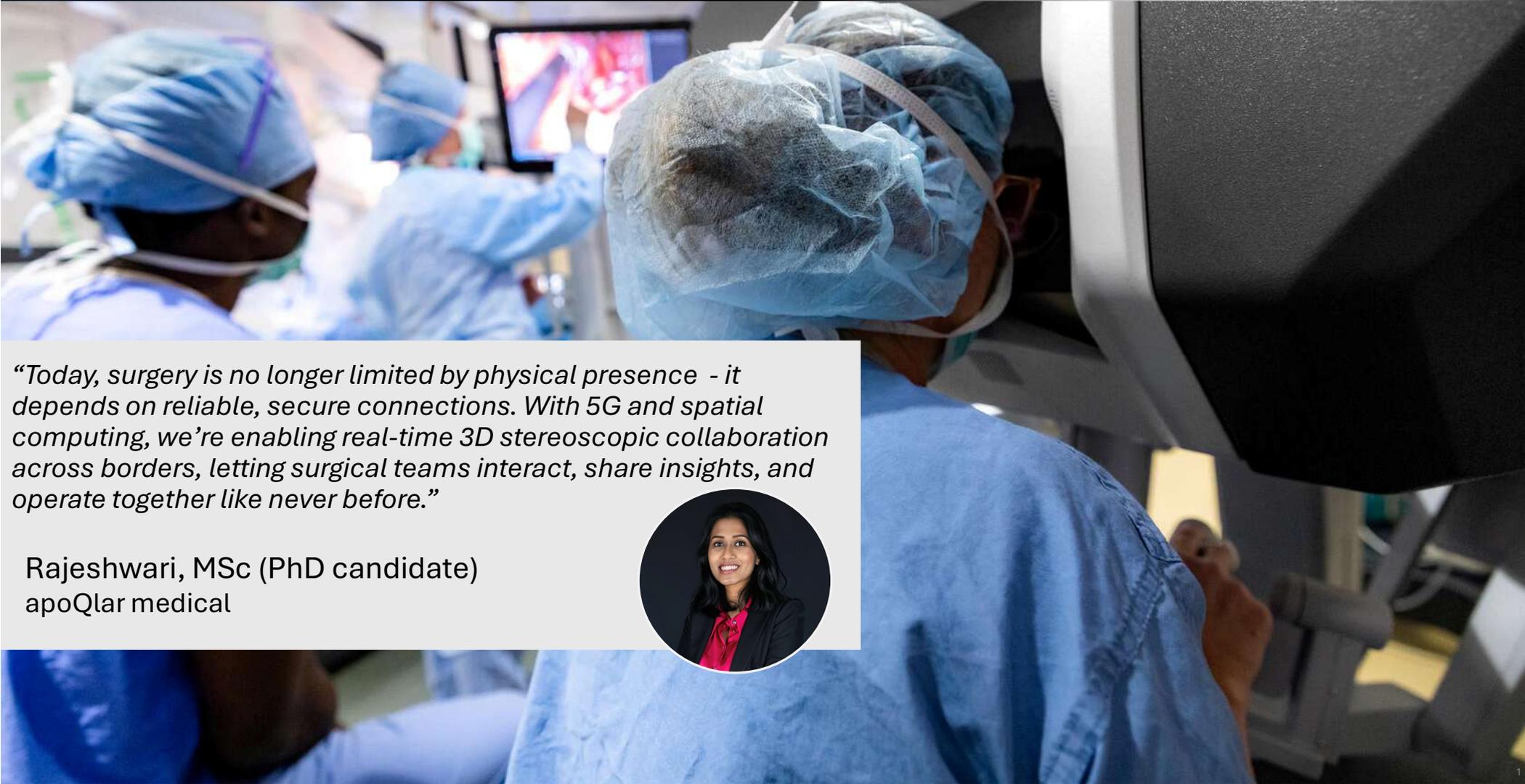# Surgical Collaboration with Spatial Computing and 5G

"Today, surgery is no longer limited by physical presence - it depends on reliable, secure connections. With 5G and spatial computing, we're enabling real-time 3D stereoscopic collaboration across borders, letting surgical teams interact, share insights, and operate together like never before."

