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Promoting Technology and Collaboration

Precision in Sight: Improving Visual Clarity in Laparoscopic Surgery for Surgical Trainees

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Background: Laparoscopic surgery presents the unique challenge of balancing visibility with efficiency. Only 56% of operating time is spent with a clear visual field. Obstructions occur an estimated 3 - 10 times on average for each laparoscopic case and require between 20 to 60 seconds to clean. For trainees this can potentially disrupt the flow of practice and extend the overall training duration. It is necessary for a new device that addresses these laparoscopic challenges and provides an improved, robust experience for surgical trainees and surgeons alike.

Technology Overview: Our device consists of a lens cap which mounts to the front of a laparoscopic camera. The cap comprises a piezoelectric transducer, a transducer control system, and a piezoelectric driver. The piezoelectric transducers emit high-frequency ultrasonic waves to autonomously clean the camera lens intra-abdominally, effectively removing debris thereby ensuring high-resolution imaging throughout the laparoscopic procedure.

Potential Application in Surgical Simulation and Education: In the context of surgical education, the device's ability to maintain uninterrupted visual clarity can lead to substantial improvements in training efficiency and ergonomics. The introduction of this device in training modules allows for continuous practice without such interruptions, enabling trainees to focus on refining their techniques. In addition, frequent removals of laparoscopic instruments is associated with repetitions of extreme shoulder positions. Therefore, by reducing the physical strain associated with repeated adjustments, the device contributes to better ergonomic practices among trainees.

Potential Opportunities to Collaborate: The development and implementation of this device opens up numerous avenues for collaboration. Educational institutions and surgical training centers can integrate the device into their curriculum, creating a more streamlined and effective training process. Engineers and device manufacturers can collaborate with surgeons to refine the device based on real-world surgical experiences.