# Skin Retraction and VASER® Ultrasonic Lipoplasty

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## Background

Since the inception of lipoplasty, postoperative skin laxity has been a concern, especially in older patients. While sagging of the skin following lipoplasty can occur with the reduction in underlying fat volume, the goal with liposuction is to have the skin redrape naturally over the underlying structures. To address the limitations of previously available devices, Sound Surgical Technologies incorporated significant design and technology improvements into the development of the VASER Lipo System, a third-generation ultrasound-assisted lipoplasty (UAL) platform. As a result, VASER technology has been shown to produce excellent skin retraction while minimizing or eliminating thermal complications.[1]

## Theories of Skin Retraction

The dermis consists of 2 basic layers: a superficial, or papillary, layer and a denser reticular layer that is interspersed with collagen, vasculature, and isoelastic tissue. Combined, these layers are generally 2 mm to 4 mm in thickness. Between the dermis and the underlying fascia and muscle is a fatty layer of varying thickness. Traditional lipoplastic treatment of the deep and intermediate fatty layers alone reduces volume, but skin retraction is limited. To achieve finer sculpting and greater skin retraction, the subdermal fatty layer also must be treated.[1]

A number of theories exist to explain how and why skin retracts as a result of lipoplastic procedures, including:

- Natural skin retraction
- Reduction of subdermal fat volume
- Thermal and mechanical remodeling

## Natural Skin Retraction

In general, skin possesses a natural ability to stretch and contract. This is in large part due to the isoelastic fibers interspersed throughout the skin. These isoelastic fibers also connect the skin and underlying fatty tissue. Removing volume from the subdermal fatty layer via the application of energy stimulates the contraction of these fibers and creates space for contraction, resulting in the natural correction of skin laxity.

## Reduction of Subdermal Fat Volume

The subdermal fatty layer, being comprised primarily of water, cannot be compressed. Since the skin and fat are connected by a tissue matrix, these 2 planes are interdependent. Because the subdermal fatty layer cannot be compressed, the fatty layer itself limits skin contracture. Thinning the superficial fatty layer reduces the subdermal, non-compressible volume, creating a potential space just beneath the dermis. This new space allows for and encourages the dermal layer to contract.

The isoelastic fibers that connect the skin and underlying fatty tissue work to distribute load between the 2 layers. Removing volume from the fatty layer partially shifts the load to the skin

**Pre** **6 Months Post**

34 year-old white female; VASER High Definition Lipo of the abdomen and flanks; aspirate - 1,600 cc (posterior) and 800 cc (anterior).

**Pre** **1 Year Post**

26-year-old white male; VASER High Definition Lipo of the abdomen, back and flanks; fat transfer to the chest; total aspirate – 2,000 cc.

layer, causing contracture. For optimal loading shift to occur, the fatty layer should be reduced to roughly the thickness of the skin. However, if the isoelastic structure is severed, its load drops to zero and load-sharing contraction will not occur. Therefore, in lipoplasty procedures, contraction is optimized if the isoelastic connective structure is left intact.

## Thermal and Mechanical Remodeling

When an instrument of any kind is introduced into the subdermal tissue, the consequent tissue disruption and inflammation may result in the stimulation of the connective tissue and the formation of fibrotic scar tissue. The newly formed subdermal scar tissue tends to contract, thereby placing additional internal traction on the dermis. These forces of traction encourage the skin to contract and redrape over the underlying muscular and boney structures. However, the scarring process must be controlled to avoid undue damage to the connective tissue, which is key to skin retraction.[2,3]

Similarly, the application of heat or thermal energy to the subdermal region may promote the creation of new collagen as part of a wound healing response that contributes to dermal remodeling (Figure 1). However, while laser-assisted lipolysis (LAL) and older continuous-energy UAL platforms use energy to break down fat, both are associated with excessive and uncontrolled heat delivery that may increase the risk of thermalcomplications such as seroma, burns, excessive scarring, and skin necrosis.[1,4,5]

## Controlled Remodeling and Preservation of the Connective Tissue Matrix

If the connective matrix is damaged or partially removed during liposculpture, especially in the subdermal layer, the capacity of the skin to produce retraction is diminished, impeding the body's natural ability to correct skin laxity.[2,3] Suction-assisted lipoplasty (SAL) cannulas are designed to forcibly remove fat without the benefit of prior emulsification. Sharp edges in standard cannulas may cause excessive damage to and partial excision of the connective tissue matrix. Since LAL is associated with uncontrolled heat delivery, these platforms also run a significant risk of causing indiscriminate damage to the support matrix and other tissue. This indiscriminate

