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UCT surgeon performs innovative holographic surgery



From left: Floor nurse Zanele Msomi, Riaan Kruger, Dr Ntambue Kauta, Sister Lungisa Ndevu, Professor Basil Vrettos, Professor Stephen Roche, Sister Portia Julies and Dr Aaron Chen.

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Professor Stephen Roche and a team from Groote Schuur Hospital recently used a Microsoft HoloLens2 – a holographic helmet – to perform a mixed reality shoulder replacement surgery. The surgery was part of a global 24-hour event in which surgeons from 13 countries collaborated on 13 orthopaedic surgeries using holographic imagery.

"This technology allows for surgeons anywhere in the world to share expertise and collaborate virtually in real time. Not only does this lead to better patient outcomes but the applications of this technology in a context such as South Africa also go far beyond the operating theatre," says Roche, deputy head of the Division of Orthopaedics at the University of Cape Town (UCT) and head of Shoulder and Elbow Service at Groote Schuur Hospital, referring to the use of holograms to plan and visualise surgeries such as shoulder and elbow replacements.

The project was launched last year, spearheaded by French surgeon Professor Timothy Grégory, who invited Roche and his team from Groote Schuur Hospital to participate in a global 24-hour event showcasing the use of the HoloLens2 in orthopaedic surgery. The event used the holographic helmet in a series of surgeries which took place in 13 locations around the world. Roche led the South African surgery and assisted in two other surgeries in Germany and France.

Roche also explains that the Groote Schuur Hospital surgery required the collaboration of administrative, surgical and anaesthetic teams who ensured everything ran smoothly on the day.

"I am happy to say that the South African surgery was successful thanks to the expertise of our team who did everything from ensuring that the Wi-Fi worked to spending long hours learning how to manipulate the holographic images produced by the HoloLens2 helmet. An eminent honorary consultant at Groote Schuur Hospital, Professor Basil Vrettos, performed the actual surgery so that I was free to attend to the integration of the technology in the theatre to maximise the showcasing of the technology without compromising the patient," says Roche.

Roche says the foremost benefit of using such technology is indeed better surgical outcomes for patients.

"Orthopaedic surgeons have for some time used computer-generated imagery of the anatomy of a patient to ensure precision, especially in the case of joint replacement surgery. Using extremely detailed holographic imagery, which can be updated and manipulated in theatre, is a very useful tool for a surgeon. For example, imagine being able to magnify or be able to walk around an actual image of a particular patient's scapula, in real time, during a surgery," Roche explains.

Surgeons not only have access to such holographic imagery both prior and during surgery, they can also share it remotely, allowing for virtual collaboration from anywhere in the world. "This promises great benefits for surgeries happening in remote areas or when surgeries need to be performed by doctors who are not necessarily specialists in that particular kind of surgery," says Roche.

Roche explains by describing a scenario in which a surgeon in a peripheral hospital is confronted with a case he may only come across once or twice a year. "Using mixed-reality technology, such a surgeon could call on the expert advice of a specialist on a different continent. It is almost like having that doctor standing beside you in the theatre," he says.

Even before the surgery, Roche had been using the HoloLens2 as a teaching tool.

"We started doing Monday surgical sessions that allowed registrars and trainee surgeons to witness surgeries which they would otherwise not have access to, especially over the course of the last year due to many surgeries not taking place due to the pandemic and COVID-19 restrictions," says Roche.

Noting the technology's exciting application in surgical education, Roche says in future such technology will become widely used.

“Mixed-reality technology is already being used across a number of medical disciplines, from cardiothoracic and neurosurgery, and now thanks to projects such as these, it is increasingly being used in the public health sector. It offers the next generation of surgeons the opportunity to learn from and share knowledge with the best in their field in a way that transcends geography or national borders,” Roche concludes.

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