Improving Abdominoplasty Results: Reconstruction of the Linea Alba Sulcus by Direct Fat Excision

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Background: A shallow vertical midline epigastric sulcus between rectus abdominis muscles is an attractive element of abdominal surface anatomy in slender, youthful women. Many patients presenting for abdominoplasty do not have this feature, and for those who do have it preoperatively, suture plication of anterior rectus sheath during the procedure can obliterate it.

Objective: This article describes a technique to improve patient satisfaction with epigastric contour following abdominoplasty by establishing a visible linea alba sulcus.

Methods: After elevation of the abdominoplasty skin flap, a precisely marked thin vertical strip of fat deep to Scarpa’s fascia is carefully excised from the neoumbilical location on the flap to the deep fascia superficial to the xiphoid process. Postoperatively, the epigastrium is drained to prevent seroma, and a vertical soft bandage roll is applied on the skin over the sulcus beneath an elastic abdominal binder for gentle compression.

Results: The technique has been applied in 25 abdominoplasty procedures with good patient satisfaction. Complications included 1 epigastric seroma, 1 over-resection resulting in an unnatural appearing vertical epigastric crease, and 2 under-resections that did not achieve a visible epigastric sulcus postoperatively.

Conclusions: When carefully performed in selected patients, creation of a linea alba sulcus by direct excision of deep fat from the abdominoplasty flap can enhance aesthetic results of abdominoplasty without increased morbidity. (Aesthetic Surg J 2006;26:682–686.)

The abdominal wall contour of the youthful, slender, and fit woman often includes a vertical midline sulcus corresponding to the natural depression of the linea alba between bilateral rectus abdominis muscles.1 In many cases, this sulcus extends from the intermammary space or xiphoid to the umbilicus and sometimes may extend, though usually less well defined, just below the umbilicus (Figure 1). Edges of the sulcus are soft and gradual rather than sharp, reflecting the contour and slight separation of the medial edges of the underlying rectus muscles. A technique of cautious and conservative direct surgical removal of fat deep to Scarpa’s fascia in the epigastrium has been added during abdominoplasty to reconstruct this sulcus, and has been successfully applied in over 25 patients.

Patient Selection

Many candidates for abdominoplasty present with amorphous abdominal surface anatomy. Childbirth, aging and/or excess weight can often result in loss or obscuring of the youthful lean abdominal wall. In the abdominoplasty patient with a pre-existing visible linea alba sulcus, plication of anterior rectus sheath during the procedure can eliminate this feature. Direct excision of fat deep to Scarpa’s fascia may be added to abdominoplasty to reconstruct the linea alba sulcus.

The technique is relatively contraindicated or must be very conservatively applied in patients with remaining epigastric skin redundancy after inferior advancement of the abdominoplasty flap, including those patients undergoing abdominoplasty or abdominal panniculectomy after massive weight loss. In these individuals, remaining skin redundancy may preferentially crease at the site of midline fat excision, creating a deformity. Reverse abdominoplasty may be required to correct this problem.

Technique

After the abdominoplasty flap was developed, exposing the anterior rectus sheath in the epigastrium, and midline suture plication was accomplished, the operating
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The table was flexed slightly at the hips. Use of a bright fiberoptic headlight was found to provide adequate illumination. Skin attachments lateral to deep fascia plication sutures and near the costal margins were mobilized sufficiently so that the plication did not bunch epigastric skin and create any epigastric skin redundancy. The abdominoplasty flap was pulled caudad to ensure accomplishment of tension-free closure.

The location of the umbilical stalk was projected anteriorly and marked on the abdominal flap. The vertical mid-epigastric linea alba sulcus was marked on abdominal skin from xiphoid to the umbilicus. A long curved Allis clamp was used to grasp the deepest and most caudal moiety of deep epigastric midline fat on the underside of the flap just cephalad to the location of the neoumbilicus.

While an assistant provided caudal and anterior counter traction from the distal end of the abdominoplasty flap, a narrow and shallow strip of deep fat with tapered edges bilaterally was separated by electrocautery dissection from the underside of the epigastrium, corresponding to the planned dimensions of the sulcus. This dissection began at the location of the Allis clamp and progressed superiorly in the midline to the xiphoid. Additional clamps were used to grasp the fat as needed.

