

Barbed sutures “lunch time” lifting: evidence-based efficacy

Bishara S Atiyeh, MD, FACS,¹ Saad A Dibo, MD,² Michel Costagliola, MD,³ & Shady N Hayek, MD⁴

¹Clinical Professor, Division Plastic and Reconstructive Surgery, American University of Beirut Medical Center, Beirut, Lebanon

²Resident PGY 2, Department of Surgery, American University of Beirut Medical Center, Beirut, Lebanon

³Department of Plastic Surgery, University of Toulouse, Toulouse, France

⁴Assistant Professor, Division Plastic and Reconstructive Surgery, American University of Beirut Medical Center, Beirut, Lebanon

Summary

There is a growing trend nowadays for patients to seek the least invasive treatments possible with less risk of complications and downtime to correct rhytides and ptosis characteristic of aging. Nonsurgical face and neck rejuvenation has been attempted with various types of interventions. Suture suspension of the face, although not a new idea, has gained prominence with the advent of the so called “lunch-time” face-lift. Although some have embraced this technique, many more express doubts about its safety and efficacy limiting its widespread adoption. The present review aims to evaluate several clinical parameters pertaining to thread suspensions such as longevity of results of various types of polypropylene barbed sutures, their clinical efficacy and safety, and the risk of serious adverse events associated with such sutures. Early results of barbed suture suspension remain inconclusive. Adverse events do occur though mostly minor, self-limited, and of short duration. Less clear are the data on the extent of the peak correction and the longevity of effect, and the long-term effects of the sutures themselves. The popularity of barbed suture lifting has waned for the time being. Certainly, it should not be presented as an alternative to a face-lift.

Keywords: thread lifting, facial rejuvenation, aptos thread

Introduction

Uneven focal ptosis of the soft tissues of the frontal, infraorbital, zygomatic, buccal, mental, and submental areas occurs as the human face ages.¹ Techniques in rejuvenating the aging face have evolved from skin tension-based procedures such as the mini face-lift, to a variety of subcutaneous, sub-SMAS (superficial muscle aponeurotic system), and subperiosteal planes of dissection.² Irrespective of the specific technique, any lifting procedure has to consider first the fact that deeper tissues need to be repositioned or augmented before attempting to excise and tighten the skin.³ For each

technique, maintaining the position of elevated soft tissues by nonabsorbable or absorbable sutures is essential.²

Surgical lifting with excision of excessive skin has been the standard of care for decades providing a radical solution and achieving dramatic improvements in the face and neck.^{1,4} Recent appreciation and understanding of the essential vectors that need to be applied for proper soft tissues elevation have optimized the results by repositioning ptotic soft tissues in a more logical vertical direction.² Surgical interventions, however, may be fraught with possible peri-operative complications such as infection, skin necrosis, hematoma, seroma, and injury to frontal and marginal mandibular facial nerve branches, in addition to the associated risks involving general anesthesia or other forms of conscious sedation.⁴ They result also in noticeable scars and are usually associated with lengthy “down-time” periods.^{1,4,5} It has

Correspondence: Shady N. Hayek, MD, Instructor, Division Plastic and Reconstructive Surgery, American University of Beirut Medical Center, Beirut, Lebanon. E-mail: sh16@aub.edu.lb

Accepted for publication February 23, 2010

been claimed that the long-term results of some surgical techniques may not justify the severity of the intervention performed.¹

Since the earliest reports of surgical facial rejuvenation, the search for more durable and less invasive means as alternatives to the traditional facelift has continued.^{4,6} The growing trend nowadays is for patients to seek the high-quality results of expertly done facelifts with the least invasive treatments possible and with less risk and downtime.^{4,7-9} In many situations patients prefer minimally invasive procedures and are willing to trade a more modest degree of cosmetic improvement in exchange for decreased morbidity.⁴

Nonsurgical rejuvenation by volumetric enhancement with various types of interventions including contour injections with a variety of gels or fat has added the "third dimension" to facial rejuvenation.^{1,2,10-12} However, though aesthetically pleasing results have been reported and may be achieved when performed by experts having an artistic flare, rejuvenation with soft tissue fillers in general may result in puffiness with unnatural contours, visually shifting the center of gravity of the face downward.¹ Using chemical peels or any other ablative or nonablative resurfacing technique, on the other hand, makes it possible to obtain superficial cutaneous improvement, but certainly will not adequately tighten and lift the underlying ptotic tissues, a critical step needed to achieve a more youthful appearance.^{1,13}

Suture suspension of the face, although not a new idea,^{6,14-16} has gained prominence with the advent of the so-called "lunch-time" face-lift. To counteract the descent and laxity of the tissues, this procedure entails the passage of sutures under the skin of the face and neck. It avoids large incisions, significant undermining, or substantial recovery time.^{6,16} Although there has been substantial mention in the popular press, little information exists in the plastic surgical or dermatologic literature regarding the safety, efficacy, longevity, or complications of these suspension procedures.⁶ The present review aims to evaluate several clinical parameters pertaining to thread suspensions: the clinical efficacy and longevity of results of various types of polypropylene barbed suture; the in vivo safety of permanently implanted barbed suture; and the risk of serious adverse events associated with such sutures.

