Plenary 8: Research & Science

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   Michael R. Polin, MD  Derrick J. Sanderson, DO
   Lauren Thomaier, MD  Mireille D. Truong, MD
Professional Education Information

Target Audience
This educational activity is developed to meet the needs of residents, fellows and new minimally invasive specialists in the field of gynecology.

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The session will focus on: advanced surgical, including robotic, approaches to training. Unique usage of virtual reality in training programs, appropriate “feedback” designed to enhance educational approaches to MIS will be explored. Is there an orderly process to proceed from laparoscopic to robotic technology via simulation?

Learning Objectives: At the conclusion of this course, the clinician will be able to: 1) Assess techniques for safe laparoscopic entry.

Course Outline

3:20 Development of an Evidence-Based Virtual Reality Training Curriculum for Laparoscopic Hysterectomy
P. Crochet

3:26 Discussant
J.L. Hudgens

3:30 Can Surgical "Warm-Up" With Instructor Feedback Improve Operative Performance of Surgical Trainees?
J. Kroft

3:36 Discussant
J.A. Shepherd

3:40 Robot-Assisted Laparoscopic Myomectomy: A Comparison of Techniques
D.J. Sanderson

3:46 Discussant
H-C Hur

3:50 Retroperitoneal Ureteral and Uterine Artery Identification During Robotic Hysterectomy: Learning Curve and Determinants of Improvement During Fellowship Training
R. Elkattah

3:56 Discussant
M.P. Milad

4:00 Increase in Prophylactic Salpingectomy Across All Approaches Following an Educational Initiative
E. Cooney

4:06 Discussant
P.H. Trivedi

4:10 Crowdsourcing: A Valid Alternative to Expert Evaluation of Robotic Surgery Skills
M.R. Polin

4:16 Discussant
E. Saridogan
4:20  Laparoscopic and Robotic Skills are Transferable in a Simulation Setting  L. Thomaier
4:26  Discussant  J.P. Lenihan
4:30  Development and Evaluation of a Low-Cost, Reusable Laparoscopic Entry and Emergency Model  C.C. DeStephano
4:36  Discussant  S.R. Hart
4:40  Video: Development of an Educational Robotic Psychomotor Skills Model  M.D. Truong
4:46  Discussant  A.E. Oshinowo
4:50  Video: Laparoscopic Entry in Patients With Previous Surgical History or Complex Pathology  X. Guan
4:56  Discussant  K.N. Wright
5:00  Adjourn
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The following members of AAGL have been involved in the educational planning of this workshop and have no conflict of interest to disclose (in alphabetical order by last name).
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Other: Proctor: Intuitive Surgical
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Frank D. Loffer, Medical Director, AAGL*
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Hye-Chun Hur
Royalty: UpToDate
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Speakers Bureau: Intuitive Surgical, Mimic Technologies
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Michael R. Polin*
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Ertan Saridogan

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Other: Advisory Panel Fees: Johnson & Johnson
Consultant: Gedeon Richter

Jessica Shepherd*
Lauren Thomaier*
Prakash H. Trivedi*
Mireille D. Truong*
Mark B. Woodland*
Kelly N. Wright

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Asterisk (*) denotes no financial relationships to disclose.
Development of an Evidence-based Virtual Reality Training Curriculum for Laparoscopic Hysterectomy

Patrice Crochet MD

I have no financial relationships to disclose

OBJECTIVES

• Assess the validity of a Virtual Reality (VR) program for Laparoscopic Hysterectomy (LH)

• Discuss the steps necessary to develop an evidence-based curriculum

• Explain how simulation enables training on complex laparoscopic procedures outside the operating room

Introduction

• Positive impact of simulators on training
  2. Fraser et al. Surg End 2003

• Lack of procedure-specific curricula
  3. Larsen et al. BMJ 2009

• VR programs need to be explored

Aims:
   to evaluate a VR LH program
   to develop an evidence-based stepwise curriculum.

Methods

• VR simulator: LapMentor*
  – LH
  – LH with guidance

• Assessment tools:
  – Quantitative: Metrics
  – Qualitative: OSATS


• Validity and learning curves


Methods

Novices
Group A n=14
Group B n=10

Intermediates
n=8

Experienced
n=8

Baselines
2 Basic tasks

10 LH
8 LH with guidance
2 LH

1 LH with guidance
Results

Metrics

<table>
<thead>
<tr>
<th>Group A =</th>
<th>LH</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>Basic tasks</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Clipping and grasping</td>
<td>Time taken &lt; 100 s</td>
</tr>
<tr>
<td>Two-handed manoeuvres</td>
<td>Time taken &lt; 90 s</td>
</tr>
</tbody>
</table>

