The shape of reconstructed breast is mainly affected by the skin envelope and breast parenchyma. In autologous reconstruction, skin envelope reconstruction is especially important given the flexibility of new breast parenchyma. With the advent of textured tissue expanders (TEs) that help produce thin and distensible capsules, reconstruction of the skin envelope has become easier. We and other researchers have reported a better control of breast shape with subcutaneous TE placement compared with submuscular TE placement. There is no need to expand the pectoralis major muscle, and moreover, we speculate that capsule formation might be different in subcutaneous TE placement compared with submuscular TE placement. To elucidate this hypothesis, we collected capsules formed around the TE in two-stage breast reconstruction patients and evaluated differences in histology and capsule wall thickness between subcutaneous (n = 7) and submuscular (n = 8) TE placement. Our findings show that subcutaneous TE placement results in thinner capsule formation with low vascularity when compared with submuscular TE placement (354 ± 96 μm and 589 ± 92 μm, respectively; P < 0.001). Because thin connective tissue can reduce postoperative shrinkage of the skin envelope, it would be beneficial to predict and control the shape of reconstructed breast. Although further study is needed, differences in vascularity between subcutaneous tissue and muscle might affect the thickness of capsules.

From the Department of Plastic and Reconstructive Surgery, Graduate School of Medicine, Osaka University, Osaka, Japan.

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and submuscularly in 8 patients with implant reconstruction (mean age, 45.5 years; range, 40–50 years). None of the patients underwent pre- or postmastectomy radiotherapy. The inserted TE was removed 6 months later, and a capsule segment measuring 2 × 1 cm was collected from the center of the dome, fixed, and stained with Masson’s trichrome (Sigma). Microscopic examination and capsule wall thickness measurement using a public domain image software (ImageJ, Wayne Rasband, National Institute of Health, Bethesda, Md.) were then performed. A Student’s *t* test was used to assess differences in capsule wall thickness between the subcutaneous and submuscular groups. *P* < 0.01 was considered statistically significant.

Most capsules consisted of 3 layers as previously reported, that is, the inner layer in contact with the TE, the middle layer with dense connective tissue, and the outer layer with loose connective tissue and high vascularity. In the submuscular group, connective tissue in the middle layer was relatively thick, and large-diameter blood vessels were found in the middle layer and in the outer layer (Fig. 1B). By contrast, in the subcutaneous group, the middle layer was composed of thin avascular connective tissue, and the vascularity of the outer layer was low with some small-diameter vessels (Fig. 1A). The capsule wall was significantly thinner in the subcutaneous group (354 ± 96 μm) than in the submuscular group (589 ± 92 μm; *P* < 0.001).

The present study shows that subcutaneous TE placement results in thinner capsule formation with low vascularity compared with submuscular TE placement. Because thin connective tissue can reduce postoperative shrinkage of the skin envelope, it would be beneficial to predict and control the shape of the reconstructed breast. Although further examination is necessary, differences in vascularity between subcutaneous tissue and muscle might affect the thickness of capsules.

Koichi Tomita, MD, PhD
Department of Plastic and Reconstructive Surgery
Graduate School of Medicine
Osaka University
2-2 Yamadaoka, Suita, Osaka 5650871, Japan
E-mail: ktomita9@hotmail.co.jp

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