

# Transblepharoplasty Brow Suspension With a Biodegradable Fixation Device

Phillip R. Langsdon, MD, FACS; Glenn B. Williams, MD; Roy Rajan, MD; and Stephen E. Metzinger, MD, FACS

Aesthetic Surgery Journal  
30(6) 802–809  
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DOI: 10.1177/1090820X10387115  
[www.aestheticsurgeryjournal.com](http://www.aestheticsurgeryjournal.com)



## Abstract

**Background:** Brow droop, eyelid tissue excess, and hyperfunction of the muscles of forehead facial expression may contribute to the aging diathesis of the upper one-third of the face. Many approaches to the brow have been described, including coronal or pretricheal incisions, direct incision of the suprabrow or forehead, and endoscopic techniques. A less frequent technique, the transblepharoplasty browlift (TBBL), has a role in rejuvenating brow position, especially in patients in whom both the eyelids and brows need to be addressed. The Endotine forehead device has been reported to increase speed and ease in providing operative support to the brows, but little has been written about its function with the TBBL approach.

**Objectives:** The authors describe their results with Endotine brow fixation for browlift through a TBBL approach.

**Methods:** Between November 2005 and January 2008, 20 patients presented to the senior author (PRL) for browlift and were treated with a TBBL approach and placement of the Endotine device in one of three sizes (3 mm, 3.5 mm, or 4 mm). The surgeon completed an operative questionnaire immediately postoperatively, as well as a satisfaction questionnaire at one and three months postoperatively. Nineteen of the 20 patients were followed up also completed satisfaction questionnaires at one and three postoperative months. The results were tabulated to assess the safety and efficacy of the Endotine device.

**Results:** A 3-mm Endotine browlift device was placed in most patients (13; 68%). The surgeon was satisfied with the performance of the Endotine device, its ease of insertion, and the fixation provided in all cases. The Endotine was always palpable under the skin but visible in only roughly half of patients. At one month, 5% of the fixations were judged by the surgeon to be fair in appearance; the remainder of cases were satisfactory or better. At three months, all fixations were judged as satisfactory or better. Patients reported being very satisfied with the results of the surgery initially (53%), and satisfaction improved with time (74%). After three months, 79% of patients would recommend the procedure to others, an increase from 63% after one month.

**Conclusions:** The Endotine device provides an effective lift for the brows, allows for easy repositioning, and is much quicker to apply than the sutures placed in a traditional browlift.

## Keywords

forehead aesthetics, browlift, blepharoplasty, endotine browlift fixation device

Accepted for publication May 17, 2010.

Brow ptosis may result from the combined effects of increased skin laxity and the relative hyperfunction of the brow depressors. The corrugator supercilii, depressor supercilii, procerus, and orbicularis oculi muscles all play a role in lowering the position of the brow.<sup>1,2</sup> Surgical approaches to elevate the brow include coronal, pretricheal, trichophytic, direct, temporal, and midforehead incisions and minimal-incision endoscopic techniques. Each of these approaches has specific advantages and disadvantages.

The transblepharoplasty browlift (TBBL) is another option, one that can minimize patient morbidity, additional incisions, and equipment costs by utilizing a blepharoplasty incision and simultaneously providing direct access to the brow musculature. Direct placement of suspension sutures or supporting implants at the site of ptosis is at least as effective as distant support techniques. With this

approach, the brow depressor muscles may be directly viewed and divided. There are few limitations, other than

Dr. Langsdon is Professor and Chief of the Division of Plastic Surgery, Department of Otolaryngology-Head & Neck Surgery, the University of Tennessee Health Science Center, Memphis, Tennessee. Dr. Williams is an ear, nose, and throat physician in private practice in Memphis, Tennessee. Dr. Rajan is Instructor in the Department of Otolaryngology-Head and Neck Surgery, Johns Hopkins University, Baltimore, Maryland. Dr. Metzinger is Clinical Associate Professor in the Division of Plastic and Reconstructive Surgery, Tulane Health Sciences Center, New Orleans, Louisiana.