Path length < 440 cm

<table>
<thead>
<tr>
<th>LH with guidance</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Time &lt; 1100 s; path length &lt; 2300 cm; no of movements &lt; 1300; idle time &lt; 300</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Laparoscopic Hysterectomy</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Time &lt; 1000 s; path length &lt; 2000 cm; no of movements &lt; 1300; idle time &lt; 250; no injuries to bladder, ureter, colon or iliac vessels</td>
<td></td>
</tr>
</tbody>
</table>

OSATS score ≥ 25

Discussion

- Validity evidence and learning curves:
  - Metrics - Bladder injuries - Qualitative scores
- Training on a range of operative skills:
  - manipulator and camera placement, forward planning
- Limitations:
  - standardized procedure
  - non intervention through the curriculum
- Further research:
  - Test on a multicenter setting
  - Transfer of skills acquired to the OR

References


Thank you for your attention.
CAN SURGICAL "WARM-UP" WITH INSTRUCTOR FEEDBACK IMPROVE OPERATIVE PERFORMANCE OF SURGICAL TRAINEES?

Jamie Kroft, MD, MSc, FRCSC
Sunnybrook Health Sciences Centre
University of Toronto

Plenary Session 8: Research and Science, November 18, 2014

Objectives
- At the completion of this talk, participants will be able to:
  - Summarize the benefits of pre-operative surgical warming-up
  - Identify the benefits of instructor feedback for learning advanced laparoscopic skills
  - Interpret the results to demonstrate how addition of instructor feedback may contribute to an improved pre-operative surgical warm-up
  - Formulate hypotheses on how surgical warming-up can be optimized and incorporated into a residency training curriculum

Background
- Athletes and musicians commonly warm-up or practice before a game or performance but surgeons do NOT typically
- Several recent studies have shown a benefit of pre-op warm-up on surgical performance by trainees
- Evidence that trainees who receive instructor feedback learn more efficiently when performing laparoscopy

Study Objectives
- To determine if warm-up by surgical trainees, with instructor feedback, compared to either warm-up or feedback alone, improves surgical efficiency, precision and quality.

Study Methods

Disclosures
- Speakers Bureau: AbbVie
Results

Comparison of Average Scores for Laparoscopic Salpingectomy

Non-parametric Regression Adjusting for Baseline Score

Overall Score (average) | Mean (SD) | Median (Range) | Estimate (SE) from model | Non-parametric test
--- | --- | --- | --- | ---
Warm-up | 19.67 (3.07) | 19.00 (10–34) | -- | Reference
Feedback | 22.17 (3.20) | 21.25 (10–32) | 2.98 (1.46) | Hot
Warm-up and Feedback | 28.92 (8.86) | 32.75 (15–36) | 9.25 (5.46) | .111

Results

Non-Parametric Analysis Adjusting for Baseline Score and Removing Participants with Intra-op Feedback

Overall Score (average) | Mean (SD) | Range | Estimate (SE) from model | Non-parametric test
--- | --- | --- | --- | ---
Warm-up and Feedback (n=9) | 21.64 (4.40) | 10–34 | -- | Reference
Warm-up and Feedback (n=5) | 31.70 (6.32) | 21–36 | 8.14 (3.64) | .048

Discussion

- Study limitations:
  - Likely underpowered due to higher standard deviation then used in sample size calculation
  - Possible bias from intra-operative feedback
- Study strengths:
  - RCT with use of stratified randomization to attempt to account for baseline skill level
  - Use of validated tools to measure baseline skill and operative capabilities for primary outcome
  - Use of two blinded assessors of outcome measure
- Future Directions:
  - Ideal type of warm-up and feedback?
  - Does benefit of warm-up translate to clinically relevant differences?
  - How do you make warming-up logistically feasible?

Summary

- Pre-operative surgical warm-up combined with instructor feedback may improve operative performance of surgical trainees compared to either a warm-up or feedback alone
- Further research is needed to elicit the ideal type of warm-up and feedback, which has the potential to provide enhanced resident training of surgical skill acquisition

References

Robot-Assisted Laparoscopic Myomectomy: A Comparison of Techniques

Derrick Sanderson, DO
Sisters of Charity Hospital
Buffalo, NY

• I have no financial relationships to disclose.

