Sir:

We have read with great interest the article entitled “Preoperative and Postoperative Assessment of Rectus Abdominis Muscle Size and Function following DIEP Flap Surgery” by Seal et al. in Plastic and Reconstructive Surgery. In this article, the researchers innovatively adopted objective and subjective measurements to assess rectus abdominis muscle size and function following deep inferior epigastric artery perforator (DIEP) flap surgery and came to the conclusion that there was no significant atrophy of the operative rectus muscle and that the rectus muscle retained contractile function. What is most ingenious about the design of this successful study is that the intelligent researchers focused solely on unilateral DIEP flap patients and regarded the nonoperative contralateral muscle of these patients as an internal self-control, thus eliminating the variability in lifestyle or deconditioning that may have occurred postoperatively and simplifying the research procedure at the same time. We would like to congratulate Shane K. F. Seal et al. for their wonderful article. With years of clinical experience in DIEP flap surgery, some problems related to the reliability and credibility of this study still need to be clarified.

Our questions are as follows. First, the researchers did not designate a specific level at which they obtained measurements of the anteroposterior length, transverse length, and cross-sectional area. There is no doubt that the results, derived from comparison among preoperative and postoperative measurements at different levels, would have relatively less consistency. Recently, a successful study was performed that aimed to evaluate donor-site morbidity after DIEP flap breast reconstruction with the help of computed tomography, with standardized transverse sections of the abdominal wall with four definite zones: zone A, 5 cm cranial to the umbilicus; zone B, umbilical level; zone C, central zone (midway between zones B and D); and zone D, 5 cm cranial to the pubic symphysis. Thus, we suggest that these researchers should adopt an analogous four zones to improve the credibility and effectiveness of their study.

Second, it is apparently unreliable that they infer the postoperative rectus abdominis muscle function from three groups of measurements obtained from dynamic ultrasound. The integrity of the rectus abdominis muscle would be damaged to a certain degree because of the intramuscular dissection, thus resulting in scar formation in the rectus abdominis, ultimately making their measurements unauthentic. Therefore, we disapprove of their using similar volume measurements from ultrasound to predict the function of the resting rectus abdominis muscle. We highly recommend that they adopt conventional methods to evaluate the function of the rectus abdominis muscle, such as isokinetic dynamometry, electromyographic studies, and a grading scale or test for rectus abdominis muscle function. Finally, some factors the article did not mention exert a huge influence on the size and function of the resting rectus abdominis muscle after DIEP flap surgery, such as preservation of the segmental motor nerve and the location and number of the selected perforators. Obviously, those with preservation of the segmental motor nerve will not develop neurodegenerative atrophy. Lateral perforators tend to have...
a more direct course through the muscle, leading to less intramuscular dissection. Medial perforators, however, may have a long, complicated, and oblique intramuscular course, with numerous subsidiary muscular branches along the way, leading to more intramuscular dissection–induced injury. The factors mentioned above would have a great influence on measurements of postoperative rectus abdominis.

In conclusion, what makes us feel gratified is that the researchers provide us with an objective and subjective scheme for assessing the size and function of the rectus abdominis muscle. We anticipate that the DIEP flap, a modification of the transverse rectus abdominis musculocutaneous flap, is bound to be regarded as the gold standard for breast reconstruction in the future, with further comprehensive assessment of the morphology and function of the rectus abdominis muscle after DIEP flap surgery is carried out.

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REFERENCES

Reply: Preoperative and Postoperative Assessment of Rectus Abdominis Muscle Size and Function following DIEP Flap Surgery

Sir:

We are thankful for the opportunity to reply to commentary on our recently published article, “Preoperative and Postoperative Assessment of Rectus Abdominis Muscle Size and Function following DIEP Flap Surgery,” published in the May of 2018 issue of Plast Reconstr Surg. In preparation for this study, our research team took a great deal of time in planning the methods to prospectively assess rectus muscle change and postoperative hernia rate in unilateral deep inferior epigastric artery perforator flap patients.

All abdominal computed tomographic measurements were standardized to a point 30 mm below the center of the umbilicus and read by a single radiologist. With regard to four zones for measurement of the rectus muscle, we were conscious of radiation exposure for our patients, and therefore chose a limited zone for postoperative computed tomographic scanning. Four zones could certainly give more information, but we question the utility of zone A, as it is out of our surgical dissection area. In our experience, most of the perforators we use occur at or just below the umbilicus. Our measurements 30 mm below the center of the umbilicus represented the most likely area of postoperative change. We are not certain whether further areas of measurement would change the results of this study, although we agree that future studies would benefit by collaborating with the methods of other researchers.

Our secondary outcome measurement was designed to obtain a functional correlation to our static computed tomographic primary outcome data. To our knowledge, there is no single standardized functional muscle assessment tool. Our literature review found multiple studies using dynamic ultrasound to visualize rectus thickness and contractility, and these are cited in our Introduction. Other modalities such as electromyography and isokinetic dynamometry are alternative options for functional muscle assessment, but we felt that dynamic ultrasound would give us the information we desired, which was whether or not the rectus muscle was contractile.

The final query was with regard to surgical factors that may affect postoperative rectus abdominis function, such as segmental motor nerve preservation, location of dissected perforators, and number of perforators used. These are certainly valid factors that could affect the rectus muscle after a deep inferior epigastric artery perforator flap dissection. We did record perforator number and location, but our study was not powered to look at these factors individually. In light of the low hernia rate in our study and other retrospective studies, a high number of subjects would likely be required to discern rectus muscle outcome differences attributable to perforator location or number. We