Rajeshwari, MSc (PhD candidate)
apoQlar medical
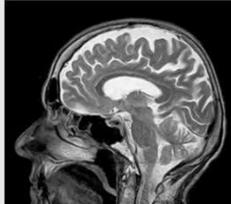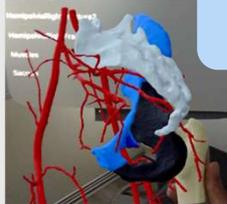
5G Use cases in 5G SHEAL, Greece

apoQlar wings. OTE ΟΜΙΛΟΣ ΕΤΑΙΡΕΙΩΝ

5G networks enable groundbreaking use of **spatial computing** in healthcare, leveraging scan imaging such as CT, PET, and MRI scans into AI-based segmentation and reconstruction algorithms for 3D organ visualization.

The HoloMedicine® Platform

Globally patented

		Co-developed with Mayo USA	Co-developed with Mayo USA	apoQlar's patents
Pre-op planning Tumor Board	**Med School Students Prof-Ed Surgical training**	**Tumor Board & Patient Treatment Plan**	**Stereoscopic streaming from robots**	**Simulation Live Tracking**
VSI HoloMedicine®	HoloMedicine® Spaces	HoloMedicine® Patient Viewer	HoloMedicine® Robotics	HoloMedicine® Simulation
✅	✅	✅	✅	Experience real-time tracking of the hip joint and pelvis in motion
USA / EU / SG MY / NZ / IND	Global	Global	Global	**Launching in January 26**

5G-Powered, Cloud-Agnostic, Secure, and Scalable by Design

Why the need for Spatial Computing and 5G in Robotics Surgeries?

Robotic surgery training remains constrained by **physical proximity** and capital-intensive **infrastructure**, limiting the global scaling of surgical expertise.

1 Core Problem Pillars
- Expertise confined to **specific** operating rooms
- Training requires physical presence
- Knowledge silos limit scale

→ From Location-Dependent Training

2 Infrastructure Barriers
- Expensive dual-console systems
- High capital and staffing costs
- Observation-based, non-immersive learning

The Solution: 5G

5G-Enabled Spatial Computing

Virtual Surgical Console
- Real-time stereoscopic streaming
- See exactly what the surgeon sees
- Remote proctoring without second console
- Immersive, interactive 3D collaboration

Transition to real-time, immersive, remote surgical training to democratize expertise globally.

Impact at Scale
- ↑ Access across regions
- ↑ Case exposure diversity
- ↓ Training cost per surgeon
- ↓ Time to competency

5G-enabled XR 3D Stereoscopic Streaming. Connecting 7 Countries.

5G-enabled XR live broadcasting of transoral robotic surgery (TORS): a feasibility study of an indoor small-cell architecture

Liang Chye Goh[1] · Hui Yan Ong[1] · Mohd Zulkiflee Abu Bakar[1]

Abstract
Background: Live broadcasting of robotic surgery can expand access to specialist training and telementoring, but operating theatres can be difficult environments for stable, low-delay wireless connectivity. We evaluated a hospital-deployed fifth-generation (5G) indoor network to support extended-reality (XR) live viewing of transoral robotic surgery (TORS). Methods: In a prospective, single-session feasibility study at a tertiary university hospital, a mid-band 5G New Radio (NR) indoor small-cell system was deployed in the operating theatre and linked to a dedicated Fixed Wireless Access (FWA) gateway. Video from a da Vinci robotic console was captured, encoded using an artificial-intelligence–assisted hardware encoder, and streamed in real time to XR head-mounted displays (Apple Vision Pro) and standard two-dimensional endpoints. Latency proxy metrics were logged throughout the broadcast, and remote viewers completed the System Usability Scale (SUS). Results: The broadcast ran continuously for a 40-minute operative teaching segment with no reported workflow disruption or safety concerns. Mean signed latency offset was −22 ms (absolute mean 22 ms) across the session. Twenty remote participants from seven countries joined the broadcast; 14/20 completed the SUS questionnaire, with a mean score of 72, indicating acceptable usability. Conclusions: A dedicated indoor 5G small-cell plus FWA configuration can deliver low-delay, XR-enabled live broadcasting of robotic surgery using commercially available components. This reproducible workflow supports scalable surgical education and provides a platform for future clinical connectivity studies.

Keywords Telemedicine · Robotic surgical procedures · Virtual reality · Augmented reality · Wireless technology · Webcasts as topic

https://link.springer.com/content/pdf/10.1007/s11701-026-03191-1.pdf