

## Abdominal Etching: Differential Liposuction to Detail Abdominal Musculature

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**Abstract.** Male athletes seeking improvement in the detail of their abdominal musculature have traditionally utilized vigorous exercise and a tightly controlled diet. Abdominal etching is a technique devised to enhance the appearance of the abdominal musculature by removing fat with liposuction at variable levels. The abdominal musculature is topographically visualized as the linea alba, linea semilunaris, and the transverse tendinous intersections within the rectus abdominus muscle. These landmarks are enhanced with localized superficial liposuction to deepen the natural grooves or furrows in these areas. We have performed abdominal etching on eight male patients with good to excellent results and minimal risks.

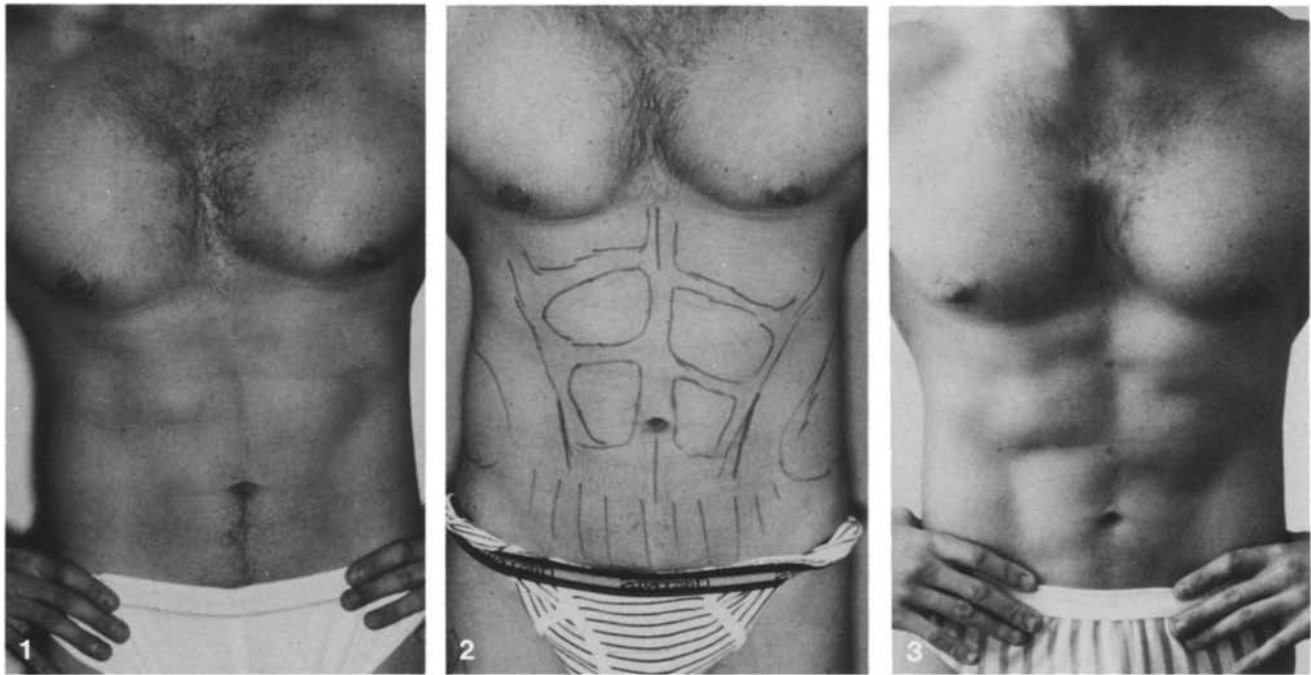
**Key words:** Abdominal etching—Liposuction, superficial

