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Review Article

Abraham Colles (1773-1843), Physician, Surgeon and Anatomist

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Summary

Abraham Colles (1773-1843), was an outstanding Irish physician, surgeon and anatomist. He made significant contributions to the study of human anatomy, surgery, orthopedic surgery and urology and also published three books and over a dozen surgical papers. He made anatomical discoveries, many of which were named after him, among which were the Colles's inguinal reflex ligament, Colles' space and the Colles' fascia in the perineal region. Among his best known contributions is his description of the distal fracture of the radius, subsequently named the Colles's fracture.

Keywords: Abraham Colles; Colles' fascia; Colles' fracture; Colles' ligament; Colles' space; Human anatomy

Introduction

At the time, knowledge and expertise emerging in British medicine was largely concentrated in London and Edinburgh. In the provinces, there were but few practitioners of note who stood out. The state of British surgery changed in the eighteenth century for several reasons, one of which was the arrival of the Hunter brothers, William and John, in London, after which surgical development became more aligned with scientific principles than previously. William and John Hunter's contributions to surgery were numerous: he helped to bring surgery into the field of experimental science [1]; his studies on inflammation were revolutionary and extensive and he developed new techniques for treating aneurysms. William and John Hunter founded the Hunterian Museum which had more than 13,000 specimens, on top of which John became a major contributor to both comparative and pathological anatomy. This was a time when surgeons improved the diagnosis and treatment of fractures, diseases of the joints, urinary tract, eyes and ears; they also improved amputation and hernia-intervention techniques. This was also a century when surgeons in United Kingdom began to benefit from a better education plus the fact that the profession began to draw practitioners from a higher social stratum than before. Thanks to this, infections and mortality decreased. Amputations stopped being routine, indeed, with this new knowledge and expertise, surgeons were no longer obliged to have recourse to amputation as a first solution, cauterization was used more cautiously and ligatures were employed only when strictly necessary [2]. Surgical training was reorganized, hospitals with adjacent training schools appeared and the level of surgical studies was raised. Among the surgeons and anatomists of the period, were John Abernethy Henry Cline (1750-1827), Sir Astley Cooper (1768-1841), William Blizard (1743-1835) and John Thomson (1765-1835) are worthy of mention but the list remains incomplete without the name of Abraham Colles (1773-1843), an outstanding Irish physician, surgeon and anatomist. Colles made significant contributions in the fields of human anatomy, surgery, orthopedic surgery, and urology, many of which were named after him and he best known for one such, namely, the Colles' fracture of the radius, a common fracture just above the wrist and usually the result of a fall on the palm of the hand.

The purpose of this paper is to review Abraham Colles' contribution as a physician, surgeon and anatomist.

Childhood and Education

Abraham Colles was born on July, 23, 1773 into a comfortable and well respected family of some social standing in Milmount, a town just south of Dublin, Ireland. He was named after his maternal grandfather Abraham Bates. His great grandfather, William Colles of Kilcollen, was a famous Kilkenny surgeon. Abraham was the second son of William Colles (1745-1779), a quarry owner and Mary Anne Bates of Wood broak, County Wexford; he had three brothers and a sister. His family lived near Millmount where his

father owned and managed his inheritance, an extensive Black Quarry that produced Black Kilkenny Marble. His father died when Abraham Colles was only 6 years old but his mother took over the management of the quarry and managed to give her children a good education [3]. Following general preparatory school, Colles went to Kilkenny Grammar School and then Kilkenny College in the South-East of Ireland followed by Trinity College, University of Dublin, where he enrolled in 1790. During 1794, he joined the 'Extern' Society, whose members abandoned their halls of residence and took quarters in Dublin City to support the United Irishmen and Irish independence. Abraham Colles graduated in Arts from Trinity College, in February 1795 [4].