Methodology

This review is not to duplicate the recently published systematic review of Villa *et al.*⁶ who were able to identify only six studies addressing midface elevation

with barbed thread suspension that tested a hypothesis or clearly identified outcomes. It has a different perspective. Irrespective of the validity of the evidence presented, the study is aimed at evaluating the general views expressed in the recent literature that have contributed to the popular myth about barbed sutures lifting while distinguishing evidence-based efficacy from empirical observation and opinion. Medline, PubMed, Embase, and Elsevier searches using the keywords "feather lift," "thread lift," "Aptos," "barbed suture," and "suture suspension" were performed to identify all possible recent relevant reports about facial rejuvenation with thread lifts including reports about physical properties and biodynamics of barbed sutures. These reports were supplemented with papers identified in the reference lists of the selected publications. None were excluded and all expressed opinions were summarized. Conclusions, however, were based on the six studies already expertly identified.

Suture suspension of soft tissues

The use of sutures, nonabsorbable or absorbable, has certainly been the mainstay of supporting repositioned soft tissues.^{5,3} Suspension techniques for facial rejuvenation are performed usually in conjunction with traditional facelift incisions. Cutaneous suspension, internal suture aponeurotic suspension, or deep subperiosteal suspension can be achieved with autologous tissue such as tendon and fascia or prosthetic materials, including sutures, slings, and mesh.^{4,6,18-21} Various types of suture material have been used for that regard in particular polytetrafluoroethylene (Gore-Tex; W. L. Gore and Associates, Inc., Flagstaff, AZ, USA), polyglactin 910 (Vicryl; Ethicon, Inc., Somerville, NJ, USA), and polypropylene sutures.⁶ Among the many suspension techniques, two general concepts of facial rejuvenation are evolving in parallel at this time.^{18,22-24} Subcutaneous suspension using the SMAS as the structure of fixation with vectors of posterior vertical elevation is one concept the other is based on subperiosteal undermining and repositioning en bloc of all the structures, with a purely vertical vector.^{18,25}

The value of soft tissue suspension in modern day facial rejuvenation techniques is best illustrated by the recently described minimal access cranial suspension (MACS) lift. It represents an evolution that seeks to balance procedural invasiveness with recovery time through a short scar lift of the lower and middle third of the face using a pure vertical vector suspension^{26,27} and platysma-SMAS plication (PSP).²⁸ Suspension techniques have been incorporated also into minimally

invasive endoscopic-assisted mid and lower face-lift procedures. It allows through minimal incisions the elevation, repositioning, and anchoring of the mid and lower face to the superficial temporal fascia or to the bone by sutures.¹⁸

Simple transcutaneous smooth suture elevations may provide simple solutions to some conditions such as for brow or midface elevation with little morbidity.^{5,29,30} The so-called Curl Lift is a recently described minimally invasive office procedure. It is a subtle lift using a special needle with a nylon or polypropylene, nonabsorbable, non-barbed suture thread. The tread acts like a sling and attaches the area of the face or neck that is being "lifted" to a stationary point on the scalp.³¹ The Arch Lift is a new variation proposed to improve the results of the Curl Lift. It uses a braided nonabsorbable suture to increase the interaction and fibrosis around and through the suture. A different approach is also used distributing the upward tension over an arch, pulling the whole midface and upper neck.³¹ Multiple looping sutures placed at various points in the face have been recently described but all lacked evidence of follow-up beyond the immediate or very short-term postoperative period.³² In general the results of such procedures are mostly unpredictable. Sutures tend to cut through too easily, and the disturbing puckering and pleating of the surrounding skin usually resolve with a concomitant loss of lifting effect.^{5,29,30} Suture suspension techniques of Keller *et al.*,³³ Sasaki and Cohen,³⁴ and De Cordier and Vasconez³⁵ have shown encouraging results but these techniques require some form of tissue dissection and belong in the surgical category because they have appreciable downtime.⁵

Barbed sutures

With the addition of barbs to polypropylene suture, the load-bearing ability of facial suspension sutures has increased.⁶ The concept of a barbed suture was first pioneered by Alcamo in 1964,^{5,36} followed by Fukuda in 1984^{5,37} and Ruff in 1994^{5,38} as well as others. These innovators used barbed sutures for wound closure without tying knots. They did not, however, anticipate their aesthetic applications.⁵ The suture they have described has many barbs serially placed along its length. Barbs change direction somewhere near the suture midpoint to create a mirror image array of barbs in the opposite direction. When engaged in tissues, one end anchors the other and closes wounds or moves tissues differentially toward the point at which the barbs change direction creating new gradients of tension and compression.³⁹⁻⁴²

Soft tissue elevation with barbed sutures was pioneered in the late 1980s by Sulamanidze *et al.*^{1,43} With minimal or no soft tissue dissection, sutures are placed at the subcutaneous level.^{2,41} Both barbed suture design and placement have evolved since their introduction. The original Aptos suture was a multiple-dented suture that was later modified to become bidirectional, with the barbs oriented so that tissue would be retained in the central region of the suture without the need for anchoring at either end. It was then redesigned as a multiple-barbed polypropylene suture intended to provide traction and suspension unidirectionally.⁴³ Unidirectional barbed sutures and methods of anchoring soft tissue to itself or to a fixed point have been later modified to allow placement of barbed sutures at various planes of dissection and to accomplish secure soft tissue approximation.^{2,41} Although several different technologies have been used over the past few years, they all entail hooking the tissues onto the barbed sutures so that they incite a biologic response and subsequently become encased in fibrous tissues.⁴⁰