## Corresponding Author:

Phillip R. Langsdon, MD, FACS, 7499 Poplar Pike, Germantown, TN 38138, USA.  
E-mail: [langsdon@bellsouth.net](mailto:langsdon@bellsouth.net)

the surgeon's inability to excise forehead skin or hair-bearing scalp. However, the TBBL does not preclude a dual approach. The Endotine fixation device (Coapt Systems, Palo Alto, CA) allows support and fixation until it begins to significantly biodegrade at about three months postoperatively. Some remnant of the device may last as long as 10 to 12 months. The Endotine eliminates the need for suturing, which can be time-consuming and somewhat cumbersome. It also allows more rapid operative brow repositioning and a more accurate brow placement than does suturing. This study shows the results of placing the Endotine brow fixation device in conjunction with the TBBL approach.

## METHODS

The project was approved by the MidLands Institutional Review Board. The study sample consisted of 20 consecutive patients who presented to the senior author (PRL) between November 2005 and January 2008 with a need for blepharoplasty or browlifting and who agreed to be in the study, allow photos to be used, and return for follow up. Exclusion criteria included a combination of blepharoplasty and brow indications, refusal to follow study requirements, and health issues. All patients underwent TBBL with the Endotine browlift fixation device, with our previously described technique.<sup>3</sup> All procedures were performed by a single surgeon (PRL), and immediately postoperatively, the surgeon completed a questionnaire (Appendix A, [www.aestheticsurgery-journal.com](http://www.aestheticsurgery-journal.com)) focused on the technical aspects of the device and its insertion. At one and three months postoperatively, both the patient and the operating surgeon completed a satisfaction survey (Appendices B and C).

## Operative Technique

Through a standard upper eyelid blepharoplasty incision, a superior suborbicularis skin-muscle flap was raised by blunt spreading-scissor dissection in the region of the lateral two-thirds of the upper eyelid. The flap dissection was carried superiorly to a point just above the superior orbital rim. Spreading-scissor dissection was then directed toward the supraorbital bone until the subgaleal plane was reached (Figure 1). The depth of dissection remained superficial to the pericranium. The pocket was then expanded with blunt dissection to free the entire forehead, up to the hairline superiorly and the lateral temporal line laterally (Figure 2). The lateral temporal line was incised if increased lateral mobility was felt to be necessary. The dissection was also carried out medially, remaining superior to the supraorbital neurovascular bundle (Figure 3).

The medial portion of the upper eyelid was elevated in the suborbicularis plane, isolating and remaining medial to the supraorbital neurovascular bundle. The dissection was carried out superiorly and medially. Superiorly, the dissection was directed into the subgaleal plane, beginning at the upper edge of the supraorbital rim. The medial



**Figure 1.** Spreading-scissor dissection is directed toward the supraorbital bone until the subgaleal plane is reached.



**Figure 2.** The pocket is expanded with blunt dissection to free the entire forehead, up to the hairline superiorly and the lateral temporal line laterally.



**Figure 3.** The dissection is carried out medially, remaining superior to the supraorbital neurovascular bundle.

dissection exposed the corrugator and depressor supercillii muscles. If a medial elevation of the brow was needed, these muscles were cauterized and then incrementally



**Figure 4.** When a medial elevation of the brow is needed, the corrugator muscles are cauterized and incrementally divided with eyelid scissors.

divided with eyelid scissors (Figure 4). The usual abundant blood supply in the corrugator required careful hemostasis. Once divided, scissor dissection was continued medially, after which the procerus was encountered and divided in a similar manner.

If a lateral elevation of the brow was needed, the orbicularis oculi could be divided at the lateral one-third point of the eyelid. Since this muscle is much thinner than the medial depressors, careful and light cautery was performed over the planned muscular division site, followed by an incremental scissor division of the muscle that extended from the blepharoplasty incision inferiorly to the inferior extent of the eyebrow superiorly. Once divided, the orbicularis was spread in a medial-to-lateral direction with scissors.

Brow stabilization was planned after division of the depressor muscles, to prevent an immediate inferior brow drift in the early healing process. A temporary implant—in this case, an Endotine forehead device—helped to maintain the muscle separation while the healing process proceeded. It also prevented any permanent fixation appearance to the brow. The L-poly-lactic acid implant is made with tines in either a 3.0-, 3.5-, or 4.0-mm length (Figure 5). Tine length selection is dictated by the surgeon's assessment of the skin thickness. In most cases in this series, the 3.0-mm tine was placed, but thick, heavy brows may dictate placement of an implant with longer tines.

