Plastic surgeons are facing increasing pressure from patients to simplify their procedures, such as minimizing the scar or reducing the operation time and recovery period. In some areas of aesthetic surgery, we have noninvasive alternatives such as botulinum toxin injections, commercially available soft tissue fillers, or suspension sutures to lift the ptotic tissue. Interestingly, aesthetic nasal surgery is one of the fields in which the minimally invasive options are few.

However, some patients asking for nasal surgery do not necessarily need a standard aesthetic rhinoplasty procedure. In some cases, refinement in nasal tip projection and rotation is enough to achieve satisfactory nasal harmony and aesthetics. In carefully selected patients who do not have a very prominent hump, too wide a nasal base, or noteworthy bony nasal deviation (namely, no serious complaints about the bony part of the nose), slight improvements in the projection of the cartilaginous tip and some cephalic rotation might create a significant change in appearance.

There are many descriptions of suture suspension techniques, mainly used in general aesthetic surgery to lift the sagging tissues back to their desired position. In rhinoplasty, the substantial majority of methods employ one or more suture techniques to reshape the nasal tip area. Likewise, there are numerous techniques in the literature describing how to improve tip rotation and projection via the caudal septum as a pillar for anchoring. However, all of

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these techniques have been proposed as a step of contemporary rhinoplasty; thus, none of them can rightfully be called a minimally invasive procedure for the correction of nasal tip deformities.

Herein, we describe a simple, office-based procedure that can be performed under local anesthesia in a matter of minutes with virtually no downtime and also can be combined with any other minimally invasive procedure. Our technique allows the surgeon to rotate the nasal tip over the hump, achieving suspension of the nasal tip with a percutaneous purse-string suture through a small access puncture made on the lateral nasal wall. This is undertaken with a double-sided needle or shuttle, smoothly anchoring the lower lateral cartilages (LLC) in a vertical direction to the glabellar periosteum, thus masking the prominence of the nasal septum and producing a limited refinement of the interdomal distance, which in turn satisfies the patient by means of simplicity and efficacy.

The described double-sided needle, characterized by two sharpened ends with a centrally or eccentrically placed eye for the chosen surgical thread, works in both directions, thereby enabling the surgeon to smoothly stitch the subcutaneous tissues without drawing the skin (Figure 1). This device was first described by Wilson, and its patent application was made in 1986, but it was widely popularized by Sulamanidze. The device is actually a surgical alteration of the conventional shuttle, a spindle-shaped device holding the thread in tatting, knotting, or netting, which is used in weaving to carry the thread back and forth between the warp threads. According to its historical role, the technique is named shuttle suspension, a term that describes the concept of the intervention.

**PATIENTS AND METHODS**

The author (KTT) successfully performed a minimally invasive rhinoplasty with the shuttle suspension technique in 86 carefully selected patients between December 2005 and December 2008, with an eight- to 24-month follow-up. Patient ages ranged from 21 to 62 years. All of the patients elected not to undergo any aesthetic nasal surgery but were requesting a slight improvement of their nasal shape. Five of the patients were secondary rhinoplasty patients.

**Surgical Technique**

Before the procedure, the midline and the most prominent spot of the nasal domes were marked, and the nasal dorsum

![Figure 1. The traditional shuttle (A) and its surgical alteration (B).](image-url)
and caudal septum were infiltrated with local anesthetic-adrenalin solution. After five to 10 minutes, a unilateral transfixion incision was made and the overlying dorsal nasal skin was undermined with delicate scissors up to the glabella. The junction between the upper and lower cartilages, as well as the space between medial crurae, was also dissected. With a No. 15 blade, another 2-mm stab incision was made on the lateral nasal wall, 5 mm medial to the medial canthus, possibly in an existing frown-line. This incision could be made on the right or left side, depending on the surgeon’s preference. A curved, double-sided needle with a free 3-0 polypropylene thread attached at its middle portion was introduced horizontally to the subcutaneous tissue and stitched through the glabellar periosteum. The needle was pushed along its traced outline; it was extracted from the skin only partially at the other side of the glabella. Following the same entry stitch by the opposite sharp end, the needle was pushed vertically down toward the tip in a subcutaneous plane, partially exiting through the skin overlying the most prominent part of the ipsilateral LLC. Turning back horizontally, the needle was then inserted symmetrically through both LLC; the final exit stitch was carried out vertically upward, in the direction of the entry stitch through the initial incision. The LLC were then anchored to the glabellar periosteum using both ends of the thread (Figure 2). This provided a correction of the tip projection and rotation, as well as a shortening of the nasal length to a desired level, masking the prominence of even heavy nasal humps without any humpectomy or rasping (Figure 3). In cases where the surgeon needs extra tip projection or a strong opposing force from the upper lateral cartilage (ULC) push, it is useful to dissect between the medial crurae and suture them to the septum percutaneously at a higher position in a tongue-in-groove manner with a 3-0 absorbable suture. Another way to reduce the ULC resistance is a simple dissection between the upper and lower cartilages. A video of the procedure can be found online (Video 1; www.aestheticsurgeryjournal.com).

