Enhancing Intraoperative Robotic Training Experience with Hybrid Simulation

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Background

- Robotic-assisted approach of surgical procedures has become increasingly pervasive in all surgical specialties.
- Significant proportion of the essential surgical operative training depends on robotically assisted procedures.
- Maximizing involvement, participation, and interactivity from both surgical trainees and their faculty has been shown to improve the quality and outcomes of surgical education.
- surgical residents may display highly variable surgical skills performances and learning capabilities.
- Operative skills should be assessed to validate curricula in terms of reliability and efficiency assessment.
- Feedback is central to medical education in promoting learning and ensuring the meeting of standards.

Current limitations

- Training during robotic procedures and optimal use of trainee and student's operative time is still limited.
- Assessment of resident's performance is often judged at the end of a given rotation and surgical skill performance is underrepresented.
- Specific tools for evaluating surgical performance and operative competency are not available.
- Training on certain skills may be easily missed.

Objectives

- Implement innovative approach to optimize the operative learning experiences of surgical trainees.
- In this project, we are introducing a hybrid robotic simulation training approach using the same operative experience, time, and consoles with additional software to engage trainees in psychomotor skills training.

Technology

- Additional software is incorporated into the second console to enable surgical residents to practice decision making and handling of various surgical situations virtually on the same operative field.
- "Resident mode" of the second console involves hybrid simulation where shadow (virtual) instruments are controlled by the trainee instead of the arrows that are currently used. These virtual instruments are used to practice performing the required surgical step/task at each stage of the procedure during the actual surgery.
- For example, the trainee on the second console identifies the hernia sac in an inguinal hernia and decides where to start dissecting or decides where to place sutures in the mesh.
- While working on this task, the trainee can compare his/her performance to the surgeon's approach and learn from.

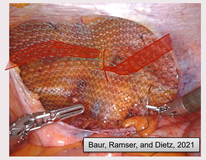
Setting

- The process involves training on evaluating surgical findings and decision making of the appropriate step and approach.
- The trainee's performance can be continuously compared to the operating surgeon on the primary console for instant feedback.
- This might trigger various discussion points to further enhance the training experience.
- Active engagement in all steps of the procedure in a proactive and safe setting using the real operative field and immediate feedback provides added experience time without additional preparation.
- Enhanced cognitive surgical skills learning, 5/5 Surgical findings analysis, and decision making.
- Mode can be used to evaluate the trainee's skills and performance level to enhance experiential learning in safe and efficient way culminating in interactive operative discussion and learning.

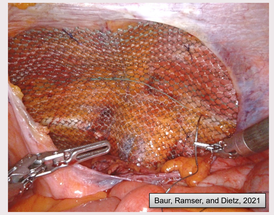
"Resident Mode"

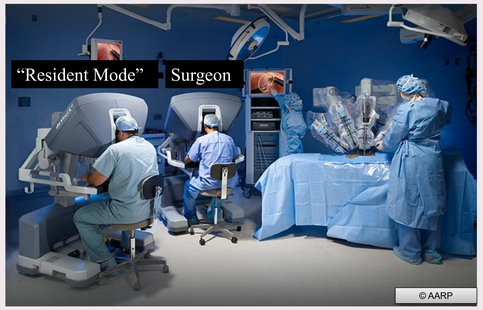


or



Surgeon





Conclusion

- Residents practice hands on experience in real time with immediate feedback to improve their cognitive and psychomotor surgical skills.
- Software advances assist a surgeon in the training of his immediate cohort.

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