At the conclusion of this activity, participants will be better able to:
- Describe the current techniques for robot-assisted laparoscopic myomectomy
- Articulate the advantages, and disadvantages of incorporating the 4th robotic arm into surgical procedures
- Interpret the impact of using the 4th robotic arm in robot-assisted laparoscopic myomectomy

Introduction

- Robot-assisted laparoscopic myomectomy is a well established surgical approach to minimally invasive fibroid removal in woman desiring uterine preservation.
  - The literature describes this technique using both 3 and 4 operative robotic arms.1-8
  - There are no studies comparing perioperative outcomes between a 3-arm and 4-arm technique.
    • Retrospective cohort study (Canadian Task Force classification II-2)

Techniques and Methods

3-arm technique1,4,6,8 4-arm technique4,6,7

Results

<table>
<thead>
<tr>
<th></th>
<th>4-arm technique</th>
<th>3-arm technique</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Age</td>
<td>36 (34 - 38)</td>
<td>35 (33 - 36)</td>
<td>0.68</td>
</tr>
<tr>
<td>BMI</td>
<td>29 (27 - 32)</td>
<td>31 (29 - 33)</td>
<td>0.33</td>
</tr>
<tr>
<td>ASA classification</td>
<td>1.7 (1.5 - 1.8)</td>
<td>1.7 (1.6 - 1.9)</td>
<td>0.38</td>
</tr>
<tr>
<td>Gravidity</td>
<td>1.2 (0.7 - 1.7)</td>
<td>0.8 (0.4 - 1.1)</td>
<td>0.77</td>
</tr>
<tr>
<td>Parity</td>
<td>0.6 (0.4 - 0.9)</td>
<td>0.2 (0 - 0.4)</td>
<td>0.91</td>
</tr>
</tbody>
</table>
Results

<table>
<thead>
<tr>
<th></th>
<th>4-arm technique</th>
<th>3-arm technique</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operative time</td>
<td>N=60 (CI)</td>
<td>N=41 (CI)</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>EBL</td>
<td>128 (116 - 140)</td>
<td>218 (196 - 240)</td>
<td></td>
</tr>
<tr>
<td>Number of fibroids</td>
<td>2 (1 - 3)</td>
<td>2 (1 - 3)</td>
<td>0.48</td>
</tr>
<tr>
<td>Fibroid weight (g)</td>
<td>203 (159 - 247)</td>
<td>174 (118 - 231)</td>
<td>0.65</td>
</tr>
<tr>
<td>Morphine in PACU</td>
<td>5 (4 - 6)</td>
<td>6 (4 - 7)</td>
<td>0.34</td>
</tr>
<tr>
<td>Length of stay (days)</td>
<td>2.5 (2 - 3)</td>
<td>2.6 (2 - 3)</td>
<td>0.46</td>
</tr>
<tr>
<td></td>
<td>0.1 (0 - 0.2)</td>
<td>0.2 (0 - 0.5)</td>
<td>0.25</td>
</tr>
</tbody>
</table>

Discussion

- The use of the 4th robotic arm had a significant impact on operative time (-90 minutes, p<0.01)
- Patient demographics and all other perioperative variables were similar between both groups
- There were no untoward events associated with use of the 4th robotic arm
- Pain scores, morphine equivalents administered in PACU, and length of stay were similar

Conclusions

- The use of 4-arm robot-assisted laparoscopic myomectomy technique is associated with a significantly shorter operative time, with all other perioperative variables and patient demographics being similar

References


Thank you
Retroperitoneal Ureteral and Uterine Artery Identification during Robotic Hysterectomy: Learning Curve and Determinants of Improvement during Fellowship Training

Rayan A. Elkattah, MD
FMIGS - Women's Surgery Center
University of Tennessee Chattanooga

I have no financial relationships to disclose

1. Describe how to identify the retroperitoneal ureteral and uterine artery during robotic hysterectomy

What the Literature says…

Uterine Artery Ligation:
- Reduces blood loss, operation duration and hospital stay - Kale et al. 2015
- Reduces intra-operative complications– Poojari et al. 2014

Our Pre-Hysterectomy Retroperitoneal Routine

1. Identify the ureter at the pelvic brim
2. Follow it caudally along the medial leaf of the broad ligament
3. Identify and clip the uterine artery
Our Study

Timings for the retroperitoneal identification of:

- $T_1$: Ureter
- $T_2$: Uterine artery + Clipping

Comparison of $T_1$, $T_2$ and total time $T_1+T_2$ between two rotations $R_1$ and $R_2$

Variables that were factored in: Age / BMI / Uterine mass / Laterality / Adhesions / Past abdominal or pelvic surgeries

Results

- Shorter dissection times were noted in $T_2$ and in $T_1+T_2$ between $R_1$ and $R_2$ ($p < .05$)
- Age, adhesions, surgical history, uterine mass and laterality of dissection had no significant effect on timings
- $T_1$ increased with increasing BMI ($p < .05$)
- $T_1+T_2$ plateaued by the 15th case

