

In rebuilding noses, age-old practice lives on

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Gary Saxon, who owns a record store in Redwood City, lost most of his nose in a medical procedure to remove skin cancer. It was rebuilt by a Stanford surgeon.
Credit: Norbert von der Groeben

Sam Most has rebuilt nearly 1,000 severely damaged or destroyed noses over the past 15 years, in many cases using a surgical technique commonly called the "forehead flap" that dates from ancient times.

Gary Saxon has a nice [nose](#). A gray beard covers his chin, and heavy eyebrows shade his eyes, but nothing hides his nose. It holds a position of prominence, sticking right out there in the middle of its owner's slightly grizzled face, like noses do. It's well-sculpted and well-proportioned—with a slightly turned-up tip that complements Saxon's positive perspective on life. And best of all, it works.

Saxon is lucky. A year ago, all he had was a bloody hole where his nose used to be.

"I was beat up, I'll admit," said Saxon, sitting between jam-packed rows of LPs at his record shop in Redwood City. "I had no nose. But my spirit was still there. I figured, well, I'm still alive, so now what?"

Part science, part architecture, part art, the surgical reconstruction of a missing nose is a most "compelling surgery," said Sam Most, MD, a facial plastic surgeon who has rebuilt nearly 1,000 severely damaged or destroyed noses over the past 15 years as chief of the Division of Facial Plastic and Reconstructive Surgery at the School of Medicine. For many of those noses, including Saxon's, the key to reconstruction was the use of an age-old surgical technique commonly called the "forehead flap."

Venerable technique



An illustration that appeared in *The Gentleman's Magazine* in 1794 shows an Indian bullock driver after rhinoplasty with the forehead flap method.

The forehead flap—so-named for the unsightly flap of forehead skin left plastered over a patient's nose for weeks following surgery—happened, by chance, to be the first surgical procedure Most ever witnessed. He observed it while a first-year medical student at Stanford, quietly standing at the back of the operating room. More than two decades later, a master craftsman of the technique himself, he has also published his own research to help improve upon it. He remains somewhat amazed

that the success of these complex nose reconstruction surgeries still depends upon a technique that's probably older than Christianity and even the Roman Empire.

"I think it is just fascinating that we can take the skin from the forehead and create this outer-lining shape of the nose and make it turn into the shape of a nose," said Most, a professor of otolaryngology-head and neck surgery. Without the forehead flap, the reconstruction of a missing nose—perhaps the most challenging of facial reconstruction surgeries—would fail.

Most is quick to recount the historical significance of the forehead flap technique, which originated in India, probably before the birth of Christ, but wasn't widely known to Western medicine until 1794 with the publication of a letter to the editor in *The Gentleman's Magazine of London*. The letter provided the first account in English literature of the procedure.

Rewards for noses

At the time, the British East India Company ruled parts of India. A sultan, angry at the occupation, offered bounties for the amputated ears, noses and hands of British sympathizers. The letter describes the nasal reconstruction of an Indian bullock driver who, imprisoned by the sultan, had his nose and one of his hands cut off as punishment for delivering supplies to British troops. It goes into detail how the driver's nose was rebuilt 12 months later, after he joined the Bombay Army of the East India Company:

First, a piece of wax was sculpted to the stump of his nose, then flattened out to create a nose template. Next, this template was laid on the forehead and outlined. An incision was made along the outline, and the skin was peeled away, while remaining attached at a point near the

top of the nose. The flap was then twisted over to keep the outward skin facing on top, pulled down over the face and molded around the area of the nose. For several weeks, the flap remained attached by a bridge of skin on the forehead to maintain a blood supply. After blood vessels from the nose began to nourish the flap, the ugly connection to the forehead was cut, and a normal-looking nose emerged. This same basic procedure remains the most popular method of nose reconstruction today.

More than 200 years later, Most, working with 21st-century surgical tools at his disposal, used pretty much the exact same procedure to rebuild Saxon's nose—with a few additions.

Saxon, like the bullock driver, had most of his nose removed, but in his case it was cut off piecemeal by a dermatological surgeon trying to root out an invasive case of squamous cell carcinoma.

Skin cancer

Skin cancer has replaced bounty hunting as the most common cause of major nose deformities that require forehead flap procedure reconstruction, Most said.



