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Robert William Smith: His Life and His Contributions to Medicine

Hriday M. Shah, BS[1] and **Kevin C. Chung, MD**[2]

[1]Medical Student, The University of Michigan Medical School; Ann Arbor, MI

[2]Professor of Surgery, Section of Plastic Surgery, Department of Surgery, The University of Michigan Health System; Ann Arbor, MI

Abstract

Robert William Smith is best known for his contribution to Smith's fracture. He also made other significant contributions to medicine and medical education, publishing on topics ranging from arthritis to neuroma. He had a great interest in pathology and helped found the Pathological Society of Dublin. At the time of his death, he was the Vice President of the Royal College of Surgeons in Ireland. His contributions to the understanding of various pathological conditions make him an important figure in medicine and in hand surgery.

Keywords

Robert William Smith; Smith's Fracture; Reverse Colles' Fracture

Robert William Smith (Oct. 12, 1807 – Oct. 28, 1873) is known for his description of what is today referred to as Smith's Fracture. However, like many eminent physicians whose names are attached to medical conditions, his contribution to medicine was much greater than just describing one specific entity. During his time, Smith was a well-renowned physician. Even across the Atlantic Ocean from his native Ireland, the American Journal of the Medical Sciences wrote that his treatise on fractures "may be considered one of our best models for conducting surgical observations."[1] He worked alongside such surgical giants as Abraham Colles, Robert Adams, William Stokes and Robert James Graves. However, because of the substantial contributions made to medicine by Smith's colleagues, it is no surprise that many of his contributions have often been overlooked and his name has become relatively obscure.

The Smith's Fracture

The fracture referred to as Smith's fracture was first described by Jean-Gaspar-Blaise Goyrand, who noted that a fracture of the distal end of the forearm could be displaced palmarly as well as dorsally.[2] However, as often occurs in history, Smith probably received recognition for describing the fracture pattern because he was a more prominent figure in the

Corresponding Author: Kevin C. Chung, MD, MS, Section of Plastic Surgery, University of Michigan Health System, 2130 Taubman Center, SPC 5340, 1500 E. Medical Center Drive, Ann Arbor, MI, 48109-5340, kecchung@umich.edu, Phone 734-936-5885, Fax 734-763-5354.

world of medicine and his description of the fracture was more detailed than that of Goyrand.

Smith first described the fracture in his book, “A Treatise on Fractures in the Vicinity of Joints, and on Certain Forms of Accidental and Congenital Dislocations,” published in 1847. His description was elegant and anatomically accurate.

“This is an injury of exceedingly rare occurrence, and one which presents characters closely resembling those of dislocation of the carpus forwards. It generally occurs in consequence of a fall upon the back of the hand, and the situation of the fracture is from half an inch to an inch above the articulation; it is accompanied by great deformity, the principal features of which are a dorsal and a palmar tumour, and a striking projection of the head of the ulna at the posterior and inner part of the forearm; the dorsal tumour occupies the entire breadth of the forearm, but is most conspicuous internally, where it is constituted by the lower extremity of the ulna displaced backwards; from this point, the inferior outline of the tumour passes obliquely upwards and outwards, corresponding in the latter direction of the lower end of the superior fragment of the radius. Immediately below the dorsal swelling there is a well marked sulcus, deepest internally below the head of the ulna, directed nearly transversely, but ascending a little as it approaches the radial border of the forearm.”[1]

