

# Robotic Technology Brings New Benefits to Patients and Practices

Can the new trend in robotic surgery benefit cosmetic dermatology practices?

BY HERBERT S. FEINBERG, MD

**A**ndrogenetic alopecia or common male pattern baldness (MPB) is extremely common. By the age of 35, two-thirds of American men experience some degree of appreciable hair loss, and by the age of 50 approximately 85 percent of men have significantly thinning hair.<sup>1</sup> The market has responded with a variety of different solutions over the years, with the most recent advance being a robotic system that achieves a very natural result in a minimally invasive procedure.

The surgical process of extracting and then grafting follicles of hair was originated by Japanese dermatologist Dr. Okud, in the 1930s. He discovered the process while helping burn victims. Dr. Norman Orentreich, a New York dermatologist, was the first to publish findings that hair from the sides and back of a man's scalp was more or less resistant to balding, and therefore extracting and grafting these hairs onto the front of the scalp solved the balding problem.<sup>2</sup> Although this discovery was well documented by the 1960s, it wasn't until the mid 1990s that hair transplantation surgery advanced enough to produce natural looking results. The practice of taking individual follicular units for transplantation, or micrografting, finally produced natural, virtually undetectable results in men seeking surgical hair restoration.

## EXTRACTION METHODS

Today, hair follicle extraction is most commonly performed using the strip method. Single-strip extraction is the process of cutting a strip of the patient's scalp from the back of the head and then harvesting the hair follicles. It is possible to harvest 2,000-3,000 grafts in a session with this procedure. The process requires stitches or staples to close the wound site but with advanced skill, the surgeon can minimize the resulting linear scar at the donor site.

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The alternative to strip harvesting is follicular unit extraction (FUE). FUE was pioneered by Bernstein and Rassman in 1995, and it fits in with the general trend in medicine over the last two decades towards less invasive procedures. Follicular units can be harvested one at a time using a dissection punch of one millimeter or less. The patient's hair has to be cut short so the scalp is clearly visible. A needle is used to score the skin above the follicular unit and a punch separates the follicular unit from the surrounding tissue. The follicular unit is then extracted using small forceps. The small holes left behind heal on their own and once healed are nearly undetectable. Benefits of FUE include a very quick recovery, less chance of numbness or paraesthesia, and an expanded donor area. With FUE there is no longer a problem of having to close a tight incision on the scalp or worry about reduced elasticity in the donor area, which often restricts further strip attempts.

Manual FUE, however, is extraordinarily slow and tedious and I, like many surgeons, do not find that this method presents results superior enough to merit the impracticality of the longer procedure time. Dr. Phillip Gildenberg, a brain surgeon, realized that just as robots are being used in other areas of medicine,



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there was an opportunity to use a robotic approach with FUE that would cut down on surgery time and increase the precision and consistency of the procedure. The ARTAS Robotic System (Restoration Robotics, San Jose, CA) is an advanced robotic system for harvesting follicular hair units directly from the scalp. It consists of a precision robotic arm and advanced imaging technology that can map and track each follicular unit and determine the optimal angle and direction of each hair follicle for dissection. It then uses micro dermal punches to harvest individual follicles in a random pattern that is nearly undetectable after healing. This complex determination of angle and depth, as well as the repetitive motion of harvesting individual grafts, makes this a task particularly well-suited to a robotic aid.

The robotic approach basically combines the benefits of the less invasive FUE technique with the efficiency of the strip technique. With manual FUE, extraction of 1,600 grafts by hand could take six to eight hours of surgery, depending on the speed of the physician and the tolerance of the patient. But with the ARTAS Robotic System, this same number of follicles can be extracted in as little as three hours.

As a hair transplant specialist, I have always investigated new technology. I tested plugs when they originally came out and transitioned as they became smaller mini grafts, which were preferred over full grafts. When microscopes were used to cut grafts, my practice was the first in the New York area to use them. Yet, when FUE was developed as a new method of harvesting follicles, I was not interested. I could not justify taking

the extra time required and experiencing the inconsistencies of manual FUE just to avoid a scar. The ARTAS Robotic Procedure, however, allows me to reap all of the benefits of FUE without the tediousness of performing it manually.

