



# Sculpting FACES AND FUTURES

Silicone noses, facial masks, acrylic eyes ... No, we're not in a costume shop. Welcome to the world of facial prosthetics, where art, science, and technology are restoring dignity to victims of trauma, cancer survivors, and others

BY *Rhona Lewis*

**I**t was a job that sounded like it came straight out of a spy novel: create disguises for the agents of the CIA. But in this real-life scenario, the stakes were sky high. Altering an identity could be the difference between life and death.

"Before I issued a disguise, I asked myself two questions: 'Will this keep the agent alive? Will it attract or detract attention?'" says Robert Barron, who used to work for the CIA. Today, Barron is asking those same two questions, but in a different context. As a highly acclaimed facial prosthetic specialist, he has designed hundreds of facial parts for cancer survivors, children born with congenital defects, and victims of burn and trauma, helping them regain their dignity and return to normal life.

"I figured that if I could put people in hiding, I could take them out of hiding. If I could give a person a new identity, I could give back an identity."

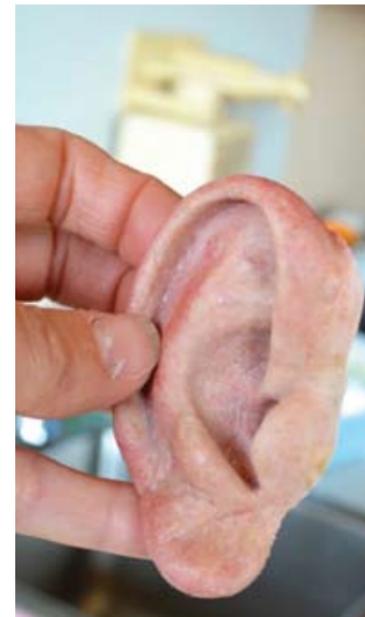
**Cloak and Dagger** From his office in Ashburn, Virginia, Barron comments, “I can make silicone look like skin.” If this sounds like the boast of an artist, it is perhaps because art was where his journey to becoming a professional facial prosthetist (known as a maxillofacial prosthetist in the UK and an anaplastologist in the US) began. When he was young, Barron once spent weeks perfecting a painting of the Grand Canyon. It was so realistic that on the opening day of the state fair he found it hanging in the photo gallery. He won a blue ribbon.

While studying commercial art in college, Barron set his heart on working for Hallmark. But instead of just cheering up people with his greeting cards, he was destined to save lives. He found work first at the Pentagon and then at the CIA where, as a senior forger, he reproduced vital documents. Then, in an effort to maximize his artistic talent, he approached the director and moved into the disguise department. Using traditional materials such as beards, mustaches, wigs, and clothing, he helped keep agents safe in the shadowy world of espionage.

When the need for more sophisticated disguises arose, Barron attended a conference of the Association of Biomedical Sculptors. There he was introduced to a different world, the world of those who were the survivors of disease and trauma, and he knew that his second career would involve helping these people. But in the meantime he perfected the art of disguise, successfully sending case officers into dangerous terrain with their new look.

Ten years later, Barron retired from the CIA and embarked on a new career as a designer of prosthetic facial devices (eyes, ears, and noses) and digits. What made him choose this field over the film industry in Hollywood, where an expert in disguise can make a fortune?

“The film industry doesn’t need my standards. If you’re not helping someone, what is life?” Reflecting on the influence of his childhood, he adds, with the slightest touch of nostalgia, “I was brought up going to church and Sunday school. I owe quite a bit of



This prosthetic right ear (above) was molded from an impression of the healthy left ear, for a perfect, seamless fit. (Bottom) A silicone eye can't replace sight, but the look is real

what I am to my grandparents and parents. I believe that G-d gave me a gift and that I am using it the way He wants me to use it. I thought I had found my purpose in the CIA, but there is no better feeling than knowing you can make a difference in a person's life.”

**A Disastrous War** While Barron and other facial prosthetists usually help civilians, the field actually had its beginnings during wartime. World War I, with its guns and shrapnel of artillery warfare, had proved disastrous to those who survived. Thousands of soldiers withstood the trenches but were left with shattered faces, missing eyes, noses, and ears. While skin grafting and plastic surgery were already options, these could not replace missing facial parts.

