

Stroke saviour

A state-of-the-art operating room brings innovative care to patients

Diane Peters

Stroke surgery, when performed right away and with the best equipment, can save lives. That's why Toronto Western Hospital created two cutting-edge operating rooms that allow interventional neuroradiologists - medical imaging specialists who also do surgery on the brain - to have some of the best outcomes in removing artery-blocking brain clots that cause ischemic strokes, relieve pressure in brain-bleeding hemorrhagic strokes and do other brain-related interventions. Step inside one of the two state-of-the-art stroke operating rooms (ORs) at the hospital to see how equipment and medical staff can change stroke outcomes. ▀

SCANNER

This sci-fi-looking piece of equipment is a biplane angiography system. It takes X-ray images of a patient's blood vessels from two angles and can move to get a full, 360-degree look at the brain. The interventional neuroradiologist can take as many as 35 pictures per second. These images can help doctors guide a catheter through one's blood vessels. Then, using a stent retriever that looks like a mini bottle cleaner, they remove blood clots. That surgery can take as little as seven minutes or up to an hour and a half.

BIG SCREEN

These screens live-stream images of the patient's brain. Staff can look at multiple angles and layer them over preoperative CT and MRI scans for a more precise view.

ANESTHETIST'S STATION

In this OR, patients are usually sedated, but awake. When an anesthetist is needed, such as for full brain surgery when a neurosurgeon and interventional neuroradiologist work together, they sit here to monitor the patient. A shield protects them against the radiation from the nearby angiography machine.

ULTRASOUND

This portable ultrasound machine has a key job: To locate the blood vessel in a stroke patient's groin. That's where the catheter gets inserted, and then goes up to the brain.

EQUIPMENT CARTS

Six different equipment carts are loaded with catheters, stents, wires, needles and more - one for each type of surgery done here. "You need to know your equipment and choose the right one for every individual," says Dr. Timo Krings, head of neuroradiology, imaging and intervention.

CONTROL PANEL

This panel controls the position of the angiography machine at the patient's head. Surgeons can work on the patient while adjusting the images they see.

OUTSIDE THE OR

CONTROL ROOM

A large room off the neuroangio suites features dozens of monitors showing various patient scans, plus images from six live cameras in the ORs. Staff monitor patients and talk about treatment in this room.

RADIATION JACKETS

Anyone who enters the OR needs to don a radiation apron, although the new angiography machine emits minimal radiation.

320-SLICE CT SCANNER

Patients with signs of stroke get a CT scan in the emergency room, which is then e-mailed to the interventional neuroradiologist on call, who can tell if the patient is a good candidate for surgery.

STROKE'S ALL-AGES IMPACT

Strokes don't just devastate the lives of older adults: People of any age can have them. Most often, they're caused by brain arteriovenous malformations (BAVMs), a genetic condition people are either born with or develop early in life. With this condition, some of the arteries of the brain are malformed and can bleed or rupture. "It's a bad disease, as the risk of bleeding over a lifetime is high," says Dr. Ivan Radovanovic, a Krembil Brain Institute neurosurgeon. "We don't have any drugs to treat it."

REPAIRING MALFORMATIONS

Dr. Radovanovic works with interventional neuroradiologists like Dr. Timo Krings to repair these malformations surgically. His research into the condition has found that a gene called KRAP (ki-ras-induced actin-interacting protein), which has been linked to some cancers, has a connection to BAVMs.

Existing cancer drugs might impact this disease's genetic pathway. Dr. Radovanovic is working with fellow researcher Dr. Jason Fish, also from UHN, to study preclinical models with altered KRAP genes and their response to these drugs.

MORE STUDY NEEDED

Better understanding the genetics of BAVMs could help Krembil researchers learn more about how the condition develops in the first place - and how it can lead to stroke in kids and adults. If we can find out more about the body's genetic messages, especially regarding blood vessels and their formation, many of the outstanding questions around how the brain and circulatory systems work could be answered. "We're thrilled to be addressing that in our research," says Dr. Radovanovic.