

Historical Vignette: George W. Smith, M.D. (1916-1964)



Angela Viers, MD
Georgia Health Sciences University

Significant Contributions to Neurosurgery

- First Chief of MCG Neurosurgery
- Smith-Robinson technique
- Automatic Drill
- Vessel-encircling aneurysm clip
- Treatment of tic douloureux with stilbamidine

Education and Training

- Born December 4, 1916 in Deer Creek, Minnesota
- Bachelor of Science degree from Indiana University in 1939
- Doctorate of Medicine from the School of Medicine in Indianapolis in 1942
- Internship at Gorgas Hospital, a United States Army installation in Panama

Education and Training

- Physician in the United States Armed Forces during World War II from 1944 to 1946
- Neurosurgery resident University of Maryland
- University of Maryland Instructor 1950-1952
- Johns Hopkins University Instructor then Assistant Professor in 1953

Smith-Robinson

- 1953 - Dr. Robinson began working as professor and clinical chief of orthopedics at Johns Hopkins University
- During their tenure in Maryland Dr. Smith and Dr. Robinson began working on their anterior approach to cervical spine pathology

Anterior Approach to the Cervical Spine



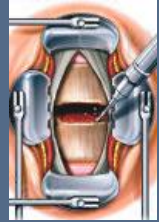
- 1930's - otolaryngologists and oncologists routinely approached the cervical spine anteriorly for osteophyte and lymphatic resections respectively
- 1950's - neurosurgical and orthopedic specialties began exploring anterior approaches
- 1958 - three different articles regarding the anterior cervical approach were published independently by Smith and Robinson, Dereymaeker and Muller, and Cloward

Smith-Robinson

- 1955 - Johns Hopkins Medical Society - Smith and Robinson presented the antero-lateral cervical approach
- 1956 - Smith-Robinson technique was introduced to the Medical College of Georgia
- 1957 - Annual Meeting of the American Academy of Orthopaedic Surgeons, Chicago Illinois - "The Treatment of Certain Cervical-Spine Disorders by Anterior Removal of the Intervertebral Disc and Interbody Fusion"
- 1958 - that same article was published in the Journal of Bone and Joint Surgery
- 1958 - Harvey Cushing Society meeting in Washington, D.C. Smith and Robinson again presented their data

Smith-Robinson Technique

- Anterior approach removing one or more cervical discs and allowing for interbody fusion of the vertebrae at the same time
- Removal of the disc and decompression of osseous structures was accomplished as indicated
- Iliac bone grafts were placed into the disc space while gentle distraction was applied to the head
- Incision was then closed in layers without drainage



Who's the Father of the Anterior Approach to the Cervical Spine?

- 1958 - Harvey Cushing Society meeting in Washington, D.C. Cloward presented his version of the procedure, "The anterior approach for removal of ruptured cervical disks"
 - His article was not published until November, 1958 despite submission for publication in September, 1957
- 1956 - Dereymaeker and Muller presented their version of the anterior approach and findings, "Nouvelle cure chirurgicale des discopathies cervicales. La ménisectomie par voie ventrale, suivie d'arthrodèses par greffe intercorporeale. (Résumé et discussion)"
 - December, 1958 published "La fusion vertébrale par voie ventrale dans la discopathie cervicale"

...Arguably Smith and Robinson

- Smith and Robinson – presented 1955, published April 1958
- Cloward – presented 1958, published November 1958
- Dereymaeker and Muller – presented 1956, published December 1958
- Bailey and Badgley – 1960
- By objective publication and presentation dates, Smith and Robinson would arguably be considered the founders of the anterior approach to cervical spine pathology

Treatment of Trigeminal Neuralgia

- While at Johns Hopkins Smith also became interested in trigeminal neuralgia, a condition that causes excruciating pain in the fifth cranial nerve sensory distribution
- Started treating patients with stilbamidine, a drug used in the treatment of fungal infections with a known side effect of causing sensory deficits in the trigeminal nerve distribution
- Questionable efficacy with irreversible renal and liver damage made use of the medication prohibitive

Development of a Residency Program

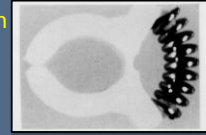
- June 1, 1956 - Dr. Smith assumed the position of Associate Professor and Chief of Neurosurgery at the Medical College of Georgia
- July 1, 1959 - promoted to Professor
- After his arrival at MCG he immediately began organizing a residency training program
 - Dr. Ernest Daniel
 - First resident to complete his training in 1959
 - Drs. Jack Griffin, Hugh Smisson, Jr. and William Pritchard
 - Also completed training under Dr. Smith

Aneurysm Clip Development

- 1937 - Walter Dandy first successfully placed the V-shaped malleable silver clip on an internal carotid artery aneurysm
- Many advances and alterations of the design and function of aneurysm clips have been made

Aneurysm Clip Development

- Dr. Smith is credited with developing the vessel-encircling clip



- Spring clip molded from polyethylene plastic allowed for obliteration of an aneurysm on the arterial wall opposite the surgeon

Development of the Automatic Drill



- Since the Neolithic period, access to the living human brain has been attempted with variable success
- From flint rocks to today's advanced hand-held pneumatic drills with interchangeable accessories
- The ability to remove portions of the human skull and to replace it while allowing the patient to survive has come a long way

Development of the Automatic Drill

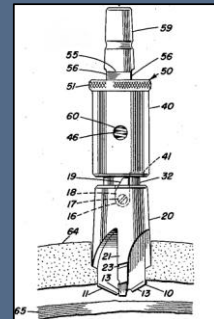
- 1875 - Dental drill patented by George F. Green was the first electric drill used on the skull
- 1887 - Sir Victor Alexander Haden Horsley used a later version of the dental drill engine to power a miniature circular saw which is reportedly the first mechanical saw designed specifically to open the human skull

