

Linear closure of surgical defects on the nose after intraoperative tissue relaxation as an alternative to a skin flap or graft



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Key words: Mohs micrographic surgery; nasal defect; nasal reconstruction; skin flap; skin graft; SUTUREGARD ISR.

INTRODUCTION

The nose represents a challenging area for reconstruction after Mohs micrographic surgery (MMS) because of the overall structure and curvatures of the nose, the sebaceous content of the region, and limited tissue mobility. Many times, a skin flap or graft is necessary to repair the defect; however, those methods may be unfavorable in certain patients. A linear closure may not be possible, as the resultant tension can compromise the normal structure and function of the nose.

Here we present a case series in which the SUTUREGARD ISR suture retention bridge (SRB) (SUTUREGARD Medical, Portland, OR) allows for intraoperative tissue relaxation without undermining to allow successful primary linear closure of nasal defects.

CASE 1

An 87-year-old man presented with nodular basal cell carcinoma (BCC) on the left nasal supratip. After 4 layers of MMS, the resultant defect was 2.5 × 1.6 cm extending from the nasal supratip proximally across the nasal dorsum. Repair options were discussed, and he declined the use of a skin graft or flap and opted for a trial of intraoperative skin relaxation and a linear closure.

The wound edges were approximated, and the SRB was secured in place centrally across the defect using a United States Pharmacopeia (USP) 0 nylon suture (Fig 1). After 30 minutes, the tissue had adequate relaxation to undergo primary linear

Abbreviations used:

BCC:	basal cell carcinoma
MMS:	Mohs micrographic surgery
SRB:	suture retention bridge
USP:	United States Pharmacopeia

closure without causing significant deformity of the nose or alteration of function. The wound was closed in a standard layered fashion using USP 4-0 Polysorb and 4-0 nylon with simple interrupted sutures. The device was subsequently removed, and the center of the defect was closed in a similar fashion (Fig 2).

The closure was treated with standard postoperative care and showed excellent healing at the time of suture removal and 1 month postoperatively (Fig 3).

CASE 2

A 96-year-old woman presented with biopsy-proven nodular BCC on the nasal tip. She underwent MMS, which resulted in a 1.5- × 1.0-cm defect with exposed cartilage at the base (Fig 4).

The advantages and disadvantages of different closure methods were discussed with the patient. Secondary intention healing and skin grafting were not favorable given that the defect contained exposed cartilage. The patient declined the use of a skin flap and opted for a linear closure after skin relaxation.

The wound edges were approximated with the SRB as described above, and the skin relaxed over

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Fig 1. Postsurgical defect on the nose after removal of BCC by MMS. A large caliber percutaneous retention suture is placed using large bites on each side of the wound edge. The suture is threaded through the flexible sides of the SRB and then through a washer.



Fig 2. Primary linear closure of the nasal tip defect using simple interrupted sutures after intraoperative tissue relaxation.

30 minutes. The wound was closed using 4-0 Polysorb and 4-0 nylon with no significant alteration of the nasal tip. The wound showed excellent healing at the time of suture removal 1 week later.

CASE 3

A 74-year-old woman presented for MMS for removal of a biopsy-proven nodular BCC on the left nasal sidewall. The resultant defect was 1.5×1.2 cm (Fig 5). After discussing different closure options, the patient opted for a linear closure.

The SRB was secured centrally across the defect, left in place for 30 minutes, then removed. After relaxation, the wound was 1.5×0.7 cm representing a 42% reduction in wound width (Fig 6). This allowed for a 2.3-cm linear closure using 4-0

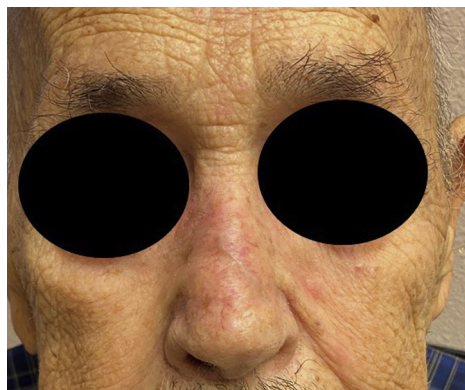


Fig 3. Excellent healing of the nose 1 month after suture removal.



Fig 4. Nasal tip defect after removal of nodular basal cell carcinoma by MMS.

Polysorb and 5-0 nylon without causing significant structural or functional deformities.

DISCUSSION

Surgical wounds can be closed in several ways including healing by secondary intention, linear repair, grafting, or reconstruction with a skin flap. In many cases, a primary linear closure is preferable but may not be possible for larger wounds on the nose because of the inherent tension of the tissue, free margins, and limited tissue mobility.¹ Some areas of the nose, like the nasal side wall and dorsum, have mobile tissue, and smaller defects in those areas may undergo primary closure without difficulty. The skin of the nasal tip is tightly adhered

