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1 | A BRIEF HISTORY OF ROBOTICS IN UROLOGY

Technological innovation is a microcosm of human curiosity, intellectual prowess, and perseverance in the face of adversity. The past century and a half have been rife with a series of technologic ‘firsts’. From the origins of manned flight in 1903 to the development of the Apollo programme culminating in extraterrestrial travel in 1969, much was achieved during this short period. The pace of innovation in surgery has paralleled that of these other industries. In urology, the advent of robotics has had a profound impact by enabling surgeons to perform procedures with an unprecedented level of precision, enhanced visualization, and decreased invasiveness in comparison to conventional open surgery.

Derived from the Czech word ‘robota’, robot refers to a device capable of doing forced work, and was first referenced to by the author Karel Capek in 1920.¹ Though industrial robots were introduced in the 1960s (e.g., General Motors & the Unimate robot), it was not until decades later that they began to be utilized in medicine in fields including orthopaedic surgery, neurosurgery and urology.²⁻⁴ The PROBOT, developed in 1989 in London, was the first urologic robot used clinically to assist in performing transurethral prostatic resections.⁵ This was followed by the development of a robot at Johns Hopkins used to obtain percutaneous access during nephrolithotomies.^{6,7} Efforts to develop a surgeon-controlled robotic system, however, were spurred on by the US government and the Defence Advanced Research Projects Agency (DARPA) in collaboration with the Stanford Research Institute. DARPA aimed to create a telepresence surgical system capable of being deployed on a battlefield and controlled from afar.¹

In 1995, Frederic Moll and Robert Younge founded Intuitive Surgical (Sunnyvale, California, USA). Intuitive spearheaded the creation of the da Vinci robot, a ‘master-slave’ robotic system that remains widely utilized today and revolutionized the way surgery is performed. In the early 2000s, Dr. Mani Menon and Dr. Ashutosh Tewari at the Vattikuti Urology Institute at Henry Ford Hospital first detailed their technique using the da Vinci to perform minimally invasive nerve-sparing radical prostatectomies.⁸⁻¹³ They demonstrated the advantages of robotic surgery and underscored that it could be feasibly

incorporated within the clinical setting, albeit with a short learning curve. This work was seminal and served as a springboard for propelling the field of robotic urology forward.¹

2 | ORIGINS OF SURS AND THE FIRST WORLD CONGRESS OF ROBOTIC SURGERY

The Society of Urologic Robotic Surgeons (SURS) was founded in 2005 in response to a growing body of urologists who had begun to perform robotic-assisted procedures worldwide. No longer limited to prostate surgery, surgeons were performing cystectomies,¹⁴⁻¹⁶ nephrectomies,^{17,18} adrenalectomies,¹⁹ pyeloplasties^{20,21} and more, with the assistance of robots. Led by its first president Dr. Raju Thomas, SURS provided a platform for developing a new nomenclature, promoting educational initiatives, disseminating knowledge and creating collaboration amongst robotic urologic surgeons around the globe. Nearly 17 years later, Mount Sinai Hospital in New York City had the privilege of hosting and supporting the first ever SURS World Congress of Robotic Surgery (WCRS) from 8 to 10 December 2022 - (Figure 1). In keeping with its roots, the meeting was grounded in a few central tenets¹: advancing education of the next generation,² promoting the development of novel therapies through international collaboration, and³ improving upon established surgical techniques.

The WCRS was a 3-day international symposium, inaugurated with an opening holographic (technology: ARHT Media, Toronto, Canada) talk by alternative medicine expert Dr. Deepak Chopra on the influence of mental well-being, physical well-being and the mind-body connection on one’s overall health. The meeting incorporated speeches from colleagues in the fields of anaesthesia, radiology, pathology and haematology oncology. Resident- and trainee-led educational sessions occurred hand-in-hand with sessions moderated by seasoned physician assistants providing important pearls and pitfalls for urologists of all ages. A fireside chat with renowned oncologist and writer Dr. Siddhartha Mukherjee served as a poignant reminder that the ‘knife’ of tomorrow will look very different from the scalpel of today. He extolled that innovation at the cellular level will ultimately define if we are able to overcome the emperor of all maladies: cancer.



FIGURE 1 (A) Former president of SURS, Dr. Ashutosh Tewari pictured here with renowned oncologist and writer Dr. Siddhartha Mukherjee at the WCRS reception dinner held at the Union Club of New York City. (B) Inaugural holographic presentation delivered on the opening day of WCRS by Dr. Deepak Chopra in which he emphasized the interplay between physical as well as emotional well-being and cancer. (C) Former presidents of SURS, Dr. Ashok Hemal and Dr. Ashutosh Tewari seen together during a WCRS banquet luncheon event in which resident and fellow-submitted poster abstracts, were on display. (D) Current president of SURS, Dr. Craig Rogers seen here addressing the audience during the reception dinner, in anticipation of the 2nd WCRS conference to be held in 2023.

Dr. Mani Menon, the father of robotic surgery, presented on his innovative ‘Precision Prostatectomy’ technique. Dr. Tewari showcased his ‘Hood’ technique for robotic prostatectomy during a live 3D surgical session using a novel artificial intelligence platform capable of annotating surgical steps in real time (technology: Theator, Tel-Aviv, Israel). A visionary holographic presentation by Dr. Prokar Dasgupta from London detailed how the power of the human brain could be captured in algorithmic form to guide clinical decision-making. And finally, the meeting concluded with a passing of the torch from the previous presidents of SURS, Dr. Ashutosh Tewari and Dr. Ashok Hemal to the current president, Dr. Craig Rogers. Onward and into the future we march, for it is bright.

KEYWORDS

education, robotic surgery, Society of Urologic Robotic Surgeons, symposium, urologic oncology

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CONFLICTS OF INTEREST STATEMENT

A complete set of disclosures have been provided alongside the submission of this manuscript. Notable conflicts of interest related to the contents of this submission include the following:

1. Dr. Siddhartha Mukherjee is the author of and receives royalties for a book titled *The Song of the Cell* which he discussed about during the WCRS meeting.
2. Dr. Craig Rogers is the current President of SURS.
3. Dr. Chandru Sundaram is the Treasurer for the Endourological Society, which provided financial support to the WCRS meeting.
4. Dr. Ashutosh Tewari and Dr. Ashok Hemal are former Presidents of SURS.

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