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ORIGINAL ARTICLE

Role of Virtual Training Lab in Enhancing Laparoscopic Skills of Residents Versus Consultants

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ABSTRACT

Objective: To compare the role of virtual training lab in enhancing laparoscopic skills at training stage and at the level of qualified surgeons.

Materials and Methods: In this comparative study, we included 70 participants of national and resident MIS workshops were included, 35 consultants and 35 residents were included. Participants were analyzed in the basic laparoscopic skills of instrument navigation on Lapsim. Data were collected on first day and on last day of workshop. Parameters included were left instrument time, right instrument time, tissue damage and maximum damage.

Result: In 35 residents the left instrument time was improved mean of 27.99(Range 39.52-13.43) to 21.53 (Range 42.37-12.38) and right instrument time improved mean of 31.73(Range 52-48.19) to 23.365 (Range 48.19-11.46). The tissue damage decreased from mean of 3.2 to mean of 1.46. The maximum damage decreased from mean of 8.82 to mean of 3.408. Data of consultants showed that the left instrument time improved mean of 35.71 (Range 140.22-13.09) to 24.39 (Range 111.82-9.71) and right instrument time improved mean of 45.76 (Range 141.45-15.89) to 27.82 (Range 49.2-8.6). The tissue damage decreases from mean of 5.171 to mean of 2.228. The maximum damage decrease from mean of 13.67 to mean of 5.136. All the values at consultant level were greater than resident level.

Conclusion: This study further confirmed that virtual lab has very important role in improving laparoscopic skills and in addition this study prove that enhancing of the laparoscopic skill at resident level is much better than the acquisition of laparoscopic skill at consultant level.

Keywords: Virtual Training Lab, Laparoscopy, Simulation.

INTRODUCTION

Minimal invasive surgery is the new technique of surgery that shifts the surgeons from conventional three dimensional open surgery technique to perform procedures using the 2-dimentional videos using the special instruments in a limited freedom of maneuverability. Using laparoscopy is challenging in each step because of no direct touching of tissues, unavailability of 3-dimentional direct visibility and absence of finger dexterity.[1, 2]

Initially, Technical skills training is under direct supervision of mentor and trainee gained experience by practicing on patients. The skills acquired in this way are no longer accepted. [1] All the trainees must be trained in a safe environment before going to perform on real patients. Simulation base training is an integral part and prerequisite for all reliable organizations like airline, nuclear industries but it requires more emphasis in medical education.[3]

In virtual training, basic skills are taught and practiced on simulators and models, with the aim to provide safe and better training to the trainees.[4-8] Simulation also offers risk-free training in technical skills, making the safe surgeons for the patients.[9,1]

Now it is beyond any doubt that the trainees who have been trained on low fidelity virtual reality models make fewer complications on real patients.[10-11] The laparoscopic psychomotor surgical skills practice on these simulators were transferable to complex tasks such as suturing and may also provide faster skill acquisition with additional benefit to traditional education.[12] so, preventing medical error is well recognized, and simulator-based training has been advocated as a possible preventive approach.[13]

Virtual training lab has number of important tools some of them are simulators and others are box trainers to train the surgeons in the field of minimal invasive surgery. This study is objected to find out the comparison of learning of these skills at two stages that is at resident level and when they became a qualified surgeon.

MATERIALS AND METHOD

This study is conducted at MIS virtual training lab, surgical unit II Holy Family hospital Rawalpindi Pakistan, which is the center of training of laparoscopic skills, from April 2011 to November 2012. The virtual training lab in this hospital was established in collaboration with Virginia Commonwealth University, USA as part of PAK-US science and technology cooperation program. This is equipped with laparoscopic surgery training tools like box trainers and virtual reality training simulators lapsim and Promis. Participants of national and resident MIS workshops were included in this study**.**

MIS workshop is four days workshop in which all the participants performs various basic exercises on these simulators and are evaluated on day four. 70 participants, 35 in each group were analyzed in the basic laparoscopic skills of instrument navigation on Lapsim. So the data is collected on day one and day four after spending sufficient