The latest generation of barbed sutures designed for soft tissue approximation is available in both absorbable and nonabsorbable materials with various suture lengths and needles attached.² The current variations include self-retaining bidirectional barbed sutures available as short Aptos threads for Aptos lift or Feather lift (TOTAL charm, Moscow, Russia) (Kolster Methods, Inc., Anaheim, CA, USA), designed to be used in freely mobile tissues.^{5,32,40} They are available also as long Woffles threads (Kolster Methods Inc., Corona, CA, USA)^{5,32} that can be introduced into the sagging tissues of the face then doubled to form a sling suspending the sagging tissues of the face to the stable temporal scalp through which the suture ends emerge.^{5,32} Contour Threads, patented under the name Featherlift Extended Aptos Length Threads,⁶ also referred to as Thread Lift or Loop Lift (with a looped suture) (Surgical Specialties Corp., Reading, PA, USA)^{6,43} are unidirectional and their deployment is fundamentally different from the classical Aptos threads.⁴⁰ They are designed to "bunch up" the tissues and be anchored to a fixed structure, such as the deep temporal fascia.⁴⁰ Originally marketed and produced by Quill and Surgical Specialties, Contour Threads polypropylene sutures swaged to long introduction needles are currently not commercially available for correction of facial ptosis since the acquisition of Quill by Angiotech.^{4,44,45} It is not known at present whether Contour Threads will return, or be replaced with a modified version. Regardless, other companies have begun to evaluate, test, and distribute products that are similar in concept to Contour Threads.⁴

Another variety is the Isse Endo Aptos thread that belongs to the surgical category. It is a unidirectional non-self-retaining thread used in conjunction with endoscopic face-lift.⁵ The Isse Endo Progressive Face Lift Suture, unlike Sulamanidze's barbed suture and similar to Contour Thread, is designed to be anchored to the temporalis fascia and thus to provide more load-bearing potential.⁶ The double-convergence polypropylene monofilament threads have been tested in Brazil (known as Beramendi threads).¹⁸ These threads do not have approval from the Food and Drug Administration at this time.⁴³ In general, Permanent barbed sutures are approved for correcting facial and cervical ptosis and for approximating wounds in soft tissue.⁴² Absorbable bidirectionally barbed sutures are only approved for soft tissue approximation and wound closure. These are made of polydioxanone (PDO), a polymer that gradually hydrolyzes. Its strength degrades in an inverse fashion to the increase in strength of the healing wound.^{39,42}

The principle applications for barbed sutures in facial aesthetic plastic surgery are those involving lifts of the brow, midface, and the lower-face and neck. Usually all three areas generally require surgical maneuvers to create a harmonious rejuvenation. Regardless of where in the face barbed sutures are planned, incisions need to be made in optimal locations followed by soft tissue dissection after which threads are deployed and anchored proximally. Finally soft tissues must be molded to achieve a smooth harmonious contour.²

Physical properties of barbed sutures

The behavior of any material utilized to apply a mechanical load on tissues is nonlinear, time dependent and anisotropic.⁴⁶ Barbs, however, provide an additional obligatory one-way travel of the thread through soft tissues preventing recurrent ptosis.^{22,47}

Strength of a barbed suture is of clinical importance. The most commonly used substrate for nonabsorbable barbed sutures is a polypropylene (Prolene; Ethicon Inc., Somerville, NJ, USA) core from which barbs are shaved to extend outward in a helical array.⁴⁸ For absorbable barbed sutures, fortunately a variety of monofilament sutures can be barbed effectively, and thus a spectrum of absorption rates can be provided.³⁶ However, the process of creating barbs decreases the effective diameter of the suture, thus diminishing its strength.⁴⁸ Nevertheless, barbed sutures are significantly stronger than their rated strength, which has been stated by the manufacturer.⁴⁸

Barb morphology influences both holding and tensile strength (also called, respectively, pull-out and

breaking strength). The deeper the barb is cut, the lower the tensile strength. Moreover, a helical barb array holds better than an axial one.³⁹ While sutures used for epidermal closure need to be stretchable to accommodate tissue edema, the high level of stiffness associated with barbed sutures used for lifting may be a useful adaptation to their function because it prevents rapid loss of lifting activity.⁴⁸ However, though not documented yet, it is possible that barbed sutures may weaken with time due to tissue reactions.⁴⁸

The purpose of barbed sutures is not only to apply but also to maintain tension without sagging or slipping.⁴⁸ Until the suture is enveloped by a supportive sheath of fibrotic tissue, the suture alone is bearing the load of the lifted skin.⁴⁸ Its holding strength may be improved by less traumatic needles in terms of diameter, and presumably tip design.³⁹ The technique of suture insertion is also assumed to strongly influence results. It is postulated that a sinuous passage of the barbed suture is preferable to a straight one and both barbed and conventional sutures hold best when they engage connective tissue at a right angle to the collagen bundles. As the suture is tightened, a wavy path straightens causing alternative vectors of force pushing against the suture. If a suture begins to pull out, new fibers then become pressed against the barbs.³⁹ In contrast, the barbs in a suture that traverses a straight line will only encounter a loosened column of tissue as it is pulled out. Undulations impart also elasticity, helping to prevent suture breakage, particularly with ballistic movements of the engaged tissue.³⁹ However, the long distance between the two points of tension is an inherent problem of looping, or cable-type suspension suture.³² An access incision superior to the brow requires, for example, at least a 5:1 ratio of proximal movement to distal movement.²

