

# Open your mouth and your appendix will follow

A very experimental, no-incision surgery is finding followers in the medical community

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If you needed a gall-bladder removal, Dr. Lee Swanstrom might tell you to open wide. The Oregon-based surgical endoscopist is currently conducting a study wherein he removes patients' gall bladders through their mouths.

First he snakes an endoscope through the mouth of the patient, who is under general anaesthesia, and feeds a tiny knife through the scope down the esophagus to make an incision in the stomach. He then pushes a small balloon through the tube and inflates it to expand the hole. Finally, using imaging equipment and feel, he locates the approximately six-centimetre-long gall bladder, dissects it, pulls the pieces back out through the mouth, and closes the stomach hole.

After just 14 procedures, it's too soon for medical conclusions, but he estimates that his patients feel 10 to 20 per cent less post-op pain, and all have been happy with the results. "Our hope is that some day we could operate on a person without making any incisions, and have them wake up pain-free, hop off the table and go on about their daily lives," he says.

Swanstrom is part of a new generation of surgeons who don't want to cut you open. Instead, they're researching how to use natural orifices—the mouth, vagina, or rectum—to conduct scarless abdominal surgery via a new surgical method, dubbed natural orifice transluminal endoscopic surgery, or NOTES. It's too early to report what advantages, other than cosmetic, natural orifice surgery has over laparoscopic surgery, which uses several small incisions in the abdomen. But early research in pigs and humans shows the procedure could lead to less pain, faster recovery time, and fewer post-op complications.

Dr. Anthony Kalloo of Johns Hopkins University Hospital is credited with coining the concept at a 1998 conference on the future of gastroenterology, but it wasn't until 2004 that the no-incision surgery was performed for the first time. Two doctors in India removed an appendix through a patient's mouth in much the same way Swanstrom is now removing gall bladders. The medical community's response was divided. Some doctors saw it as the future of minimally invasive surgery and began proposing their own studies. So far a few thousand patients have undergone NOTES worldwide, with European and Middle Eastern countries leading the pack—a research group in Germany recently reported 800 cases of transvaginal gall bladder removals—though, because many countries do not have strict reporting regulations, the actual figure is unknown.

Other researchers were, and remain, skeptical. “There isn't really any data that it's better than conventional surgery,” says Dr. Teodor Grantcharov, who practises minimally invasive surgery at St. Michael's Hospital in Toronto. Grantcharov was part of the first Canadian team to perform NOTES on pigs in 2008. “There isn't any data that it's safe,” he says. “It's just not acceptable to try it on humans at this point.” This is a view widely held in Canada; there have been very limited studies and research has been restricted to animals.

Grantcharov notes the technology has not yet caught up with the concept, and therefore surgeons demonstrate reduced dexterity when trying to do their work with endoscopic instruments. Also, the visualization equipment, he says, “is not perfect,” which has caused problems when closing the stomach wall, for instance, leading to leakage that requires further, more invasive operations to correct. There are even informal reports in the international community of patients dying from post-op problems.

“It's not something you can rush ahead of technology,” says Dr. Mehran Anvari, professor of surgery and director of the Centre for Minimal Access Surgery at McMaster University. “You can't have poor patient outcome because you want no scar.” Anvari's team is developing a robotic NOTES platform, but he sees hybrid operations—the natural orifice technique combined with one or two small incisions—as a safer, more practical surgery for now. He also says scars resulting from laparoscopic incisions are negligible, and the marketing of NOTES in the U.S. appeals to patients' vanity. (Swanstrom admits patients who have sought him out for NOTES “tend to be from sunny, bikini-wearing states.”)

Still, experiments continue. Grantcharov's colleague at St. Michael's, Dr. Elena Dubcenco, a clinical fellow in gastroenterology, calls herself an enthusiast. “It's

controversial. But the entire world is doing research. We need to be the leaders, not the followers.” Dubcenco recently received a grant from the cleverly named Natural Orifice Surgery Consortium for Assessment and Research (NOSCAR) to pursue further research in pigs. In July, NOSCAR kicked off a multi-centre human trial in the U.S. that will compare NOTES gall-bladder removal with its conventional laparoscopic equivalent.

One of the major advantages of NOTES, according to Kalloo, is it might also suit overfull, resource-strapped hospitals better. With no incisions in the body, a sterile room is no longer needed, just sterile instruments. Not only could this become a huge cost-saver for hospitals and patients, he points out, but it could dramatically alter emergency care. “Picture a motor vehicle accident or a trauma on the battlefield in which the injuries are such that if you could operate right away, you could save that patient. Or in Third World countries, where to build a hospital with an operating room costs millions,” says Kalloo. “The potential is huge.”