Intraoperatively, the magnitude of change and the exact effect can be determined by observing the rotation of the tip as the suture is tightened (Video 2; www.aestheticsurgeryjournal.com). This is a crucial point at which the amount of tip rotation and projection should be evaluated. A slight overcorrection is suggested in all cases. If the septum was too long, a caudal septal resection was performed simultaneously through the transfixion incision. The transfixion incision was then closed with an absorbable suture, whereas the glabellar puncture was covered with steristrips. The nose was taped for three to four days postoperatively at night, and each patient was instructed to apply the same tape for three weeks.

**RESULTS**

The results were satisfactory in all but 12 of the 86 cases based on patient satisfaction surveys. Seven patients found the results inadequate and two of those patients underwent normal rhinoplasty afterward. Five patients found the result overcorrected and the suspension suture was removed. In the first four cases, the undermining of the dorsum was not performed before the suspension. During short-term follow-up, the desired results were not found to be sustainable and the procedures were renewed with undermining of the dorsal skin in order to achieve subdermal fibrosis. The tip support suture between the caudal septum and medial crurae was applied in 62 patients.

The suspension suture was also extraordinarily effective in secondary rhinoplasty patients. After an initial loss of the overcorrected projection and rotation, the results were durable throughout follow-up. The operation duration was under 15 minutes in all of the cases. Our longest follow-up was 24 months, during which we observed that the final outcome appeared after the third month and did not undergo any change afterward. We have not seen any complications related to the permanent suture, such as palpability or visibility through the skin.

**DISCUSSION**

In an era when the motto “Less is more” is so popular, nasal aesthetic problems are one of the few fields in which we are not able to offer our patients an acceptable, minimally invasive alternative. Not every patient requires all of the integral parts of a traditional rhinoplasty operation to address their concerns—in fact, a significant number of them do not. Furthermore, we have patients who are incapable of arranging their daily programs to accommodate the required recovery period or who do not wish to undergo such a significant operation because of their associated health problems or anxiety over an irreversible change in their facial characteristics. The main objective of the technique we describe is to provide patients with a simple method for nose reshaping, which can be performed in the office under local anesthesia in less than 15 minutes and is therefore comparable with Botox or fillers in the patient’s mind.

The description of suture techniques as an integral part of rhinoplasty is very well established in the literature. Joseph used sutures to secure the nasal tip to the caudal septum and, over the years, a great number of other suture techniques have been proposed. However, all of these techniques have been suggested as a part of traditional rhinoplasty and none of them was described as a minimally invasive, stand-alone procedure for nasal correction. For selected patients, however, our method can be proposed as a simple, office-based procedure that can be performed under local anesthesia in a matter of minutes with virtually no downtime. This procedure does not jeopardize the key anatomic structures of the nose, so there is no risk of skin irregularities related to LLC excision or internal valve problems related to ULC surgery.