A bony anchor site for the implant was formed with a hand drill, including a Coapt Systems (Palo Alto, CA) drill bit (2.97-mm diameter and 3.0-mm depth, with a depth-limiting collar; Figures 6 and 7), approximately 10 mm above the orbital rim, near a vertical line from the lateral limbus of the eye. A screw-fixated applicator handle allowed the surgeon to gently snap the implant into the bony anchor site after bone fragments were removed by suction (Figure 8). A counterclockwise twist of the application handle released the implant, which was placed so that the tines leaned superiorly (Figure 9).



**Figure 5.** The Endotine forehead device.

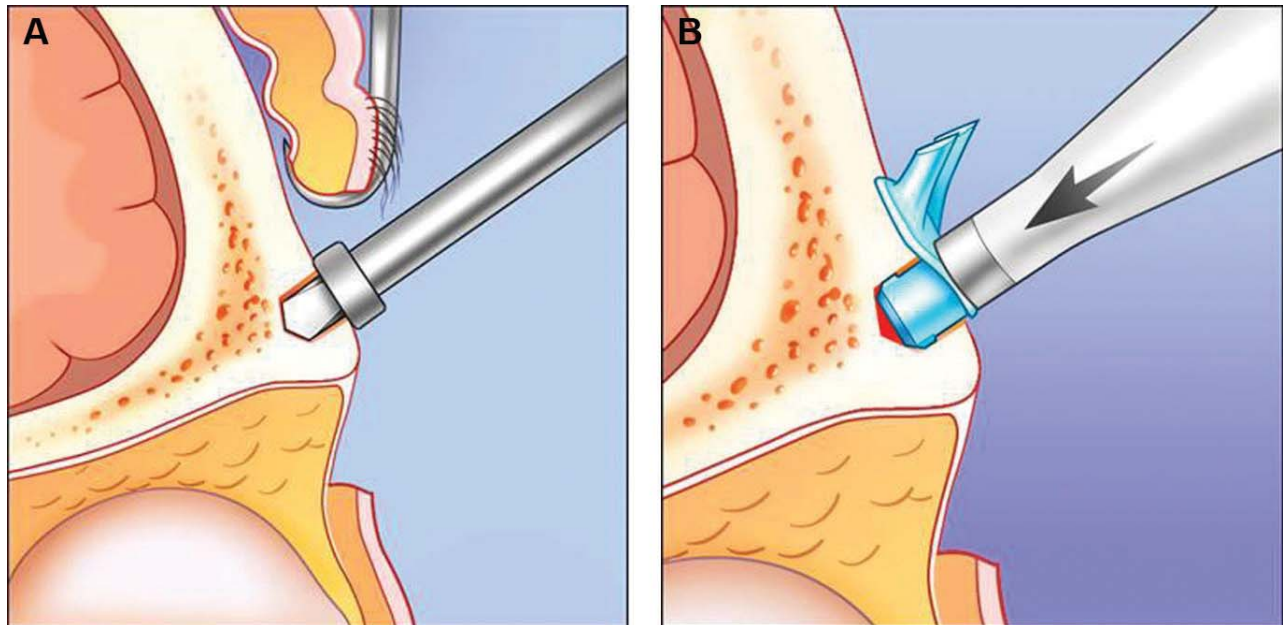


**Figure 6.** A bony anchor site for the implant is formed with a hand drill.

Because the forehead tissue has more than one glide plane, the implant should not be expected to provide an absolutely immobile fixation of the forehead brow tissue. The goal should be suspension during healing, rather than exact spot fixation. Our normal procedure was to secure the brow to the tine about 5 mm above the site at which the brow normally lays in the recumbent position after muscle release. The brow was secured to the Endotine by gentle application of external thumb pressure. Repositioning the brow was easily accomplished if necessary with an elevator, which released the brow tissue from the tines, allowing for repositioning and reattachment.

The Endotine usually underwent significant dissolution within three months. If any early palpability was present, it was found to significantly diminish by three months. Some remnant of the implant may last as long as 10 to 12 months but is usually nonpalpable.