The careful attention to details that Smith provided is characteristic of his descriptions throughout the book. He makes a point to describe every spatial relationship, as well as a beautiful drawing of a Smith’s fracture (Fig. 1). Even though Smith often performed post mortem dissections to study the pathologies of a disease, he did not have an opportunity to perform a post-mortem examination on an extremity which sustained this injury, primarily because it was a relatively uncommon fracture. Rather, his observations were made upon observing the external features of a man with this fracture. It is impressive that he was able to make such accurate deductions about the anatomical relationships of the bones involved in the fracture from a gross examination. Smith also provided several diagnostic criteria for the fracture which are applied even today. One of the diagnostic criteria of a Smith’s fracture is a deformed wrist with swelling visible on the volar side.[3] Smith was perceptive enough to realize that the fracture occurs when the patient falls with a flexed wrist. In fact, the person whose hand is shown in Figure 1 is a man who “in endeavouring to save himself from being run over by a car, fell with great violence upon the back of the hand.”[1] Moreover, Smith came to the important realization that his predecessors had almost certainly seen this type of fracture, but had mistaken it for a dislocation of the “carpal bones forwards and of the bones of the forearm backwards.” [1] He went one step further and instructed readers on how to distinguish between a dislocation and a fracture. He pointed out that the swelling resulting from the fracture appeared oblique with respect to the long axis of the forearm, but the swelling resulting from the dislocation is perpendicular to the long axis of the forearm. Such insightful diagnostic observations are remarkable given Smith’s limited exposure to the fracture. Though Smith considered the fracture to be exceedingly rare, Solgaard and Petersen found that when examining 452 radiographs of wrist fractures that occurred in 1981, 8 of them were Smith’s Fractures and 438 were Colles’ Fractures.[4]

Other Contributions

Colles' fracture is the more common counterpart of Smith's fracture. It occurs when the patient falls with extended hands and the distal radius is displaced dorsally. Because of this relationship between the two fractures, Smith's fracture is often called the Reverse Colles' Fracture. The eponym for the fracture pays homage to Abraham Colles, a colleague of Smith's and a legendary Irish surgeon. It is often overlooked that Smith had strong ties to Colles. Indeed, their relationship was so strong that Colles asked Smith to perform an autopsy on him. This autopsy was later published in Stokes's *Observations on the Case of the Late Abraham Colles, M.D., Formerly Professor of Surgery of the Royal College of Surgeons in Ireland*.[5]

Smith can be given credit for attributing Colles' name to this fracture. Colles published his account of the fracture in a provincial journal and his account went largely unnoticed until Smith's publication.[2] In his treatise of fractures Smith wrote, "In this country, the name of an eminent surgeon, lately deceased, has been associated with this injury; we know it here as Colles's Fracture of the Radius."[1] This is interesting because Colles was, in fact, not the first person to describe the dorsal displacement of the radius. The fracture was initially described by Claude Pouteau of France. Before Pouteau wrote on the fractures of the wrist, it was generally held that these injuries were wrist dislocations and not fractures. In a posthumously published account, Pouteau described a fracture of the wrist with the dorsal displacement of the radius.[2] However, as was the case with Smith's fracture, Colles received the distinction of having his name attached to the most common fracture of the wrist. The fact that Smith decided to refer to the fracture as Colles' fracture is even more interesting when one considers that Smith was well aware of Pouteau's work. In fact, in his treatise on fractures, Smith referred to Pouteau's statement regarding Colles' fracture that "there is no fracture the existence of which it is more easy to tell at a single *coup d'oeil* (look of the eye)."[1]

Because both Smith and Pouteau might have found Colles' fracture to be an easy one to diagnose, Smith was involved in settling many controversies regarding the exact nature of the fracture. He disagreed with Colles on three counts regarding the nature of the fracture. Whereas Colles stated that the distal end of the radius is particularly strong and thick, Smith pointed out that this part of the radius is the weakest part of the bone as a result of the thinner cortex of the distal radius. He elaborated upon Colles' description of the distal radius angulation following the fracture, stating that is was "downwards, forwards, and very slightly inwards" rather than "directly downwards", as Colles believed.[1] Lastly, Smith stated that Colles was in error regarding the exact position of the fracture. Colles believed that the fracture is located an inch and a half proximal to the distal end of the radius. Smith corrected this assessment and stated that the fracture is almost never located more than an inch proximal to the carpal end of the bone and in the majority of cases, it is even less.[1] As Smith himself explains, he was able to make these elaborations primarily because, in contrast to not having an opportunity to conduct post-mortem examination of the Smith's Fracture, he was able to perform many post-mortem dissections on patients who had sustained Colles' fractures during their lives. Unlike Smith who had more anatomic information regarding Colles' fractures, Colles wrote his account of the fracture based only upon examining the

external features of the fracture. Smith, even while correcting Colles, was always respectful. He stated that Colles' anatomical errors were understandable given that Colles did not perform any autopsies.[1]