Evidence-based benefit and long-term efficacy of barbed sutures lifting

It is really surprising that serious long-term studies and peer-reviewed data about longevity and patient satisfaction following barbed suture lifting procedures now in vogue are notoriously lacking.^{4,49} The few clinical studies that exist do not offer any level of evidence more than level III. Most fall short of confirming the claims of fewer complications compared with standard techniques and improved patient satisfaction.⁶ Yet, that did not stop dozens of television shows and physicians from promoting barbed sutures lifting directly to the public with unbridled enthusiasm.⁴⁹

Sulamanidze *et al.*⁴¹ claimed that lifting facial tissues using Aptos threads is simple, constructive and time saving and avoids scars as well as the need for implants. He claimed also that both the immediate and late results are good and persistent (follow-up of 2 months–2.5 years).^{41,50} The technique lifts and suspends the skin and subcutaneous fat, resulting in a visible yet subtle facial rejuvenation.²² Lycka *et al.*²² reported good results in a series of 350 patients in a retrospective study based on patients' interviews and surgeons' observations. They have even advocated the use of threads as a replacement for traditional surgical interventions because of minimal complications and high patient satisfaction.^{22,44} For them Aptos thread was a much safer alternative to current face-lift procedures suggesting that correctly oriented barbed threads have the effect of making the face appear sleeker and tighter.⁵ In terms of longevity of the Aptos procedure's effects, 117 of the patients have been followed for a period of 12–24 months and have maintained 70% of their initial correction, as determined by blinded photographic assessment.²² Others have ascertained that facial tissues appear tighter, firmer, rejuvenated, and, importantly, patients seem happy with the results although very little persistent elevation may be seen. This reported improvement may have occurred because of subsequent fibrous tissue production around the threads combined with the implanted threads acting as a scaffold within the soft tissue matrix. Fibrocollagenous reaction was claimed to enhance the collagen matrix of the dermis and subcutaneous tissue.⁵

The enthusiasm for the so-called thread lifts in treating nasolabial folds, melomental folds, lateral brows, and platysmal banding has been largely patient driven.^{22,40,44} In the short-term post-thread lifting period (1–3 months), many patients claim that they look as if they had "a perfect facelift" and both patients and physicians may be thrilled with the quality of the results.⁴ Published data from an anonymous satisfaction survey mailed to 20 consecutively treated patients and from pre and post procedure photographs assessment of seven patients by seven independent dermatologists concluded that anchored, unidirectional, barbed, permanent sutures (Contour Threads) placed in the subcutaneous space can produce elevation of ptotic facial tissue that is long-lasting.⁴ Based on these results it was hypothesized that a correction lasting almost 1 year would continue for some length of time thereafter.⁴ Proponents of Contour Threadlifting cite also the rapid recovery of their patients postoperatively.⁴⁵ Although there are many theoretical and real advantages to using anchored barbed sutures for minimally invasive facelifts⁴

the long-term efficacy has been disappointing leading to decline in their popularity.⁴⁴ On the whole, the results achieved by Contour Threadlifting are subtle and short-lived.⁴⁵

Numerous aesthetic plastic surgeons have questioned claims of low morbidity and a nearly nil complication rate as well as predictable and long-standing results made by proponents of barbed sutures techniques.^{12,51} Results of unidirectional and bidirectional barbed sutures are disappointing and have failed in terms of long-term maintenance of repositioned soft tissue often resulting in visible threads, extruded threads, broken threads, or traction lines at rest or with animation³⁷ (Fig. 1). Despite some reported satisfactory results in cases involving the jawline and upper neck³⁷ it was observed that the skin tended to relax with time⁴ (Fig. 2). Tissue relaxation occurred more readily in the neck region though better improvement of the midface can be expected.⁴ Even when techniques were modified

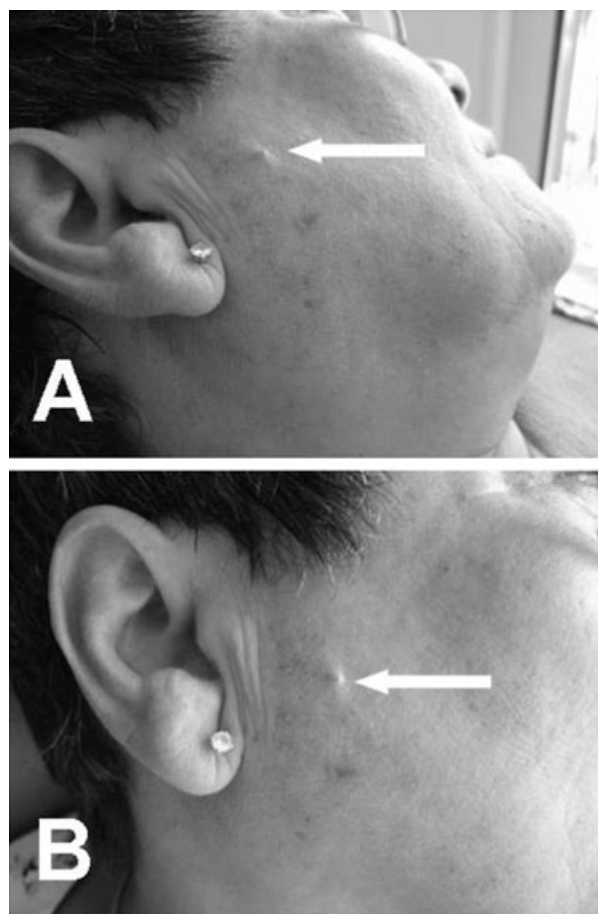


Figure 1 (A, B) Extruded barbed suture (arrows) with inadequate lifting effect.