Becoming a physician and surgeon

After he graduated in Arts in 1795, Abraham Colles started to study medicine and later received the Licentiate Diploma of the Royal College of Surgeons in Dublin, following in the steps of his great grandfather, William Colles of Kilcollen. Colles was an enthusiastic student and took five courses, including anatomy, physiology and surgery under William Dease, Samuel Halahan, William Lawless, and

William Hartigan. Though Colles' primary concern was his duties as an apprentice surgeon and pursuit of a classical education, he was also a known face in the debating halls of Trinity College. Soon after leaving Trinity College, he went on to Scotland to study medicine at Edinburgh Medical School, one of the most outstanding medical centers at that time in the world [5]. There, he learned human anatomy under the great anatomists, Alexander Monro (1733 -1817) and Charles Bell (1774 -1842). Abraham Colles was subsequently apprenticed to Philip Woodroffe, resident surgeon in Dr Steevens' Hospital, where he gained his Medical Doctor degree in 1797: with his degree thesis was called 'De venaesectione'. Afterwards, he lived in London for a short time, attending the London hospitals, including Guy's hospital and worked with the surgeon Astley Cooper (who had studied human anatomy with John Hunter) both in his dissections of the inguinal region and on Cooper´s book, entitled On hernia. At that time, Colles described the membranous layer of subcutaneous tissue of the perineal region which would become known as Colles' fascia. In addition to Colles' dissections with Astley Cooper, he described the reflex inguinal ligament, which has been called Colles' reflex ligament, a deep triangular fibrous band extending from the eponeurosis of the obliquus externus abdominis muscle to the tuberculum pubicum on the opposite side [6]. The friendship that formed after Colles and Cooper had worked together for a while would become life-long. Abraham Colles paid tribute to their friendship in 1837 in his book "Practical observations on the venereal disease, and on the use of mercury".

Abraham Colles' career and work

In 1797, Colles returned to Dublin from London and at first he practised medicine and was appointed visiting physician to the Meath Dispensary, a Sick Dispensary in Meath Street, a charity that had been established a few years before by the Society of Friends. Initially, he had a few financially difficult years but he began clinical teaching and also lectured on surgery in his private rooms. He also became an active district visitor for the Sick and Indigent Roomkeepers' Society, a charitable gesture that brought him to the attention of a number of members of the medical profession. In 1799, Abraham Colles succeeded his old teacher Philip Woodroffe (who retired) as resident surgeon at the Dr Steevens' Hospital. This hospital was founded by Dr. Richard Steevens (1653-1710) who had left his fortune to be used to build a hospital. It opened finally in 1733 in Dublin and had a capacity of 40 patients.

The year of 1799 was a tumultuous time, both in Irish history and for Colles personally. After the collapse of the United Irishmen and the failed Irish rebellion, Colles witnessed the sudden death of his mentor William Dease (1752-1798), a pioneer of Irish surgery. Colles followed Dease, with an appointment at £60 per year; he was subsequently elected as a member of the Royal College of Surgeons. In 1800, he received his first apprentices. Colles worked with persistent energy at the Steevens' Hospital and soon became recognized as a talented surgeon **[7].** It was at this hospital that he spent the rest of his surgical life. When he was appointed, Abraham Colles was 26 years of age and he was in an important position, for he became administrative head of one of the leading hospitals of Ireland with complete charge of one third of the surgical beds, and was also free to engage in private practice, to teach and to take on apprentices.

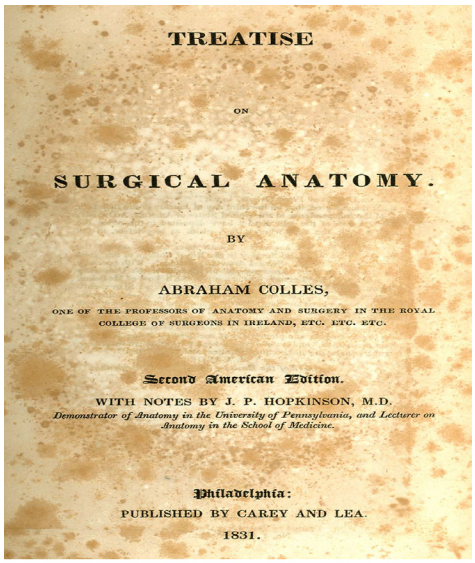
As surgeon of Dr Steevens' Hospital, Colles began clinical and surgical teaching almost immediately. In 1802 he failed to win the chair of anatomy and surgery at Trinity College.

He then unsuccessfully challenged the election in law, and never again had anything to do with that institution. He immediately became active in the Medico-Chirurgical Society and soon gained the respect and confidence of Dublin surgeons, to such an extent that on January 4, 1802, when at only 29 years of age, he was elected President of the Royal College of Surgeons in Ireland; in the following year, he was appointed surgeon to Cork Street Fever Hospital. In 1804, he became professor of anatomy and surgery in the Royal College of Surgeons in Ireland, an office he held for thirty-two years (Figure 1).

