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ROBOTICS IN VITREORETINAL SURGERY: EXPERIENCE WITH THE DA VINCI ROBOT USING SIMULEYE MODELS

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To evaluate the feasibility, performance, and potential benefits of using the Da Vinci Surgical System for simulated vitreoretinal (VR) procedures on SimulEYE artificial eye models.

Experienced VR surgeons performed a series of standardized VR surgical tasks (e.g., core vitrectomy, membrane peeling, endolaser application) on SimulEYE PPV (Pars Plana Vitrectomy) artificial eye models using the Da Vinci Surgical System. Performance metrics included task completion time, instrument precision (measured by motion scaling and tremor filtration), perceived difficulty, and qualitative feedback on ergonomics and visualization compared to traditional manual surgery.

The Da Vinci system enabled relatively successful completion of simulated VR tasks on the SimulEYE models. Surgeons reported enhanced visualization due to the 3D high-definition view and improved dexterity and precision, particularly for fine manipulations like membrane peeling, attributed to tremor filtration and motion scaling. The SimulEYE models provided a realistic and consistent platform for evaluating robotic performance.

Robot-assisted VR surgery using the Da Vinci system is feasible in a simulated environment using realistic eye models like SimulEYE. While challenges like longer initial procedure times and the learning curve exist, the system offers potential advantages in precision, visualization, and ergonomics. SimulEYE models serve as valuable tools for training and evaluating robotic proficiency in VR surgery. Further studies are needed to translate these simulated findings into clinical practice and assess long-term outcomes.