A Novel Method for Auto-Suturing in Robotic-Assisted Laparoscopic Coronary Artery Bypass Grafting Anastomosis

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The purpose of this experiment was to compare three types of auto-suturing (4, 5, & 6-sutures per segment) and control of continuous hand sutured anastomoses. It was hypothesized that if three types of auto-suturing techniques and a control were used in a simulated robotic-assisted laparoscopic coronary artery bypass grafting anastomosis, then the 6-sutures per segment auto-suturing will have the highest blood pressure (P, mmHg), and tensile strength (J, N*Sec), because more sutures per segment may provide a stronger anastomosis and increased resistance to pressure. The procedure included assembling tensile test and burst test apparatuses, and helical suture needles. Then, artificial tissues were sutured together with 4, 5, & 6-sutures helical suture needles, and continuous hand sutures (control). Moreover, silicon tubes were sutured together with the three types of auto-suturing (4, 5, & 6-sutures per segment) and control. The artificial tissues were placed in tensile test apparatus, & the tensile strength was measured using sensitive force-gauge. Next, the helical sutured and control anastomoses were inserted in the burst test apparatus & the peak pressure was recorded using sensitive pressure-gauge (80 experiments). The results indicated that the 5-sutures per segment auto-suturing is the optimum solution with highest pressure sustainment and the second highest tensile strength. In conclusion, the results did not support the hypothesis because the 5-suture per segment is the best compromise, since it had the optimum number of sutures. The results of this study are significant as it can help improve the quality of life of heart disease patients by providing cardiac surgeons an efficient way to conduct a robotic-assisted coronary bypass grafting anastomosis surgery.

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