We selected patients who did not have significant problems with their bony nasal construction, including five patients who had a previous rhinoplasty operation with
Figure 2. Surgical steps of the procedure. (A, B) A curved, double-sided needle with a free 3/0 polypropylene thread attached at its middle portion is introduced horizontally to the subcutaneous tissue and stitched through the glabellar periosteum. The needle is pushed along its traced outline; it is extracted from the skin only partially at the other side of the glabella (C). Following the same entry stitch by the opposite sharp end, the needle is pushed vertically down toward the tip in a subcutaneous plane, partially exiting through the skin overlying the most prominent part of the ipsilateral lower lateral cartilage (LLC) (D). Turning back horizontally, the needle is then inserted symmetrically through both LLC (E); the final exit stitch is carried out vertically upward, in the direction of the entry stitch through the initial incision (F). The LLC are then anchored to the glabellar periosteum using both ends of the thread.
inadequate tip rotation and projection. Inadequate tip pro-
jection is one of the most common problems after rhino-
plasty and securing the nasal tip has become a challenging
problem in nasal surgery. Instead of performing
another nasal surgery to correct slight postoperative prob-
lems, the shuttle method can, in our experience, achieve
the greater satisfaction in secondary rhinoplasty patients.
Moreover, secondary problems related to the aging process
(like increased nasal length) can be dealt with very easily,
safely, and quickly in conjunction with facial rejuvenation
operations such as fat injections, other suspensions, or
facelift operations. In fact, older patients benefit the most,
with the least loss of initial rotation, probably because of
the lack of a strong opposing force (Figure 4).
Nasal tip width is also one of the important features of
facial aesthetic harmony. Because of the circular shape of
the suture, which is passed through both LLC, tightening of
the knot results in a medial shift of the nasal cartilages, and
as such, we can achieve a slight narrowing of the tip area.
The caudal part of the loop suspension serves as a tradi-
tional interdomal suture, only performed percutaneously.
To achieve similar results, a single caudal septal sus-
pension suture can be placed, but in some cases at the
cost of a retracted columella. By performing a dorsal sus-
pension for the tip first, it is easier to judge the degree of
the rotation and then a septocolumellar suture can be
placed accordingly, without the risk of columellar retrac-
tion. On the other hand, in patients with inadequate nasal
projection, using columellar-septal sutures by dissecting
between the medial crurae and suturing them to the sep-
tum at a higher position in a tongue-in-groove manner
does help to achieve an extra 1- to 2-mm projection and
might also be helpful for stability in the long-term out-
come. If the septum is too long, a small segment from the
anterocaudal portion can be excised to reduce the oppos-
ing force created by the septal cartilage push. To further
diminish the opposing effect of the existing structures,
especially the upper cartilages, it is advantageous to
reversely dissect between upper and lower cartilages, so
that a space is created for cartilaginous overlapping.
In patients with very deep nasofrontal junctions, the sus-
pension knot can be used as filler in the glabellar area to
mask the dorsal prominence. The dorsal dissection is an
important part of this procedure and is performed to achieve
fibrosis of the subcutaneous tissue, to create a sustainable
fixation. The rapid production of scar tissue in the interface

Figure 3. (A) A 24-year-old woman who presented with a heavy nasal hump. (B) The masking effect of the suspension suture
is shown immediately postoperatively.
Figure 4. (A, C) A 58-year-old woman who presented with concerns about facial aging. (B, D) One year after blepharoplasty, as well as neck and midface suspensions, including nasal suspension.
Figure 5. (A, C) A 26-year-old woman who presented with aesthetic concerns about her nose. (B, D) One year after nasal suspension.
of the skin acts as a biological glue that maintains the new tip position over time (Figure 5).\textsuperscript{13,14} According to our experience, it takes a minimum of three to four weeks to achieve a strong subcutaneous fibrosis. The suspension, if detached earlier than this period, might be reversible, which may be seen as an advantage of this procedure by the patients. As a continuation of this study, it might be beneficial to measure the nasal length and the nasolabial angle pre- and postoperatively at different times, so that we can have data by which to precisely judge the necessary overcorrection.

**CONCLUSION**

The shuttle lift described herein is one of very few minimally invasive alternatives for aesthetic nasal tip surgery. For selected patients, our method can be used as a simple, office-based procedure that can be performed under local anesthesia without any significant morbidity, a very high patient satisfaction, and a recovery period of only two to three days. The suspension suture serves as an internal splint, and the permanent result is attributable to tissue fibrosis. The reversibility of the result, at least for a short period of time, is also appealing to patients who are uncertain about the outcome of nasal surgery. It is important to keep in mind that there are three crucial steps for a durable and satisfactory outcome: undermining of the dorsal skin, a slight overcorrection of the tip, and (in most cases) a reverse separation of the medial crurae and the placement of a percutaneous septocolumellar suture.

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**REFERENCES**

8. *Webster’s Online Dictionary*. Available at: www.websters-online-dictionary.org/definition/shuttle