Laparoscopic surgery, or Minimally Access Surgery (MAS), is virtually replacing open surgery. Robots have further enhanced possibilities and certain operations like Radical prostatectomy are already being considered as Gold standard for Prostate cancer. This has led to review and devise strategy to train future surgeons to acquire these skills. This is essential to perform these procedures safely without putting patients to risk. Traditional surgical teaching methodology was based on “See one, do one, teach one”. This is no longer possible keeping in view large number of surgical residents, patient safety concerns, and cost of operating room time.

Surgical simulation offers an opportunity to teach and practice laparoscopic skills outside of the operating room environment. The current goal of simulator training is to help trainees acquire the skills needed to perform complex minimally invasive surgical procedures prior to practicing them on living patients. Simulation has enabled the trainee surgeon to learn in a comfortable stress free environment. Studies have demonstrated that the combination of virtual reality training and inanimate box training leads to better laparoscopic skill acquisition than either training method alone or no training at all. Optimal preclinical laparoscopic training should incorporate both virtual reality trainers and inanimate box trainers. They can make and learn from common mistakes in the learning phase of training. A technique can be practiced over and over until the trainee is comfortable with the steps and safeguards. The proper handling of an emergency condition is very difficult to teach during the actual emergency. Preparation is essential in the form of lectures and rehearsal. During an emergency situation, however, there is no time to stop and think about what the next step should be. The actions and protocols should come naturally; they should be second nature. The only way to practice a crisis without endangering a patient is to learn in a simulated environment. After learning from lectures and observation, residents can practice on a realistic - but not real - patient. When they are ready to perform the task for the first time on a real patient, they are merely fine tuning their technique. Nothing will completely replace learning by interacting with real patients, but the early learning should take place in a controlled, safe way. Initial MIS training on simulators and then tele-mentoring of trainees during performing operative procedure by remote consultants using telemedicine technology is one safe way to transfer surgical skills.

The Minimally Invasive Surgery training facilities are limited in teaching hospitals of Pakistan. This was the background for establishing Virtual Trainer Lab in Department of surgery Rawalpindi Medical College, Holy Family Hospital, in 2007 under phase 2 of Pak-US science and technology Cooperation Program in collaboration with Department of Surgery, Virginia Commonwealth University Richmond, USA. The lab was equipped with box trainers, virtual reality and full procedural simulators. The operating rooms and training lab were linked National and Internationally to Universities and CPSP Regional centers utilizing PERN Network of Higher Education Commission. MAS Curriculum was developed jointly by two institutions after detailed review of fundamentals of laparoscopic surgery FLS training programs adopted by American College of Surgeons. FLS was designed for surgical residents, fellows and practicing physicians to learn and practice laparoscopic skills to have the opportunity to definitely measure and document those skills. The FLS Test measures cognitive knowledge, case/problem management skills and manual dexterity. The FLS program content has been endorsed by the American College of Surgeons (ACS) and is a joint educational offering of SAGES and ACS. FLS is also CME accredited. The MIS Virtual lab training model consisted of three modules including basics of laparoscopic training lectures and demonstrations, working on virtual simulators. Its focus was to teach the MAS Skills to surgeons outside the operation theaters. The training tools like Virtual Reality simulators and full procedural simulators enabled surgeons to practice these skills in Lab with simulated environment and not on actual patients.

All trainees had opportunity to scrub with experienced trained faculty members to assist and observe at least 12 procedures during the 4 day hands on training workshop. This was unique hybrid model adopted in training. In the first phase 50 surgical faculty members from Rawalpindi and Islamabad Hospitals were trained at the lab during 2008-09. Master trainers were selected to conduct training of post graduate trainees of Rawalpindi Medical College and Allied hospitals and conduct National training program. This initiative has trained more than 200 surgeons and trainees from all over Pakistan and still ongoing. These trainees have gone on to start similar initiatives in their own institutions.

Virtual reality and full procedural simulators are expensive. A joint initiative of National University of Science &Technology and MIS Virtual Lab Holy Family has led to Pakistan's first indigenously produced simulator Smart Sim. This has incorporated Pre exercise education including surgical videos of different scenarios, Run-Time Assistance and Post Exercise Review. Sialkot is renowned the world over for their surgical instruments. It has come up with producing high quality disposable laparoscopic instruments meeting European standards. Local industry is also producing box trainers which are integral part of training.

There is dire need to develop Skill labs in all major teaching institutions of the country. CPSP will have to take up leading role in providing well equipped labs in all its regional centers in the country. Major teaching hospitals will have to follow this. Regulating authorities in collaboration with Society of Surgeons of Pakistan and Society of Laparoscopic and Endoscopic surgeons (SOLES) will have to play key role in implementing standardized training program and identify and accredit Universities and institutions which can carry out Basic Fundamental and advanced training in Pakistan.

The MIS Virtual Lab is one model which can be replicated and its curriculum can be adopted and modified according to...
Simulators, tele mentoring in OR and tele-presence surgery are the upcoming support for minimal invasive surgery training, which are really the future of surgery. A proficiency-based VR training curriculum shortens the learning curve on real laparoscopic procedures when compared to traditional training methods. This may be a more cost- and time-effective approach, and supports the need for simulator-based practice to be integrated into surgical training programs.\textsuperscript{10,11}

REFERENCES


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