discovery that the original lesion in these conditions (of the right iliac fossa) was in the vermiform appendix, that it seems scarcely credible that for less than 45 years have we had any adequate knowledge of appendicitis."¹ The history of appendicitis is an excellent anecdote for the history of surgery itself. In his presidential address at the 94th meeting of the Southern Surgical Association, G. Rainey Williams noted that "the history of appendicitis includes examples of great resistance to changing concepts, brilliant but unaccepted early observations. emotional support for unsupportable views, the importance of timing, and, finally, the development of a highly satisfactory solution."²

Ancients

Disease of the appendix is likely as old as man. One of the earliest examples, right lower quadrant adhesions suggestive of previous appendicitis, was discovered in an Egyptian mummy during the Byzantine era. Much of what was known about human anatomy before the Renaissance was from the second century observations of Galen. No anatomical description of the appendix is seen in his work, which was based largely on the dissection of primates.¹ However, he did comment on right lower quadrant pain in his writing. He noted that "the colic passion, situated in the large bowel, was found below the umbilicus, more often on the right, and was very apt to recur." At that time, surgical treatment was often delayed until the last possible moment when the abscess was actually "pointing." Physicians were careful not to cause discomfort from surgery and to avoid the charge of "having killed the patient by operation." In fact, the major practice was to allow either spontaneous abscess drainage with cutaneous fistual formation or to allow the patient to die "a peaceful death" from sepsis.

Renaissance

The first descriptions of the appendix can be found from scientists and physicians during the late 15th and early 16th centuries. Although the anatomic structure was clearly identified during this period, little was known about its function or role in right lower quadrant inflammation. One of the first drawings of the appendix is from Leonardo da Vinci (1492); however, the structure was not described and the drawing was not published until the 18th century. Credit for the first description of the anatomic structure of the appendix is given to Berengario Da Carpi (1522), Professor of Surgery at Pavia and Bologna. In his work, "*De Humani Corporis Fabrica*," Andreas Vesalius (1543) illustrated the appendix (Fig. 2) but called this structure the cecum. He noted this was "because of its true blind pouch



FIG. 1. Reginald Heber Fitz, M.D. Reproduced from http:// ihm.nlm.nih.gov/images/Bo09136. Accessed October 15, 2012.

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FIG. 2. Colon and appendix, Andreas Vesalius, Di Humani Corporis Fabrica, 1543. Reproduced from www.appendicitis.pro/ the-john-hunter-memorial/the-anatomy-and-physiology.html Accessed October 17, 2012.

nature whereas the actual cecum has three openings." This description led to much confusion in terminology between the cecum and appendix for centuries to come.

Age of Enlightenment

During the 18th century, much perturbation regarding the role of the appendix in right lower quadrant inflammation and the appropriate treatment for a perforated appendix existed. One of the earliest descriptions of management of "iliac passion" is from Boerhaave (1709), a leading medical expert of the time. He advised the following treatment: large and repeated bloodlettings, laxative and cooling clysters (enemas), opiates, and fomentations (warm animal compresses) to the abdomen. Further confusion regarding the etiology of right lower quadrant abscess formation came from Lorenz Heister (1711) and Mestivier (1759) who both described perforated appendices resulting from foreign bodies. Claudius Amyand is credited with the first recorded appendectomy in 1735. This was performed in an 11-year-old boy with an inguinal hernia. A fecal fistula to the scrotum was found, which resulted from a foreign body perforation of the appendix from a pin. One of the best known surgeons and anatomists of the late 18th century was Scottish-born scientist John Hunter. His works and those of other anatomists of the era contain many descriptions of perforated appendices or periappendiceal abscesses on pathologic specimens. Surprisingly, there was still no recognition of the appendix as the primary cause of right lower quadrant inflammation by Hunter and colleagues.

19th Century

In the early 19th century, there was continued confusion regarding the etiology of right lower quadrant pain. Baron Guillaume Dupuytren, a leading surgeon of Hotel Dieu in Paris, felt that right lower quadrant inflammation began from cecal pathology. In regard to his beliefs, he famously said: "I have been mistaken, but I have been mistaken less than other surgeons." Many other papers of the period further complicated the issue. Another leading source on the topic was Goldbeck's graduation thesis (1830) on "Inflammation in the Right Iliac Fossa," which described accurately all of the signs and symptoms of appendicitis. Like Dupuytren, he mistakenly believed right lower quadrant pathology originated from cecal mucosal inflammation, a process which he named "perityphlitis."

