Original Research Article

Assessment of laparoscopic surgical skills by Laparoscopic skills index (LSI)

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Abstract: Approximately 80 percent of gynecologic operations performing with laparoscopy at present. In present study Laparoscopic skills index (LSI) builds with selection of item, method to scale responses, Design and choosing method. Reliability was evaluated by four raters reviewed 40 videotaped procedures. Cronbach's alpha was 0.95, which indicating a high level of internal consistency. A best measure of reliability coefficient for interrater reliability was 0.79 (95 % CI 0.56 to 0.90) which is considered to be very good. This result was attained after excluding one rater where a systematic bias was evident and LSI shown to be a suitable measure of level II gynecologic laparoscopic skill in the human setting. The LSI appears to have the properties of a unidimensional index in which the item variables are true components of the overall attribute.
Keywords: Laparoscopic skills index (LSI), Reliability and Laparoscopy

INTRODUCTION

Recent reports on safety and quality of surgical performance by the WHO, alarms the urgent need for improvement of training, assessment, and accreditation for technology dependent surgical procedures such as laparoscopy [1]. The traditional surgical education models are unsuitable to train surgeons in laparoscopy, especially not in the early stages of training [2-4].

Laparoscopic Surgical Skills (LSS) is the answer to satisfy the needs of both the surgeons and the healthcare authorities. LSS is an initiative by the European Association for Endoscopic Surgery (EAES) to provide a standard to credential surgeons to perform laparoscopic surgery effectively and safely [5]. LSS offers a standard for comprehensive performance assessment for training and education in laparoscopic surgery within a multi-level curriculum. It focuses on safeguarding the quality of performance in laparoscopic procedures and goes beyond the basic skills. The LSS programme is divided into two grades. Grade I is divided into 2 consecutive levels and includes all basic laparoscopic skills and fundamental laparoscopic procedures. Grade 11 consists of several separate assessments each focusing on a specific advanced laparoscopic procedure [6, 7].

MATERIALS AND METHODS

The present study was conducted in association of department of Surgery, Orthopaedics and Obstetrics & Gynaecology in MNR Medical College and Hospital, Sangareddy during March 2015 to September 2016. This study includes video recordings of 40 gynaecological laparoscopic procedures. Informed consent was obtained from the patients and faculty surgeons. All procedures were electively performed during day time operating hours in one of two dedicated gynecologic laparoscopy suites.

Inclusion criteria: Surgical procedure less than 60 minutes, level II laparoscopic procedure according to society of obstetricians and gynaecologist of Canada.

Exclusion criteria: Level I procedures such as laparoscopy and laparoscopic sterilization, level III procedures such as the Burch sling for urinary stress incontinence.

In preparation for scoring, a revised multicolored rater package was prepared. The raters were advised to complete the LSI rater form for each operative procedure as soon as the procedure had been reviewed. The videotaped and completed LSI forms were

collected at the end of the two week period from each rater and the raw data were entered into a data sheet.

RESULTS

A total 26 videotaped items was used to assess Laparoscopy skills index, among that 4 items were dropped prior to conducting the statistical analyses. One of these, knot typing, and ligation were not observed during any procedure by raters. Electrosurgical dissection was scored only 20 times. Rater 1 was responsible for 24/40 entries and the other three raters combined scored electrosurgical dissection only eight times. Thus, it was felt that rater 1 was including under electrosurgical dissection events that did not qualify. Such as bipolar coagulation of a pedicle prior to dividing it or electrosurgical techniques for hemostasis. Rater 1, the community rater, differed from the three institute raters 2, 3 and 4 in other respects and this is discussed below. Therefore, because electrosurgical dissection was very infrequent and because the numbers for raters 2, 3 and 4 were very small. Electrosurgical dissection was also dropped from the final analysis. At Women's College Hospital. The laser modality was used almost exclusively.

Table 1: Total scores for individual raters

Rater	Mean	SD	Range
1	84.75	9.16	67-96
2	68.00	21.37	33-100
3	61.35	18.98	35-92
4	66.4	18.66	31-87

Table 2: Interrater reliability and confidence intervals for different combinations of raters and subjects

Raters	Subjects	Interrater reliability	Confidence interval
1234	40	0.47	0.20 - 0.71
1234	36	0.49	0.20 - 0.76
234	40	0.71	0.47 - 0.85
234	36	0.79	0.56 - s0.90

When rater A is excluded the reliability coefficient is in the good range and when only the last 40 subjects are analyzed across raters 2, 3 and 4. The reliability coefficient is in the good to excellent range. The result was 0.47 (CI is 0.20 – 0.71). The reliability coefficient raise to 0.71 (CI is 0.47 – 0.85), if rater 1 was excluded from the analysis. If rater 1 was excluded and only the last 36 subjects were considered. The ICC was 0.79 (0.56 – 0.90).

Table 3: Interrater reliability and confidence intervals for different combinations of raters and subjects

	Raters/ Subjects (8/40)		Raters/ Subjects (8/36)		Raters/ Subjects (6/40)		Raters/ Subjects (6/36)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Scope control	0.45	0.18-0.68	0.51	0.21-0.73	0.58	0.28-0.57	0.66	0.36-0.82
Irrigation	0.40	0.16-0.63	0.47	0.20-0.69	0.65	0.41-0.83	0.74	0.52-0.88
Suction	0.41	0.15-0.64	0.40	0.12-0.65	0.57	0.27-0.76	0.55	0.19-0.76
Laser dissection	0.33	0.10-0.58	0.38	0.12-0.62	0.44	0.17-0.69	0.50	0.22-0.75
moval	0.21	0.05-0.49	0.34	0.09-0.58	0.59	0.34-0.79	0.41	0.10-0.66
Hemostasis	0.49	0.20-0.72	0.55	0.21-0.75	0.79	0.55-0.88	0.78	0.58-0.90
ol	0.35	0.07-0.58	0.36	0.07-0.61	0.33	0.05-0.63	0.39	0.04-0.67

DISCUSSION

The present work was designed to test the reliability, of the LSI, a new, objective measure of level II gynecologic laparoscopy skills in the human setting. The construction phase consists 4 items (1) item selection (2) selecting a method to scale responses (3) design (4) choosing a scoring method. The results of this study indicate that the LSI has a high level of internal consistency. In particular Cronbach's alpha for individual raters and al1 raters combined exceeded the level of 0.90 considered to be the minimal satisfactory 1eveI of homogeneity for decisions pertaining to individual subjects.

The results provided evidence that the LSI has a very high level of internal consistency and excluding the systematic bias of rater A, good to very good interrater reliability. There is a tendency for assessments of

clinical skills to be skewed towards superlative ratings. Linn (1979) found that the mean score on a five point scale was 4.11 rather than 3.00 and the scores ranged between 3.30 and 4.56 (11). There are multiple factors that can influence the reliability in assessments. An important factor is the training of the raters in the assessment method. Usage of the LSI is evident in its additive index, numerical rating system, limited categories of response, clarity of the component elements and a scoring system in which the original expressions of data do not have to be convened by some form of transformation such as weighting.

CONCLUSION

The laparoscopy skills index has been shown to be a sensible measure of level II gynecologic laparoscopic skill in the human setting. It has a high level of internal consistency and good reproducibility. In the short-term, construct validity and the level of agreement between in vivo and videotape administrations must be established. In the long-term, norms (standard values) should be developed, and responsiveness measured.

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