EVALUATION OF BASIC LAPAROSCOPIC SURGICAL SKILLS COURSE PROGRAMME FOR SURGERY RESIDENTS AT A SIMULATION LAB IN SOUTH INDIA

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ABSTRACT

Introduction: Patient safety is the critical priority in surgical education. The new training models and curriculum are needed for maintaining safety and quality of surgical performance. An established laparoscopic surgical skill (LSS) grade 1 level 1 programme running for surgical residents is being already taken up in various European countries under the support of European Association of Endoscopic Surgeons. Aim: The paper aims to evaluate the perception of surgery residents on Laparoscopic surgical skill (LSS) Grade 1 Level 1 course in South India. Material and methods: A total of 5 accredited Laparoscopic surgical skill Grade I Level 1 courses were held in Simulation modules for advanced research and training laboratory (GSL SMART LAB) between April 2013 and December 2016. The demographic data and pre-course surgical experience in laparoscopic surgery of the participants were recorded. After completion of 12 hrs practice on endotrainer and lap mentor combined, the participants attended two days of basic laparoscopic surgical skill programme with different modes of assessment/examination related to basic laparoscopic skills. The participants filled the course evaluation form to evaluate course progress, course materials, assessment, staff, course location and overall impression of the course on a 1-10 scale for assessing feedback information. Results: Thirty-four surgery residents were enrolled in an LSS Grade I Level 1 programme. The mean age of the participants was 28.294 years (SD = 3.51), the male/female ratio was 31/3, and previous experience with laparoscopic surgery was limited. Overall impression of the course was rated with 8.8 points (SD = 0.78). The applicability of the course content in practice and the balance between theory and hands-on training were also rated very well – mean 8.8 (SD = 1.01) and 8.1 points (SD = 0.80) respectively. Conclusions: The result of this study shows that the course is a well-balanced training programme, meeting the expectations of individual surgery residents. Hence, the overall interest in the programme suggests that it might become the future Indian standard of surgical education in laparoscopic surgery. The success of the course may be drawn after the completion of the clinical assessment of enrolled participants.

KEYWORDS: laparoscopy, training, simulation, virtual reality, surgery

Introduction

Laparoscopy procedures are gaining demand in modern surgery. Laparoscopic procedures are technology dependent besides the knowledge of basic surgical anatomy and human physiology.
For the patient safety and quality of surgical performance, there is a need to improve training, assessment and accreditation for the laparoscopic procedures\cite{1,2}. Surgical training, traditionally governed by Halstedian apprenticeship model, has recently undergone a paradigm shift. Training laparoscopic procedure to surgery residents in operation theatre appears unsuitable, especially in early stages of surgical education. Working time restrictions, consumer forum and medico-legal issue, comprehensive closed camera recording system, changing technology have considerably reduced the amount of time available to train and supervise residents in the operating room\cite{1}. Furthermore, the concept of accreditation based only on the number of procedures performed does not seem to be acceptable any longer. All of this together has led to a paradigm shift in surgical training\cite{2,3}. Currently, a skill lab with basic suturing boards, endo trainers with different tasks on hand and eye coordination, virtual reality simulators of the dry lab, synthetic models of the wet lab, well equipped audio-visual classroom and de-briefing room with computers that allow deliberate practice of technical procedure and training of clinical scenarios in a safe environment should be the preliminary stage of education in laparoscopic surgery\cite{3,4}

LSS (Laparoscopic surgical skill) is an initiative and supported by the European Association for Endoscopic Surgery (EAES) in the laparoscopic discipline. LSS has developed, validated and implemented an educational and training curriculum and proficiency assessment tool with an associated E-learning platform and necessary additional tools for institutions to be able to educate and train to the required standard and issue their students the LSS Certificate of Accreditation.\cite{5} Laparoscopic surgical skill As per LSS guidelines the crucial clinical training stage, during which trainees operate on patients under the supervision of an experienced surgeon, should only follow as the second step after successful completion of simulation training.

At GSL Simulation Modules for Advanced Research and Training Laboratory (GSL SMART LAB), the surgery residents took part in the course which focused on providing a standardized training platform to perform basic laparoscopic surgeries independently with minimal error within the economic availability of resources to the surgeon and the health care center, decreasing the time of learning.

**Aim**

The paper aims to evaluate the perception of basic laparoscopic surgical course in India considering overall quality, the applicability of the course content in practice, and the balance between theory and hands-on training modules, by participating trainees.