### EFFICACY

FDA trials for the ARTAS System were prospective, blinded, controlled studies of 36 males at two separate sites.<sup>3</sup> Each patient served as his own control with half of the scalp dedicated to the ARTAS System and the other half reserved for manual FUE. The researchers analyzing the follicles were blinded to the extraction technique. The study established that the efficacy of the automated robotic system was not inferior to manual FUE and, perhaps most importantly, they have seen no adverse events or medical device malfunctions in any study.

My staff and I are finding that the quality of the graft with the robotic system is probably better than what we get with single strip extraction. Optimal growth occurs from six months to a year after the hair is grafted, and our very first patients are just now reaching that point, so we have not conducted a formal study. However, observation of new growth indicates that the yield is a little bit higher and overall, the procedure is better.

### ADAPTING TO NEW TECHNOLOGY

Our practice first started using the ARTAS System in May 2012, and now, because I am extremely comfortable with the procedure, I introduce it to most of my patients. While some still choose to have the strip extraction method due to the higher cost of robotic FUE, there are three groups of patients for whom I suggest that the ARTAS Robotic System is their best option.

The first group consists of patients who wear their hair very short or wear it longer but do not have good hair quality, making it difficult to hide the linear scar. I recently saw a patient who had reasonably short hair and a fine linear donor scar from his initial transplant. But I felt that if he would have any future strip, he might have trouble hiding the scar. I recommended that in the future, he should consider switching to FUE with the robotic system.

The second group who are really attracted to the ARTAS Procedure consists of those patients who are drawn to techniques that are very hi-tech and new. They may not have difficulty camouflaging the scar, but they appreciate the benefits of the technology enough to pay the price difference.

The last group includes any patients with a very low pain tolerance. While using the ARTAS System makes the harvesting process longer than strip extraction, it is decidedly more comfortable for the patient and offers an easier recovery. My patients who have had both methods prefer robot-assisted FUE.

The ARTAS System is an innovative device that can produce excellent results, but it is important to remember that with any new technology, there is still a learning curve. While the system

is automatic, various modalities, such as speed and angle of penetration of the needle and punch, skin turgor and the density of follicular units must be monitored. Previous transplant experience, especially understanding how to judge and handle hair grafts, makes for a smoother transition to robotic hair transplantation.

Now that my staff and I have worked with all types of hair texture and quality and received significant guidance from the manufacturing staff, we are very confident with the procedure and have no difficulty convincing patients to make the investment in it when we recommend it.

### PRACTICE GROWTH

As a recognized hair restoration specialist with a busy practice, I have seen positive growth due to the adoption of the ARTAS System. Robotic technology is exciting, and we have received several new patients who have read about the ARTAS Robotic Procedure online and came in to ask more questions. Some have had a robotic follicular transplant and some have had strip extraction, but their initial impetus to call our practice was the new technology. The state-of-the-art technology captures interest, and I have been featured on local news outlets. Articles and television appearances not only attract new patients, they also impress current patients. Patients like to know that the practitioner they choose stays up-to-date with research and technology, and acquiring robotic technology generates very positive publicity in general.

Investing in new equipment is an ongoing endeavor in the medical field, and I have regularly purchased new lasers and other treatment and diagnostic equipment that were similar in price to the ARTAS System, but I've never had any machine that has paid back its initial investment so quickly. The initial investment for the machine was recovered in less than one year, an excellent return by any measure.

In today's world, almost any cosmetic procedure generates income. Procedural medicine in general tends to generate the greatest income, and that remains true in this case as well. In my practice, the greatest proportion of my earnings comes from hair transplantation, and the ARTAS Robotic System is the top earner in terms of specific overhead for this procedure. ■

*Herbert S. Feinberg, MD is a world-renowned dermatologist and the founder of the Dermatology and Hair Transplant Center in Englewood, NJ. He is a pioneer in hair transplantation and has been performing transplants for over thirty years. He is the author of the frequently quoted book, "All About Hair," and can be reached at 201-568-6977.*



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