Despite confusion regarding the etiology of appendicitis, one of the greatest advancements in management occurred in 1848. Under chloroform anesthesia, Hancock performed the first deliberate laparotomy to drain a periappendiceal abscess before "pointing" or fluctuation. Four additional cases were reported by Willard Parker in 1867. At this time, he advocated surgical drainage after the fifth day of illness but without waiting for fluctuance, an approach that was later credited with reducing mortality from perforated appendicitis.

Two of the greatest advances in the management of surgical patients, although not specific to the history of appendicitis, occurred in the mid-19th century. The first of these was the development of general anesthesia. In 1846, William T. G. Morton, a Boston dentist, persuaded John Collins Warren, a surgeon at the Massachusetts General Hospital, to allow him to administer ether during the removal of a small vascular tumor of the neck. After successful surgery, Warren, impressed with the new discovery of inhalational anesthesia, famously stated "Gentlemen, this is no humbug." The second major advance came in the field of infectious disease. Despite the previous work of Ignaz Semmelweis, demonstrating the importance of handwashing in obstetrical clinics, most surgery was practiced under unsanitary conditions where bloody laboratory coats were seen as a sign of the surgeon's experience. Based on the work of Louis Pasteur demonstrating the role of micro-organisms in infection, Joseph Lister began to experiment with carbolic acid solution on hands, surgical instruments, and wounds. In 1867, Lister published his first series of papers on antisepsis in The Lancet and dedicated his career to improved methods of antisepsis, which greatly advanced the safety of surgery.

One of the greatest contributions to the management of appendicitis came not from a surgeon, but rather a pathologist. In June 1886, the first meeting of the Association of American Physicians was held in Washington, DC, with many of the leading physicians present, including Dr. Sir William Osler. At this meeting, Reginald Heber Fitz, a Harvard pathologist, presented his paper entitled "Perforating Inflammation of the Vermiform Appendix; with Special Reference to Its Early Diagnosis and Treatment." In this paper, Fitz emphasized that the etiology of most right lower quadrant inflammatory disease was the appendix. He provided a clear description of the clinical features of appendiceal disease, described in detail the pathological changes, and coined the term "appendicitis." Most importantly, he advocated early surgical removal to the audience and ended any further challenge to the appendix as the cause of right lower quadrant inflammatory disease.

Not long after this meeting, Thomas Morton (1887) was credited with the first successful operation deliberately performed for appendicitis. This is based on a case report, which he presented to the College of Physicians on June 1, 1887. The case was of a 26-yearold man managed medically (calomel, soda water, pepsin, stimulants, quinine, poultices [warm compresses], and eventually leeches) over the course of a week when he eventually was taken for laparotomy with drainage of an intra-abdominal abscess and appendectomy with abdominal irrigation. He recovered over the next several weeks successfully. Interestingly, Morton presented another similar case of a woman who underwent appendectomy several months prior who died 3 hours postoperatively from septic shock. In answer to Dr. Morton's discussion as to the advisability of removing the human appendix, Dr. Chapman replied: "a true vermiform appendix is found only in six animals: man, gorilla, chimpanzee, orang, gibbon and wombat. There can be no doubt, therefore, that the cecal appendix is one of those parts of the human body having no particular function of significance, being of use only in animals... In the human being it ought to be removed with no bad effect whatsoever, so that I thoroughly agree with Dr. Morton in what he has to say regarding the opening of the abdomen and taking out the appendix. It seems to me that the human being is better off without the appendix than with it, for it is nothing but a trap to catch cherry stones and other foreign bodies."3 Interestingly, Dr. Morton's brother and son both died of acute appendicitis.

Two significant advances in the diagnosis and treatment of appendicitis are attributed to Dr. Charles McBurney (Fig. 3) who practiced in the Roosevelt Hospital in New York. In 1889, McBurney described the pattern of migratory pain with eventual point localization one-third of the distance between the anterosuperior iliac spine and the umbilicus, "McBurney's Point."⁴ Later, in July of 1894, he described the lateral musclesplitting incision in *Annals of Surgery*. Interestingly, Dr. Lewis McArthur was to have described the same incision to the Chicago Medical Society the previous month. His paper was postponed when the program ran overtime and the term "McBurney incision" has lasted the test of time. Further modification of the right lower quadrant incision occurred over the subsequent decade. Drs. A. E. Rockey of Portland, Oregon, and Gwilym G. Davis of Philadelphia are credited with the prominence of the transverse right lower quadrant skin incision with division of the underlying muscle layers along their fibers.