Figure 2 (A) Disappointed patient few months after a thread lift performed by another physician with poor correction of lower facial laxity (arrow). (B) Early result following liposculpture resulting in (C) satisfactory definition of mandibular margin and correction of laxity (arrow).

to “catch” some of the fascia overlying the platysma muscle, results on the neck continued to be inferior to those seen in the malar region.⁴ Barbed sutures seem to provide little traction on tissue after 1 month of healing, especially in dynamic areas such as the forehead.⁴³

Although some have embraced these techniques, many more express doubts about their safety and efficacy⁴⁰ limiting their widespread adoption.⁵⁰ Even experts in the use of barbed sutures admit that short- to medium-term results are usually good, but long-term safety and efficacy have yet to be established.^{4,6,48} As a matter of fact, evidence-based information on objective long-term cosmetic results and the fate of the implant materials are lacking despite heavy advertising and case-based propagation.¹² Even though at present suspension with barbed threads applied through trocars eliminating the need for incisions and directly addressing the buccal (Bichat), malar, and suborbicularis oculi fat (SOOF) pads are becoming fairly popular¹⁸ most anatomic areas require soft tissue dissection at various planes. The sutures can be placed more superficially, such as in the superficial musculoaponeurotic system (SMAS), or as deep as the subperiosteal plane and are just being used to maintain the mobilized soft tissues in their new position.³⁷

Villa *et al.*⁶ have recently reviewed the literature to evaluate the clinical efficacy of various types of polypropylene barbed sutures, the longevity of their effect in midface suspension, the *in vivo* safety of permanently implanted sutures, and the risk of serious adverse events including injury to the facial nerve. Despite the great popularity of barbed sutures, only six studies meeting their inclusion criteria were identified by the authors. They concluded that the early results of barbed suture suspension remain inconclusive. Adverse events do

occur though mostly minor, self-limited, and of short duration. Less clear are the data on the extent of the peak correction and the longevity of effect, and the long-term effects of the sutures themselves. They concluded also that objective outcome measures and long-term follow-up data are not provided in a systematic manner in the few available studies.⁶

Complications of barbed sutures lifting

An unsatisfactory and only short-term result may not be the only risk of “noninvasive” thread suspension procedures. The permanent introduction of foreign bodies may lead to unexpected reactions with considerable morbidity and negative aesthetic effects and even the most stable alloplastic material, whether metal or synthetic, finally fails and breaks under repeated bending stress, as in the ever-moving face.^{12,51} Reports on side effects from an increasing variety of alloplastic materials introduced into the facial tissue for this purpose are increasing, and more scrutiny in the monitoring of such effects should be requested.^{7,12} Although adverse chemical or immunologic tissue reactions are very unlikely with an inert implant material such foreign bodies may become infected or may break and fragment.¹² Because these procedures are commonly performed for relatively young patients and complete surgical removal is virtually impossible, fragmented residuals may remain for decades, with symptoms worsening through time.¹² Moreover, a broken suture can result in facial asymmetry and may necessitate an invasive and potentially disfiguring procedure for removal.⁴⁸

No major complications are reported in most articles that describe the use of barbed threads;^{1,11,22,41,47}

however, the procedure is not harmless.⁴⁷ Minor complications reported include mild facial asymmetry, ecchymosis, erythema, hematoma, swelling, discomfort, thread migration and exposure, and scar formation in the entrance and exit sites.^{7,47,52} Aptos thread complications were more recently reported in a series of 102 patients: eleven palpable thread ends with pain, eight thread migrations, five infections or granulomas, and five skin dimpling or irregularities.^{5,6} More serious complications such as Stensen's duct rupture, nerve damage, chronic foreign body sensation, and scarring appearing as late as 2 years following the procedure were also reported by others.^{7,43,47,50,52}

In addition to noticeable ecchymosis and swelling commonly seen, many of the patients develop chevron-shaped contour irregularities in the skin overlying the Contour Threads. Though transitory in nature, these may persist for many days to weeks. A patient would be unlikely to return to regular daily activities until resolution of such irregularities. The time required for resolution of sequelae of thread lifting may thus be equivalent to the time required for resolution of a traditional rhytidectomy's postoperative sequelae.⁴⁵ Moreover, the rates of revisional surgery following thread lifting are high, and the time to these revisional procedures is short.⁴⁵ A total of 11% of patients ultimately required removal of their threads due to palpable threads, thread extrusion, or dissatisfaction with the appearance.⁴⁵

Discussion

How does an aesthetic procedure become "hot"? The answer is troubling. Though it should be determined by data, enthusiasm has taken the place of data with the media, patients, industry, and even with some doctors.⁴⁹ The most successful widely publicized topics are about products rather than techniques, and are all promoted by a company regardless of their true clinical effectiveness.⁴⁹

