

axisthree 
...beyond imagination

**SCIENCE-BASED
3D SIMULATION
TOOLS FOR
COSMETIC AND
PLASTIC SURGERY**

By Peter D. Geldner, M.D.



The introduction of new technology provides an opportunity to the practicing physician as well as a challenge. The Axis Three system (www.axisthree.com) is a wonderful example of such a device.

This device takes a series of images and merges them into a three dimensional matrix that allows the surgeon and the patient to view the patient as a figure in space. It allows the surgeon to alter those views to simulate the effect of various surgical interventions. In its initial incarnation, the surgeon can show the effects of implant placement and realistically anticipate the physical result.

In my clinical practice of plastic surgery, I have been employing the Axis Three for nearly two years. When patients come for breast augmentation

consultations, we begin with a discussion of how the procedure is performed including the various incisions, implant placements, implant types, and adjunctive procedures. We then discuss the various risks that these patients may experience and how they are

patient's preferences. We now routinely image the patients with the Axis Three. We reiterate the patient's preferences by simulating those implants that would deliver the patient's expectations.

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handled. Recognizing that the patient's expectations are the most important factor in eventual success, we use simulation implants in a bra to both give the patient a rough idea of what a given size can do to their physiques, as well as to gauge the

catalogue of all the implants available in the U.S., as well as those anticipated to be cleared by the FDA in the immediate future. By selecting the preferred implants, the patient can see how they would look with each of the options. We can view the image from any angle:

left, right, frontal, oblique, from below, from above, and any view in between. This objectifies file options and allows the patients an added measure of confidence in their selection. Following surgery, we can reevaluate our results in a very objective manner.

By itself, the device works well. However, postoperative simulations can be performed much more cheaply to the

with various options demonstrate the effect of particular breast implants, not in an abstract sense, but in an objective image.

Chest wall asymmetries or breast asymmetries pose a particular challenge. Accessing the native volume of the breast is fraught with difficulties. The Axis Three system allows the measurement of that breast and assists the surgeon in selecting

most complex case of breast asymmetry.

BREAST RECONSTRUCTION

But this only begins to describe the utility of the imaging system. Breast reconstruction following cancer surgery can be performed with a variety of techniques, implants tissue expanders, tissue transfers, and fat transfers. In each case, a pivotal question is how much to add to the mastectomy site to simulate the opposite side. I have used the Axis Three to image these patients to predict the result of various device placements as well as deduce the volume of tissue required for reconstruction. In recent cases of breast defects following lumpectomy or the partial removal of the breast, the system has proven invaluable for the preoperative planning of fat transfer. It has also allowed me to access the success of those procedures and plan what further interventions would be necessary.

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satisfaction of the patients. How then do we justify the use of this device? The answer is both the precision of file device and the ability to demonstrate topographic details of the patients' bodies, which uncovers subtle asymmetries.

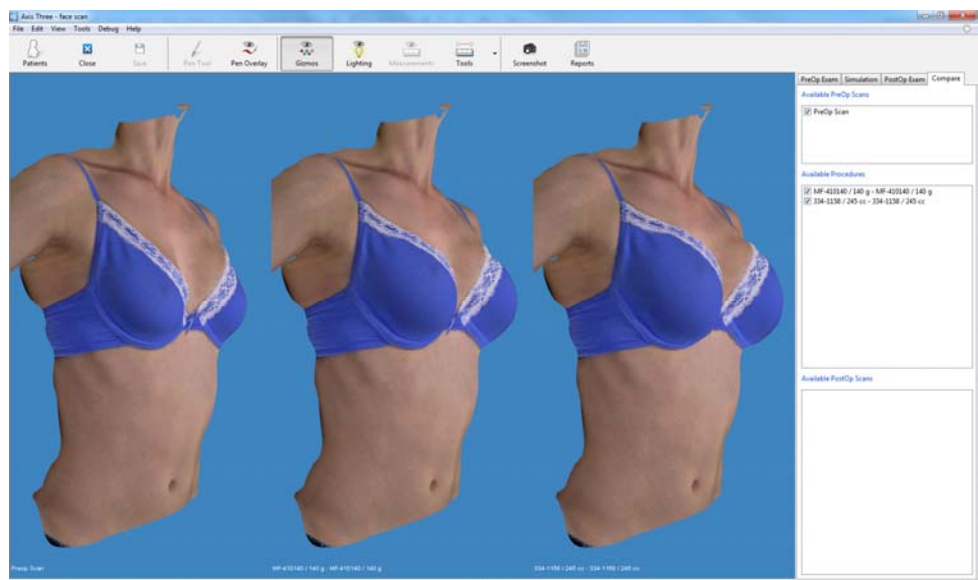
BREAST IMPLANTS

Breast implants come in a variety of sizes. They also have a variety of shapes such that the same volume can be applied to several different implants that differ in their base diameters and projections. To create a plausible augmentation, the implant has to lie within the confines of the patient's breast.