Sir Astley Cooper, best known today for his work on vessel ligation and Dupuytren's contracture, reported after performing dissections of Colles' fracture that the radius and the ulna were displaced dorsally, whereas the carpal bones were displaced palmarly.[6] Smith corrected Cooper's assessment and reported that the carpal bones are displaced dorsally along with the radius and the ulna.[1]

Smith argued against theories of other contemporaries as well. Auguste Nelaton and Voillemier, both French physicians, reasoned that every Colles' fracture is an impacted fracture in which the two fragments resulting from the fracture are driven into each other. Smith questioned the theory, concluding that all fractures of the distal end of the radius are not necessarily impacted. He noted that Nelaton and Voillemier arrived at their conclusion incorrectly by studying malunited fractures. The healed malunion suggested an impacted pattern. Smith sampled fractures that had occurred shortly before the subjects' death, prior to the formation of the fracture callus (i.e. compacted bone).[1] Furthermore, other physicians, such as Charles-Paul Diday, a French physician known today for his work on venereal diseases, contented that the Colles' fracture was an oblique fracture. Smith made use of the twenty Colles' fracture specimens in his possession to demonstrate that the fracture was indeed transverse.[1]

Smith was ahead of his time in using statistics to support his positions. He tabulated the aforementioned twenty samples according to whether the fracture was oblique or transverse (Fig. 2). He also noted the relative location of the fracture to show that it occurs more distally than Colles had originally suggested.[1] Smith made use of statistics to study the extent of femoral neck shortening in hip fracture. Some physicians, including Sir Astley Cooper, held that the degree of shortening which occurred in intracapsular fractures is greater than in extracapsular fractures, whereas others, such as Dupuytren and Cloquet, who held the converse to be true. Smith used tables once again to show that latter argument was correct, supporting his conclusion by organizing data from 200 hip fractures.[1]

Smith's Life

Smith was born and raised in Dublin, Ireland and received his medical education primarily at the Richmond Hospital School. It was fortunate for Smith's training that medicine was in its heyday during this time, which allowed him to work under some of the world's foremost physicians. After completing his education, Smith taught medical jurisprudence and surgery at the Richmond Hospital School. He was also a surgeon for the Lunatic Asylum, Island Bridge.[5] In 1838, his passion for pathology inspired him to start the Pathological Society along with Colles, Graves, Corrigan and Stokes.[7] After publishing his treatise on fractures in 1847, he published *A Treatise on the Pathology, Diagnosis and Treatment of Neuroma* in 1849. This gigantic book measured 48 × 70 cm.[8] It included a full description of generalized neurofibromatosis, including a description of Von Recklinghausen's disease (neurofibromatosis Type I) 33 years before von Recklinghausen described it.[9] It was evident

from Smith's writings that he was a very good linguist and a medical historian.[10] Smith subsequently became Professor of Surgery at Trinity College, Dublin, and in 1873, was honored by being named Vice-President of the Royal College of Surgeons of Ireland.[5,7] Unfortunately, he died later that year on October 28th. Smith was a prominent physician in Ireland throughout his life. He made important contributions to medicine and his writings are still relevant today. Smith once wrote, "It is, I conceive, the duty of every person who undertakes to write upon a given subject, to make himself, as far as possible, acquainted with, and also to acknowledge the labours of those who may have preceded him in the same field of inquiry."[1]

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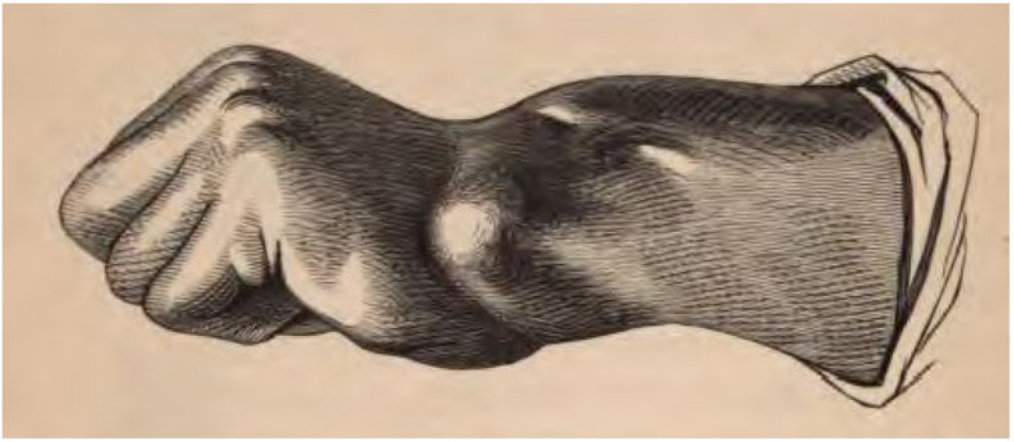