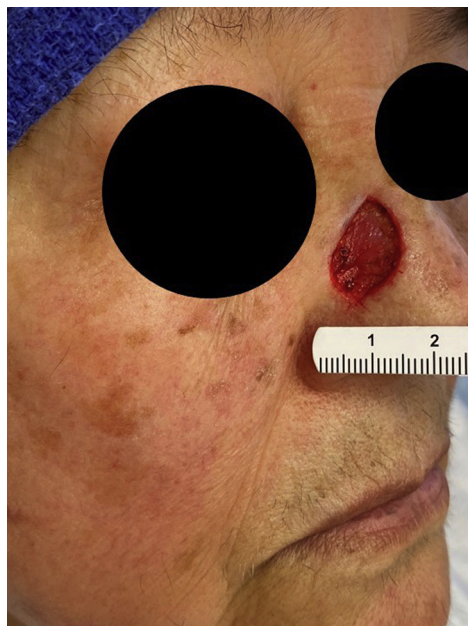


Fig 5. Removal of BCC on the nasal sidewall by MMS resulted in a postsurgical defect 1.5×1.2 cm.



Fig 6. A 42% reduction in wound width after 30 minutes of intraoperative tissue relaxation using the SRB.

to the underlying cartilage and usually requires the use of a skin flap for closure, particularly if there is exposed cartilage at the base of the defect. For larger nasal defects, attempting to approximate the wound edges with a suture alone, and no undermining, requires a great deal of force, which can cause the thin suture to tear through the sebaceous tissue. If the defect can be pulled closed, many times the

resultant tension pulls on the alar free margins causing significant structural deformity to the nose, which leads to an unacceptable cosmetic result and may compromise function of the nasal valves.

Previous studies have shown that the SRB reduces wound closure tension in scalp defects by 65% in 30 minutes.² The bridge design of the device displaces tension in such a way that the wound edges are not disrupted when the tissue is approximated. We were able to show that nasal skin responds in a similar fashion. In our experience, the device allowed adequate tissue expansion without undermining to allow primary linear closures. With the device in place, the physician is able to determine if there is any distortion of free margins and whether the nasal valve is functionally compromised before proceeding with suture placement. If there is any noticeable structural or functional abnormality, other closures should be considered. In our experience, there have been very few risks associated with use of the device. Most patients complain of mild tightness during the first few minutes after the device is secured and report substantial relief after 5 to 10 minutes. This finding is consistent with previous data showing that most stress-relaxation occurs within the first 10 minutes.² There will be a transient indentation in the skin after device removal. No other tissue damage such as laceration or blistering has been noted.

Other repair options were discussed with all patients before proceeding with a trial of intraoperative skin relaxation and linear closure. In our nasal tip case (case 2), healing by secondary intention and skin grafting was not favorable given the location and exposed cartilage. In cases 1 and 3, in which the defects were located on other regions of the nose, the postsurgical defect was either too large to undergo healing by secondary intention or the patient requested a surgical closure. In those cases, the patients declined the use of a skin graft. In a previous study, only 75% of patients who had a skin graft repair on the nose after MMS were happy with the cosmetic outcome versus 100% of patients who underwent repair using a flap.³

Many different flaps can be used depending on the size and location of the nasal defect. Even within the nose itself, the respective subunits have unique characteristics. The ideal flap for nasal repair utilizes adjacent skin that is similar in the color, texture, and sebaceous content. It is also favorable to place incision lines within the boundaries between cosmetic subunits and avoid crossing subunits if possible.⁴ Possible flap designs were discussed with each patient. A staged paramedian forehead flap is the gold standard for closing defects on the distal

nose or nasal tip, particularly those larger than 2.0 cm.¹ The disadvantages to this procedure include a more invasive closure with larger and additional incision sites, a take-down procedure several weeks later, and an unfavorable appearance while the primary flap is in place. In our practice, these reasons can deter some patients from choosing this option, particularly elderly patients who are not as concerned with the cosmetic outcome of the final repair.

Single-stage skin flaps are also commonly used to repair nasal defects. No particular flap has proven to be superior to others in all cases; therefore, the reconstruction selected depends on the specific location of the defect and the characteristics of the patient. A bilobed flap is best suited for more lateral defects as the skin from the nasal sidewall is a different texture than the nasal tip.⁵ A dorsonasal flap, or Rieger flap, is a laterally based rotational flap that recruits skin from the nasal dorsum, bridge, and glabella to close defects on the distal nasal dorsum or tip. The Rieger flap requires a large curvilinear incision and extensive undermining to mobilize the tissue. Defects that are located more laterally may necessitate a larger flap to avoid excess tension pulling the contralateral ala superiorly.⁶ The Peng flap is a pinch modification of a linear advancement flap that recruits tissue from the nasal sidewalls and dorsum. This flap rotates and advances, which provides excellent cosmetic results over the convex surface of the nasal tip. It is wider than it is long so there is minimal risk of flap necrosis.⁷ The melolabial transposition flap works well for lateral defects

but can lead to tenting across the nose-cheek junction.

Although a linear closure of postsurgical nasal defects may not be the best choice for all patients, we hope that the SUTUREGARD ISR device can help provide another option for those patients who are not candidates for other closure types or for those who decline the use of a skin flap or graft. We primarily use this device for nasal and scalp wounds. However, we also use it to assist with wound closures on the trunk, leg, and foot with success. The device should be avoided in thin, fragile skin. In those instances, other devices to bolster the skin are better solutions.

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