Figure 1: Abraham Colles (1773-1843). https://wellcomecollection.org/works/gputjdpf#licenseInformation.

He modified the teaching of anatomy, following the line of James Macartney (1770-1843), who began with topographic anatomy at St. Bartholomew's in London, with the intention that surgeons better establish the relationships between anatomical structures. Until then, the students dissected the muscles on one side of the body and the nerves and vessels on the other, without actually establishing their relationship. Colles was a passionate advocate of a complete medical education. During his years as professor, he published three books and over a dozen surgical papers [8].

Colles' teaching career was highly successful, and drew crowds of students to the Royal College of Surgeons in Ireland where he enhanced the reputation of the surgical profession where it was no longer considered inferior to medicine. This was the era of surgery prior to anesthesia, antisepsis, and antibiotics so treatments were relatively crude with high mortality from bleeding and infections. Surgeons had to work rapidly and accurately to minimize the suffering of their patients. In this way Colles reorganized the teaching of human anatomy and succeeded in arousing and maintaining the interest of students by regional dissections so that they made more rapid advances in useful knowledge than by way of their previous study of uncorrelated anatomical systems. Furthermore, he was one of the first to produce a work on this new topographical approach entitled A Treatise on Surgical Anatomy, which was published in 1811 (Figure 2). In this book Colles dealt with the anatomy of the perineum and in Particular, drew attention to the middle fascia of the urogenital triangle (Colles' Fascia), the attachments of which served to confine extravasation of urine from a ruptured urethra within strict limits. He described also a space (Colles' space) under the perineal fascia containing the labial or posterior scrotal neurovascular bundle, bullous uretra bulbocavernous muscle, ischiocavernous muscle and transverse perineal muscle [9]. This book signaled a paradigm shift in surgical knowledge, from the systemic anatomy of the Hunterian era to the topographic anatomy encountered at the operating table. In his Treatise on Surgical Anatomy, he discussed the forms of hernia and various important surgical operations in a manner which showed his deep and accurate anatomical study developed over many years of daily dissections [10]. This book was reprinted in United States in 1820 and again in 1831.


TREATISE

ON

SURGICAL ANATOMY.

BY

ABRAHAM COLLES,

ONE OF THE PROFESSORS OF ANATOMY AND SURGERY IN THE ROYAL COLLEGE OF SURGEONS IN IRELAND, ETC. ETC. ETC.

Second American Edition.

WITH NOTES BY J. P. HOPKINSON, M.D.

Demonstrator of Anatomy in the University of Pennsylvania, and Lecturer on Anatomy in the School of Medicine.

Philadelphia:

PUBLISHED BY CAREY AND LEA.

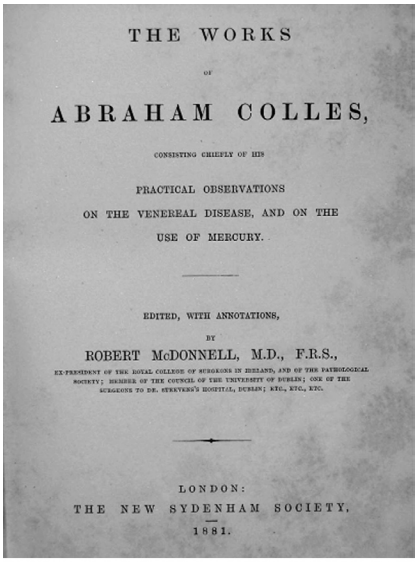
1831.

Figure 2: Treatise of Surgical Anatomy. Abraham Colles 1831 edition. https://www.semanticscholar.org/paper/Abraham-Colles-and-his-contributions-to-anatomy.-Shayota-Oelhafen/18a1be3cbc828fdbc63e004f2f569690608a00da/figure/1.