Despite overall modest improvement by physician assessment, patient satisfaction regarding barbed sutures suspension, as reported, remains high. Given the ongoing discussion of just what role minimally invasive procedures should have in cosmetic surgery, this observation is thought-provoking. The central debate regarding these procedures remains what constitutes a "successful" procedure and whether the success of a procedure should be measured by patients' satisfaction or by surgical standards and considerations.⁴ Whether it is optimal to perform a less invasive short incision or to utilize materials such as Aptos or Contour Threads is still

the subject of investigation.⁴ Serious consideration should be given as well to the financial costs of these threads in view of their limited benefits and in the context of the unknown long-term efficacy and risks.⁶

The introduction of new technology and procedures typically undergoes initial skepticism followed by generous acceptance and finally is characterized by cautious implementation.⁴³ Usually, new techniques may emerge, become popular, and then quickly fade into oblivion when they do not live up to their promise or are replaced by newer and better technology.²⁵ Surgeons are quite justified in being skeptical about new procedures that sound too good to be true before they are assured of its safety, effectiveness, and efficacy.⁴⁰ Physicians would like to perform procedures that can be defined as successful by virtually any measure; however, patients are showing willingness to trade results for morbidity, while still considering their procedures "successful."⁴ To justify showing "post" photographs indistinguishable from the "pre" ones, it is fascinating to note how presenting subtle results has become acceptable saying "this was what the patient wanted."⁴⁹ Unfortunately, Aesthetic surgery relies heavily on patients' feedback to determine success. Endpoints like "disease-free survival" to measure outcomes are generally lacking. However, the type of feedback received depends on how carefully questions are selected. The most well-intentioned physician can easily end up promoting a procedure of limited benefit.⁴⁹

In recent years, barbed sutures have been proposed as the method to achieve a nonsurgical face-lift capturing the interest of patients and surgeons worldwide.²⁵ However, several important questions still remain to be answered such as who is the ideal candidate, what is the proper number of threads to place, and where do they work best.⁴ Persistence of results and safety issues are also two major obstacles that have prevented their more widespread acceptance.⁵ Other issues demanding consideration include the effect of suspension sutures on facial animation and the duration of the suspension effect and what is the fate of suspension sutures following repeated facial movement. Remaining questions to be resolved are how complications might be managed and whether placement of suspension barbed sutures affects or prohibits future cosmetic or reconstructive procedures.⁶

Although barbed sutures lifting has been aggressively marketed to the public,⁴⁷ long-term results of pure "noskin-excision" suspension lifts with permanent suture materials have been in general disappointing.³² Nevertheless, future research is warranted to document benefits if any. Research should consider objective,

standardized photographic analysis of facial suspension at fixed intervals postoperatively in double-blinded fashion. Patient groups matched for age, sex, and skin characteristics or randomized to experimental and control arms should be used for future studies comparing thread lifting with standard suspension techniques. Laboratory and animal studies should examine the biomechanical and biochemical reactions of suture barbs in a biological environment. Finally, it remains to be seen whether the best results are reproducible and relatively operator independent.⁶ Side effects, long-term results, and complications should also be scientifically reported and considered.⁴⁷ Until then, physicians who use barbed sutures may wish to apprise patients of the limited data on efficacy, adverse events, and longevity of effect.⁶

It seems that the ideal patient is either a younger person who does not have many rhytides or much redundant skin or a post-face-lift patient whose surgical result requires mild to moderate improvement.²² It is certainly not suited when significant dematoheliosis or when more prominent rhytides are present.²² Moreover, no conclusive consensus is available yet as to the number of threads and optimal placement location.²² However, as understanding of the critical vectors develops, new patterns of placement are being shown to produce the desired result more successfully than the original placements. Possibly further scientific study and clinical experience will determine optimal placement of the threads, its role as a procedure that can be performed with other face-lift techniques, and ultimately the role of this emerging and novel treatment option in the rejuvenation of the aging face.²²

Conclusion

Quick nonsurgical procedures, frequently advertised as “lunch time” treatment alternatives to formal rejuvenation operations, are in vogue.¹² In fact, nonsurgical facial rejuvenation has become the Holy Grail of aesthetic surgery.⁵ Unfortunately, the technique is appealing to the ever-growing numbers of underqualified practitioners performing cosmetic procedures.⁴⁷

The popularity of barbed suture lifting has waned for the time being.⁵⁰ Certainly, it should not be presented as an alternative to a face-lift and should be viewed only as a temporizing procedure that can be maintained until the aging appearance in a patient demands a different approach.⁵⁴ Patients are likely to be disappointed if they expect a face-lift-type result from a suture suspension procedure.⁵⁵ New variations, however, on self-engaging sutures are on the horizon⁵⁴ and technological progress

may enable reemergence of suture suspension in the near future. Until then, traditional surgical and nonsurgical techniques for facial rejuvenation remain the golden standards for rejuvenation.⁴⁴ Although it appears simple to suspend the ptotic facial tissues like a marionette, more profound knowledge concerning the anatomic and physiologic basis of aging argues for the need of a surgical approach to redistribute the different layers and components by standard open or endoscopic face lifts.^{12,51}