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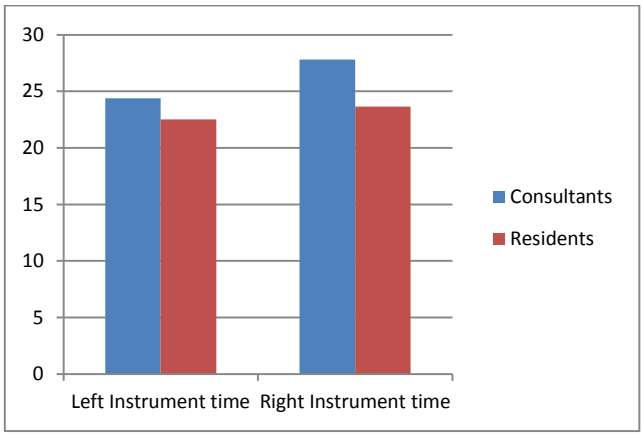
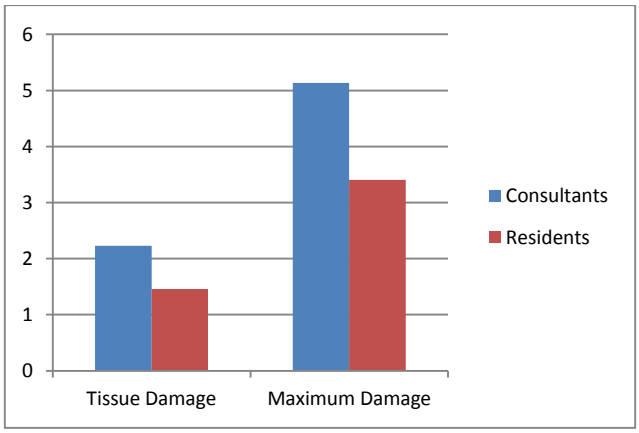
time on these simulators. Data is safe on the lapsim for one of the basic laparoscopic skill of instrument navigation. The data of premature exercise is excluded from the study. Parameters included were left instrument time, right instrument time, tissue damage and maximum damage.

RESULTS

In 35 residents the left instrument time was improved mean of 27.99(Range 39.52-13.43) to 21.53 (Range 42.37-12.38) and right instrument time improved mean of 31.73(Range 52-48.19) to 23.365 (Range 48.19-11.46). The tissue damage decreased from mean of 3.2 to mean of 1.46. The maximum damage decreased from mean of 8.82 to mean of 3.408.

Data of consultants showed that the left instrument time improved mean of 35.71 (Range 140.22-13.09) to 24.39 (Range 111.82-9.71) and right instrument time improved mean of 45.76 (Range 141.45-15.89) to 27.82 (Range 49.2-8.6). The tissue damage decreases from mean of 5.171 to mean of 2.228. The maximum damage decrease from mean of 13.67 to mean of 5.136. The comparison of the data of the consultant and residents are shown





DISCUSSION

Virtual training provides a safe and standard environment for surgeon's training by bypassing the risks associated with training on real patients. This experience is so realistic and highly engaging that the trainees forget that they are in simulation. The skills learned during simulation can then be implemented in real practice for safe conduct of laparoscopic procedures.[14,15]

The two integral components of virtual training are; box trainers and simulators. The skills learned on simulators are very encouraging and the trainees trained on these simulators are reported to be quick, with lesser errors and have economy movements scores during the procedure. [16, 17] Skills learned on box training are reproducible on both VRS and BT.[18] the participants spent times on both simulators during workshop days.

Lapsim virtual training simulator was used to collect the data and then on the basis of this data we compare the laparoscopic skills. The prime advantage of VRS over BT is that it provides objective data regarding progress of training skill of each participant and there is no need of direct supervision. It provides accurate and unbiased data.[19] VR surgical simulators replicate critical laparoscopic skills and procedures through their advanced computer software. These simulators provide a more believable practice environment with higher face validity than box trainers.[20]

Seymour et al. conducted a comparative study on skills acquisition among trainees trained using traditional training with those trained using virtual lab. The authors reported better performance in simulation group, regarding the time of dissection of gallbladder, lower incidence of errors and overall progress.[21] In another study by Grantcharov et al. the virtual training group performed faster than the conventional group and made less errors in comparison to conventional group.[22]

Van Hove et al. in their study showed inverse correlation between trainee age and the skills improvement during training and overall final scores. The authors reported that old age trainees are slower to develop technical skills.[23] So it is postulated that virtual training is more successful if started at earlier stage of education.

The results of acquisition of skills in all aspects left and right instrument time, tissue damage and maximum damage were two folds. Firstly, it confirmed that the simulation training is helpful in acquiring these skills. Secondly, this study proved that training of VRS at trainee level is more beneficial in-terms of better skills improvement. than on later part of training laparoscopic consultants can even improve their skills by doing training on these VRSs.[24, 25]

This study was not without limitations. Larger sample size used to assess and compare the improvement of laparoscopic skills. Long term follow up is required to assess the effectiveness in the real life. Given the advances in technology and the acquiring evidence of their effectiveness, we should device the method to assess the training of surgeons on these simulators.

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