Fresh Frozen Cadaver: A Model for Laparoscopic Surgery Training

Muhammad Hanif Shiwani

Changes in medical education and practice are happening at a fast pace. In the past decade, innovative methods for medical education, training and practice have been developed. Surgical training has revolutionized since the inception of the laparoscopic and endoscopic surgery in last 20 years. Video-surgical surgery has almost taken over the bulk of conventional open surgery. Almost all general surgical procedures and majority of surgical procedures in various sub-specialties are being performed using minimally access approach. Surgeons all around the world are moving towards scarless surgery.

This advancement requires different training. The approach of the traditional apprenticeship of learning by the trained surgeon on alive patients in operating theatre is now shifting towards training in the laboratories before embarking on living patients. More and more methods of surgical education have been introduced and effectiveness of various methods have been well researched, assessed and now widely adapted by the trainers and trainees.

Various types of simulators have been developed over the last two decades and used in dry and wet laboratories of the laparoscopic skills development centres throughout the world. Various types of simulators are available commercially. Recently, the virtual reality (VR) simulators have been proposed to be an excellent tool of learning. A Cochrane review of 23 trials involving 622 participants concluded that virtual reality training was more accurate than video training (VT). VR training can supplement standard surgical training and is as effective as VT, in supplementing standard laparoscopic training.1

Traditionally the cadavers have been used for the learning of anatomy. Currently, more and more non-cadaveric specimens have been used to learn the anatomy and now the current trend is moving towards the use of cadavers for the training and development of open surgical techniques. Fresh frozen cadavers (FFC) have shown to provide an excellent opportunity to teach basic open vascular surgery principles.2 A prospective crossover trial has shown that FFC is more realistic and preferred model for direct laryngoscopic orotracheal intubation as compared to training on manikins.3

More recently, the fresh frozen cadavers have gained popularity in UK for the development of laparoscopic surgical skills. At present, the cadavers used for the training of laparoscopic surgical skills are fresh frozen and thawed prior to use. These cadavers provide perfect reproduction of the anatomical landmarks, tissue flexibility and consistency, tactile feedback from tissue handling, ability to use gravity and retraction to make simulation more realistic. Operative technical steps can be used in the identical fashion as in live surgery,4 for example; the setup of the position of the cadaver, positioning of all the staff involved in the operation including first and if necessary second assistant and a nurse. Use of actual instruments for all the necessary skills of port insertion, tissue retraction, dissection and use of energy devices like diathermy and harmonics devices. Use of fixation devices and the prosthetic materials like meshes for the repair of hernia and also the use of sutures and stapling devices, all can be performed with the actual instruments.

The setting and environment is almost real like theatre setting with light, camera steak, operating table etc. Moreover, the atmosphere is very relaxed and pure educational, without any risk to the patient-safety-issue. It provides much more conducive environment for better learning. The trainers are dedicated and generally experienced laparoscopic surgeons fully trained to train the skills.

With personal experience of teaching laparoscopic skills on various types of simulators over a decade and now using FFC recently, along with the experiences of other colleagues, one can suggest that it is a far superior model than many others in the market at present.5

An ideal simulator is the one which provides nearly all the characteristics of a live anaesthetized human body. However, critics can argue that even those simulators would not provide the computer generated feedback, hence, the simulators which provides feedback is better in laboratory setting. Therefore, perhaps the future rests in a modified FFC which would bleed and where one can implant an artificial feedback system.

Apart from the financial issues of establishing a laboratory where cadavers are provided on a regular basis, stored frozen and thawed and used when required,
there are many reasons why this modality of training cannot be used very widely all over the world. There are ethical and legal requirements to fulfil, which varies according to the regulation of the country. For example, in UK, wet animal laboratory is not allowed whereas in France and Germany anaesthetized pigs are widely used for such purpose. In UK, the Human Tissue Act 2004 authorizes the storage and use of cadavers for the purpose of laparoscopic training, and now there are at least 3 centres i.e. Newcastle, Bristol and Nottingham where FFC are used for such training in England.6

In Pakistan, traditionally, cadavers have been used to learn the anatomy. Time has come now that we should consider moving towards the new ideas and innovation of teaching and training. Laparoscopic surgery is gaining much more acceptance and popularity. More and more patients are now aware that even the complex surgical procedures including major organ resection and bariatric surgery can be performed using laparoscopic techniques. Surgeons who are very well experienced in open techniques are not necessarily well versed with the recent advanced laparoscopic procedures and might not be able to offer the latest approach to their patients.

Learning laparoscopic skills on fresh frozen cadavers would provide a standardized training, ideally under the auspicious of a reputable institution with the help of dedicated fully trained laparoscopic surgeons. College of Physicians and Surgeons Pakistan should consider taking this challenging role in the development of a laboratory of fresh frozen cadavers. This will be the way forward to provide our nation with a very safe and highly skilled generation of laparoscopic surgeons of the future. The achievement of surgeons of future depends on the resources to train them and to provide them the opportunities of developing innovative skills. They would perform far beyond than what their predecessor would have dreamed of. It would also provide an opportunity, even for the trained laparoscopic surgeons for developing skills of new techniques of complex procedures on the cadavers first, before embarking on the experimentation on living human beings.

REFERENCES