

First U.S. Experience With The Symani Surgical System In Complex Head And Neck Reconstruction

Hamzah Almadani, BS¹; Judith Monzy, BS¹; Hosung Rhyu, DDS²; Javier Gonzalez, BS³; Jocelyn Lu, MD¹; Jorge Robles Cortés, MD¹; Evan Walgama, MD¹; Dennis M. Tang, MD¹; Curtis L. Cetrulo, MD¹; Victor Chien, MD¹

¹Cedars-Sinai Medical Center, Los Angeles, CA; ²New York University College of Dentistry, New York, NY; ³The University of Arizona College of Medicine, Tucson, AZ

BACKGROUND

- Head and neck reconstruction poses **unique challenges**:
 - Constrained anatomy** limits visualization and instrument maneuverability
 - Prior surgical and nonsurgical treatments may compromise **vessel quality**
 - Small vessel-caliber and prolonged cases** increase ergonomic strain and affects performance
- The Symani Surgical System (MMI, Pisa, Italy) offers submillimeter precision in microsurgery
- Its role in **head neck reconstruction in the United States remains largely unexplored**

OBJECTIVE

- To demonstrate the versatility of the microsurgery robot in performing complex head and neck free flap reconstruction

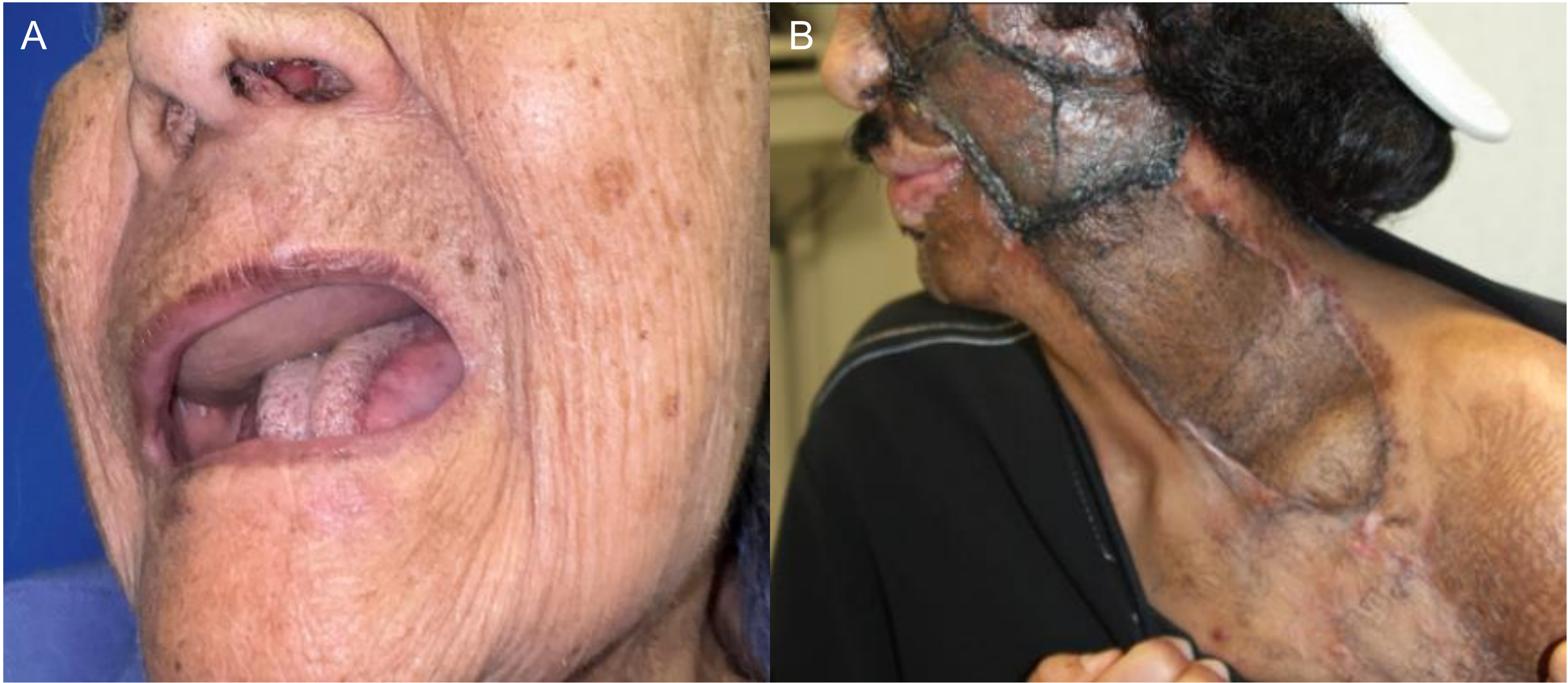
METHODS

- Retrospective review of **4 patients** who underwent robot-assisted head and neck reconstruction (March - May 2025)
- Robot was used for **arterial microanastomoses** in cases with:
 - Vessel size mismatch**
 - Diseased or calcified vessels**
- Venous anastomoses performed with **couplers (2.0-4.0 mm)**
- Arterial anastomoses performed **end-to-end** using **9-0 nylon**
- Visualization was achieved using the **Mitaka-Hawksight-4K3D (Mitaka, Tokyo, Japan) Video Microscope**

Table 1. Summary of operative details in robot-assisted head and neck reconstruction cases. M: Male; F: Female; ALT: Anterolateral thigh; RFFF: Radial forearm free flap.

Case	Presentation	Flap	Donor Artery	Recipient Artery	Vessel Size Mismatch
1	Right hemi-maxillectomy defect (90F)	ALT	Descending branch of lateral circumflex femoral artery	Superior thyroid artery	2:1 (2 mm:1 mm, calcified)
2	Skull base defect with recurrent CSF leak (29F)	RFFF	Radial artery	Angular artery	3:1 (2.25 mm:0.75 mm)
3	Burn scar contracture of left face and neck (24M)	ALT	Descending branch of lateral circumflex femoral artery	Facial artery	1.5:1 (3 mm:2 mm)
4	Left clavicle fracture complicated by nonunion and bony resorption (48F)	Vascularized fibula	Peroneal artery	Transverse cervical artery	4:1 (3 mm:0.75 mm)

Figure 1. (A) Patient 1 following intraoral ALT flap at 6 weeks postoperatively. (B) Patient 3 after anterolateral thigh flap-based reconstruction of left neck at 9 weeks postoperatively.



RESULTS

- All flaps were **viable** as confirmed by:
 - Excellent Doppler signals
 - Appropriate warmth and turgor
 - Adequate bleeding
- All anastomoses were successful **despite vessel mismatch and diseased arteries**
 - No postoperative complications** with any of the flaps at 17, 14, 14 and 4 weeks, respectively
 - No suture or needle damage**
- No vein grafts required**, even in cases with significant vessel size mismatch

CONCLUSIONS

- Robot-assisted microsurgery is **technically feasible and safe** for complex head and neck reconstruction
- The system enables:
 - Precise handling of size-mismatched and diseased vessels**
 - Expanded recipient vessel options in constrained anatomy**
- Improved ergonomics may help mitigate **surgeon fatigue during prolonged microsurgery**
- Prospective studies are needed to demonstrate the long-term impact of the robot on **reconstructive outcomes, operative efficiency and microsurgical practice**