In March 1916, during the height of the war, a sculptor named Francis

Wood, who had enlisted as a private in the Royal Army Medical Corps, set up a mask-making unit in the Third London General Hospital. His aim was to construct lightweight copper masks for irreparably facially disfigured soldiers. “My work begins where the work of the surgeon is completed,” Wood commented.

Toward the end of 1917, Anna Ladd, an American sculptor whose husband had been appointed to a position in the Red Cross, opened the Studio for Portrait Masks in Paris with a similar goal. Both Wood and Ladd invested enormous amounts of energy in producing thin masks of galvanized copper. A single mask took about a month to complete. Once the patient had healed from the injury and the restorative operations, a plaster cast was taken. This formed the basis of a clay or plasticine mold that was used to cast the copper mask. The masks were 1/30th of an inch thick and, depending

on whether they covered the entire face or just the upper or lower half, they weighed between four and nine ounces. They were held on by glasses.

The hardest job was painting the mask to match the skin hue of the wearer. At first, Ladd used oil paint, but because this chipped easily, she changed to hard enamel that was washable and looked more like skin. Eyebrows, eyelashes, and mustaches were usually made from real hair. By the end of 1919, Ladd had produced 185 masks; Wood probably produced more since his studio was open for longer and he worked faster. While these numbers are admirable, they pale when we consider that the war produced an estimated 20,000 facial casualties. By 1920, both studios had closed. Even though the masks lasted for only a few years before they began to look battered, it's hardly surprising that the former soldiers continued to wear them. After all, a mask allowed

the wearer to reenter society with a small measure of dignity. Tragically, most of these maimed soldiers quietly passed away.

### The Art of Facial Restoration

Noted sculptress Kathleen Scott (widow of famed Antarctic explorer Captain Robert Falcon Scott) volunteered to help pioneer plastic surgeon Sir Harold Gillies in the 1950s, and was known to have declared, “Men without noses are very beautiful, like antique marbles.” Not surprisingly, people who have actually lost part of their faces do not share this view. Becoming a recluse is often preferable to facing society with part of one's face missing, and some people even consider suicide.

Robert Barron relates that his first case involved an attempted suicide in which a man blew off half of his face with a shotgun. “I had to go to the nursing home and take an impression. Using this

## CREATING A SILICONE FACIAL PROSTHESIS

According to Sharon Haggerty, it takes four to five visits to create a facial prosthesis. The process is as follows:

- First an impression of the affected area is taken using a soft dental material.
- This image is reversed in wax or clay and the prototype is checked for fitting.
- Prosthetic silicone material is matched to the patient's skin tone.
- The sculpture is then molded and cast in silicone.
- The prosthesis is hand-painted to blend with the surrounding anatomy.

All prostheses wear out with regular use and exposure to skin oils, UV light, environmental contaminants, adhesives, and removers. On average, silicone prostheses last about two years, but repairs and touch-ups can extend their life a bit. A replacement prosthesis can be created from the patient's master mold. This mold can withstand multiple castings and last for up to ten years. Children may outgrow their prosthesis, so a new impression, sculpture, and mold will need to be made to obtain a prosthesis that fits properly and achieves proper symmetry.

The cost of a prosthesis is subject to many variables, including number and type of body parts, method of retention, state, country of practice, etc. Typically 20 to 40 hours of clinical and laboratory work may go into the creation of a custom prosthetic restoration.

impression and old photos, I sculpted a face. Thanks to this mask, which covered half of his face and was held on by straps, the man was able to walk around the nursing home.”

He adds that upon receiving their prostheses, people feel whole again and are able to return to society. Donnie Fritts, from Calhoun, Georgia, was diagnosed in 1995 with ameloblastic carcinoma, a rare form of cancer, and given the choice to die with his face or live without it. He chose life. The operation that removed the four tumors in the center of his face also removed his

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nose, his top lip, the roof of his mouth, his forehead, and part of his brain. Fritts lived as a recluse for six years, until a team of surgeons and Barron sculpted his new face. Finally, he could eat again and rejoin society.

For strong-willed people such as Fritts, a convincing prosthesis not only gives the strength to go on, it also protects the exposed tissues. “A prosthetic nose for cancer or burn survivors keeps the mucus cavities moist and free of irritation, as well as restoring speech patterns,” explains Barron. It also allows the patient to do something we all take for granted — wear glasses. Three to six months after undergoing surgery, radiation, and chemotherapy, the facial prosthetist will work together with the surgeon to design the right prosthesis.

