Nipple reconstruction is an essential procedure to change an amorphous breast mound to a distinct breast. Various skin flaps have been proposed for nipple reconstruction. In the C-V flap technique, which is one of the most commonly used flaps for nipple reconstruction, the scar that is developed after closure of the donor site of the V-flap frequently extends beyond a new areola area. To reduce the length of the donor site scar, various modifications of the C-V flap have been proposed. We adopted the semilunar flap instead of the V flap of C-V flap by changing the angle of V flap for nipple reconstruction. The semilunar flap design allowed generation of a donor flap with sufficient width and length of the skin flap for a nipple barrel without increasing the length of the donor site scar. In most cases, the semilunar flaps showed stable outcomes and resulted in angled donor-site scars that were usually located within the boundary of a new areola. We think the semilunar flap represents a good alternative method in nipple reconstruction by changing the angle of the donor-site scar and leaving the scar length within the new areolar area. (Plast Reconstr Surg Glob Open 2018;6:e1947; doi: 10.1097/GOX.0000000000001947; Published online 18 December 2018.)

PATIENTS AND METHODS
Between March 2017 and April 2018, a total of 20 nipple reconstructions were performed using a semilunar flap on reconstructed breast mounds after breast implant by the single surgeon. The follow-up period ranged from 6 to 12 months.

Surgical Techniques
The nipple position was marked in the upright position for preoperative flap design. The width of the flap varies from 10 to 13 mm, according to the contralateral nipple size. We modified the horizontal lateral V flap of the C-V flap to a semilunar shape that was angled toward the superior direction. The angle of the semilunar flap axis was approximately 45 degrees. The length of the semilunar flap was usually approximately 2 times the width of the flap base. We designed the semilunar flap and C-flap in the center of the proposed nipple position (Fig. 1A). The skin flap was elevated with a #15 blade from the distal end, and the proximal site of the flap base was meticulously elevated with blunt dissection to secure circulation to a skin flap. After completion of flap elevation, the donor site of the semilunar flap was closed from the distal to proximal side with interrupted suture using #5-0 nylon suture. The bilateral ends of the semilunar flap were brought together and fixed to the skin edge of the donor site of the C-flap with a #5-0 nylon suture, forming a barrel. The left distal parts (dotted area) of the semilunar flap after making a barrel were discarded and fixed to each other. The inner edge of the semilunar flap was connected to the C-flap (Fig. 1B). The area was covered with 2-layered 5-mm foam dressings for protection from external compression for 3
weeks. The suture material was removed at postoperative 2 weeks.

RESULTS

There was no flap necrosis, infection, and wound dehiscence in these 20 cases. In 1 case, the distal margin of the flap was partially congested due to unexpected external compression by a brassiere on the immediate postoperative day. We revised the distal part of the flap at 2 weeks postoperative and noted that the size of nipple was slightly decreased as a result of the revision. The scar at the donor site of the semilunar was confined within the area of the new NAC (Fig. 1 C, D). The mean outer limb length of the semilunar flap was 25.5 mm, the mean inner limb length was 13.6 mm, and mean postoperative scar length of the donor site was 15.3 mm (Table 1 and Fig. 1). The final scar length of semilunar flap is 1–2 mm longer than the length of inner limb of semilunar flap. Postoperative views of the nipple reconstruction with semilunar flap are shown in Figure 2. Areolar reconstructions by tattooing were usually performed 3 months after nipple reconstructions.