Barbed sutures may be another useful tool in our armamentarium; however, cautious evaluation and acceptance during this time of their increasing use are recommended.⁴³ Barbed sutures seem to provide significant improvement when combined with open procedures⁵³ and are likely to remain a viable option for lifting ptotic tissue.⁴ Currently, no consensus on an optimal subdermal suspension thread placement pattern has been reached,²² and unfortunately, a safe and effective “lunch hour” procedure for elevating and redraping the soft tissues in an upward direction, with minimal or no patient downtime, is still eluding us.⁵

References

- 1 Sulamanidze M-A, Paikidze T-G, Sulamanidze G-M, et al. Facial lifting with “APTOS” threads: Featherlift. *Otolaryngol Clin N Am* 2005; **38**: 1109–7.
- 2 Paul M-D. Barbed sutures for aesthetic facial plastic surgery: Indications and techniques. *Clin Plastic Surg* 2008; **35**: 451–61.
- 3 Watson S-W, Morales-Ryan C-A, Sinn D-P. Poster 14: Internal midfacelift: the foundation for facial rejuvenation. *J Oral Maxillofac Surg* 2003; **61**(8S1): 88.
- 4 Kaminer M-S, Bogart M, Choi C, et al. Long-term efficacy of anchored barbed sutures in the face and neck. *Dermatol Surg* 2008; **34**: 1041–7.
- 5 Wu W-T-L. Barbed sutures in facial rejuvenation. *Aesthet Surg J* 2004; **24**: 582–7.
- 6 Villa M-T, White L-E, Alam M, et al. Barbed sutures: A Review of the Literature. *Plast Reconstr Surg* 2008; **121**: 102–8.
- 7 Silva-Siwady J-G, Az-garza C-D, Ocampo-Candini J. A case of aptos thread migration and partial expulsion. *Dermatol Surg* 2005; **31**: 356–8.
- 8 Weiss R-A, Weiss M-A, Beasley K-L, et al. Our approach to non-ablative treatment of photoaging. *Lasers Surg Med* 2005; **37**: 2–8.
- 9 LaFerriere K-A, Castellano R-D. Experience with percutaneous suspension of the malar fat pad for midface rejuvenation. *Facial Plast Surg Clin North Am* 2005; **13**: 393–9.
- 10 Adamyan A-A, Taran N-V, Vishnevsky A-V. Clinical aspects of facial skin reinforcement with special (gold)