Using the clamp(s) for counter traction, a strip of fat was removed that was uniform in width and thickness. Width and thickness of the excision were roughly proportional to the thickness of the patient’s epigastric subcutaneous fat pad. A 1.5-cm–wide superficial excision was adequate for a thin patient, but deeper excision up to 3 cm wide was required to achieve a visible linea alba in the heavier patient. Extreme care must be exercised at every moment during fat excision to avoid wandering too superficially, which can result in surface contour irregularities and skin injury. My preference is to be overly conservative, generally keeping the dissection deep to Scarpa’s fascia to avoid thinning the flap excessively. The excision and its effect on surface anatomy can be examined from the deep side of the flap and the superficial side, respectively, and revised as indicated before completing the abdominoplasty.

Prior to wound closure, 10-mm self-suction drains were positioned beneath the abdominoplasty flap, one vertically in the epigastrium and the other across the lower abdomen, exiting at the lateral extremes of the closure. Postoperative dressings included petrolatum-impregnated gauze over all wounds, a rolled-up Abd pad (Kendall Tendersorb Wet Pruf, Tyco Healthcare Group LP, Mansfield, MA) placed vertically from xiphoid to umbilicus beneath a Combine Abdominal Roll (Dukal Corporation, Hauppauge, NY) across the abdomen, and then a snugly applied abdominal binder (Dale Medical Products, Inc., Plainville, MA).

Results

No patients have expressed dissatisfaction with the results of this contouring technique, and many have been very pleased with their new or re-established linea alba sulcus (Figures 2 through 4). Forward and lateral flexion have...
not caused irregularity of the reconstructed sulcus. The poorest outcome was a frank midline vertical epigastric crease, resulting from a combination of over-resection of fat and epigastric skin redundancy in a weight-loss patient. Two patients had no visible sulcus postoperatively. These patients were treated before I began adding gentle vertical midline compression with a rolled up Abd pad beneath the abdominal binder as part of the postsurgical bandage.

**Discussion**

Traditional abdominoplasty reconstructs a more youthful and lean shape by removing excess skin and by tightening postpartum abdominal wall redundancy. Results can be embellished by aesthetic umbilicoplasty, individualized flap advancement, meticulous wound closure, and attention to other details of the procedure. Any additional techniques to improve abdominoplasty results must not further compromise blood supply to the abdominoplasty flap, which is devascularized during the procedure. Matarasso specifically advocates preservation of flap thickness between Scarpa's fascia and epigastric skin during full abdominoplasty to maintain midline crossover of blood flow. Lipoplasty of the abdominoplasty flap was not performed in this series.

Liposuction and/or liposculpture have been widely applied to shape the abdominal surface. Gradinger demonstrated direct excision of midepigastic fat to reconstruct linea alba surface anatomy without a specific description. Because this excision does not diminish blood supply to the abdominoplasty flap, is quick to perform, and can result in improved patient satisfaction with the procedure when carefully accomplished in selected patients, it has been a valuable addition to my surgical routine. Given that abdominal surface anatomy can be very beautiful without a well-defined linea alba sulcus, and that removal of excessive midline fat may create a deformity that is difficult to correct or, worse yet, may injure overlying skin, it is always best to err on the side of under-resection.

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*Figure 2. A, C, Preoperative views of a 54-year-old mother of 5. B, D, Postoperative views 2 months after abdominoplasty with direct excision of vertical midline sub-Scarpa's fat to create a linea alba sulcus.*

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Figure 3. A, C, Preoperative views of a 35-year-old mother of 3. B, D, Postoperative views 4 months after abdominoplasty with direct fat excision to create a linea alba sulcus.

Figure 4. A, C, Preoperative views of a 44-year-old mother of 7, including twins. B, D, Postoperative views 3 months after abdominoplasty with direct fat excision to create a linea alba sulcus.
Conclusion
Reconstruction of the linea alba sulcus can enhance the results of aesthetic abdominoplasty. For successful results, the procedure requires careful patient selection and a conservative operative approach.

Acknowledgment
The assistance of Debbie White in this study is gratefully appreciated.

References

Accepted for publication October 2, 2006.
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1090-820X/$32.00
doi:10.1016/j.asj.2006.10.023