Male athletes frequently seek consultation to obtain a rippled “washboard” appearance of their abdominal muscles. Vigorous exercise and a tightly controlled diet are not enough for many patients. Traditional abdominal lipoplasty utilizes deep liposuction and generally leaves a subcutaneous pad of fatty tissue over the entire abdominal wall. This preserves subdermal fat and minimizes irregularities. This traditional technique fails to achieve the “washboard” aesthetic goal because subdermal fat obscures the muscular detail. The purpose of abdominal etching is to achieve the desired aesthetic appearance of a muscular abdomen or “washboard” stomach. This is accomplished by

modifying the existing principles of the wet technique and superficial liposuction. Localized superficial liposuction is performed using a small cannula to create or enhance a skin fold or crease. Illouz first reported the enhancement of a skin fold by using superficial liposuction in the infragluteal crease to shape the infragluteal fold [3]. Gasperoni reduced the risk of irregularity by decreasing the size of the cannula [1]. The abdomen inherently is a difficult area for liposuction. It has been classified as a “problem” area for liposuction [4]. Persistent wrinkling is a frequent sequelae and an irregular contour may be produced. For these reasons, liposuction on the abdomen has been performed on the deeper fatty layers to prevent unaesthetic furrows and dimples.

The male athlete seeking refined abdominal musculature presents with distinct preoperative anatomy and unique goals. These patients are young with vigorous lifestyles. Exercise schedules are rigorous and patients may be on a tight dietary regime. Total body fat may be in the range of 8%–15%. They are physically fit with good muscular bulk. Their chief complaint is the moderate layer of fatty tissue on the abdomen that erases muscular detail. Their goal is specific reduction of fatty tissue to enhance and “detail” the muscular abdomen. To achieve this goal, detailed preoperative markings, a modified wet technique, and vigorous superficial liposuction in specific areas are used. Generalized deep liposuction is performed to thin the abdominal fat pad when necessary, and superficial liposuction outlines the more distinct grooves or furrows separating the muscles. This differential liposuction technique is used to enhance the detail of the abdominal musculature.

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**Fig. 1.** Twenty-eight-year-old patient before surgery

**Fig. 2.** Detailed preoperative markings of the abdominal musculature

**Fig. 3.** Six months after abdominal etching

### Patients and Methods

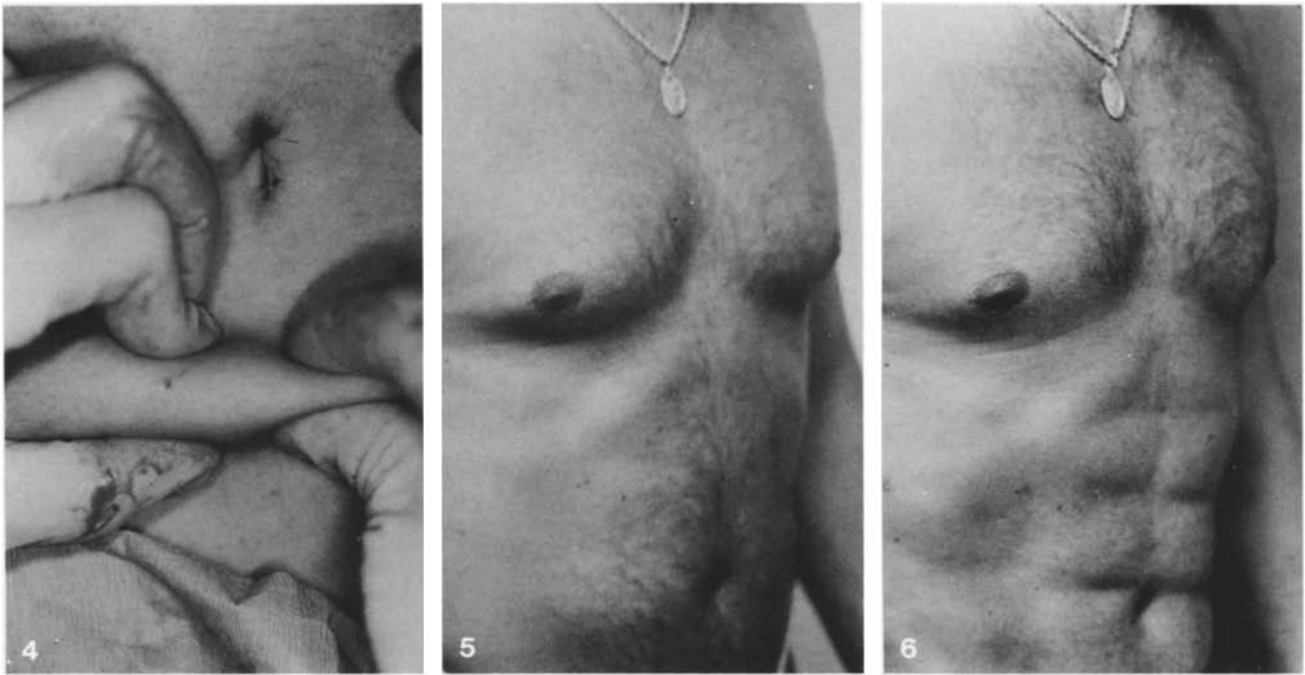
This study reviews eight patients treated with abdominal etching (Fig. 1). All patients chosen for this procedure were healthy males in excellent physical condition who desired an improvement in the appearance of the abdominal musculature. In particular, these patients desired a "washboard stomach." All patients were examined, and the operation and risks were discussed thoroughly.

