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Commentary

A Short Note on Advanced Robotics in Cardiac Surgery

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DESCRIPTION

Robotic instrumentation was developed in the intention of improving surgical competence and enabling endoscopic microsurgery. Cardiac surgery was thought to be an appropriate use for this sophisticated technology since traditional handheld endoscopic tools, while competent for excisional and resection treatment, lacked the dexterity required for reconstructive microsurgery. There was a lot of expectation that it would allow for minimally invasive, fully endoscopic coronary bypass grafting.

Early study in the field proved that the method allowed for endoscopic coronary bypass grafting through conventional incisions on the stopped heart while on cardiopulmonary bypass. Several organizations, mostly in Germany, began to test completely endoscopic coronary bypass grafting on the stopped heart. All of these procedures made use of the Heart port System and the Intuitive Surgical Deviance robot. One of the pioneering groups in Leipzig studied that 22 patients underwent Deviance system single-vessel left internal thoracic artery to left anterior descending artery bypass grafting. The percentage of conversion was 18%.The average time for a cross clamp was 68 minutes, with a cardiopulmonary bypass period of over 2 hours. The 3-month patency was outstanding. A bigger experience from Frankfurt documented 45 instances utilizing identical procedure, 8 of which underwent double-vessel coronary bypass grafting. Crossclamp times were comparable: 16 minutes for single-vessel bypass grafting and 55 minutes for double-vessel bypass grafting. The mean cardiopulmonary bypass times for single-coronary and double-coronary bypass grafting were 136 and 197 minutes, respectively.

Although the conversion rate was only 22%, the patency was good. There were no obvious advantages to this procedure over standard coronary surgery, and complication rates were rather high, with a 2% incidence of myocardial infarction and a 2%risk of stroke and aortic dissection.

The average duration of stay for individuals receiving single-vessel coronary bypass grafting was 8-10 days [1]. Endoscopic coronary bypass grafting on a beating heart has been the only plausible use for robotic systems remained. With the development of off-pump coronary bypass grafting procedures, this became the treatment of choice for restricted coronary artery disease in many facilities.

The early results of the Deviance system on the beating heart were not encouraging.

As of August 2002, 100 closed-chest beating heart surgeries had been completed, with a conversion rate ranging from 25% to 50%.At the time of this early study by Falk and colleagues, there was no objective angiographic control available [2]. This prompted Dogan and colleagues to declare in the same years, "Despite attempts to conduct fully endoscopic using the Deviance TM system on the beating heart. The comparatively lacklustre outcomes achieved with robots may be explained in part by the technology's limitations, notably with regard to the beating heart. Endoscopic trainer designed to imitate pounding heart symptoms. Twenty individuals were instructed to physically or robotically touch things using the Deviance system. The item was either kept at rest or moved gently at a frequency of 35 to 90 Hz to simulate off-pump coronary bypass grafting. Task completion was slowed by 2.9 times due to robotic help. According to this study and countless others in the literature, there has been no indication of any therapeutic utility of robotic assistance for coronary bypass grafting after roughly a decade of usage in the operating theatre [3]. There has not been a single study in the literature that shows a statistically significant improvement in outcomes, length of stay, or death with these pricey systems. At the moment, the only realistic technique for which robots is required has proven to be so complex that it has not found broad use. It is time to acknowledge that robots is no longer an exciting new technology, but rather a technology that has been tested and failed to provide any therapeutic effectiveness

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