<table>
<thead>
<tr>
<th>Time (sec)</th>
<th>$R_1$</th>
<th>$R_2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$T_1$</td>
<td>273.7 ± 30.4 s</td>
<td>188.2 ± 32.9 s</td>
</tr>
<tr>
<td>$T_2$</td>
<td>129.6 ± 16.4 s</td>
<td>83.3 ± 10.7 s</td>
</tr>
<tr>
<td>$T_1+T_2$</td>
<td>230.9 ± 23.2 s</td>
<td>106.5 ± 10.3 s</td>
</tr>
</tbody>
</table>

Conclusions

1. A fellow in MIGS training requires a minimum of 15 robotic hysterectomy cases to become adept at retroperitoneal identification of the ureter and the uterine artery

2. Increasing body mass index increases the time to identify the ureter

References


Increase in Prophylactic Salpingectomy Across All Approaches Following an Educational Initiative

Presenter: Elizabeth Cooney, MD
Christiana Care Hospital
Department of Women’s Health
Newark, DE

Disclosure
I have no financial relationships to disclose.

Objectives
• At the conclusion of this activity, the participant should be better able to ...
  – Articulate the potential benefits of salpingectomy when performed during benign hysterectomy
  – Identify barriers to the performance of salpingectomy
  – Recognize the value of educational initiatives on evidence-based surgical practice

Background
• “Evidence-based medicine is the conscientious, explicit and judicious use of current best evidence in making decisions about the care of individual patients.”
• Ovarian cancer
  – Most lethal gynecologic malignancy
  – No validated screening tests
  – Best-available data suggest a potential for reduction in ovarian cancer via salpingectomy
• Discussion regarding prophylactic salpingectomy
  – ACOG
  – SGO
  – Canadian GOC

Materials and Methods
• Intervention:
  – A 10-slide PowerPoint presentation was dispensed to gynecologic surgeons at Christiana Care Hospital
  – A 10-question, anonymous survey was attached
• Data Collection:
  – Retrospective chart review of benign hysterectomies for 18 months
  – Primary outcomes: rate of salpingectomy, route of hysterectomy
  – Secondary outcomes: BMI, Δ Hgb, age, race, length of stay; physician attitudes

Survey Results
• Response: 20/49 (41%)
• Surgical Practice:
  – 40% perform 0-10 hysterectomies per year
  – 10% perform greater than 40 per year
  – 95% report routine salpingectomy
• Adnexal Counseling:
  – 100% discuss ovarian preservation
  – 95% discuss salpingectomy
• Impact on practice:
  – 40% stated would increase salpingectomy rate > 40%
**Main Results**

**Patient Characteristics**

<table>
<thead>
<tr>
<th></th>
<th>Pre-intervention (N = 318)</th>
<th>Post-intervention (N = 351)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean age (years)</td>
<td>46.2</td>
<td>45.5</td>
<td>0.39</td>
</tr>
<tr>
<td>Mean BMI (kg/m²)</td>
<td>30.8</td>
<td>30.7</td>
<td>0.82</td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>197</td>
<td>211</td>
<td>0.89</td>
</tr>
<tr>
<td>Black</td>
<td>97</td>
<td>110</td>
<td></td>
</tr>
<tr>
<td>Hispanic</td>
<td>17</td>
<td>23</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>7</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Route</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vaginal</td>
<td>53</td>
<td>65</td>
<td>0.70</td>
</tr>
<tr>
<td>Laparoscopic</td>
<td>169</td>
<td>189</td>
<td></td>
</tr>
<tr>
<td>Abdominal</td>
<td>96</td>
<td>97</td>
<td></td>
</tr>
<tr>
<td>Mean length of stay (days)</td>
<td>1.48</td>
<td>1.56</td>
<td>0.83</td>
</tr>
<tr>
<td>Mean Δ Hgb (mg/dl)</td>
<td>1.59</td>
<td>1.84</td>
<td>0.17</td>
</tr>
</tbody>
</table>

*a* = Fisher’s exact

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**Pre-Intervention**

**Post-Intervention**

**Strengths/Weaknesses**

**Strengths**
- No reliance on CPT codes
- Diverse surgeon population
- Consistent patient characteristics pre/post intervention

**Weaknesses**
- Retrospective design
- Inability to assess ‘intent-to-treat’
- Unable to control for natural trend

**Discussion**

- Visual presentation of educational material appears to be effective in promoting uptake of best-surgical practice
- Vaginal hysterectomy remains underutilized and is least likely to incorporate salpingectomy
- Salpingectomy should continue to be discussed with patients undergoing benign hysterectomy desiring ovarian preservation
References