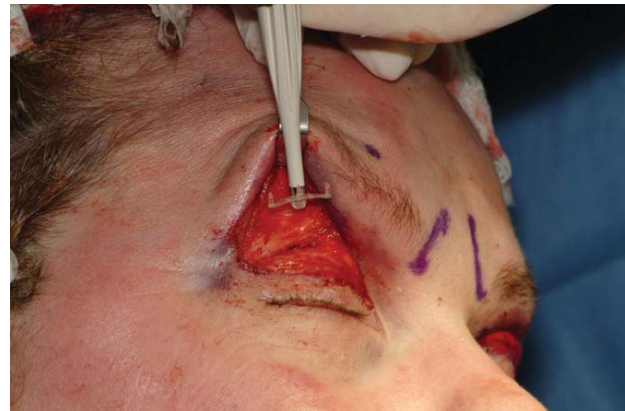




**Figure 7.** (A, B) Illustration of hand drilling for bony anchor site formation.



**Figure 8.** The bone fragments at the anchor site are removed with suction, and a screw-fixed applicator handle allows the surgeon to snap the Endotine implant in place.



**Figure 9.** A counterclockwise twist of the application handle releases the implant, which is placed so that the tines lean superiorly.

## RESULTS

All 20 patients in this series (14 female, 6 male) underwent TBBL with the Endotine forehead device, according to the technique described above. Only one patient failed to follow up and is not included in our results. Sixty-three percent ( $n = 12$ ) of the remaining patients were deemed by the operating surgeon to have normal preoperative brow thickness; 21% ( $n = 4$ ) were thick and 16% ( $n = 3$ ) were thin. A 3-mm Endotine forehead device was placed in 13 (68%) patients, with the 3.5-mm device placed in five patients (27%) and the 4-mm device placed in one patient (5%).

The results of the immediate postoperative surgeon evaluation form are listed in Table 1. The surgeon was satisfied with the performance of the Endotine device, its ease of insertion, and the fixation provided in all cases. The device usually had to be repositioned at least once for proper placement, but no more than twice. The Endotine was always palpable under the skin but visible in only roughly half of our patients. (In this case, *visibility* refers to a subtle suprabrow fullness.)

The one- and three-month postoperative surgeon satisfaction survey results are presented in Table 2. The surgeon was satisfied with the fixation in all cases. At one month, 5% of the fixations were judged to be fair in

**Table 1. Surgeon-Reported Operative Performance Survey Results**

Query	Responses	Percentage (n = 19)
Surgeon satisfaction with drill bit	Unsatisfied	0
	Satisfied	26
	Very satisfied	74
Surgeon satisfaction with insertion tool	Unsatisfied	0
	Satisfied	27
	Very satisfied	73
Surgeon satisfaction with ease of device insertion	Unsatisfied	0
	Satisfied	27
	Very satisfied	73
Surgeon satisfaction with brow fixation	Unsatisfied	0
	Satisfied	47
	Very satisfied	53
Endotine length adequate	Yes	100
	No	0
Number of times device repositioned	None	26
	Once	68
	Twice	5
	More than two	0
Device visibility under the skin	Not visible	47
	Slightly visible	53
	Visible	0
Device palpability under the skin	Not palpable	0
	Slightly palpable	95
	Palpable	5

appearance. The remainder of cases were satisfactory or better. At three months, all fixations were judged as satisfactory or better. The palpability and visibility of the device were also noted to decrease with time after the surgery.

The one- and three-month postoperative patient questionnaire results are listed in Table 3. Patients reported being very satisfied with the results of the surgery initially (53%) and satisfaction improved with time (74%). Reported device palpability and visibility diminished with time for the patients, as well. After three months, 79% of patients would recommend the procedure to others, an increase from 63% after one month.

Clinical results from two patients from this series can be seen in Figures 10 and 11.

## DISCUSSION

There are few reports on the TBBL procedure in the literature. Since Sokol and Sokol<sup>4</sup> described the technique in 1982, only four articles have been published concerning the technique. It is the authors' belief that TBBL offers a viable alternative in many instances when a traditional browlift is indicated. There are many other effective approaches for addressing ptotic brows that are commonly performed in conjunction with upper-eyelid surgery. However, traditional browlifting techniques involve one or

more additional incisions in the brow or scalp to gain access to the ptotic areas of concern and the depressor muscles. Occasionally, these larger incisions are replaced by three to five additional smaller ones, in tandem with an endoscope to assist visualization. While successful outcomes are always the greatest concern in cosmetic surgery, morbidity and cost must also be considered. TBBL is effective and has the advantage of utilizing existing incisions without the need for additional equipment when the occasion arises to add brow support to a blepharoplasty.