Gary Saxon after having his nose rebuilt using the forehead flap method. Credit: Sam Most

"Unfortunately we are seeing skin cancers in younger and younger patients," Most said. "We get patients in their late 30s, early 40s who need total nasal reconstruction."

The 72-year-old Saxon said his own nose story began more than 40 years ago, with a dog bite.

"When I was 30 years old, a dog bit off the tip of the nose," Saxon said. "It was a mama Dalmatian who'd just had pups. I bent down to pat her and boom, boom, snap." Three nips later, the tip of his nose was gone.

"It healed up, but I had a sore on the tip of the nose for years that kept festering and coming back for decades," he said. Finally, two years ago, he had it biopsied, and it came back positive for cancer. The

dermatologist scheduled him for a surgical procedure called Mohs, which is a way of precisely removing the cancerous tissue. The patient sits in the waiting room while the tissue that's been removed is examined for cancer to determine whether all of the diseased cells have been cut out. If not, the patient returns to the operating room for additional tissue removal.

'I had no nose left'

"I was there for nine hours," said Saxon. "By that point, I had no nose left. I was stunned." In addition, he learned that he was still not cancer-free; the disease was traveling to his brain, and he'd need radiation therapy to treat it.

Most performed the nose reconstruction surgery the very next day at Stanford Health Care, before Saxon really even had time to miss the protuberance. "When he arrived, there was a very extensive hole all the way to the base of the lip," Most said. "They had chopped off most all of the nose." Before the flap procedure could be performed, Most had to rebuild the missing cartilage with cartilage taken from Saxon's ear.

"When you reconstruct a nose, you have to worry about nasal function and create the nasal skeleton both to make it look good and so that it doesn't collapse, so the person can still breathe," Most said. To recreate the aesthetic component of the nose, the surgeon attempts to recreate the nose in subunits, dividing it into sections where the natural shadow lines of a nose should fall. The nose is rebuilt into these subunits with the intention of hiding the scars or stitches along these shadow lines.

"For Mr. Saxon, his entire cartilage framework of the septum in the front of the nose and the cartilage that formed the tip of the nose were gone," Most said. "The cartilage structure of the septum and the tip had to be rebuilt in order to give him a tip again, to make it look like a

natural-looking nose."

Creating the template

After the primary reconstruction, the forehead flap was cut out and brought down to form the nose.

Most used a piece of sterile pad dressing to create a template of the nose. He drew an inked outline around the nose defect, placed the pad on top to create an inked negative and then placed that on Saxon's forehead. The flap was incised along this inked on line, the skin peeled away, turned over and placed over the area of the nose, where tiny stitches molded it into place.

"It's not pretty," Most said, describing what it looks like to wear a forehead flap over your face for the typical three- to four-week period. "People have a horrible time with it. They walk around with this giant bridge of skin sticking down. It's scary looking. They can't go to work."

In an effort to decrease this length of time, Most has published two studies in medical journals showing evidence that new imaging techniques can allow surgeons to see exactly when the nose's blood vessels are supplying the skin graft.

"The accepted dogma is—there is no real evidence out there—that you have to wait three to four weeks or longer before you can cut that umbilical cord," Most said. By using laser-assisted angiography, the surgeon can actually see, rather than guess, when the new vessels are supplying blood to the graft.

A natural-looking nose

For Saxon, the new technology didn't reduce the amount of time he lived with the attached flap. The damage to his nose was too extensive. For more than a month, he walked around with the flap while undergoing radiation therapy for his remaining cancer. After the umbilical cord was cut, it took six months for the swelling to go down and for a natural-looking nose to emerge.

"I wore that forehead flap for about six weeks," Saxon said. "I went to work. I wasn't going to hide out." When you are a small business owner, that's just the way it is, he said. You have to work; you can't stay home.

It hasn't been easy, and he's still at risk for a return of the cancer. But he said he's extremely grateful for his new nose.

"My nose looks really different to me, but other people don't notice," he said. For the six-month recovery period, the nerve regeneration made his nose itch like crazy, and he would feel sharp pains rip through it. But his new nose is a nice nose. He's finished radiation therapy, and he's been given a second chance at life.

"I'm satisfied, and I'm grateful," he said, scratching his new nose as naturally as could be.

Provided by Stanford University Medical Center

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