Abraham Colles quickly became a masterful surgeon and a number of his operations constituted significant advances. He was the first in Ireland who tied the subclavian artery for a large axillary aneurism in 1811 and later one more time in 1813; this operation had been attempted only twice in England, and never in Ireland. Colles wrote about it in his paper "On the operation of tying the subclavian artery", in 1815. He was the first man in Europe to tie the innominate artery successfully. In 1814 Colles wrote his paper "On the Fracture of the Carpal Extremity of the Radius", which appeared in the Edinburgh Medical and Surgical Journal, accurately describing transverse distal radial metaphysis fractures, with displacement of the hand posteriorly and outward, causing the characteristic dorsal displacement and angulation ("dinner fork" deformity) and described its treatment. For centuries this injury was mistaken for a dislocation of the wrist. It was probably first described as a fracture by Claude Pouteau (1725-1775), but his description remained unknown. It was the succinct and accurate description by Abraham Colles that became widely regarded as the definitive description [11]. This Colles paper was comparatively short but, in its accuracy, clarity and conciseness, it is an outstanding descriptive fragment of clinical surgery, the reading of which conveys a feeling of finality in the

presentation of the signs of fracture and deformity [12] Although it is inconceivable nowadays that this common injury was thought not to be a fracture but rather a carpal dislocation until the end of the eighteenth century is evidence of just how far ahead of its time Colles'paper was, having been published decades before much became clearer with the the 1895 discovery of X rays by Whilem Rœntgen (1843-1923). This injury continues to be known as Colles' fracture and it is the most common fracture of adults. The vast majority of this type of fracture occur following a fall onto the outstretched hand. Here is an excerpt from Colles' paper: "The posterior surface of the limb presents a considerable deformity; for a depression is seen in the forearm, about an inch and a half above the end of this bone, while a considerable swelling occupies the wrist and metacarpus. Indeed, the carpus and base of metacarpus appear to be thrown backward so much, as on first view to excite a suspicion that the carpus has been dislocated forward" [13]. In the year 1818, "On the Distortion termed Varus or Club Foot" was the title of a paper he contributed to the Dublin Hospital Reports. Two dissections of varus feet were described in detail in this paper, one of a child of 5 years and another of a youth of 18 years. Colles cured many of these deformed feet by treating them with a club foot shoe of his own design. The shoe had a resistant sole of tin, covered with leather, laced down the middle and open at the toes. A broad strap in front of the ankle held the heel in the angle between upper and sole. A detachable angular side splint, slotted into the sole, extended along the inner side of the foot and up the inner side of the leg. Another splint, also slotted into the sole, continued along the outer side of the leg only. The splint, of which an illustration was given, corrected the equinus deformity and promoted eversion of the foot. It was applied a few weeks after birth and was continued for 3 months or more [14]. Also in 1818, Colles published A Disease of the Lymphatic Glands of the Groin attended with Peculiar Symptoms, for which he is credited with the discovery and description of lymphogranuloma inguinale (years later, now known to be caused by Chlamydia Trachomatis).

Colles was also interested in spinal disease. He adopted the teaching of Percivall Pott (1714 -1788) in his condemnation of steel stays and "other pieces of machinery" but was less convinced about the efficacy of applying caustic substances to each side of the gibbus. Colles's ability as a lecturer greatly extended the reputation of the college and of the Dublin medical school, with the number of students rising from 60 on his arrival in 1802 to about 1000 by 1836. On his retirement, the Royal College of Surgeons in Ireland voted on an address stating that he 'had been the principal cause of the success and consequent high character of the school of surgery in Ireland. In his lectures, Colles was always careful to prevent the influence of predetermined theories on his own and his pupils' judgments. In 1830 he was elected for the second time President of the Royal College of Surgeons in Ireland, prior to receiving a master's degree from the University of Dublin. In the same year, he was offered a baronetcy but declined the honor. In 1836, when Colles resigned after 32 years in the chair of surgery, he was succeeded by William Henry Porter. In 1827, when he was still lecturing to 250 students, Colles had been constrained to resign from the chair of Anatomy owing to his own failing health. During his research on venereal disease, he followed and advanced John Hunter's practice of using mercury for its great therapeutic properties. In 1837, Abraham Colles wrote his book "Practical observations on the venereal disease, and on the use of mercury" (Figure 3) in which he introduced the hypothesis of maternal immunity of a syphilitic infant when the mother had not shown signs of the disease.


THE WORKS

OF

ABRAHAM COLLES,

CONSISTING CHIEFLY OF HIS

PRACTICAL OBSERVATIONS

ON THE VENEREAL DISEASE, AND ON THE

USE OF MERCURY.

EDITED, WITH ANNOTATIONS,

BY

ROBERT McDONNELL, M.D., F.R.S.,

LONDON:

THE NEW SYDENHAM SOCIETY.

