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## **The Future of Urology**

'The empires of the future are empires of the mind.'

- Winston Churchill

The year is 2062, the month is May and it is 6 am on a bright sunny day at my home as I take out my journal to express gratitude. And the topic for today's journaling is 'My fulfilling urology career'.

The rise and penetration of sub-specialty practice into urban, semi-urban as well as rural areas has been unprecedented. I express my gratitude and feel lucky to have taken birth at a time when I could witness the development of specialized RIRS centers, miniaturized PCNL centers, penile implant and urethroplasty centers, female wellness centers amongst many others with a focus on providing the best possible results. Cryoablation, high intensity focused ultrasound(HIFU) and radiofrequency ablation have become as effective, if not more for certain conditions and it is a treat to watch patients getting cured without undergoing surgery. Some of these facilities are now available in a mobile form with fully equipped vans delivering services to patients at their doorstep. Most of these specialized centers also offer a robust home care program.

Over the years, a huge part of the medical task has been taken up by Artificial Intelligence(AI) based software programs. During our residency, we used to manually jot down drug orders. These days, when a patient gets admitted, the software itself suggests treatment based on his/her provisional diagnosis. The same is true with laparoscopic and robotic systems. AI based learning has helped budding surgeons by guiding them at every step and helped in shortening the learning curve. At most centers, before every surgery a 3D model of the actual organ to be operated upon is created. A day prior to surgery, the resident and primary surgeon posted for the particular case need to undergo practice sessions on such models before embarking upon the actual surgery. Gone are those days when surgeons could just walk into the operating rooms, scrub and operate. Things are now more streamlined and accountable.

However, the most revolutionary contribution during my career was that of nanotechnology and nanomedicine to urology. An artificial kidney, an artificial bladder and replacement of the penile urethra using autologous stem cells was unthought-of, back in the old days . It still feels unbelievable to me that computers now can create an almost replica of human organs; thus helping overcome the shortage of renal transplant donors. Today, renal transplantation is a walk-in affair. Replacement of the bladder using bioengineered artificial bladders have already benefitted thousands of patients worldwide. The deterrent currently though, is the cost and we hope to solve this issue too in a few years time.

Residency and training in urology excitingly got better with time. A long distance training program from a far-off overseas university with practical training at a local hospital is now possible. Mentoring through teleconferencing and virtual training was something I initially struggled with; but thankfully got used to it. Residents now have a better control over their own training program where they are allowed to focus more on their areas of interest. A renewed interest in patient empowerment and patient education has helped in developing strong patient support groups spear headed mostly by residents. The one thing I wish my residents focus more is on clinical skills which are being neglected probably because of better imaging and diagnostic modalities.

My passion of developing an AI enabled autonomous robotic surgical system which can operate itself like a self driven car while the surgeon closely watches and takes over if deemed necessary, has borne fruits. My team successfully created a prototype in 2038 which ultimately launched commercially in 2041. Today, we have the 7<sup>th</sup> edition of our self operating robot being inaugurated at a healthcare facility in West Africa where I will be the operating surgeon, miles away on a console situated in my office.

As I shut my journal close, I beam with a smile, feeling gratified to have been able to contribute and give back something to the field of urology which gave me everything in life. As Churchill rightly said, the future belongs to those who own ideas and I look forward to what the future further holds.