Detailed preoperative markings were performed with patients in a standing position (Fig. 2) since the soft tissue orientation changed significantly with the patient lying down. The patient could flex his abdominal muscles to assist in the definition of the musculature detail. The medial and lateral edges of the rectus muscle were marked at the linea alba and linea semilunaris. Transverse intersections or inscriptions of the rectus muscle were also marked separately. Marks for incisional punctures were made in the pubic hair at the lateral edge of the rectus and at the midline for liposuction of the linea semilunaris and linea alba. An umbilical puncture was used for access to the linea alba and the lowest of the rectus inscriptions. Another two punctures were made in the midline at the upper two rectus inscriptions.

The 2-mm puncture incisions were made with a #11 blade. Punctures were stretched with an iris

scissor. The infusion fluid was a mixture of 1 L of normal saline with 1 cc of 1:1000 epinephrine and 50 cc of 1% lidocaine. An infusion pump was used to deliver the infusion fluid into the subcutaneous fat. The cannula passed just under the skin. The areas were filled with the fluid until a *peau d'orange* appearance of firmness was achieved. An approximately 15-min delay was allocated for vasoconstriction.

Following this, a 2- or 3-mm flat Becker-style liposuction cannula was used for superficial liposuction in the marked areas. The cannula was used with the openings facing the skin; then the cannula was flipped over and used with the openings facing the muscular surface. (A modified cannula has been developed for use in these cases and is presently being utilized.) A groove was created to the desired depth. Superficial liposuction was continued at the marked areas until there was apparent furrowing or deepening of the natural crease on the table. The pinch technique can be used to check for the thickness of the fat pad (Fig. 4). The surgeon then began wide liposuction of the deeper fatty tissues. Deep liposuction was performed using a small Mercedes cannula (1.5–2.5 mm), leaving a thicker fat pad in the islands where muscular enhancement was necessary. A pinch test typically demonstrated less than 1 cm at the area of superficial liposuction and a 1–2-cm fatty



**Fig. 4.** Pinch test demonstrating the thick and thin areas of differential liposuction

**Fig. 5.** Thirty-five-year-old patient before surgery

**Fig. 6.** Same patient three months after etching

pinch overlying the muscle bulk. Typically, there is an immediate enhancement of the abdominal contours. This technique often creates moderate erythema on the skin surface overlying the superficial liposuction that may last 24 hours. Superficial thinning is also performed lateral to the rectus muscles to enhance the result.

The puncture sites were closed using a single 5-0 nylon suture, and the patient was placed in an abdominal garment. Hemoglobin levels were checked preoperatively and postoperatively. Sutures were removed on the 7th postop day, and exercise was allowed on the 14th postop day.

## Results

Eight male patients were treated with abdominal etching over an eight-month period (Fig. 3). Followup was three to eight months. The patients selected had extensive preoperative consultation, during which postoperative and long-term expectations were discussed. The average age was 32 years, and this select group averaged four workouts per week. Most patients also reported an increase in their workouts and exercise programs after surgery.

All patients were operated on by the authors using

the pressure infusion technique [2]. Fat aspirate from the abdomen was minimal with a mean measurement of 581 cc of infiltrated fat. Most patients had liposuction performed in several areas. Pre- and postoperative hemoglobin changes were minimal. Patients resumed normal activities in one to ten days and were back to regular exercise activities in five to 30 days. Patients were telephoned by our nursing staff for postoperative questions. Only one reported pain to be severe; he had received liposuction in multiple areas. The other seven reported the pain to be mild to moderate. All patients reported postop results to be above or at preop expectations except one. All patients were satisfied and all reported that they would undergo the procedure again.