1881.

Figure 3: Practical Observations of the Venereal Disease, and on the use of mecurey. Abraham Colles 1814. https://www.semanticscholar.org/paper/Abraham-Colles-and-his-contributions-to-anatomy.-Shayota-Oelhafen/18a1be3cbc828fdbc63e004f2f569690608a00da/figure/2.

He strongly advocated the use of mercury in syphilis in opposition to a prevailing tendency among surgeons to employ less effective remedies [15]. But in using it, he maintained strict control of the patient and of the use of the drug for his experience in clinics for venereal disease had taught him the dangers of mercurial poisoning. Colles was also influential in introducing new principles for the use of mercury in the cure of syphilis, replacing the high dosages, which practitioners, following John Hunter's example, used with a more cautious approach that helped to revive the reputation of the treatment among surgeons. One of his guiding principles at this time has since been known as Colles' law which reads as follows: a child born to a mother who has no signs of venereal symptoms, and presents with this disease at the age of a few weeks, will infect the healthiest nursemaid, but not its mother [16], although the observation itself had been made in 1565 by Simon de Vellembert. This work on venereal disease

was his last important contribution. Colles' observations stood for almost 70 years, until they were refuted by August Paul von Wassermann (1866 -1925) a German bacteriologist and hygienist. Colles clearly observed the apparent immunity of the mother but could not have guessed that she already had the disease in a mild form. It was nearly 70 years later that the Spirochaeta pallida of Schaudinn was discovered and the serological test was devised by Wassermann. For the last 20 years of his life Abraham Colles had the most lucrative surgical practice in Dublin and this in spite of the demands of his professorship and hospital duties. He was also co-director of the Cow Pox Institution. Having married Sophia Cope, daughter of the Rev. Jonathan Cope, Rector of Ahaseragh, County Galway, Colles lived most of his life at 21, Stephen's Green, Dublin. They had eleven children of whom nine survived; the oldest son, William Colles Cope, became Regius Professor of Surgery at Trinity College and, following in the steps of his father, was elected President of the Royal College of Surgeons in Ireland in 1863. In tribute to his distinguished career, in 1839, Professor Colles was again awarded a baronetcy in 1839 and again, he declined. He retired in 1841 and died on 16 November 1843 of chronic respiratory disease, gout and heart trouble. Sensing his approaching death, Abraham Colles wrote to Robert Smith (1807-1873) who described the Smith's fracture of distal ventral radius, requesting his expertise in Colles' own post-mortem examination: "My Dear Robert, I think it may be of some benefit, not only to my own family, but to society at large, to ascertain by examination the exact seat and nature of my last disease". An investigator until the end, this is described by Dr Martin Fallon as the "last great act of Colles' medical career, the last evidence of unchanging devotion" [17].

His final book, Lectures on the Theory and Practice of Surgery, was published posthumously in 1844 in the Dublin Medical Press, and also separately in two volumes, based on notes by Simon McCoy; for many years they were among the most easily comprehended and practical surgical texts in Ireland. Abraham Colles was buried in Mount Jerome Cemetery, Dublin, Ireland. Following his death, all medical schools in the Irish capital suspended their proceedings for one day and medical students had the day off to honor his memory. Also, a tribute was paid to Colles by the College of Surgeons and the College of Physicians.

Discussion

Abraham Colles was a first-rate clinical observer and a skilful and resourceful surgeon who devoted a part of his practice to free treatment of poor people. He made substantial contributions to our current knowledge of human anatomy and also in medicine, surgery, orthopedic surgery and urology. Throughout his papers and books, Colles identifies and describes anatomical structures and diseases. Abraham Colles appears to have been the first in Ireland to teach topographical anatomy with emphasis on the relationships of the various parts of structures to each other. He was responsible for much of the early scientific development of surgery in Ireland and was the leading Irish surgeon of his time. As a competent lecturer and pedagogue, Colles contributed to making his college one of the most respected in Europe for at least twenty years. In his honor, the President's Office in the Royal College of Surgeons in Ireland is called the Colles Room and has on display a number of paintings and personal items that belonged to Colles. Also an Abraham Colles' ward was built with a 31-bed orthopedic unit in St. James's Hospital, in Dublin, Ireland which deals with primary trauma and accidents as well as case of trauma referred from other units.

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