A Three-Dimensional Printed Tool for Precise and Easy Umbilical Identification during Abdominoplasty

The umbilicus, albeit small, holds significant aesthetic value as the focus of the abdomen.[1] The attention paid to this structure during abdominoplasty is of high importance and it can be challenging or time-consuming to relocate the umbilical stalk without efficient tools or techniques. The authors propose a simple technique that uses an inexpensive, three-dimensional printed tool to permit quick and accurate location of the umbilical stalk before creation of the opening for the new umbilicus.

The tool resembles a hollow, bottomless pyramid with a 3.5 cm base length. A pyramidal design offers an apex that can be palpated without collapsing under pressure. Its hollow quality allows lateral collapsibility for easy removal. The tool has suture tabs and slots to pass a suture through and allow for securing to the fascia. The tools were printed on an Original Prusa SL1 3D printer using 85A TPU Flexible Filament 1.75 mm with 0.3 mm layer at 465°F. The tools were steam-sterilized with appropriate controls in autoclave. Versions of the tool with adjusted dimensions were used in heavier patients whose skin thickness necessitated a more prominent marker of the enclosed umbilical stalk.

After muscle plication, the tool was placed on top of the umbilical stalk, enclosing it. A single 3-0 polydioxanone suture stitch was secured through the pyramid's slots and suture tabs. [**See Video 1 (online)**, which demonstrates the pyramid enclosing the umbilical stalk.] The superior abdominal skin flap was then lowered into position, trimmed, and secured inferiorly at the suprapubic incision site with sutures. The location for the opening of the new umbilicus was then attempted through palpation along the abdominal skin flap's midline. [**See Video 2 (online)**, which demonstrates palpation and detection of the tool.] The concealed apex was definitively located where the opening for the new umbilicus was created. The tool's securing suture was removed and the collapsible sides were pinched in order to remove the tool easily from the body. [**See Video 3 (online)**, which demonstrates the tool's flexibility during extraction from the opening.] The umbilical stalk was in the exact spot of the new umbilicus, which was inset in the usual fashion. The tool was discarded after a single use.

Other tools with a similar purpose are not as easily produced or effective in diverse patient populations, unlike our tool's thoughtful design and open source that readily allows customization.[2,3]

This tool was used successfully in 12 abdominoplasties using progressive tension sutures.[4] There were no complications or infections from the use of the tool. A spool of filament, which can print 200 to 250 pyramids, each taking 1 to 2 minutes to print, costs less than $30. The ability to create this tool using only a computer and three-dimensional printer represents an affordable and efficient way to locate the new umbilical opening, saving the surgeon time while achieving a more desirable aesthetic outcome.

Related digital media are available in the full-text version of the article on www.PRSJournal.com.

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Monica Vegiraju, BS
Texas A&M College of Medicine
Dallas, TX
Brian Mirth
Austin Mirth
Malcolm Rude, MD
Brazos Valley Plastic Surgery
College Station, TX

Correspondence to Monica Vegiraju
3600 Gaston Avenue, Wadley Tower Suite 280
Dallas, TX 75246
vmonica98@tamu.edu

PATIENT CONSENT

The patient provided written informed consent for use of the patient's images.

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DISCLOSURE

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Neuroaesthetics in Plastic and Reconstructive Surgery: Opportunities for Interdisciplinary Collaboration

Neuroaesthetics is a burgeoning discipline concerned with the neural basis for the perception and creation of art[1] and neuroscientific mechanisms of human aesthetic experiences.[2] Research in this field has combined principles of neurology, neuroanatomy, psychology, and art history to answer

questions about the experience of beauty.[2] Vision has received particularly close attention, especially human perception of faces, paintings, landscapes, and architecture.[3]

Neuroaesthetics has made meaningful contributions to unraveling neurologic mechanisms underpinning the aesthetic experience, previously regarded as a philosophical concept. Research has demonstrated aesthetic evaluations are important for human activity in consumer behavior, mate selection, and determination of morality.[4] The field has identified neuroanatomic structures implicated in the perception of beauty broadly, notably the medial orbital frontal cortex, as well as cortical and subcortical structures specific to certain visual or auditory experiences.[2]

Within plastic surgery, neuroaesthetics overlaps with the specialty's goal of characterizing optimal aesthetic outcomes for people. Plastic surgery research on aesthetic preferences may be augmented through collaboration with our colleagues in neuroaesthetics, who offer valuable expertise in neuroscience and aesthetic principles. In return, plastic surgery offers clinical, anatomic, and human aesthetic perspectives that may broaden the neuroaesthetic scope of inquiry. The fields complement one another to enhance the sophistication of questions posed, data generated, and analyses of those data.

One example of such a collaboration is the University of Pennsylvania's Center for Human Appearance, in which neuroaesthetics, plastic surgery, oral surgery, dermatology, oculoplastic surgery, and ear, nose, and throat play key complementary roles in designing studies that enhance understanding of appearance and clinical outcomes. Examples of the center's initiatives include employing crowdsourcing to compare layperson aesthetic preferences, applying eye-tracking technology to characterize gaze patterns toward visual stimuli, and leveraging face databases to associate character traits to those with facial anomalies.[1] Such studies have had an effect on understanding clinical outcomes in aesthetics, craniofacial surgery, and breast surgery. These clinical studies may be augmented with techniques common to the neuroaesthetics toolbox, including functional magnetic resonance imaging or magnetoencephalography to characterize brain activity in response to visual stimuli or convolutional neural networks to learn image features from datasets.[5] Other efforts to leverage architectural and artistic principles are also poised to improve health care infrastructure and optimize the patient experience.

Plastic surgery has not been regarded as a subdomain of neuroaesthetics inquiry. Plastic surgery would be an asset to the evolution of neuroaesthetics and should seek opportunities to foster relationships with colleagues in this nascent field. This convergence of interests is an exciting opportunity to continue plastic surgery's history of collaboration to answer unique, multidisciplinary questions with implications for the outcomes of our patients.

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Dillan F. Villavisanis, BA
Linton A. Whitaker, MD
Division of Plastic and Reconstructive Surgery
Children's Hospital of Philadelphia
Penn Center for Neuroaesthetics
Perelman School of Medicine at the
University of Pennsylvania

Anjan Chatterjee, MD
Penn Center for Neuroaesthetics
Perelman School of Medicine at the
University of Pennsylvania

Jesse A. Taylor, MD
Division of Plastic and Reconstructive Surgery
Children's Hospital of Philadelphia
Penn Center for Neuroaesthetics
Perelman School of Medicine at the
University of Pennsylvania
Philadelphia, PA

Correspondence to Dr. Taylor
Division of Plastic and Reconstructive Surgery
Children's Hospital of Philadelphia
3401 Civic Center Boulevard
Philadelphia, PA 19104
jataylor@gmail.com

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Ten Community-Informed Principles for Plastic Surgeons Beginning Gender-Affirming Care

As demand for gender-affirming surgery increases, increasing numbers of plastic surgeons are entering the field or expanding their current practice to include gender-affirming procedures.[1] However, most graduating and nearly all practicing plastic surgeons will not have had any formal training in principles of gender-affirming care.[2] Although robust clinical guidelines for medical and surgical care are available, there is