Venturing outside those confines can produce strange looking results indeed which look like nothing seen in nature. Sometimes anatomic variations in nipple location mandate the use of particular implants to avoid "cross-eyed" or "wall-eyed" breasts. Simulations

which implant can result in symmetric breasts following surgery. With chest wall anomalies, the system demonstrates the results of using different implant profiles to camouflage the chest wall differences. The use of the Axis Three system allows precision and predictability in even the

Axis Three Breast Scan



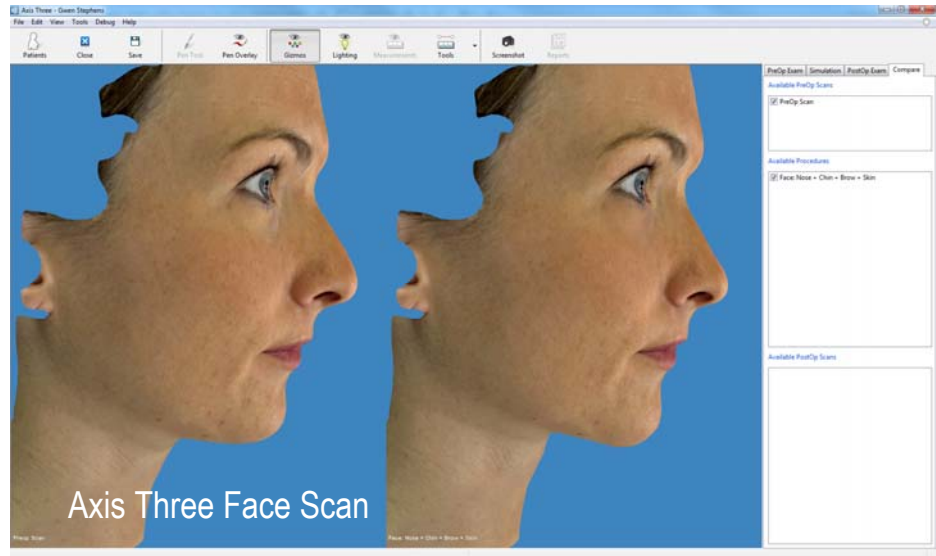
BRAZILIAN BUTT LIFTS & FAT TRANSFER

Brazilian butt lifts or fat transfer to the buttocks is an aesthetic procedure where fat is harvested using liposuction and carefully transplanted into the patient's buttock to create a more attractive backside. This technique is rapidly gaining popularity in many quarters and is an excellent alternative to implant buttock augmentation. Again, the ability to measure and model this topography helps the surgeons in their preoperative planning. It also allows us to determine the success of the procedure by measuring the differences between the preoperative and the postoperative image and accurately calculate the volume change.

FACIAL PROCEDURES


Utilizing the recently added face module, we can simulate the expected results of several operations including brow lift, mid-face lifts and face-lifts. Alternatively, we can predict the results of facial volumizing procedures such as fat transfer or filler use. Patients can objectively see how aesthetic interventions will affect their final outcome. The hope is to achieve the patient's expectations and ensure that the patient and the surgeon have the same postoperative goal.

Two-dimensional surgical simulators have been used for decades. Using morphing software, it allows the doctors to communicate their planned operative interventions to the



patient. It is a recognized part of most nasal procedures. For facial surgery, it allowed a simulation of what various operations could provide. In the case of breast surgery, there was nothing available that could accurately predict surgical outcomes. The Axis Three system meets these needs and surpasses the efficacy of the preceding two-dimensional simulator.

Pixels are only pixels. No imaging system can guarantee surgical results. However, in the hands of a skillful surgeon, knowing the expectations of the patients and recognizing the preoperative condition in a reproducible and objective manner can yield spectacular results.

The Axis Three system is in its infancy. It is constantly being improved and validated. It allows inquisitive surgeons the opportunity to test their expectations as well as the patient's without drawing blood and also provides the challenge to test the technology in ever expanding applications. 



About the Author

Peter D. Geldner, M.D., is Chief of Plastic Surgery at Michael Reese Hospital. He is also Clinical Assistant Professor at the University of Illinois and a clinical instructor at The University of Chicago. He is certified by the American Board of Plastic Surgery and has been nominated as "Best Plastic Surgeon" and "America's Top Surgeon." He is the former President of the Chicago Society of Plastic Surgeons and is an active member of the American Medical Association, the American Society of Plastic Surgery, American Society for Aesthetic Plastic Surgery, and the Chicago Medical Society. Dr. Geldner is a graduate of the Johns Hopkins University and the University of Wisconsin. He completed his residency in general surgery at the University of Chicago and completed his residency in plastic surgery at Wayne State University and the University of Texas Medical Branch. Visit the Geldner Center Website: www.mygeldnercenter.com.