- surgical filaments. *Ann Plast Reconstr Aesth Surg* 1998; **3**: 18–22.
- 11 Sulamanidze M-A, Sulamanidze G-M, Paikidze T-G. Wire scalpel for surgical correction of soft tissue contour defects by subcutaneous dissection. *Dermatol Surg* 2000; **26**: 146–51.
 - 12 Stark G-B, Bannasch H. The "Golden Thread Lift": radiologic findings. *Aesth Plast Surg* 2007; **31**: 206–8.
 - 13 Atiyeh B, Dibo S. Nonsurgical nonablative treatment of aging skin: radiofrequency technologies between aggressive marketing and evidence-based efficacy. *Aesth Plast Surg* 2009; **33**: 283–94.
 - 14 Salasche S-J, Jarchow R, Feldman B-D, et al. The suspension suture. *J Dermatol Surg Oncol* 1987; **13**: 973–8.
 - 15 Robinson J-K. Suspension sutures in facial reconstruction. *Dermatol Surg* 2003; **29**: 386–93.
 - 16 Hudson D-A, Fernandes D-B. Caveats for the use of suspension sutures. *Aesth Plast Surg* 2004; **28**: 170–3.
 - 17 Gorgos D. Cosmetic skin surgery of the future. *Dermatol Nursing* 2004; **16**: 192.
 - 18 Badin A-Z, Forte M-R-C, Silva O-L. Scarless mid- and lower face lift. *Aesthet Surg J* 2005; **25**: 340–7.
 - 19 Little J-W. Three-dimensional rejuvenation of the mid-face: volumetric resculpture by malar imbrication. *Plast Reconstr Surg* 2000; **105**: 267–85.
 - 20 Anderson R-D, Lo M-W. Endoscopic malar/midface suspension procedure. *Plast Reconstr Surg* 1998; **102**: 2196–208.
 - 21 Tonnard P, Verpaele A, Monstrey S, et al. Minimal access cranial suspension lift: a modified S-lift. *Plast Reconstr Surg* 2002; **109**: 2074–86.
 - 22 Lycka B, Bazan C, Poletti E, et al. The emerging technique of the antiptosis subdermal suspension thread. *Dermatol Surg* 2004; **30**: 41–4.
 - 23 Owsley J-Q. Face lift. *Plast Reconstr Surg* 1997; **100**: 514–9.
 - 24 Plaza R, de la Cruz L. Lifting of the upper two-thirds of the face: supraperiosteal-subSMAS versus subperiosteal approach. The quest for physiologic surgery. *Plast Reconstr Surg* 1998; **102**: 2178–89.
 - 25 Psillakis J-M, Rumley T-O, Camargos A. Subperiosteal approach as an improved concept for correction of the aging face. *Plast Reconstr Surg* 1988; **82**: 383–92.
 - 26 Tonnard P, Verpaele A. The MACS-lift short scar rhytidectomy. *Aesthet Surg J* 2007; **27**: 188–98.
 - 27 Verpaele A, Tonnard P. Lower third of the face: indications and limitations of the minimal access cranial suspension lift. *Clin Plast Surg* 2008; **35**: 645–59.
 - 28 Berry M-G, Davies D. Platysma-SMAS plication facelift. *J Plast Reconstr Aesthet Surg* 2010; **63**: 793–800.
 - 29 Graziosi A-C, Beer S-M-C. Browlifting with thread: The technique without undermining using minimum incisions. *Aesth Plast Surg* 1998; **22**: 120–5.
 - 30 Erol O-O, Sozer S-O, Velidedeoglu H-V. Brow suspension, a minimally invasive technique in facial rejuvenation. *Plast Reconstr Surg* 2002; **109**: 2521–32.
 - 31 Kalil A-F, Fournier P-F. Curl Lift versus other suture suspension lifts. *Cosmet Dermatol* 2006; **19**: 133–7.
 - 32 Eremia S, Willoughby M-A. Novel face-lift suspension suture and inserting instrument: use of large anchors knotted into a suture with attached needle and inserting device allowing for single entry point placement of suspension suture. Preliminary report of 20 cases with 6- to 12-month follow-up. *Dermatol Surg* 2006; **32**: 335–45.
 - 33 Keller G-S, Namazie A, Blackwell K, et al. Elevation of the malar fat pad with a percutaneous technique. *Arch Facial Plast Surg* 2002; **4**: 20–5.
 - 34 Sasaki G-H, Cohen A-T. Meloplication of the malar fat pads by percutaneous cable-suture technique for midface rejuvenation: outcome study (392 cases, 6 years experience). *Plast Reconstr Surg* 2002; **110**: 635–54.
 - 35 De Cordier B-C, Vasconez L-O. Rejuvenation of the midface by elevating the malar fat pad: review of technique cases and complications. *Plast Reconstr Surg* 2002; **110**: 1526–36.
 - 36 Alcamo J-H Surgical suture. U.S. Patent 3,123,077 [free patents online website. March 1, 1964. Available at: <http://www.freepatentsonline.com/3123077.html>. Accessed August 10, 2008.
 - 37 Fukuda M. Surgical barbed suture. US Patent 4,467,805. [Patent Storm website]. August 28, 1984. Available at: <http://www.patentstorm.us/patents/4467805/fulltext.html>. Accessed August 10, 2008.
 - 38 Ruff G-L. Insertion device for a barbed tissue connector. US Patent 5,342,376. [Patent Storm website]. August 30, 1994. Available at: <http://www.patentstorm.us/patents/5342376/fulltext.html>. Accessed August 10, 2008.
 - 39 Ruff G-L. Absorbable barbed sutures. *Aesthet Surg J* 2006; **26**: 620–8.
 - 40 DeLorenzi C-L. Barbed sutures: rationale and technique. *Aesthet Surg J* 2006; **26**: 223–9.
 - 41 Sulamanidze M-A, Fournier P-F, Paikidze T-G, et al. Removal of facial soft tissue ptosis with special threads. *Dermatol Surg* 2002; **28**: 367–71.
 - 42 Ruff G. Technique and uses for absorbable barbed sutures. *Aesthet Surg J* 2006; **26**: 620–8.
 - 43 Helling E-R, Okpaku A, Wang P-T-H, et al. Complications of facial suspension sutures. *Aesthet Surg J* 2007; **27**: 155–61.
 - 44 Sardesai M-G, Zakhary K, Ellis D-A-F. Thread-lifts: the good, the bad, and the ugly. *Arch Facial Plast Surg* 2008; **10**: 284–5.
 - 45 Garvey P-B, Ricciardelli E-J, Gampper T. Outcomes in threadlift for facial rejuvenation. *Ann Plast Surg* 2009; **62**: 482–5.
 - 46 Rubin M-B, Bodner S-R. A three-dimensional nonlinear model for dissipative response of soft tissue. *Int J Solids Struct* 2002; **39**: 5081–99.
 - 47 Winkler E, Goldan O, Regev E, et al. Stensen duct rupture (sialoceles) and other complications of the aptos thread technique. *Plast Reconstr Surg* 2006; **118**: 1468–71.

- 48 Rashid R, Sartori M, White L-E, et al. Breaking strength of barbed polypropylene sutures: rater-blinded, controlled comparison with nonbarbed sutures of various calibers. *Arch Dermatol* 2007; **2143**: 869–72.
- 49 Teitelbaum S. Enthusiasm versus data: how does an aesthetic procedure become “hot”? *Aesthet Surg J* 2006; **26**: 51–3.
- 50 Beer K. Delayed complications from thread-lifting: report of a case, discussion of treatment options, and consideration of implications for future technology. *Dermatol Surg* 2008; **34**: 1120–3.
- 51 Baker T-J. Rhytidectomy: a look back and a look forward. *Ann Plast Surg* 2005; **55**: 565–70.
- 52 Monheit G-D. Dysesthesia and fasciculation: unusual complications following face-lift with cog threads – Commentary. *Dermatol Surg* 2007; **33**: 253–5.
- 53 Paul M-D. Complications of barbed sutures. *Aesthet Plast Surg* 2008; **32**: 149.
- 54 Hochman M. Midface barbed suture lift. *Facial Plast Surg Clin North Am* 2007; **15**: 201–7.
- 55 Flynn J. Suture suspension lifts: a review. *Oral Maxillofac Surg Clin North Am* 2005; **17**: 65–76.