Figure 1.
The original drawing of Smith's Fracture from Smith's treatise on fractures.[1]

SIDE.	DIRECTION OF THE FRACTURE.	DISTANCE OF THE FRACTURE ABOVE THE WRIST-JOINT.	LENGTH OF THE LINE OF COMPACT TISSUE.	LENGTH OF THE ANTERIOR SURFACE OF THE BONE.	LENGTH OF THE POSTERIOR SURFACE OF THE BONE.
Left,	Nearly transverse, .	$\frac{1}{2}$ inch.	1 inch,	$8\frac{1}{2}$ inches,	8 inches.
,,	Transverse, . . .	$\frac{5}{8}$,,	1 ,,	$8\frac{1}{4}$,,	8 ,,
,,	Oblique, downwards and inwards, . .	1 ,,	$\frac{1}{2}$,,	$8\frac{1}{2}$,,	8 ,,
,,	Transverse, . . .	$\frac{3}{4}$,,	$\frac{3}{4}$,,	$7\frac{1}{2}$,,	7 ,,
,,	ditto,	$1\frac{1}{4}$,,	$\frac{3}{4}$,,	8 ,,	8 ,,
,,	ditto,	$\frac{3}{4}$,,	$\frac{1}{2}$,,	9 ,,	$8\frac{1}{2}$,,
,,	ditto,	$\frac{1}{2}$,,	$\frac{1}{2}$,,	$7\frac{3}{4}$,,	$7\frac{1}{2}$,,
,,	ditto,	$\frac{3}{4}$,,	$\frac{1}{2}$,,	$7\frac{3}{4}$,,	$7\frac{1}{2}$,,
,,	ditto,	$\frac{5}{8}$,,	$\frac{3}{4}$,,	9 ,,	9 ,,
Right,	ditto,	$\frac{3}{4}$,,	$\frac{1}{4}$,,	$7\frac{3}{4}$,,	$7\frac{1}{2}$,,
Left.	ditto,	1 ,,	$\frac{1}{2}$,,	8 ,,	$7\frac{1}{2}$,,
,,	ditto,	$\frac{3}{4}$,,	. . . .	9 ,,	$8\frac{3}{4}$,,
,,	ditto,	1 ,,	. . . .	$8\frac{1}{2}$,,	$8\frac{1}{4}$,,
,,	ditto,	$\frac{3}{4}$,,	$\frac{3}{4}$,,	$7\frac{3}{4}$,,	$7\frac{1}{2}$,,
Right,	ditto,	$\frac{3}{4}$,,	. . . .	$8\frac{1}{4}$,,	8 ,,
,,	ditto,	1 ,,	$\frac{3}{4}$,,	$7\frac{1}{2}$,,	7 ,,
,,	ditto,	$\frac{3}{4}$,,	$\frac{1}{2}$,,	$8\frac{1}{2}$,,	8 ,,
Left,	ditto,	$\frac{3}{4}$,,	$\frac{3}{4}$,,	$10\frac{1}{2}$,,	$9\frac{3}{4}$,,
Right,	ditto,	$\frac{1}{4}$,,	. . . .	$8\frac{1}{2}$,,	$8\frac{1}{2}$,,
,,	ditto,	$\frac{3}{4}$,,	$\frac{3}{4}$,,	$8\frac{1}{4}$,,	$8\frac{1}{4}$,,

Figure 2.
Smith's original data entries about Colles' Fracture Samples.[1]