Placement of an Endotine forehead device saves operating time because brow anchoring in this manner is quick and easy when compared with suture placement or suture repositioning. When sutures are placed to support the brow, the authors typically apply two sutures, which can be tedious and difficult. In most cases, we have found Endotine application to be quicker, easier, and more uniform.

An important feature of the device is its three separate tines, which widen the attachment. As described in the Methods section, repositioning a brow is also uncomplicated, when necessary. This is also reflected in the postoperative surgeon satisfaction survey, in which satisfaction with the degree of brow fixation and length of device tines was reported in all cases. In the majority of cases, optimal brow position was obtained with relative ease, except in very thick brows. Because the forehead has multiple layers, thicker brows may undergo an increased inferior drift during the postoperative period; for those patients, we would attempt to position the brow a full 1 cm above the resting operative position after muscular division.

Of greatest concern is patient satisfaction, which translates to both surgeon satisfaction and potential referrals. As the postoperative time increased, patient satisfaction with the procedure was also found to increase. Again, as intuition would suggest, both device visibility and palpability by the patient decline as healing continues (84% to 58% and 100% to 95%, respectively; Table 3). Patients were also likely to recommend the procedure to others. Those who did not recommend the procedure after one month were mainly concerned with device visibility and sensitivity, both of which were complaints that diminished after three months. The percentage of patients (21%) who initially reported they were "undecided" about whether they would recommend the procedure to others declined to 10.5% at three-month follow-up.

Complications and side effects from external wires, pins, and screws (including alopecia and regression of position) have all been reported with browlift procedures.<sup>5,6</sup> Permanent metallic mini-screws are attached to the overlying periosteum with sutures.<sup>7,8</sup> In some of these reports, bioabsorbable miniscrews made of Lactosorb or polyactic acid were utilized; as with the metallic mini-screws, sutures were also placed to tether the devices to the overlying tissue.<sup>9</sup> In this regard, Endotine presents another advantage in a decreased risk of alopecia (both brow and scalp); because of multipoint fixation, the risk of regression is also decreased.<sup>10,11</sup> Furthermore, since it is placed through a transblepharoplasty approach, there is no additional scarring.

**Table 2. Surgeon-Reported Satisfaction Survey Results**

Query	Responses	One Month (n = 19)	Three Months (n = 19)
Satisfaction with transblepharoplasty fixation	Unsatisfied	0	0
	Satisfied	68	68
	Very satisfied	32	32
Aesthetic outcome of procedure	Poor	0	0
	Fair	5	0
	Satisfactory	63	58
	Very good	21	26
Device visibility under the skin	Optimal	11	16
	Not visible	32	68
	Slightly visible	63	32
Device palpability under the skin	Visible	5	0
	Not palpable	0	16
	Slightly palpable	89	84
Repeat use of product	Palpable	11	0
	Yes	100	100
In which upper blepharoplasty patients would you suggest an Endotine transblepharoplasty browlift?	No	0	0
	None	0	0
	Half	79	89
	All	21	11

**Table 3. Patient-Reported Satisfaction Survey Results**

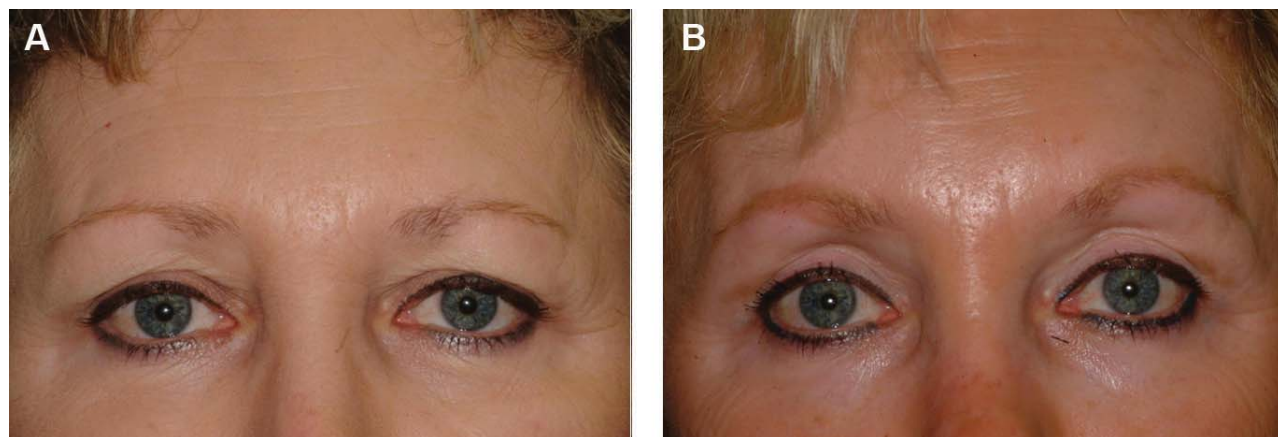
Query	Responses	One Month (n = 19)	Three Months (n = 19)
Procedure satisfaction	Unsatisfied	5	0
	Satisfied	42	26
	Very satisfied	53	74
Device visibility under the skin	Not visible	26	42
	Slightly visible	53	53
	Visible	21	5
Device palpability under the skin	Not palpable	0	5
	Slightly palpable	63	69
	Palpable	37	26
Would you recommend procedure to others?	Yes	63	79
	No	16	10.5
	Undecided	21	10.5

