Title: Robotic-assisted cleft palate repair: A feasibility study

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Purpose: The number of applications in which robotic-assisted surgery are used has grown steadily, especially in the fields of transoral, reconstructive and microsurgery. We evaluate the robot in cleft palate repair by conducting a feasibility study.

Methods: Eight cadaveric human heads were used to evaluate cleft palate repair and radical intravelar-veloplasty utilizing the Da Vinci robot. Dissection of the levator veli palatini with the robot was randomized to either the right or left side. The opposite side of the velum acted as the control and was dissected by hand. Times required to complete subsequent steps of the procedure using the robot were measured.

Results: The time (seconds±SD) to perform a robotic dissection (491±90) of the levator muscle was equivalent to the time taken to perform a dissection by hand (552±140; p: 0.349). Time for repair of the levator (309±106) (Figure. 1) and oral-mucosa closure (1185±165) decreased with experience, while nasal-mucosa closure (980±190) did not. Based on average times, repair of a cleft palate with intravelar-veloplasty would take 57.4 minutes when all the steps are performed using the robot. Both the surgeon and the assistant felt the instrumentation was ergonomic and visibility was excellent. While there was no haptic feedback capability, no notable complications occurred.

Conclusions: Robotic-assisted repair of cleft palate defects with intravelar-veloplasty is feasible on adult cadavers and may provide enhanced visualization and ergonomics. There is a trend towards faster operating time with experience on the robot. Although untested in the pediatric population, robotic technology may offer a safe and effective technique.