One of the most interesting anecdotes regarding appendicitis involves a surgeon as a patient. In early September 1897, Dr. Harvey Cushing (Fig. 4), a surgery resident at Johns Hopkins, operated on a patient with a perforated appendicitis who subsequently died of sepsis. Several weeks later, he developed abdominal pain causing a great deal of personal apprehension. As his symptoms progressed, he subsequently had to convince Dr. Halsted to operate despite the objections of Dr. Osler. He was finally taken to the operating room the next day. During his hospital course, Dr. Cushing documented his own history and physical examination and it was said that he would have assisted on his own operation had it been possible.

20th Century

Two of the most famous cases of patients with appendicitis occurred during the next decade. Around



FIG. 3. Charles McBurney, M.D. Reproduced from http:// en.wikipedia.org/wiki/Charles_McBurney_(surgeon). Accessed October 15, 2012.



Fig. 4. Harvey Cushing, M.D. Reproduced from www.histansoc. org.uk/uploads/9/5/5/2/9552670/7753552.jpg?161. Accessed October 15, 2012.

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FIG. 5. Major Walter Reed, M.D. Reproduced from http://en. wikipedia.org/wiki/Walter_Reed. Accessed October 15, 2012.



FIG. 6. Coronation portrait, King Edward VII. Reproduced from http://en.wikipedia.org/wiki/Edward_VII. Accessed October 15, 2012.

1900, U.S. Army physician Dr. Walter Reed (Fig. 5) demonstrated that the mosquito was the vector of the virus causing yellow fever. He both demonstrated disease transmission from mosquitos and disproved the common belief that yellow fever could be transmitted through soiled clothing, articles that became known as fomites. Research on yellow fever under Dr. Reed's leadership allowed the completion of the Panama Canal between 1904 and 1914. Unfortunately, Dr. Reed was unable to see the benefit of his great work. He developed appendicitis in 1902 and initially declined surgery. After evidence of perforation, he eventually underwent surgery and later died from a fecal fistula and sepsis.

Perhaps the most famous patient with appendicitis was the U.K.'s Prince Albert Edward, heir to the throne of Queen Victoria. After Victoria's death in January 1901, Edward developed abdominal pain 12 days before his scheduled coronation. He subsequently developed an abscess when his appendix ruptured but planned to continue with the scheduled coronation anyway. Ten days after the onset of symptoms, and a mere two days before the scheduled coronation, he finally allowed Sir Fredrick Treves, with the support of Lord Lister, to drain his appendiceal abscess and postpone the coronation by six weeks (Fig. 6). When Edward was hesitant to delay the accession, Treves was famously quoted "Then Sir, you will go as a corpse." After the operation, Treves was said to have spent seven sleepless nights at the bedside. The day after surgery, Edward was reported to be up from bed and smoking a cigar. Two weeks later, Edward was declared free from danger and appendiceal surgery entered the mainstream of medical practice. Dr. Treves went on to become one of the busiest surgeons in London. Ironically, his daughter later died from complications of appendicitis.

During the early 20th century, great progress was made in the management of appendicitis. The importance of fluid resuscitation was recognized making surgery significantly safer. In addition, the value of operating before peritoneal contamination from rupture helped greatly in reducing mortality. Finally, the development of antibiotic therapy in the 1940s further reduced morbidity and mortality from appendicitis. Today, appendectomy is one of the most common abdominal operations performed with excellent outcomes for acute appendicitis.

Considering the frequency with which appendicitis is diagnosed and treated today, one might assume that the etiology of the disease has been known since antiquity. In reality, the cause and treatment of appendicitis have only been known for the past 125 years. Recognition of the pathology of right lower quadrant inflammation by Dr. Reginald Fitz and new developments in antisepsis, anesthesia, and surgical techniques in the late 19th century, and later the development of antibiotic therapy, paved the way for the improved surgical outcomes after appendectomy, which are seen today.

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