Additional Slides

- National trends in route of hysterectomy as examined by Wright et al showed in 2010
  - Vaginal hysterectomy at a rate of 16.7%
  - Abdominal hysterectomy 54.2%
  - Laparoscopic 8.6%
  - Robotic 8.2%

Generalist/Specialist

- Prior to education
  - 71% of cases performed by specialist had salpingectomy
  - 45% of cases performed by generalist had salpingectomy
- Following education
  - 75% of cases performed by specialist had salpingectomy
  - 68% of cases performed by generalist had salpingectomy
Crowdsourcing: A valid alternative to expert evaluation of robotic surgery skills

Michael R. Polin MD

Disclosures

I have no financial relationships to disclose.

Learning Objective

• Discuss an alternative resource for evaluating trainee surgical skills.

Introduction

• Robotic Training Network (RTN) was developed to standardize robotic surgery training.
  – Created in 2010
  – Originally 9 academic sites, now over 50


Introduction

• Robotic-assisted gynecologic surgery is common, but requires unique training.

• Standardized assessment tool needed
  • Objective Structured Assessment of Technical Skills (OSATS)¹
    • Robotic-Objective Structured Assessment of Technical Skills (R-OSATS)
      – Validated by RTN²
Introduction

- Robotic-Objective Structured Assessments of Technical Skills (R-OSATS)

Objectives

- Crowdourcing is the process of getting work from a large group of people.

Methods

- Methods-comparison study
- Crowdworker selection and training

- Study:
  - Expert Evaluator scores
  - Crowdsourced scores
  - Comparison of crowd vs. expert
**Methods**

- Methods-comparison study

- Crowdworker selection and training

- Study:
  - Expert Evaluator scores
  - Crowdsourced scores
  - Comparison of crowd vs. expert

---

**Methods – crowd selection and training**

- Tasks posted on Amazon Mechanical Turk

- Crowdworkers screened:
  - 95% approval rating
  - Passed screening test
  - Passed attention question

- Crowdworker training:
  - Viewed extremes, good and bad, for dry lab drill

---

**Methods – expert scores**

- Expert evaluator scores:
  - Videos from validation study
  - 3 expert evaluators scored using R-OSATS

---

**Methods – expert scores**

- For each dry lab drill, mean expert evaluator scores were calculated.

- Mean scores separated into quartiles.

---

**Methods**

- Methods-comparison study

- Crowdworker selection and training

- Study:
  - Expert Evaluator scores
  - Crowdsourced scores
  - Comparison of crowd vs. expert
Methods – crowd scores

- Crowdsourced scores:
  - Crowdworkers assessed videos randomly selected from each scoring quartile per drill.

Methods – crowd scores

- Average crowd scores calculated using linear mixed effects models\(^4\)
- \(\geq 30\) crowd assessments needed per video to obtain tight confidence intervals\(^5,6\)


Methods

- Methods-comparison study
- Crowdworker selection and training
- Study:
  - Expert Evaluator scores
  - Crowdsourced scores
  - Comparison of crowd vs. expert

Methods - comparison

Crowd vs. Expert

Methods - comparison

- Pearson correlation coefficients & linear regression models to assess the correlation between crowdsourced vs. expert scores.

Results
Results

• 448 crowdworkers \( \rightarrow \) 2,119 R-OSATS assessments

16 hours

16 hours

No Correlation
\[ r = 0.3 \]

Negative
\[ r = -0.7 \]

Positive
\[ r = 0.7 \]

Tower Transfer

\[ r = 0.75 \]

mean expert R-OSATS score

mean crowd R-OSATS score

Roller Coaster

Train Tracks

Big Dipper

Figure of Eight

mean expert R-OSATS score

mean crowd R-OSATS score

\[ r = 0.86 \]

\[ r = 0.76 \]

\[ r = 0.87 \]

Results

• Correlation UNIVERSALLY HIGH

• Correlation coefficients for each task:
  
  - tower transfer \( r = 0.75 \)
  - roller coaster \( r = 0.91 \)
  - big dipper \( r = 0.86 \)
  - train tracks \( r = 0.76 \)
  - figure-of-eight \( r = 0.87 \)
Strengths/Limitations

• Strengths
  – Study design
  – Use of a validated assessment tool
  – Large number of crowdworker scores obtained in small amount of time

• Limitations
  – Limited to dry lab surgical skills

Conclusions

• Crowdsourced assessments of dry lab robotic surgical skills using R-OSATS are a suitable alternative to faculty expert evaluation.