Endotine is not without its own potential complication profile, which includes paresthesias, temporary visibility and palpability, change in brow position (regression), over-correction, and problems with the drill and hole.<sup>12</sup> However, device visibility and palpability were the most common issues encountered in this series. We recommend that surgeons evaluate and select appropriate candidates based on the device's dissolution characteristics and the patient's skin thickness. The Endotine may be a good choice for heavier brows, tighter and more immobile brows, and revision cases. It may also be preferable in cases of reverse brow procedures intended to lower the hairline.<sup>13,14</sup>

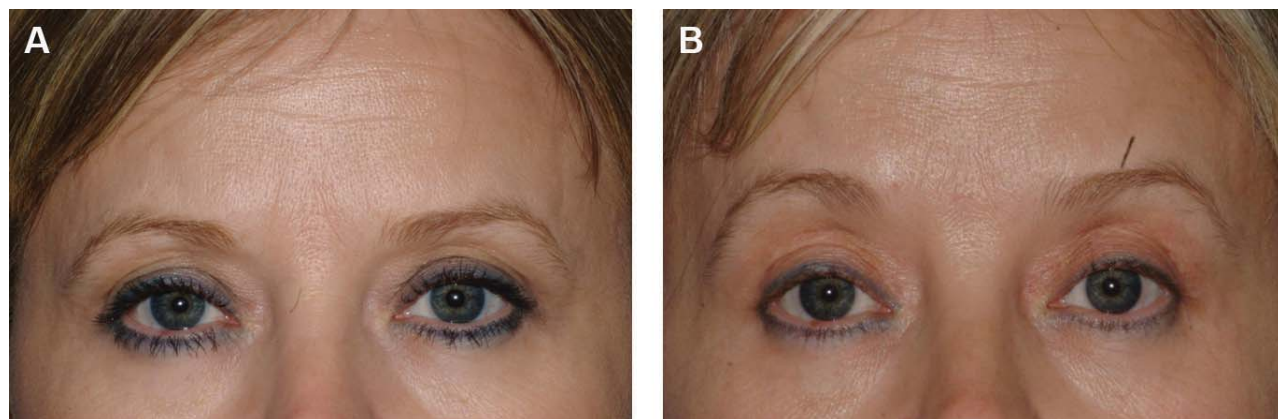
## CONCLUSIONS

The transblepharoplasty browlift is an effective procedure for brow support that provides direct access to the point of concern. It also provides a clear view and open access for dividing the depressor muscles and applying supporting sutures or implants, such as the Endotine fixation device, which was placed with a high degree of patient and surgeon satisfaction in our study. The Endotine device provides an effective lift for the brows, allows for easy repositioning, and is much quicker to apply than the sutures placed in a traditional browlift.





**Figure 10.** (A) A 54-year-old woman who presented for browlift. (B) 44 months after treatment with the author's TBBL technique and placement of an Endotine fixation device.



**Figure 11.** (A) A 46-year-old woman who presented for browlift. (B) 17 months after treatment with the author's TBBL technique and placement of an Endotine fixation device.

### Disclosures

CoApt Systems, Inc, provided funding for the implants and drill used in the study, office record expenses, and patient incentives for follow-up visits.

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