Real-time Augmented Feedback Benefits
Robotic Laparoscopic Training

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Abstract. Robotic laparoscopic surgery has revolutionized minimally invasive surgery for treatment of abdominal pathologies. However, current training techniques rely on subjective evaluation. There is a lack of research on the type of tasks that should be used for training. Robotic surgical systems also do not currently have the ability to provide feedback to the surgeon regarding success of performing tasks. We trained medical students on three laparoscopic tasks and provided real-time feedback of performance during training. We found that real-time feedback can benefit training if the feedback provides information that is not available through other means (grip force). Subjects that received grip force feedback applied less force when the feedback was removed. Other forms of feedback (speed and relative phase) did not aid or impede training. Secondly, a relatively short training period (10 trials for each task) significantly improved most objective measures of performance. We also showed that robotic surgical performance can be quantitatively measured and evaluated. Providing grip force feedback can make the surgeon more aware of the forces being applied to delicate tissue during surgery.

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