OBJECTIVE, PROCEDURE-SPECIFIC ASSESSMENT OF MINIMALLY INVASIVE INGUINAL HERNIA REPAIR: EXPANDED USE TO DOCUMENT PROCEDURAL SAFETY AND GRANTING AUTONOMY

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BACKGROUND

- To support competency-based surgical skill assessment, consistent with the American College of Surgery's program for entrustable professional activities (EPAs), we developed an objective procedure-specific assessment (OPSA) to assess videos of laparoscopic inguinal hernia repair (Lap IHR) procedures.

OBJECTIVE

- Evaluate the IHR-OPSA instrument's utility to evaluate a surgical trainee's preparedness for individual autonomy, by including an expanded set of 23 operative videos.

METHODS

Assessment Tools

- 8 item assessment: port placement, elevation of peritoneal flap, exposure; reducing the sac, dissection of myopectineal orifice, mesh insertion, mesh fixation, and operation flow (Table 1).
- 1 item assessment: Global Case Difficulty (1 - easy; 2 - average; 3 - hard).
- GEARS scale for robotic-assisted procedures or the GOALS scale for laparoscopic procedures.

Data Set

- 43 videos - 30 from multiple surgeons in the United States and 13 videos from YouTube.
- Surgical videos were de-identified, randomized, and uploaded into a cloud-based SaaS platform.
- Each surgeon-rater scored each operative video the appropriate instrument set.

Analysis

- Inter-rater reliability (IRR) was measured by Total Agreement and by Gwet's AC_2, a weighted measure that adjusts for scales with a high probability of random agreement.
- Lap IHR-OPSA IRR was measured using a dichotomous safe vs. unsafe scoring rubric, with "poor" ratings documented as unsafe and ratings of "adequate" or "excellent" documented as safe.
- GOALS and GEARS IRR measures were measured using their 5-point scales.
- Total Agreement was measured as the ratio of raters that agreed on scores.

METHODS

ITEM	SCALE
1. Incision/Port placement	1. Poor (Unsafe – Position or insertion or removal technique) 2. Adequate (Safe – Functional position [even if awkward] or some port insertion difficulty, but generally safe) 3. Excellent (Expert-level performance – safe, efficient and optimal port position for procedure and anatomy)
2a. Elevation of Peritoneal Flap (TAPP)*	1. Poor (Unsafe – Poor technique and/or excessive bleeding or trauma to flap) 2. Adequate (Safe – Satisfactory technique but made closure more difficult than necessary) 3. Excellent (Expert-level performance – Excellent technique and minimal bleeding with an intact flap for easy closure)
2b. Elevation of Peritoneal Flap (TEP)*	1. Poor (Unsafe – Difficult entrance into pre-peritoneal cavity or difficulty with balloon insertion and inflation) 2. Adequate (Safe – Moderate efficiency in balloon insertion and inflation) 3. Excellent (Expert-level performance – Avoidance of peritoneal injury, careful insertion of balloon and inflation)
3. Exposure	1. Poor (Unsafe – Poor or inadequate pneumoperitoneum, or camera angel, or retraction with frequent loss of exposure) 2. Adequate (Safe – Adequate establishment and maintenance of pneumoperitoneum camera angle and retraction with occasional loss of exposure) 3. Excellent (Expert-level performance – Optimizes exposure, efficiently directs retraction and camera while maintaining exposure and pneumoperitoneum)
4. Reducing the sac	1. Poor (Unsafe – Poor technique requiring greater than expected time) 2. Adequate (Safe – Moderate efficiency in reducing the sac) 3. Excellent (Expert-level performance – Careful and efficient reduction of the sac)
5. Full dissection of the myopectineal orifice	1. Poor (Unsafe – Poor technique – inadequate exposure of the myopectineal orifice) 2. Adequate (Safe – Moderate efficiency in dissection exposing the full myopectineal orifice) 3. Excellent (Expert-level performance – Careful, efficient, and full exposure in the dissection of the myopectineal orifice)
6. Mesh insertion	1. Poor (Unsafe – Excessive time for mesh insertion or poor placement) 2. Adequate (Safe – Moderately efficient mesh insertion and acceptable placement) 3. Excellent (Expert-level performance – Efficient and accurate placement)
7. Mesh fixation	1. Poor (Unsafe – Poor technique or fixation technique) 2. Adequate (Safe – Acceptable fixation technique) 3. Excellent (Expert-level performance – Ideal fixation technique)
8. Operation flow	1. Poor (Unsafe – Frequent lack of forward progression or frequently stopped operating or seemed unsure of next move) 2. Adequate (Safe – Some forward planning and reasonable procedure progression) 3. Excellent (Expert-level performance – Obvious planned course of operation and anticipation of next steps)

Table 1. The Lap IHR-OPSA Instrument

RESULTS

n = 43	GCD	MI-IHR OPSA (Laparoscopic)	MI-IHR OPSA (Robotic)	GOALS	GEARS
Total Agreement	58%	96%	95%	50%	37%
Inter-Rater Reliability	59%	92%	92%	75%	77%
Interpretation	1.9 (average)	Excellent IRR	Excellent IRR	Good IRR	Moderate IRR

Table 2. Surgical Performance Measures Associated with the 43 MI-IHR Operative Videos

- Overall, case difficulty was average (mean 1.9). A total of six videos received at least one score of 3 (difficult).
- Inter-rater reliability was only 59% for the GCD but was 92% for both laparoscopic and robotic procedures assessed using the MI-IHR OPSA.

CONCLUSION

- This study shows a very a high degree of inter-rater reliability for the Lap IHR OPSA video assessment tool.
- The inclusion of additional publicly-available operative videos, without a decline in measurement performance, further demonstrates the validity of the tool to identify safe surgical task completion in Lap IHR
- Lap IHR OPSA tool may be used for determining surgeon competency and granting independent privileges in Lap IHR.

REFERENCES

1. Nikolian, V. C., Camacho, D., Earle, D., Lehmann, R., Nau, P., Ramshaw, B., & Stulberg, J. (2024). Development and preliminary validation of a new task-based objective procedure-specific assessment of inguinal hernia repair procedural safety. *Surgical endoscopy*, 1-9.
2. Kramp KH, van Det MJ, Hoff C, Lamme B, Veeger NJGM, Pierie JPEN. Validity and reliability of global operative assessment of laparoscopic skills (GOALS) in novice trainees performing a laparoscopic cholecystectomy. J Surg Educ. 2015; https://doi.org/10.1016/j.jsurg.2014.08.006.
3. Goh AC, Goldfarb DW, Sander JC, Miles BJ, Dunkin BJ (2012) Global evaluative assessment of robotic skills: validation of a clinical assessment tool to measure robotic surgical skills, J Urol, DOI: 10.1016/j.juro.2011.09.032, November 17, 2011.

DISCLOSURES

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