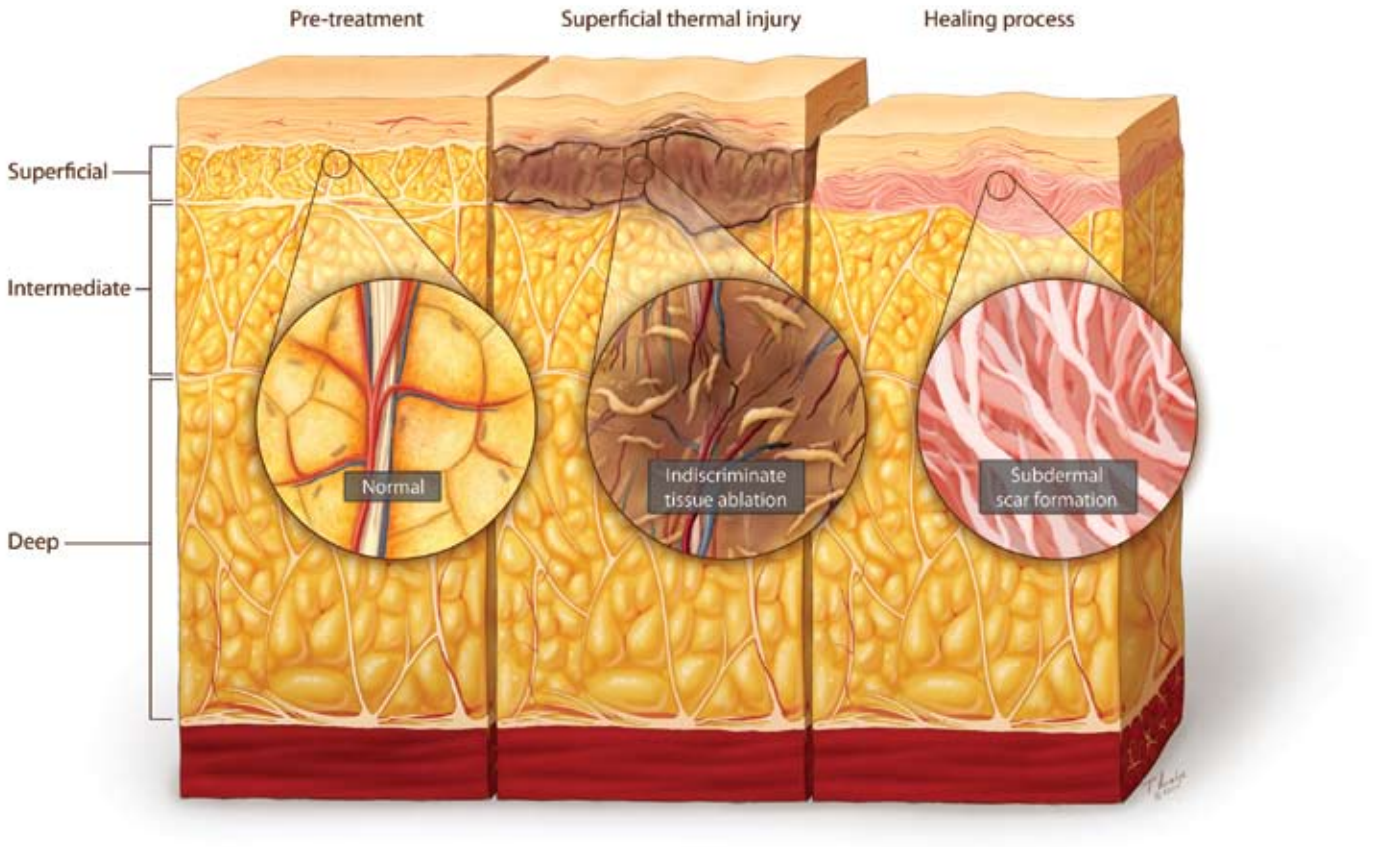


Figure 1: Indiscriminate Thermal Injury

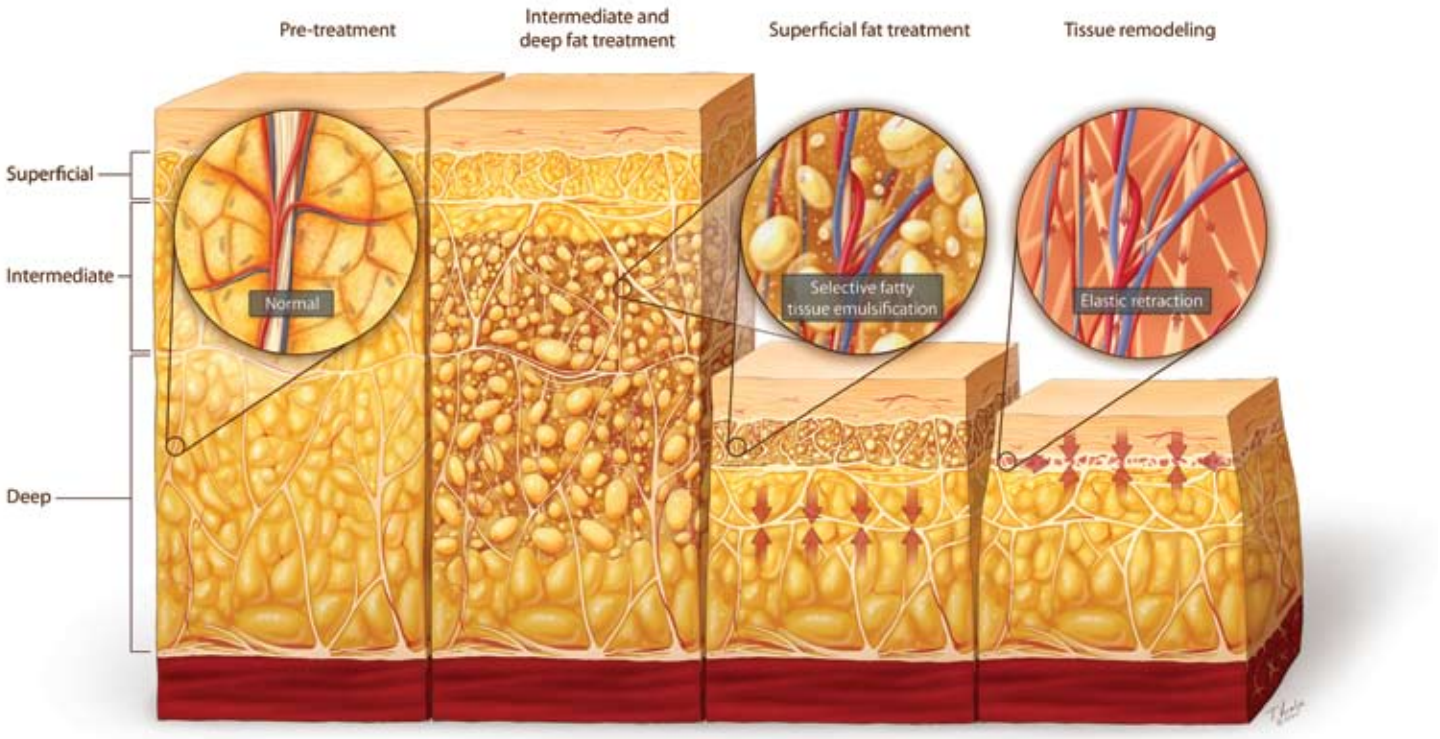


Figure 2: Controlled Remodeling (VASER Mechanism)

ablation can reduce the ability of the skin to retract.

In contrast, the VASER Lipo System's solid, smaller-diameter titanium probes and choice of 1, 2, or 3 tip grooves provide more treatment options and enhance the surgeon's ability to address the superficial layer of fat with more efficient and precise delivery of ultrasound energy than previous UAL platforms.[3,6] In addition, VASER technology offers a choice of continuous or pulsating ultrasound energy delivery, allowing the surgeon to tailor the approach according to the extent of fibrous tissue.[6] In the pulsating mode, the VASER System uses roughly half of the ultrasound energy of previous UAL platforms to emulsify the same amount of fat, thus reducing the risk of excessive mechanical and thermal injury and damage to the connective matrix. As a result, VASER probes may be used safely and effectively in the subdermal fatty layer, thereby producing greater skin retraction and, ultimately, better patient results (Figure 2).[3,4,6]

## The Role of Aspiration in Skin Retraction

Aggressive aspiration following emulsification has also been associated with damage to the connective tissue matrix in the fatty layer. The VASER System is an efficient and effective modality that is tissue-selective, which helps to preserve the connective tissue during the emulsification process. The VASER System includes specially designed VentX® cannulas that provide gentler suction, which also contributes to the preservation of the connective tissue matrix. In addition, VentX cannulas are extremely efficient, offering a unique handle vent that continuously clears the suction tube to encourage smooth, uninterrupted, and faster aspiration.[3,7]

