Periareolar closure in augmentation, mastopexy, and breast reduction has evolved dramatically over the past 10 years with changes in technique and technology. Plastic surgeons have tried many techniques from simple purse string closures using permanent sutures to interlocking purse string closures with Gore-Tex (Gore Medical, Newark, DE) or absorbable sutures. Running and interrupted suture techniques or combinations of both have all been utilized.

I began using absorbable barbed sutures in 2007 for abdominoplasty to eliminate knot tying and decrease complications associated with permanent sutures such as knot palpability, extrusion, and infection. I then applied this new suture technology to surgical closures of the breast and developed a technique for periareolar closure that has improved my efficiency.

**OPERATIVE DETAILS**

First the areolar is marked into eight quadrants. A surgical staple is placed at the 12 o'clock position to stabilize the tissues. Starting at the 6 o'clock position of the areola, a double-armed 2-0 polydioxanone (PDO) Quill (Surgical Specialties Corporation, Wyomissing, PA) suture is looped to include the subdermal areolar tissues and the two corners of the adjacent skin comprising the top of the vertical limb. Each arm of the barbed suture is deployed in the subdermal plane and passed up to the 12 o'clock position in an interlocking fashion, catching both the areolar tissues and the respective skin edges of the corresponding circumferential pattern (Figure 1).

At the 12 o'clock position, both arms of the PDO are pulled superiorly to cinch the closure to the desired size. Once set, the barbs hold the areolar size and can be further adjusted by additional pull. A video depicting cinching of the interlocking purse string is available as Supplementary Material.

A single back throw of the suture locks it in place without the need for knot tying. The same procedure is then repeated with a double-armed 3-0 Monoderm Quill (Surgical Specialties Corporation, Wyomissing, PA) suture for the subcuticular closure. A video demonstrating complete layered barbed suture closure is available as Supplementary Material.

The average time for periareolar closure with running barbed suture was approximately 8 minutes, while the interrupted suture closure averaged a few minutes more, at approximately 12 minutes.

**MY EXPERIENCE**

I performed this closure in 322 patients (644 breasts) from 2007 to 2014. These included all procedures in which a periareolar closure was needed. The average age of my patients was 47, with an average BMI of approximately 24. Despite this, there were patients in all age groups (19-79) and weight classes (BMI 18-53). A summary of the patient demographics in this population can be found in Table 1.

**OUTCOMES**

Complications, based on 644 areolae, included eight hematomas (1.2%), three instances of partial thickness necrosis (0.5%), and eight (1.2%) patients with various wound healing complications, including suture extrusion, superficial

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dehiscence, or delayed wound healing. Infection occurred in three patients (0.5%) and deep vein thrombosis was noted in one patient (0.15%). The mean follow-up time was 12 months with a range from 6 to 24 months. A clinical example is shown in Figure 2.

The challenge in maintaining the areolar diameter comes when the closure material has to resist skin tension that favors widening. This is very common in procedures such as augmentation combined with mastopexy. Conversely, when a vertical scar component is added to the periareolar scar, these forces can be diminished. Similarly, in breast reduction where volume is decreased, widening forces on the periareolar scars are generally reduced.

Table 1. Patient Demographics

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Total Cases</th>
<th>Average Age (years)</th>
<th>Age Range (years)</th>
<th>Average BMI</th>
<th>BMI Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduction Mammaplasty</td>
<td>86</td>
<td>48</td>
<td>19–79</td>
<td>28</td>
<td>21–53</td>
</tr>
<tr>
<td>Mastopexy</td>
<td>90</td>
<td>50</td>
<td>21–79</td>
<td>24</td>
<td>18–38</td>
</tr>
<tr>
<td>Augmentation Mastopexy</td>
<td>146</td>
<td>44</td>
<td>20–72</td>
<td>23</td>
<td>18–32</td>
</tr>
<tr>
<td>Total Cases Reported</td>
<td>322</td>
<td>47</td>
<td>19–79</td>
<td>24</td>
<td>18–53</td>
</tr>
</tbody>
</table>

These variables, in addition to unreliable methods of direct or indirect post operative areolar measurement, make quantitative comparison with other suture techniques extremely difficult. That being said, my subjective experience with this technique shows it to be comparable to smooth suture with regard to areolar widening and scar quality.

**COST**

The cost of the barbed suture closure as described is about $31 and includes one double-armed 2-0 PDO and one double-armed 3-0 Monoderm. This is approximately $14 more than using PDS and Monocryl (Ethicon, Somerville, NJ), which is the non-barbed equivalent.

**CONCLUSION**

My periareolar closure technique prior to 2003 involved interrupted sutures for the deep layer and running sutures for the subcuticular layer. From 2003 to 2007, I performed periareolar closures with running GORE-TEX sutures (Gore Medical, Newark, DE) for the deep layer and did not like the occasional complications encountered. These included knot palpability, extrusion, and infection. In addition, with non-interlocking techniques, I would occasionally encounter a “cerclage” effect with the areola herniating through the simple purse-string, forming a ring-like structure with areolar widening beyond it (Figure 3).

With the advent of absorbable barbed suture in 2007, I changed to the technique described to achieve a faster, running, knotless closure. Distribution of tension at multiple points along the whole length of the wound in an interlocking fashion preserved areolar shape and size. Absorbable sutures eliminated permanent foreign bodies under the thin areolar soft tissues, with their inherent complications. I found that we simply did not need permanent sutures to get permanent results.

Although the barbed sutures added an additional charge of $14 compared to the smooth sutures, it is still a nominal upcharge to the total case cost and did save us a few minutes of closure time.
The interlocking purse-string technique, combined with absorbable barbed suture technology, is my preferred technique since it eliminates tedious knot tying, is reliable in preserving areolar size, reduces the inherent long-term complications associated with permanent sutures, and is somewhat faster to perform.

**Supplementary Material**

This article contains supplementary material located online at www.aestheticsurgeryjournal.com.

**Disclosures**

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**REFERENCES**


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**Figure 2.** (A, C, E) Preoperative and (B, D, F) 9-month postoperative photographs of a 22-year-old woman following a 400 gram breast reduction using a 4.2 cm areolar template. Note periareolar size preservation and excellent scar quality.

**Figure 3.** This photograph of a 37-year-old female, taken 7 years after undergoing augmentation-mastopexy, demonstrates the “cerclage effect” deformity associated with herniated areolar contents and “spread effect” beyond the boundaries of the permanent purse-string suture.