At this point, all redness and swelling should have subsided, permitting a flush fit and correct color match.

“The method of attachment depends on the patient’s level of activity,” explains Sharon Haggerty, a successful facial prosthetist and public relations chairperson of the IAA, International Anaplastology Association. “An elderly or visually or mentally impaired person may opt for a prosthesis that is attached to a pair of glasses, or retained with a medical adhesive.”

An active person, on the other hand, usually chooses titanium implants, which offer more security. The implants, developed by Swedish surgeon Per-Ingvar Brånemark, are inserted by the surgeon. Amazingly, the surrounding bone fuses with the implant surface.

After a four-month healing period, a second surgery is performed: the surgeon punches through the healed skin and screws a connection point into the implant. This visible connection point protrudes through the skin.

Depending on the type of prosthesis, the patient may have two or three implants to which the prosthesis is attached by clips, snaps, or magnets. But the seamless joint isn’t easy to achieve.

“It takes a lot of trial, error, experience, and scientific knowledge,” says Barron.

### A Security Blanket for Kids

As with Barron, it was the combination of art and technology, in addition to an interest in sculpture, that drew Sharon Haggerty to the field. “While



Robert Barron paints this artificial ear to match skin tone. “It gives the strength to go on”

I was studying medical illustration at the University of Illinois–Chicago, I heard about an elective course in facial prosthetics. When I saw the results in people’s lives, and I realized that I could do something for someone, it clicked and I realized, “This is who I am.”

Perhaps one of the most gratifying aspects of the job is helping children who look different feel like the rest of the kids in their class. For instance, microtia is a common birth anomaly that can make a child’s life miserable. A child with the condition is born with a malformed or undersized ear, and will sometimes be mercilessly teased by classmates, which can lead to a lowering of self-esteem and grades.

Although restorative surgery is an option, Barron comments that the results often don’t meet the patient’s expectations. “There simply isn’t enough bulk tissue to get the reconstructive ear to stand away from the head. The color of the tissue is a problem, as is scarring. The ears must match, and that’s impossible to achieve through surgery.”

Shlomo is a child from Brooklyn who was born with one ear smaller than the other. His mother, Ruchie, found Barron through an online support group. Although the family’s health insurance didn’t cover the cost of a prosthetic ear, when Shlomo was five and a half years old, Ruchie and her husband decided to go ahead.

“Shlomo was rarely teased,” says Ruchie, “but as he got older, he became aware that having one ear smaller than the other looks odd to other people. The new ear gives him loads more confidence. The prosthesis is a stunning work of art and truly looks like his other ear. Shlomo’s principal asked my husband how Shlomo suddenly grew an ear over the summer.”

When asked about society’s focus on the external over the internal, Ruchie mentions a painful point: “In the *frum* world, where medical history is so important, there is much more of a stigma and more need to correct any differences.”

“The prosthesis becomes a security blanket and allows the children to join their peers,” says Barron. Janie from California, who somehow snipped the back of her prosthetic ear, refused to allow her mother to mail her ear to Virginia for the simple repair. Instead, the family drove to Barron’s office. “Their classmates are fascinated, and instead of feeling rejected, the child thinks, ‘Hey, I’m cool.’”

A prosthetic ear is most easily attached using medical adhesive. The glue dries within 15 seconds. Says Ruchie, “You get used to it very quickly; it’s just

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## “You get used to it very quickly; it’s just an extra three minutes to figure into the morning rush. And it absolutely does not look glued on”

an extra three minutes to figure into the morning rush. And it absolutely does not look glued on. Shlomo’s ENT actually thought we had attached it surgically.”

Barron advises removing the prosthesis at night, to allow the skin to breathe.

**Is It Real?** Another area where facial prosthetists are making a big difference in people’s lives is the aesthetic restoration of missing eyes. Depending on the case, there are one or two parts to the prosthesis: an orbital prosthesis and an ocular prosthesis (artificial eye). In cancer cases where the entire orbit has been removed, the orbital prosthesis replaces the missing eyelids and adjacent hard and soft tissues. Like a nasal prosthesis, the orbital prosthesis protects the exposed tissues and keeps them moist.

“The orbital prosthesis is designed to allow air space behind it, so that the skin can breathe,” explains Haggerty. It also houses the ocular prosthesis, which the facial prosthetist either creates or has custom-made by an ocularist.

