



# Giants of Orthopaedic Surgery

## Giants of Orthopaedic Surgery: Austin T. Moore MD

Kim J. Chillag MD

**O**n June 2, 1963, distinguished orthopaedic surgeon Austin T. Moore MD gave the commencement address to the graduating class of his alma mater, Wofford College in Spartanburg, SC, USA. The title of his address was “The Man and the Challenge.”

“The measure of a man is the way he meets the challenge,” Dr. Moore told the graduating class that day [6]. Indeed, Dr. Moore (Fig. 1) had met the challenge. His pioneering work in the treatment of hip fracture surgery changed the face of orthopaedics and

helped usher in the era of prosthetic replacements, which improved the lives of hundreds of thousands of people worldwide.

Orthopaedic surgery was only in its infancy when Dr. Moore received his medical degree from the Medical College of South Carolina in Charleston, SC, USA in 1924. In fact, the man who went on to become a pioneer in hip surgery never witnessed a hip procedure as a medical student. At the time, major orthopaedic procedures were only performed in urban medical centers. South Carolina did not have a children’s hospital, nor any orthopaedic facilities. In order to gain the necessary experience, Dr. Moore moved to Philadelphia, PA, USA to become a resident and junior assistant at the children’s hospital there. He received his orthopaedic residency training from Dr. A. Bruce Gill, a

renowned orthopaedist and the sixth president of the American Academy of Orthopaedic Surgery (AAOS). At the time, Dr. Gill had developed a number of original surgical procedures [2] and was widely considered the premier authority on congenital dislocation of the hip [2]. It is likely that under the tutelage of Dr. Gill in Philadelphia, Dr. Moore learned the importance of adaptability and creativity in orthopaedic surgical procedures—traits he would come to rely on later in his surgical career.

### The Unsolved Problem

“There will be times when the way is uncertain,” Dr. Moore told the graduating class at Wofford College. “Remember, that which cannot be avoided must be endured; the happy man is the one who makes adjustments; and don’t forget the master word is work” [6].

Following his residency in Philadelphia, Dr. Moore moved back to South Carolina and in 1928 opened the first orthopaedic clinic in the region, the Moore Orthopaedic Clinic [3]. He also set up children’s clinics throughout the state and created the

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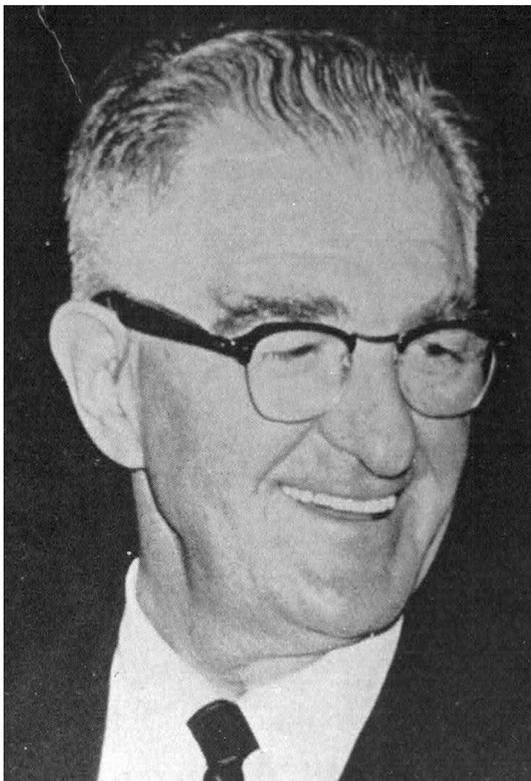
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K. J. Chillag MD (✉)  
Orthopaedic Surgeon, Palmetto Health,  
14 Richland Medical Park, Suite 200,  
Columbia, SC 29203, USA  
e-mail: [kim.chillag@gmail.com](mailto:kim.chillag@gmail.com);  
[Kim.Chillag@palmettohealth.org](mailto:Kim.Chillag@palmettohealth.org)

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**Fig. 1** Austin T. Moore MD. (Published with permission from the Moore Clinic archives).