## Summary

The VASER System's efficient use of power and smaller, solid probes reduce the risk for heat-related complications and connective matrix damage associated with LAL, SAL and previously available UAL platforms. The more efficient and precise VentX cannulas decrease the likelihood of inadvertent tissue damage in the aspiration phase.[1,3] In light of these advantages, the VASER Lipo System is ideal for safely thinning the subdermal plane while preserving the underlying connective tissue, thereby encouraging the greatest possible skin retraction.[1]

While superficial sculpting requires a significant time commitment and a level of artistry to achieve optimal

results, the design advancements inherent in the VASER Lipo System, along with sufficient training in its use, provide the surgeon with the ability and confidence to effectively treat the superficial fatty layer and maximize skin retraction.

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Dr. Broadway is a preeminent cosmetic surgeon based in Colorado and one of only a few in the field who are certified by the American Board of Plastic Surgery, the American Board of Facial Plastic and Reconstructive Surgery, and the American Board of Otolaryngology.

In addition to providing patients with the latest cosmetic procedures, Dr. Broadway is an international instructor, using the state-of-the-art bod:evolve facility he created and shares with his partner to train other surgeons in advanced cosmetic techniques such as VASER High Definition Liposculpture. He has served as a clinical instructor at the University of Illinois College of Medicine, the University of Colorado School of Medicine, and the Department of Plastic and Reconstructive Surgery at the University of Missouri.

Dr. Broadway also volunteers his time and services as a member of Operation Smile, an organization that corrects congenital and acquired deformities in children from rural areas worldwide and developing countries such as China, the Philippines, Colombia, and Ecuador.