## Discussion

Traditional abdominal lipoplasty incorporates deep liposuction and wet techniques in order to prevent contour irregularities. A subdermal pad of fatty tissue is necessary to prevent excess wrinkling and contour irregularities on the abdomen. This technique does not accomplish the goals of young male athletes who desire a "washboard" appearance.

In the healthy male, the topographical anatomy

of the abdominal muscles is typically covered by the superficial fatty layer and the deep membranous fatty layer, preventing visualization of the muscular detail described. To visualize the anatomy, the abdominal musculature must have adequate volume and tone, and total body fat must be in the range of 8%–15%.

There are three intertendinous insertions of the rectus abdominis muscle. Insertions may be at the same level, side to side, or offset at different levels. They can be classified as three different types. The first type of intertendinous intersection is transverse, extending perpendicular to the linea alba. The second type is oblique or Chevron, and the third type is stair-step. These tendinous intersections may be irregular and are typically asymmetric. Levels of the intersections can differ from side to side and may be offset several centimeters. Typically, the lowest insertion is at the level of the umbilicus. The other two intersections lie more superiorly. The technique used for superficial liposuction in these cases is essentially the same. Etching is performed only to deepen the natural creases.

Special techniques have been used to enhance abdominal contours. Extensive preoperative marking, pressurized infusion of the wetting solution, and liposuction at variable levels or differential liposuction are used together to enhance abdominal musculature. Preoperative markings are placed with the patient standing and flexing if necessary. Detailed marking and assessment are necessary because creating nonanatomic furrows in patients without adequate musculature may lead to an unaesthetic and unnatural look.

Pressurized subcutaneous delivery of the infiltration solution has six technical advantages:

1. It enables the surgeon to distribute the solution more evenly because the area infiltrated is superficial and more easily seen and evaluated.
2. It is safer because the delivery tip is always seen and never plunges deeply, risking damage or perforation of deep structures.
3. The subcutaneous plexus of vessels is more directly exposed to the vasoconstrictive solution. Direct and extensive subcutaneous expansion may cause vessel stretch and enhance vasoconstriction. These two properties combine with the effects of epinephrine to reduce intraoperative and postoperative blood loss [2].
4. It reduces contour irregularities. Subcutaneous delivery causes an expansion or magnification of the infiltrated area. The large amount of tumescent fluid delivered expands the subcutaneous area by two or three times. This effect reduces the relative cannula and tunnel size. For example, an area infiltrated is expanded or magnified two times, and a 3-mm cannula is used to create 3-mm tunnels. After

the tumescent fluid is reabsorbed, the area shrinks by two times, returning to the original size. The tunnel size is effectively reduced to 1.5 mm. This reduces the effective cannula size and can reduce blood loss and postoperative contour irregularities. The deeper tissues are not infiltrated and require more fat removal. These are safe areas for 2–4-mm cannulas and tissue magnification is not necessary. Furthermore, liposuction of these deeper tissues does not routinely have consequences of rippling and contour irregularities.

5. It may improve postop intravascular volume depletion by adding a reservoir of subcutaneous interstitial fluid.

6. The large volume infiltration reduces postoperative pain in the first 24 hours because the subcutaneous reservoir contains lidocaine.

Differential liposuction is used to enhance the detail of the abdominal musculature. In abdominal etching, it is used to define the abdominal muscles. The subdermal fat pad can be thinned over the muscular junctions with superficial liposuction and can be left thicker over the muscle bellies to exaggerate the abdominal muscle bulk. Lateral thinning over the oblique muscles can enhance this effect further.

## Conclusion

The technique presented here was designed specifically for the male body builder to enhance the appearance of developed abdominal musculature (Fig. 5). The procedure has minimal risks and is performed easily. Patient satisfaction has been above the expected outcome. With appropriate patient selection and application of lipoplasty principles, the technique can give predictable, long-term, favorable results (Fig. 6). With the new concept of differential liposuction, the lipoplasty surgeon can truly sculpt the body by creating smooth and retracted skin to enhance underlying anatomical features. A larger series with longer followup will be necessary to determine the long-term efficacy of the procedure.

## References

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