• Crowdsourcing provides a rapid and accurate method of assessing technical skills of trainees while minimizing burdens on faculty time.

References


Laparoscopic and Robotic Skills are Transferable in a Simulation Setting

Lauren Thomaier, MD

Department of Gynecology and Obstetrics, Johns Hopkins Hospital

Disclosure

• I have no financial relationships to disclose

Objective

• To assess the transferability of skills from the robotic to the laparoscopic simulation platform and vice versa among simulation naïve participants.

Introduction

• Increasing number of procedures performed using robotic technique
• Residents with less experience in abdominal and laparoscopic procedures
• Simulation platforms are effective for surgical training- are skills transferable?

Methods

• 40 simulation naïve medical students
• Randomized controlled single-blinded trial
  – N=20 Robotic group: pegboard 1 exercise on Mimic dV-trainer
  – N=20 Laparoscopic group: peg transfer task on Fundamentals of Laparoscopic Skills (FLS) Laparoscopic Box trainer
• Baseline and Post-training evaluation
  – Objective measures (time to task completion, error rate, motion metrics on Mimic dV-trainer)
  – Objective Structured Assessment of Technical Skills (OSATS)
    • completed by blinded robotic and laparoscopic surgeons

Tasks

- Pegboard 1 Exercise
- Peg transfer task
Methods

40 simulation naïve medical students

Baseline evaluation: Laparoscopic task, Robotic task

Laparoscopic group N=20: 10 repetitions on peg transfer
Robotic group N=20: 10 repetitions on pegboard 1

Post-training evaluation: peg transfer, pegboard 1 exercise

Primary outcome measures

- Time to task completion (seconds)
- Error rate
- Modified Global Rating Scale (GRS) for Laparoscopic and Robotic Operative Performance:
  - evaluating depth perception, bimanual dexterity, efficiency and tissue handling (0-5)
- Reznick Laparoscopic and Robotic Assessment:
  - evaluating respect for tissue, time and motion, instrument handling and flow of operation (0-5)
- Composite GRS score = GRS + Reznick score (0-40)
- Motion metrics:
  - time to task completion (s), economy of motion (cm), number of instrument collisions, excessive force (s), time instruments are out of view (s), workspace range (cm), and number of drops

Results

- No significant differences between the two groups at baseline
  - Age, sex, hand dominance, experience with hand-eye coordination activities
  - Objective measures (time, error rate, motion metrics)
  - Composite Global Rating Scale (GRS)

Results: Laparoscopic task

<table>
<thead>
<tr>
<th></th>
<th>Baseline time to completion (mean, seconds)</th>
<th>Baseline composite GRS score (mean)</th>
<th>Post-training time to completion (mean)</th>
<th>Post-training composite GRS score (mean)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laparoscopic</td>
<td>201</td>
<td>15.4</td>
<td>100 s</td>
<td>25.8</td>
</tr>
<tr>
<td>Robotic</td>
<td>226</td>
<td>14.8</td>
<td>158 s</td>
<td>18.8</td>
</tr>
<tr>
<td>p-value</td>
<td>0.46</td>
<td>0.71</td>
<td>&lt;0.001</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

Results: Robotic task

<table>
<thead>
<tr>
<th></th>
<th>Baseline Time to completion (mean)</th>
<th>Baseline Composite GRS score (mean)</th>
<th>Post - Time to completion (mean)</th>
<th>Post-Composite GRS score (mean)</th>
<th>Post- Economy of motion (cm)</th>
<th>Post-Instruments out of view (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laparoscopic</td>
<td>167 s</td>
<td>15.2</td>
<td>120 s</td>
<td>19.6</td>
<td>241</td>
<td>3.06</td>
</tr>
<tr>
<td>Robotic</td>
<td>166 s</td>
<td>15.5</td>
<td>71 s</td>
<td>26.9</td>
<td>161</td>
<td>0.91</td>
</tr>
<tr>
<td>p-value</td>
<td>0.94</td>
<td>0.67</td>
<td>&lt;0.001</td>
<td>0.002</td>
<td>&lt;0.001</td>
<td>0.02</td>
</tr>
</tbody>
</table>

Results: Transferability

- Composite GRS score improvement
- Laparoscopic group
  - GRS score on Robotic task: 15 to 20 (p=.091)
- Robotic group
  - GRS score on LSC task: 15 to 19 (p = .02)
Discussion

• Simulation training improves performance on both platforms
• Laparoscopic and robotic skills are transferable in simulation setting
• Robotic skills are more transferable to the laparoscopic simulation platform

Clinical implications

• Robotic vs. laparoscopic simulation training programs
• Can formal training programs in one technique substitute for the other?
• Resident training in robotic technique → improved performance in laparoscopic technique