**Material and methods**

This retrospective study included 200 adult patients who were diagnosed with acute stroke and followed up in Kahramanmaras Sutcu Imam University Medical Faculty Hospital Neurology Clinic between 01.01.2016 and 31.12.2016. In the clinical history of the patients, the presence of diseases such as hypertension, heart disease, diabetes mellitus, hyperlipidemia, and epilepsy, and chronic drug use and smoking were investigated. The patients were classified as the total internal carotid artery, middle cerebral artery, anterior cerebral artery, posterior cerebral artery, and lacunar infarct according to the anamnesis, neurological examination, and neuroimaging (brain tomography or magnetic resonance imaging) results. The mortality rates and the number of patients applied to our hospital in the first 4.5 hours were investigated over a one-year period.

The Mean, Standard Deviation and Frequency tables were used. The continuous variables were expressed as mean±standard deviation, and the categorical data were expressed as median and percent. For further analysis, the test of significance of the difference between the ratios (chi-square) was used. \( p < 0.05 \) was considered significant.

**Outline of Laparoscopic Surgical Skills.**

Laparoscopic Surgical Skills offers a standard for comprehensive performance assessment for training and education in laparoscopic surgery within a multi-level curriculum combining criterion-based assessment in the skills lab with clinical assessment of performance on indicator procedures. At GSL SMART LAB the LSS curriculum with a modification taken as a pilot project in INDIA. As LSS assessments are criterion-based and practice-oriented, all the participants have to pass several types of performance assessments (Figure 1). All LSS assessments are criterion-based and very practice-oriented. All the surgical residents are included in the study protocol. 34 surgery residents attended the course curriculum at the GSL smart lab, GSL G1 L1 course, accredited by LSS organisation. Gynecology residents were excluded from the study protocol. The participants were informed regarding course pattern and various stages of assessment. The surgery residents enrolled in the study group signed in the informed consent, and each resident completed the demographic questionnaire with the age and any experience in laparoscopic surgery.

Two months before the scheduled assessment date the participants are allowed to attend eight classes in GSL SMART LAB of 30 minutes each with the faculty where group discussions regarding the basic laparoscopy were also done. After the class, participants were allowed to do different tasks on the endo-trainer and lap mentor for about 30 to 45 minutes in batches. The tasks on the endotrainer were peg transfer, block building and pattern cutting. On the simulator (lap mentor) the tasks done were camera manipulation, clipping the leaking duct, peg transfer, pattern cutting and ligating loop along with partial and complete lap cholecystectomy procedure with clear identification of critical view of safety (CVS). A study book of 67 pages was provided to the participants through their email. The book contains topics of basic laparoscopy (indications/contraindications), instruments, ergonomics, energy sources, diagnostic lap, lap appendicectomy and lap cholecystectomy procedure. Ten days before the scheduled course date the participants appeared an online knowledge test regarding procedures, techniques, instrumentation and ergonomics. The candidates should pass the examination to enter to the second level scenario-based assessment and simulator assessment.

All the participants who participated in the study filled in the preliminary questionnaire. The participants were divided into
with ergonomically placed monitors. The entry points for the (CAT form)[6]. After completion of course programme, the participants had to dissect cystic artery and duct with the use of energy sources to obtain a critical view of safety. One assessor assistant for holding the camera and instrument when required.

Simulator assessment certifies that participants have achieved a sufficient level of psychomotor and technical surgical skills to start performing the specific index procedures in the clinical setting under the supervision of an acknowledged trainer. All the participants were asked to demonstrate sufficient performance of a selection of basic and procedural tasks on the assessment simulator. Passing the simulator assessment is required for admission to the clinical performance assessment. Online scenario-based assessment is conducted to assess the knowledge and judgment skills about the index procedures (camera manipulation, diagnostic lap, ergonomics in laparoscopy). In the test, several real-life scenarios are presented with problems or questions at specific critical moments, which the participant has to solve successfully. Passing the scenario-based assessment is required for admission to the clinical performance assessment.

All participants performed a Lap cholecystectomy procedure in a goat liver model placed in the box trainer (Figure 2,3). The boxing trainer was placed on a designed height adjustable table with ergonomically placed monitors. The entry points for the laparoscopic instruments mimicked the port point in human lap cholecystectomy. A fellow participant played the role of assistant for holding the camera and instrument when required. The participants had to dissect cystic artery and duct with the use of energy sources to obtain a critical view of safety. One assessor allotted to assess the participants and after the procedure, both the participant and expert filled out a CAT form independently (CAT form)[6]. After completion of course programme, the participants are advised to do lap cholecystectomy procedure in the presence of the faculty. A global assessment form (GAS) had to be filled up after the procedure by the faculty/assessor [7,8]. The unedited video of the procedure was further submitted to the GSL SMART LAB for assessment and to get a final certificate of competency after it was assessed.

