

Robotic-Assisted Nerve and Vascular Reconstruction Following Robot-Assisted Oncologic Resection: A Case Series Using the da Vinci Xi Surgical System

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Abstract

Background: Robotic-assisted microsurgery offers enhanced dexterity, tremor filtration, and high-definition three-dimensional visualization. However, clinical reports regarding robotic-assisted nerve and vascular anastomosis remain limited. This study presents our experience using the da Vinci Xi surgical system for robotic-assisted repair of transected nerves and vessels following robotic oncologic surgery.

Methods: A retrospective review of four consecutive patients who underwent robotic-assisted microsurgical reconstruction between 2020 and 2026 was performed. Two patients underwent robotic-assisted end-to-end epineural repair of the recurrent laryngeal nerve following robotic transaxillary thyroidectomy for papillary thyroid carcinoma with nerve invasion. Two patients underwent robotic-assisted hepatic artery reanastomosis following intraoperative arterial injury during robotic pancreatic surgery. All anastomoses were performed using Black Diamond forceps. Interrupted 8-0 nylon sutures were used for nerve repair, whereas 6-0 Prolene sutures were used for vascular reconstruction.

Results: Robotic-assisted recurrent laryngeal nerve repair was successfully completed in both patients, with operative times of 20 and 25 minutes. Robotic-assisted hepatic artery reconstruction was successfully performed in both vascular injury cases, with operative times of 60 and 47 minutes, respectively. No immediate postoperative vascular thrombosis or ischemic complications occurred. Literature review demonstrated that

robotic-assisted microsurgery provides stable instrument control and precise manipulation in confined operative fields.

Conclusion: Robotic-assisted nerve and vascular anastomosis using the da Vinci Xi surgical system is technically feasible and safe. This approach enables precise microsurgical reconstruction following robotic tumor resection while avoiding conversion to conventional open surgery.

Keywords: robotic-assisted microsurgery, nerve repair, vascular anastomosis, microsurgical reconstruction, da Vinci Xi surgical system, recurrent laryngeal nerve, hepatic artery reconstruction