Columbia Brace Shop, which was specifically designed for children with polio and other diseases.

Although he treated patients of all ages, from newborns with congenital problems to the elderly, Dr. Moore's lifelong research would be dedicated to "solving" femoral neck fractures, known at the time as "the unsolved problem" [1]. Femoral neck fractures

were common, but the treatment options were inadequate. Internal fixation devices and techniques were primitive and frequently failed. There were no endoprotheses of any kind available to use when internal fixation failed or when fractures were displaced. Patients were frequently left with painful and limited hip function for the rest of their lives.

During this time, Dr. Moore became close friends with Dr. Robert L. Sumwalt, a professor at the University of South Carolina School of Engineering. An MIT graduate, Dr. Sumwalt would go on to become President of the University of South Carolina. In 1934, Dr. Moore collaborated with Dr. Sumwalt to develop adjustable pins for the treatment of nondisplaced femoral neck fractures. This method, known as multiple pin placement, or hip pinning, became the standard treatment approach for femoral neck fracture repair [8]. However, if the fractures still did not heal, no suitable alternative approaches existed. That would soon change.

## Pioneering Work

In 1940, a patient presented with a problem that required a ground-breaking solution. The patient, a 46-year-old man who weighed approximately 250 pounds, had a giant cell tumor on the upper-end of the femur, which had a history of fractures. Every conservative treatment had been exhausted, resulting in short periods of relief followed by the recurrence of large cysts and great pain. Dr. Moore considered amputating the limb at the hip joint, before choosing a radical new procedure—an endoprosthesis replacement of the proximal femur [4, 7].

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**Fig. 2** Dr. Moore had the Austin Moore prosthesis welded to the hood of his 1951 Chrysler Imperial convertible. (Published with permission from Kim Chillag MD).

Dr. Moore collaborated with Dr. Harold Bohlman of Baltimore, MD, USA to create a prosthesis manufactured by the Austenal Company (a company that, at the time, made aircraft parts). Dr. Bohlman, who specialized in trauma surgery, had previously performed metallurgical testing of various alloys [4]. In September 1940, Dr. Bohlman flew to Columbia, SC, USA to perform the experimental surgery with Dr. Moore. Both surgeons realized the epic nature of this procedure—if successful, the surgery would open a world of possibilities for orthopaedic implants. Dr. Moore even hired a professional cameraman to film and preserve the procedure.

The surgical procedure was difficult. The tumor area bled profusely. The surgeons managed to resect the proximal femur. The endoprosthesis,

designed by Dr. Moore and Dr. Bohlman, fit externally over the proximal shaft of the femur. The design included loops proximally to reattach the hip muscles. The patient's postoperative course was just as stormy. A large hematoma formed and had to be drained. Slowly, the patient recovered and finally resumed walking. He died 2 years later from congestive heart failure. Dr. Moore explanted the device for analysis at autopsy. No evidence of corrosion could be found [4].

Dr. Moore's first prosthesis used for replacement of the proximal femur led to his pioneering work in the development of an off-the-shelf endoprosthesis for the treatment of displaced femoral neck fractures. The Austin Moore prosthesis became the first off-the-shelf body part replacement to be available worldwide.

It was a career highlight for Dr. Moore, who admired the prosthesis so much that he had the device welded to the hood of his 1951 Chrysler Imperial convertible (Fig. 2).

Augusto Sarmiento, former President of the AAOS, worked alongside Dr. Moore from 1953 to 1956 and considers Dr. Moore a mentor. Dr. Sarmiento witnessed Dr. Moore's problem-solving approaches firsthand.

“He seemed to love his work with a passion, and his superior surgical skills made my enjoyment even greater,” Dr. Sarmiento told *CORR*®. “He never hesitated to tackle any problems he encountered during surgery. He took his innovating mind seriously. He always wanted perfection.”

