n conclusion, accurate measurement of facial movement is essential to all clinicians involved in facial paralysis rehabilitation. To advance the field in such a niche subspecialty, it is essential that outcomes are reported uniformly. In addition to the creation of a “global” database, standardization of smile analysis would further this goal. To achieve widespread acceptance, the system needs to be simple, intuitive, and inexpensive. It must be reproducible across different international centers, and requires strong interrater and intrarater correlation. We believe the SMILE system is valid and satisfies these criteria. To our knowledge, it is the only smile analysis technique that permits remote measurement of digitally transmitted photographs. This development alone represents an improvement for patients, who often travel long distances for review of smile excursion, and for surgeons, who can now analyze smile outcome without the patient physically present. It also provides a useful tool for retrospective photographic facial analysis. Comparing preoperative to postoperative change in measured parameters from rest to smile may be the most useful determinant of successful facial reanimation surgery.

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The Bow-Tie Mattress Suture for the Correction of Nasal Cartilage Convexities and Concavities

Aesthetic medicine continues to evolve toward less invasive procedures with equal or superior results. While the current economic conditions have had some influence in the recent rise of minimally invasive cosmetic procedures and the decline in surgical procedures, they are likely not the sole cause. The popularity of minimally invasive surgery cannot be de-
nied, because many patients prefer the minimal morbidity and favorable results associated with less invasive procedures. While much of aesthetic medicine is evolving toward less invasive procedures, rhinoplasty, in contrast, has evolved over the past 2 decades into a bigger procedure, performed primarily by 1 method and with extensive grafting. The emphasis placed on grafting is partially to control crooked or deviating nasal cartilages. And while outcomes include straight, strong, well-built noses, results may take months to years to be realized. We describe a modification of the mattress suture for straightening a curved convex or concave cartilage segment as well as supporting the nasal tip, middle vault, and nasal valves while decreasing the need for harvesting cartilage, further reducing morbidity.

Traditional techniques to correct cartilaginous curvatures include strutting grafts, sutures, and nasal scoring, all of which have been reported with success yet come with specific limitations. Scoring weakens cartilage and can result in future collapse. Splinting strut grafts are very successful but may require significant donor site material, frequently necessitating extranasal sources of cartilage. In addition, excess grafting can lead to a larger nose, and, although the nose may be straightened and well supported, its appearance may not be as aesthetically appealing.

Suture techniques to alter nasal tip cartilage position and attitude have been described since Joseph. McCollough and English, Tardy and Cheng, and Tardy et al have previously illuminated the benefits mattress suturing can have for controlling the nasal tip. Gruber et al described in detail the surgical technique for straightening a cartilaginous convexity with mattress suturing. Cadaver studies on variable-thickness cartilage helped to further define appropriate distances between the suture purchases. While the mattress suture is a primary tool for controlling nasal cartilage positioning, a slight modification in design has resulted in a more predictable and effective outcome in our hands.

**Methods.** The modification of the mattress suture involves a suture crossed over in a bow-tie manner. A 5-0 polydioxanone (PDS) mattress suture (Ethicon, Somerville, New Jersey) is used; however, instead of the insertion and exit points of the suture being in the same plane as with a typical mattress suture, the second insertion entrance and exit points are reversed (Figure 1). While maintaining the distance between the parallel purchases consistent with the previous recommendations of 6 to 8 mm or 7 to 10 mm is dependent on cartilage thickness, the apex of the cartilage convexity is crossed over by the bow-tie suture. This places the focal point of tension directly over the cartilage convexity, driving the deviated segment straight (Figure 2).
Comment. We have found the bow-tie mattress suture to be a highly valuable tool for straightening a convexity and also a reliable mechanism for strengthening the cartilage. It has been previously shown that mattress sutures increase cartilage stiffness, and it has been our experience that the bow-tie mattress suture is a valuable tool for supporting the nasal tip, middle vault, and nasal valves. This technique has been found particularly valuable in treating a deviated nasal septum that otherwise would require an open repair, strong strutting grafts, or possible total septal replacement. The technique has been used successfully, extramucosally correcting the slightly deviated nasal septum using a 4-0 absorbable PDS suture, avoiding an open septal repair. The bow-tie mattress suture has resulted in less need for harvesting cartilage, further reducing morbidity. In addition, the repaired nose is strong and aesthetically appealing without having to be increased in size. As rhinoplasty surgeons continue to search for less invasive maneuvers to achieve equal or superior results, the bow-tie crossover suture is a valuable tool for the armamentarium.

Objective. Bow-tie mattress sutures have been advocated as an option for straightening mild to moderate deviations of the nasal septum. As they are performed extramucosally, the procedure is less invasive than traditional methods. Aims: The objective of the study was to evaluate the use of the bow-tie mattress suture for correction of a deviated nasal septum using a 4-0 absorbable PDS suture, avoiding an open septal repair.

Methods. Thirteen patients were entered into the study from the senior author's practice (A.A.J.). All 13 patients were offered the opportunity to participate in the treatment arm. Informed consent was obtained from the patients. All 13 patients received routine postoperative care, which includes oral steroids, prophylactic antibiotics, the botanical Arnica montana, and bromalain. The treatment group received 5 perioperative HBO treatments at 2 atmospheres for 60 minutes administered on the 2 days prior to surgery and then again on PODs 3, 4, and 5. Standard digital photography was taken on PODs 1, 5, 7, and 10 for digital analysis.

Each photograph underwent digital analysis using Adobe Photoshop (Adobe Systems Inc, San Jose, California) in the CMYK (cyan, magenta, yellow, and black) color mode from the image drop-down menu with the internal control of normal skin and the surgically treated cheek soft tissue evaluated.

The CMYK color mode was used as previously described by Seeley et al, providing information on the difference between the internal control area and the cheek soft-tissue flap to assess 5 different characteristics: cyan, magenta, yellow, black, and luminosity. The control area was taken in order of preference from the earlobe skin, temple skin, nasal skin, and cervical skin to compare an area that was uninvolved in the surgical field and is most similar to the cheek soft tissues. The cheek flap was independently evaluated (Figure 1).

Following collection of both the control and cheek soft-tissue data, color change was objectively quantified with a previously validated formula, \[ \Delta E = (\Delta L^2 + \Delta a^2 + \Delta b^2)^{1/2} \], in which \( \Delta \) represents the difference in the individual characteristic between the study area and the internal control area.