Development of the Automatic Drill

- Faster access without sacrificing safety continued to drive the industry to revise and refine the mechanical drill
- 1909 - French neurosurgeon Thierry de Martel published his article, "A point opératoire dans craniectomy technique" (a technical point of surgical craniectomy)
- 1925 - de Martel developed an electric drill with automatic brake
 - Non-plunging
 - Self-disengaging
 - Use limited by its cumbersome weight (over 10 lbs)

Development of the Automatic Drill

- Smith wanted a single drilling unit that would perforate bone structures and automatically stop by disengaging as soon as the last shelf of the inner table of bone was removed



- Other requirements for the drill were that it be light and easily assembled and disassembled for cleaning and sterilization

Development of the Automatic Drill

- July 8, 1958 – Smith awarded a United States Patent for his Automatic Drill
- There have been over 20 patents referencing Smith's Automatic Drill including the Codman perforator drill and the Midas Rex, both of which are still used extensively today
- Arguably Smith's most valuable contribution to the field of neurosurgery

Death



- Frequent travel led Dr. Smith to obtain his private piloting license so he would not have to rely on airlines and flight schedules, ironically this convenience cost him his life
- 18 April, 1964 – in route to a Harvey Cushing Society meeting the plane that Dr. Smith was piloting crashed killing himself, his wife and his mother on impact

In Summary

- Credited with developing the Smith-Robinson technique, the Automatic Drill, the vessel-encircling aneurysm clip, treatment of tic douloureux and the establishment of the MCG neurosurgery residency program
- Dr. George W. Smith was a prolific researcher with numerous publications and a talented entrepreneur with several inventions which have had significant and positive impact on the field of neurosurgery

References

1. Allen MB: **Personal and historical account of G.W. Smith**, 2011
2. Alleyne CH: A Brief History of Neurosurgery at GHSU and in the City of Augusta, Georgia, in, 2011
3. Alleyne CH, Allen MB: Historical Vignette George W. Smith M.D., **Volume 2, Issue 1 - Summer 2005**. Augusta, Georgia: Department of Neurosurgery, 2005, p6 Newsletter
4. Bailey RW, Badgley CE: Stabilization of the cervical spine by anterior fusion. **J Bone Joint Surg Am 42-A**:565-594, 1960
5. Baker JW: Cranial Perforator, Patent USA, 1987,699,550
6. Cloward RB: The anterior approach for removal of ruptured cervical disks. **J Neurosurg 15**:602-617, 1958
7. Dandy WE: Intracranial Aneurysm of the Internal Carotid Artery: Cured By Operation. **Annals of Surgery 107**:654-659, 1938
8. De Martel T: Un point technique operatoire dans la craniectomie. **Revista Neurocirugia 5**, 1909
9. Dereymaeker A, Muller J: [Vertebral fusion by a ventral approach in cervical intervertebral disk disorders]. **Rev Neurol (Paris) 99**:597-616, 1958
10. Dereymaeker A, Muller, J.: Nouvelle cure chirurgicale des discopathies cervicales. La ménisectomie par voie ventrale, suivie d'arthrodèses par greffe intercorporeale. (Résumé et discussion). **Neurochirurgie**:233-234, 1956

References

11. Eboli P, Stone JL, Aydin S, Slavin KV: Historical characterization of trigeminal neuralgia. **Neurosurgery 64**:1183-1186; discussion 1186-1187, 2009
12. Fox JL: Vascular clips for the microsurgical treatment of stroke. **Stroke 7**:489-500, 1976
13. Gosselin NJ, McKinney WW: Quick Release Coupling for a Dissecting Tool. Patent USA, 1994, 5,505,737
14. Mostofi SB: **Who's Who in Orthopedics**. Verlag London: Springer-Verlag London, 2005
15. Pait TG, Dennis MW, Laws Jr. ER, Rizzoli H V, Azzam CJ: The History of the Neurosurgical Engine. **Neurosurgery 28**:111-129, 1991
16. Robinson RA, Smith GW: Anterolateral Cervical Disc Removal and Interbody Fusion for Cervical Disc Syndrome. **Bulletin of the Johns Hopkins Hospital 95**:223-224, 1955
17. Smith GW: Automatic Drill. Patent USA, 1957, 2,842,131
18. Smith GW: An automatic drill for craniotomy. **J Neurosurg 7**:285-286, 1950
19. Smith GW: [Differential diagnosis & treatment of facial pain]. **Resen Clin Client 27**:43-48, 1958
20. Smith GW, Miller JM: A further report on the treatment of tic douloureux with stilbamidine. **J Med Assoc Ga 46**:209, 1957

References

21. Smith GW, Miller JM: The relief of tic douloureux with stilbamidine. **Ann Intern Med 38**:335-338, 1953
22. Smith GW, Miller JM: The treatment of tic douloureux with stilbamidine. **Bull Johns Hopkins Hosp 96**:146-149, 1955
23. Smith GW, Robinson RA: The treatment of certain cervical-spine disorders by anterior removal of the intervertebral disc and interbody fusion. **J Bone Joint Surg Am 40-A**:607-624, 1958
24. Surgery Department: Medical College of Georgia Records, 1956
25. Van Alphen HA, Laws ER, Takakura K, Mendez J, El Gindi S, Simpson-Noel D: Relationship Between the Regional Neurosurgical Societies and the World Federation of Neurosurgical Societies, 2009
26. Wilkins R, Wilkins GK: **Neurosurgical Classics II**. Rolling Meadows, IL: Thieme Publishers for the American Association of Neurological Surgeons, 2000
27. Wiltse LL: **The Adult Spine: Principles and Practice**, ed 2nd. New York, NY: Raven Press, 1997, Vol 1



Questions?