The Austin Moore prosthesis is arguably the most widely distributed and implanted prosthetic device in history, and it is still in use in its original form in some limited areas of the world today. In fact, I treat a 72-year-old patient who is now 58 years postreplacement of her right hip with one of the first versions of the Moore prosthesis (Fig. 3). Dr. Moore replaced her hip after two failed procedures for congenital hip dislocation. At age 14, Dr. Moore implanted the device seen in Figure 3, which shows her current radiograph now 58 years since implantation. He eventually replaced her other hip with a modified version of the Moore prosthesis and a metal

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**Fig. 3** A radiograph of a 72-year-old patient treated with one of the first versions of the Austin Moore prosthesis is shown. (Published with permission from Kim Chillag MD).

acetabular component. I have since revised this hip and replaced both of her knees, but the first side continues to function well and there are no plans to do anything further.

## Touring the World

Dr. Moore traveled the world lecturing and demonstrating his prosthesis. His travelogue was recorded and reprinted in the *Journal of the Columbia*

*Medical Society* in 1962 [5]. This was no vacation. Dr. Moore worked, lectured, or operated in each city [5] including Honolulu, Tahiti, Sydney, Tokyo, Melbourne, Yokohama, Nikko, Hong Kong, Singapore, Bangkok, Calcutta, Benares, Agra, New Delhi, Kashmir, Bombay, Karachi, Cairo, Beirut, Istanbul, Athens, and Salonika. All told, his trip covered 45,000 miles, 28 different cities, and 17 countries. The following year, he became ill while performing a derotational

osteotomy on a young woman with congenital dysplasia of the hip, and died later that day.

Dr. Moore was a surgeon, inventor, teacher, world traveler, and a deep believer in self-evaluation. As he told the graduating class at Wofford College: “Man has to take stock” [6].

“I arrived at my philosophy at daybreak one morning driving on my way to Charleston to teach at the medical college,” Dr. Moore explained in his commencement address. “I found myself, among other things, worrying that the cases I had operated on the previous week might be in trouble. I then began to rationalize and consider I had only certain potentials and certain limitations. I reasoned that if I was honestly doing my very best then I could not possibly do more. With this thought, I achieved peace of mind” [6].

The ripple effect of Dr. Moore’s work can still be felt today. The Austin Moore prosthesis laid the groundwork for the modern era of hip replacement surgery and has improved the lives of hundreds of thousands of people. He could not possibly do more.

## References

1. Apfelbach GL, Weinstein L. The solved and unsolved problems of femoral neck fractures. *Q Bull Northwest Univ Med Sch.* 1949;23:276–279.

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2. Arthur Bruce Gill, 1876-1965. *J Bone Joint Surg Am.* 1966;48:394–396.
3. Dean R. Orthopaedist's legacy lives on. Available at: [http://www.thecolumbiastar.com/news/2013-03-01/Front\\_Page/Orthopaedists\\_legacy\\_lives\\_on.html](http://www.thecolumbiastar.com/news/2013-03-01/Front_Page/Orthopaedists_legacy_lives_on.html). Accessed September 30, 2016.
4. Hernigou P, Quiennec S, Guissou I. Hip hemiarthroplasty: From Venable and Bohlman to Moore and Thompson. *Int Orthop.* 2014;38:655–661.
5. Moore AT. *Around the World with "Dear Buford"*. Columbia, SC; Columbia Medical Society: 1963.
6. Moore AT. *The Man and the Challenge. Commencement Address. Graduating Class of 1963.* Spartanburg, SC; Wofford College: 1963.
7. Moore AT, Bohlman HR. Metal hip joint: A case report. 1942. *Clin Orthop Relat Res.* 2006;453:22–24.
8. Tronzo RG. Fractures of the hip in adults. In: Tronzo RG, ed. *Surgery of the Hip Joint.* 2<sup>nd</sup> ed. New York, NY: Springer-Verlag; 1987.