

3D applications for aesthetic surgery



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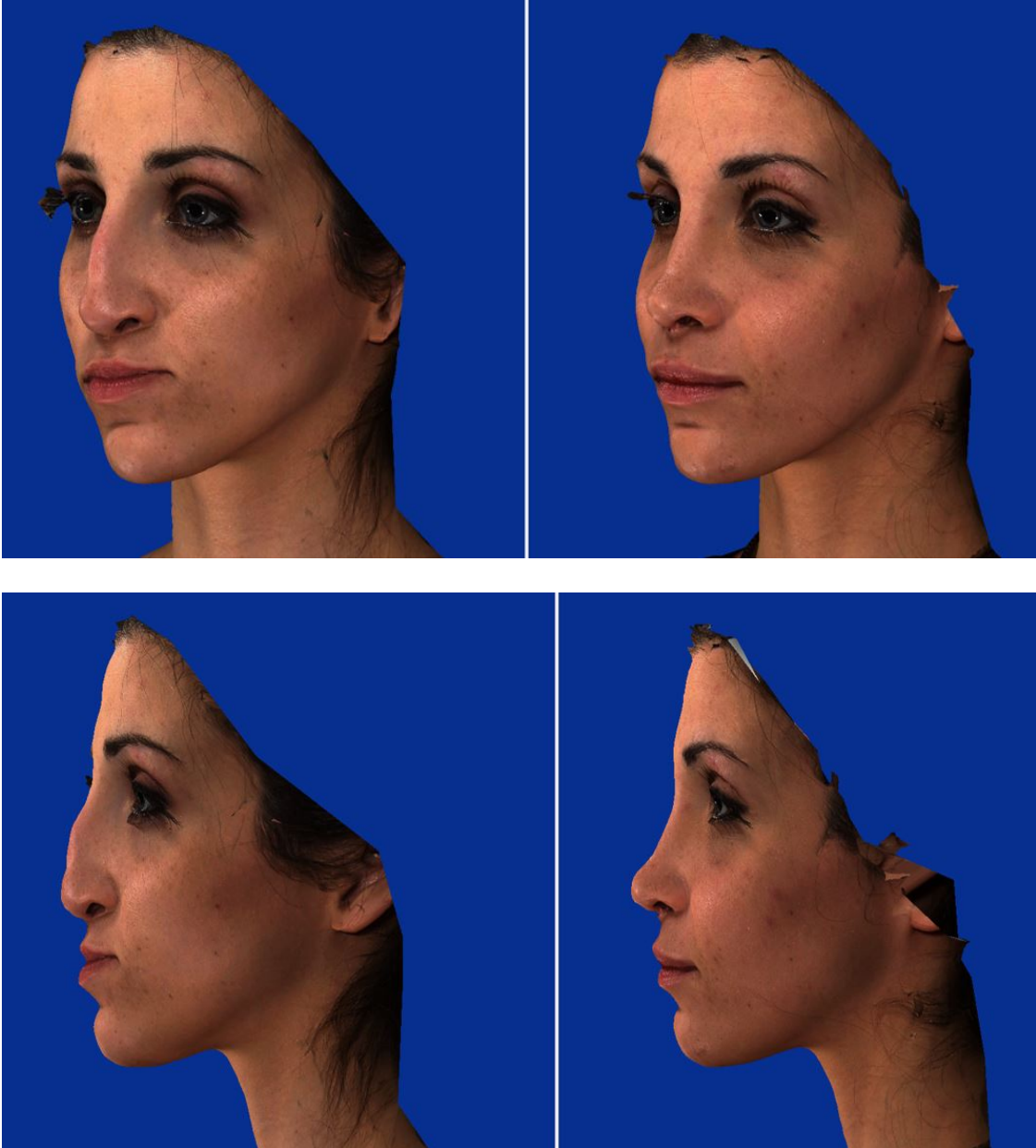
Three-dimensional (3D) analysis and planning is a powerful tool in plastic surgery — one that can improve diagnoses, patient communication and education and intraoperative transfer for optimal results, according to a recently published [paper](#) on 3D applications for plastic surgery planning.

Senior author Derek M. Steinbacher, M.D., D.M.D., director of craniofacial surgery at Yale Plastic and Reconstructive Surgery, New Haven, Conn., tells *Cosmetic Surgery Times* that he uses 3D analysis and planning with as many of his patients as possible.

“Certainly, with [almost] every cosmetic patient,” he says.

Dr. Steinbacher, who uses the Vectra 3D camera (Canfield) and a 3D CT technology (Materialise), says 3D analysis can increase efficiency and accuracy for many cosmetic surgical procedures. The application is especially useful for procedures involving bone reduction or repositioning, and when placing implants for cosmetic purposes (breast, mandibular or facial). The utility is less, at least for now, for soft-tissue only procedures like face and neck lift, skin resurfacing and abdominoplasty, he says.