DISCUSSION

A variety of techniques have been developed to generate skin flaps for nipple reconstruction to maximize aesthetic outcomes and overall patient satisfaction. In most methods, the skin flaps were elevated from the area of the future NAC, and a donor-site scar that remains beyond the future areolar area, reduces the aesthetic outcome of a reconstructed nipple. The C-V flap, one of most popular methods in nipple reconstruction, has the drawback that the donor-site scars frequently extend beyond the boundary of the NAC. A larger V flap produces a longer length of the scar on the future areolar area. To reduce the length of the donor-site scar, various modifications of the C-V flap have been developed. The design of 2 V flaps was changed to “V” and “M” patterns at each end that fit into each other like a jigsaw piece on closure, with the advantage of reducing the dog ear deformities. The C-Y

| Preoperative Limb Length | Postoperative Scar of a Semilunar Flap (mm) |
|--------------------------|------------------------------------------|
| Outer Limb (a) | Inner Limb (b) | Flap (mm) (c) |
| 1 | 25.0 | 12.0 | 14.0 |
| 2 | 27.0 | 15.0 | 17.0 |
| 3 | 26.0 | 13.5 | 15.0 |
| 4 | 24.0 | 13.0 | 14.0 |
| 5 | 26.0 | 14.5 | 16.0 |
| 6 | 27.0 | 15.0 | 16.0 |
| 7 | 26.0 | 13.0 | 15.0 |
| 8 | 26.0 | 14.0 | 16.0 |
| 9 | 25.0 | 14.0 | 16.0 |
| 10 | 25.0 | 12.5 | 14.0 |
| 11 | 25.0 | 12.0 | 14.0 |
| 12 | 25.0 | 13.0 | 15.0 |
| 13 | 24.0 | 12.0 | 14.0 |
| 14 | 26.0 | 14.0 | 16.0 |
| 15 | 25.0 | 13.0 | 15.0 |
| 16 | 26.0 | 15.0 | 16.0 |
| 17 | 25.0 | 13.0 | 14.5 |
| 18 | 27.0 | 15.0 | 17.0 |
| 19 | 25.0 | 14.0 | 16.0 |
| 20 | 25.0 | 13.5 | 15.0 |
| Mean | 25.5 | 13.6 | 15.3 |
trilobed flap proposed by Butz et al.\textsuperscript{5} has focused on the donor-site scar length by modification of the end of the V-flap to a Y pattern.

We adopted the semilunar flap instead of the V flap for nipple reconstruction. The semilunar flap design allowed generation of a donor flap with sufficient width and length of the skin flap for a nipple barrel without extending the length of the donor-site scar beyond the future areolar area. We think that the semilunar flap has several advantages. First, the donor-site scar was usually confined to the boundary of the NAC, except in patients with a very small areola. Second, the angled skin flap was more easily approximated with each end than a straight lateral skin flap for generation of a cylindrical shape; therefore, the tension to the skin flap base was much less, and usually the distal parts of the semilunar flap were left and could be discarded. Third, in comparison with the straight lateral flap, the axis of the semilunar flap is relatively parallel to the axis of the entire skin flap to secure the blood supply of the lateral wing of the skin flap.

The semilunar flaps showed stable outcomes and resulted in aesthetically pleasing donor-site scars that were usually located within the boundary of the new areola. We think the semilunar flap represents a good alternative method in nipple reconstruction by changing the angle of the donor-site scar and leaving the scar length within the new areolar area.

\textbf{REFERENCES}

1. Sierakowski A, Niranjan N. Star flap with a dermal platform for nipple reconstruction. \textit{J Plast Reconstr Aesthet Surg}. 2011;64: e55–e56.
2. Rubino C, Dessy LA, Posadinu A. A modified technique for nipple reconstruction: the ‘arrow flap’. \textit{Br J Plast Surg}. 2003;56: 247–251.
3. Losken A, Mackay GJ, Bostwick J 3rd. Nipple reconstruction using the C-V flap technique: a long-term evaluation. \textit{Plast Reconstr Surg}. 2001;108:361–369.
4. El-Ali K, Dalal M, Kat CC. Modified CV flap for nipple reconstruction: our results in 50 patients. \textit{J Plast Reconstr Aesthet Surg}. 2009;62:991–996.
5. Butz DR, Kim EK, Song DH. C-Y trilobed flap for improved nipple-areola complex reconstruction. \textit{Plast Reconstr Surg}. 2015;136:234–237.