There are few glass eye makers left in world. Today artificial eyes are fabricated

from polymethyl methacrylate acrylic plastic (PMMA), which is also used in aquariums, aircraft windshields, intraocular lenses, and bone cement. While plastic artificial eyes are more prone to scratching than glass, they are much more break-resistant.

“Our patients vary greatly in age,” says Tim Barrett, board-certified ocularist of Midwest Eye Laboratories, who followed his father into the field. “The youngest child I’ve fitted was ten days old. For one congenital anophthalmia [missing eye] case, I fitted a conformer of clear plastic into the socket to promote socket growth and expansion. Conformers are changed every few weeks during the first two years of life. After that, a prosthetic eye is fitted for the child’s socket. My oldest patient was a 103-year-old farmer who had had an accident with a pitchfork. We also see a fair number of patients who have lost an eye to cancer.”

Prosthetic eyes are manufactured in an eye lab. The process usually takes one to two days and requires several appointments with the patient. The eye color is matched up within an hour by painting the eye while the patient sits in front of the ocularist. The iris and

sclera are hand-painted to match the companion eye; the veins are created with fine shavings from red thread.

“The best compliment we can get is when our patient sees an eye specialist who tries to check the vision in the prosthetic eye,” says Barron. In cases where a blind eye doesn’t need to be removed but is unsightly, a scleral shell is fitted. Like a large contact lens, the shell covers the entire eye comfortably.

While prosthetics for the eyes serve aesthetic purposes only, digital prostheses for the fingers and toes fill a functional role. Held on by suction, they protect the sensitive tip from extreme cold and trauma. They also allow the user to carry out many of the tasks we take for granted, including typing comfortably at a keyboard. “If you bump an exposed fingertip against a table, the nerve endings will send your brain a message that will put you through the ceiling,” Barron comments.

**In the Field in Israel** As might be expected, Israel is home to several world-class facial prosthetic specialists. Professor Rephael Zeltser heads the oral and maxillofacial surgery department at Hadassah Ein Kerem

Medical Center. His team at the Maxillofacial Rehabilitation Center treats patients with congenital differences as well as survivors of cancer and trauma.

“When treating oncological patients, we take a CT scan of the person’s jaw or nose before any surgery,” Professor Zeltser explains. “Based on this, we reconstruct a plastic model of the part that will be removed by surgery. Often, while the patient is undergoing surgery, a temporary prosthesis of the relevant part is constructed, so that he already has it when he awakens from the anesthesia. Since the surrounding tissue changes a lot after surgery, a more permanent prosthesis is built later. This is then tinted in the hospital’s laboratory by a technician.”

Terror victims are an unfortunate part of the country’s reality and of Professor Zeltser’s expertise. “We are lucky to have a multidisciplinary approach. In most cases involving civilians or soldiers who have suffered explosions or high-velocity trauma, teams of doctors operate on the patient for six to 15 hours, depending on the severity of the case. The first step is to treat and repair the soft tissues and bones. Next the specialists move in. If there is a need, neurosurgery will be performed, followed by the maxillofacial surgeon and, finally, the ophthalmologist, the ENT, and the plastic surgeon.”

Like Barron and Haggerty, Professor Zeltser, who has

worked in his field for 32 years, has always been drawn to art. “As a maxillofacial surgeon, I have the opportunity to combine art with science, to save people’s lives. Who needs more than that?” He then adds, “I come from a family of dentists, so that probably also influenced my choice.” When asked how he copes with the pain that he faces regularly, he says, “I have a fanatical desire to express my professional skills. I dance to work every day.”

**Are Robotics Next?** Dr. David Franklin Hanson has developed human-like robots with realistic facial expressions and conversational abilities. Each face features Hanson’s Frubber biometric skin that contracts and folds like facial muscles to create “millions” of possible expressions.

Despite this, Sharon Haggerty is doubtful whether robotics will be able to offer realistic prostheses. “You’re working with a very limited amount of space,” she says. “The prosthesis has to fit in with the normal facial contours, and I doubt there’s enough room for robotics. Second, moving mechanical parts will cause more wear to the silicone, but if you use more durable materials, you will sacrifice the aesthetics. And the cost is prohibitive.”

Today we are reliant on art, science, and technology to heal the ravages of disease and trauma. We longingly await the day when Hashem Himself will heal all affliction. ●

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