“It’s not as suitable to use for abdominoplasty because you’re not repositioning hard-tissue or placing an implant, so there are no guides generated for intraoperative repositioning and no predictable response of placing an implant. However, 3D imaging can serve as an effective communication tool in patients presenting for a tummy-tuck or facelift, where image simulation can depict the goals for the desired post-operative abdominal or facial contour. However, it is not as predictive as when used for rhinoplasty, breast augmentation or aesthetic orthognathic jaw surgery,” Dr. Steinbacher says.



Patient shown before and after jaw surgery and rhinoplasty with 3D image from two vantage points. Photos courtesy Derek M. Steinbacher, M.D., D.M.D.

Application in the Cosmetic Practice

Joe Niamtu, III, D.M.D., an oral and maxillofacial surgeon with a practice limited to cosmetic facial surgery in Richmond, Va., says 3D planning has limited application in his current practice, which for 15 years has been focused on surgery of the aging face.

“There are not a lot of soft tissue applications for this type of technology,” Dr. Niamtu says.

Where he does use a similar technology is in genioplasty surgery and to make custom facial implants.

“I have a cone beam CT scanner in my office specifically for these applications,” Dr. Niamtu says.

Dr. Niamtu, who before limiting his practice to cosmetic surgery practiced as an oral and maxillofacial surgeon, performed a lot of trauma, reconstruction and orthognathic surgery. He says he agrees with 3D planning’s value.

“I have ample experience in the shortcomings of doing surgery prior to this technology,” Dr. Niamtu says. “Although this type of technology and surgical guidance is in its infancy, great strides are being made with diagnosis, treatment, surgical guidance, prosthetics, custom implants and 3D models. Again, most of these current applications are for hard tissue applications, but this will permeate all areas of surgery in the future.”

Still, the surgeon’s skill and expertise are paramount to repeatable outcomes, especially when it comes to orthognathic or reconstructive procedures.

“Much of the actual treatment is in reality an educated guess or approximation based on experience. This is something that is difficult to teach, learn, duplicate or quantify. It is a learned skill set that comes from hundreds or thousands of procedures,” Dr. Niamtu says.

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Three-dimensional planning can eliminate some of the guesswork for plastic surgeons and others by simplifying and replicating some of the steps in these surgeries that have been more conceptual than physical, according to Dr. Niamtu.

“It was not that we did not apply metrics to previous surgical technique, it is more that we were using two-dimensional x-rays with plaster models and direct impression techniques. All of these are fraught with inaccuracies when it comes to moving the facial skeleton in terms of millimeters. We relied primarily on splints for repositioning and stabilizing, and these were fabricated with manual technologies that are not as accurate as computer guidance and fabrication,” he says.

3D Pointers and Pitfalls

In a recent *Cosmetic Surgery Times* survey question, 47% of readers responded that they use 3D imaging system to simulate treatment results for patients. The rest indicated they do not use the technology.

Dr. Steinbacher says today’s cosmetic surgeons use 3D planning at various levels.

“Certainly... , there are more 3-dimensional assessment and analysis tools available, so practitioners use these technologies to look at the existing preoperative state and as a patient communication tool, to better define and outline what their aesthetic goals are,” he says. “The next level is trying to incorporate simulation. That’s also an effective tool, where you can create something that you think is feasible and achievable, surgically, and then ensure that the patient understands and is in agreement with the surgical goals and desired realistic result.”



Breast augmentation patient shown before (left) vs. simulation (middle) vs. actual after (right). Photos courtesy Derek M. Steinbacher, M.D., D.M.D.

Altering the images can become tricky for less experienced cosmetic surgeons who change pictures digitally, but not in ways that are biologically possible, according to Dr. Steinbacher.

“The less experienced surgeon must take care to not give an unrealistic expectation of what can be achieved as a result during the simulation. One must know the limits of what is possible biologically and what may happen with time, with tissue settling, scar contracture and so forth. It is advisable to create a more conservative simulation, to avoid giving a false expectation or false representation of what can feasibly be achieved.” he says. “The naysayers or those skeptical of using [3D technology] voice this as a concern. They don’t want to promise a patient that they can achieve something that may not be possible or give the patient false hope or expectations.”

While Dr. Steinbacher doesn’t use a special consent form for the 3D planning in plastic or reconstructive surgery, he says it’s clearly noted on the images that these are simulated results only, they are not representative of actual results and in no way guarantee actual results.

3D planning is not yet the gold standard approach in cosmetic or reconstructive surgery, according to Dr. Niamtu.

“In many cases, the expense outweighs the benefit, these surgeries can take a lot longer, in some instances, and inaccuracies can still occur with this technology, so, it is not fool proof,” Dr. Niamtu says. “There is no doubt, [however,] that this type of technology will be a game changer and paradigm shift.”

Disclosures: None

Reference:

Pfaff MJ, Steinbacher DM. Plastic Surgery Applications Using Three-Dimensional Planning and Computer-Assisted Design and Manufacturing. *Plast Reconstr Surg*. 2016 Mar;137(3):603e-616e.