References


Development and evaluation of a low-cost, reusable laparoscopic entry and emergency model

Christopher DeStephano, MD, MPH
Minimally Invasive Gynecology Fellow
Mayo Clinic Florida
Jacksonville, Florida

• I have no financial relationships to disclose

OBJECTIVES

• Develop a laparoscopic emergency model using on-hand, low-cost, widely available materials
• Determine whether the model and scenario were acceptable for use by surgical residents and attendings
• Explore whether differences existed in the identification and management of hemodynamic instability following laparoscopic entry

BACKGROUND

• Injury to a major retroperitoneal vessel is a rare (0.01%-0.64%) but serious complication of laparoscopic entry
  – Incidence: 0.01-0.64%
  – Mortality: 12-23%
• Obstetric emergency drills have resulted in improved communication, recognition, and management
• Needs assessment of residents:
  – Of 93 respondents, 84% participate in OB simulation drills
  – Of 90 respondents, 8% participate in laparoscopic emergency simulations

MODEL DESIGN

• Conveniernce sample of OB/GYN and general surgery residents (n=20) and attendings (n=9)
• Laparoscopic entry followed by hemodynamic instability
• Study was designed to establish content, response process, and relations with other variables evidence
  – Performance checklists during the scenario
  – Post-simulation surveys

METHODS
**RESULTS**

- **Component checklist**
  - A difference (p<0.005) existed in decision to perform an ex lap
    - Junior resident group (n=12): 41.7%
    - Senior resident, fellow, attendings (n=17): 82.4%
    - Median (range) time: 3 (2-5) minutes
  - Hematoma identified laparoscopically (p=0.87)
    - Junior resident group (n=12): 25%
    - Senior resident, fellow, attendings (n=17): 23.5%

### Post-Simulation Survey

<table>
<thead>
<tr>
<th>Question</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neither agree/disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>The simulated drill approximates the stress of a vascular injury during laparoscopy</td>
<td>1 (6.9%)</td>
<td>14 (48.3%)</td>
<td>13 (44.2%)</td>
<td></td>
</tr>
<tr>
<td>The model setup appears appropriate for approximating a retroperitoneal hematoma</td>
<td>2 (6.9%)</td>
<td>20 (69.6%)</td>
<td>7 (24.1%)</td>
<td></td>
</tr>
<tr>
<td>The model is useful in improving recognition of a vascular emergency</td>
<td>1 (3.4%)</td>
<td>18 (62.1%)</td>
<td>10 (34.5%)</td>
<td></td>
</tr>
<tr>
<td>The model is useful in improving management of a vascular emergency</td>
<td>1 (3.6%)</td>
<td>17 (60.7%)</td>
<td>10 (35.7%)</td>
<td></td>
</tr>
<tr>
<td>The model is useful in improving knowledge of the differential diagnosis for hypotension during laparoscopy</td>
<td>3 (10.3%)</td>
<td>15 (51.7%)</td>
<td>11 (37.9%)</td>
<td></td>
</tr>
</tbody>
</table>

**REFERENCES**

Development of an Educational Robotic Psychomotor Skills Model

Mireille D. Truong, MD
Columbia University Medical Center, New York, New York

Objective: To demonstrate the development of a robotic psychomotor skills model for implementation in the Fundamentals of Robotic Surgery curriculum and its clinical application in gynecologic surgery.

Design: Demonstration of the process of creating a psychomotor skills model from a low to high fidelity prototype followed by clinical application examples via narrated video footage.

Setting: The psychomotor skills dome is a comprehensive all-in-one multiuse model that was developed to incorporate core robotic surgery skills into 7 tasks established by the Fundamentals of Robotic Surgery committee. The model was designed to include skills that are universal to robotic surgery across all fields. Low fidelity prototypes using household materials were first created to allow for efficient and economical testing and modifications. Once this step was complete and a final design was achieved, a high fidelity model using 3-D stereolithography and industrial grade silicone material was constructed.

Interventions: Seven different tasks are included in the psychomotor skills dome and were designed to assess multiple robotic skills within each task. The tasks include Docking and Instrument Insertion, Ring Tower Transfer (endowrist manipulation, camera control), Knot Tying, Railroad Track (sutting exercise), 4th Arm Cutting (multi-arm control), Puzzle Piece Dissection (dissection and atraumatic tissue handling), and Vessel Energy Dissection (dissection, energy source control). In this video, specific clinical examples of how these skills are applied in gynecologic surgery are also shown.