Course evaluation

Demographic data collection was performed from the participants. Data on age, sex, year of surgical training and pre-course surgical experience in laparoscopic surgery were recorded before the course. The final course evaluation form was completed by each participant after the course on day 2 (anonymously) to evaluate course progress, course materials, assessment, staff, location and overall impression of the course on a scale of 1-10 (1 – abominable, 2 – very poor, 3 – poor, 4 – very unsatisfactory, 5 – unsatisfactory, 6 – satisfactory, 7 – more than satisfactory, 8 – good, 9 – very good, 10 – excellent).

Results

So far, five accredited LSS Grade I Level 1 courses have been offered in GSL SMART LAB between April 2013 and December 2016. 34 surgery residents took part in one of the courses mentioned above and were enrolled in this study. Most of the participants were second and third-year residents (n = 30), but also already established surgeons took part (n = 4) whose clinical experience in laparoscopy was somewhat limited. The mean age of the participants was 28.35 (SD = 3.51), and the male/female ratio was 31/03. All 34 participants completed the knowledge test, scenario-based assessment and simulator assessment. By 2017, participants also completed the phase of clinical training and evaluation.

Feedback from the participants of LSS Grade I Level 1 accredited courses was predominantly positive. The course progress and course material were rated as 8.2 (SD 0.67) and 8.38 (SD 0.73) respectively.

The type of assessment in the LSS curriculum is new to the Indian scenario, but all the participants appreciated the methods of assessment with a rate of 9.23 (SD -0.56). Participants also appreciated the location, ambience and staff of the training centre. Overall impression of the course was rated 8.55 points (SD = 0.53) on a scale of 10. The applicability of the course content in practice and the balance between theory and hands-on training were also rated very well – mean 8.6 (SD = 0.91) and 8.3 points (SD = 0.88) respectively.

Discussion

LSS is a versatile programme that offers a standard for comprehensive performance assessments for training and education in laparoscopic surgery within a multi-level curriculum. LSS is the first standard that combines criterion-based assessment in the skills lab with clinical assessment of performance on index procedures. The target Group in LSS curriculum are surgeons in training, surgical fellows, practising surgeons and other physicians who perform laparoscopic surgery or would like to acquire laparoscopic skills. The LSS programme first started at Catharina Hospital, The Netherlands. GSL SMART LAB is the accredited centre to conduct the LSS G1 and L1 programme in India.

The participants in the study group well appreciated the course progress. All the participants liked the unique contents of the course like ergonomics and laparoscopic space access. Ergonomics is a new topic for the residents, and it stressed on the operating room setup, proper posture, and practice of postural resets which are necessary components for a longer, healthier, and pain-free surgical career. [7] Hands-on training is
an effective format particularly for laparoscopic skills in which two-hand coordination is essential[8]. The residents in the study group were satisfied with the quality of hands-on training the endotrainers and lap mentors. A similar study by Dhariwal AK. Revealed that a short-term, intensive, focused course does improve laparoscopic skills of trainee [9]. They used box trainers like our endotrainer box to train laparoscopic skills.

The assessment in the curriculum is unique as after the evaluation both the participants and assessor has to fill the CAT form separately and then assessor will discuss with the trainee regarding his feedback. We took goat liver model as an index procedure to be done by the participants. They experienced the camera movement, instrument handling and dissection of a critical view of safety with energy sources.

The participants faced difficulties in identifying cystic duct and artery separately, and then we prepared the model by injecting methylene blue to make the duct more prominent. The overall impression rated by the participants is comparable with the course conducted in The Netherlands.[10,11,12,]

As the same no. of training hours were given to the participants on the endotrainer and simulator to all participants, some of the surgery residents suggested to have more training hours as the perception, and tactile sensitivity differs from person to person

Conclusion
The LSS Grade I Level 1 curriculum can be safely practised in India as the structure of the training, the applicability of the course content, the pattern of assessment are rated positively by the trainees. As laparoscopic gained the popularity this pattern of course curriculum may be included in the various health universities in India for surgical trainees.

Authors’ Statements

Competing Interests
Written informed consent was obtained from the patient for publication of this case report and any accompanying images.
There were no financial support or relationships between the authors and any organization or professional bodies that could pose any conflict of interests.

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