Conclusion: As robotic surgery continues to grow, it is important to develop, improve and implement training and assessment tools for robotic surgical skills acquisition and maintenance. The psychomotor skills model shown in this video serves as an example of a robotic training tool that is currently undergoing validation, both as a physical model and a virtual reality model.
Laparoscopic Entry in Patients with Previous Surgical History or Complex Pathology

Ciaoming Guan, MD, PhD
Baylor College of Medicine, Houston Texas

Objective: To demonstrate the feasibility and advantages of Guan’s Point as an entry point for complex laparoscopic surgeries.

Design: A video demonstrating the use of Guan’s Point for accomplishing total laparoscopic hysterectomy for endometrial hyperplasia and symptomatic uterine fibroids. The video provides a step-by-step explanation of Guan’s Point port entry technique.

Setting: Insertion of the first trocar is the most dangerous step in laparoscopic surgeries. Traditionally, surgeons have been using Palmer’s Point for port placement in patients with previous surgical history or large pathology. Using Guan’s Point as the site of incision for complex laparoscopic surgeries is superior to using Palmer’s Point because Guan’s Point can be used as a camera and gas port, is not associated with risk of injury to stomach and liver, avoids adhesions, and can be used for patients who have had previous RUQ surgery. Compared to the traditional umbilical entry, Guan’s Point entry is associated with similar occurrence rates of large vessel injury, but less frequent rates of bowel injury when the patient has previous history of lower midline skin incision or large pathology.

Interventions: We present two cases of total laparoscopic hysterectomies; one for endometrial hyperplasia and the other for management of symptomatic uterine fibroids. Palmer’s Point has traditionally been associated with risk of injury to liver and stomach, limited use as a camera and gas port, and cannot be used in those with RUQ surgery. Using Guan’s Point as a first port entry, we were able to perform complex laparoscopic surgeries with no risk of liver or stomach injury on patients who have had RUQ surgery, and the site of entry can be still be used as a camera and gas port. This video demonstrates the use of Guan’s Point to successfully accomplish two safe port entries for complex pathology.

Conclusion: We have found that because the anatomic layers in the abdominal wall at Guan's Point are similar to Palmer’s Point, the surgeon does not need to relearn any new techniques to be familiar with Guan’s Point. Performing first laparoscopic port entry in complex pathology using Guan’s Point is an alternative to using Palmer’s Point.

References:


Governor Arnold Schwarzenegger signed into law AB 1195 (eff. 7/1/06) requiring local CME providers, such as the AAGL, to assist in enhancing the cultural and linguistic competency of California’s physicians (researchers and doctors without patient contact are exempt). This mandate follows the federal Civil Rights Act of 1964, Executive Order 13166 (2000) and the Dymally-Alatorre Bilingual Services Act (1973), all of which recognize, as confirmed by the US Census Bureau, that substantial numbers of patients possess limited English proficiency (LEP).

California Business & Professions Code §2190.1(c)(3) requires a review and explanation of the laws identified above so as to fulfill AAGL’s obligations pursuant to California law. Additional guidance is provided by the Institute for Medical Quality at http://www.imq.org

Title VI of the Civil Rights Act of 1964 prohibits recipients of federal financial assistance from discriminating against or otherwise excluding individuals on the basis of race, color, or national origin in any of their activities. In 1974, the US Supreme Court recognized LEP individuals as potential victims of national origin discrimination. In all situations, federal agencies are required to assess the number or proportion of LEP individuals in the eligible service population, the frequency with which they come into contact with the program, the importance of the services, and the resources available to the recipient, including the mix of oral and written language services. Additional details may be found in the Department of Justice Policy Guidance Document: Enforcement of Title VI of the Civil Rights Act of 1964 http://www.usdoj.gov/crt/cor/pubs.htm.

Executive Order 13166, “Improving Access to Services for Persons with Limited English Proficiency”, signed by the President on August 11, 2000 http://www.usdoj.gov/crt/cor/13166.htm was the genesis of the Guidance Document mentioned above. The Executive Order requires all federal agencies, including those which provide federal financial assistance, to examine the services they provide, identify any need for services to LEP individuals, and develop and implement a system to provide those services so LEP persons can have meaningful access.

Dymally-Alatorre Bilingual Services Act (California Government Code §7290 et seq.) requires every California state agency which either provides information to, or has contact with, the public to provide bilingual interpreters as well as translated materials explaining those services whenever the local agency serves LEP members of a group whose numbers exceed 5% of the general population.

If you add staff to assist with LEP patients, confirm their translation skills, not just their language skills. A 2007 Northern California study from Sutter Health confirmed that being bilingual does not guarantee competence as a medical interpreter. http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2078538.