A Simplified Approach to Alar Base Reduction

A Review of 124 Patients Over 20 Years

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Objectives: To simplify the approach and diagnosis of alar base reduction, suggest a treatment algorithm, and evaluate the long-term outcomes of 3 different techniques used separately or in conjunction with one another.

Design: Retrospective review of 124 patients seen in a private practice by a single surgeon. Patients ranged in age from 15 to 59 years (mean age, 30.4 years). Patients were undergoing primary (83.9%) or revision (16.1%) procedures.

Results: Of the 124 patients undergoing alar base reduction, 31 (25%) were male and 93 (75%) were female. Average follow-up was 2 years. All patients underwent wedge excision, and for 64 patients (51.6%), this was the only technique used on the alar base. Alar wedge and nasal sill excisions were performed in 21 patients (16.9%); 19 (15.3%) underwent alar wedge excision with V-Y advancement, and 20 (16.1%) underwent alar wedge excision, nasal sill excision, and V-Y advancement. Thirty-one patients (25.0%) received dermabrasion for notable postoperative incision scars.

Conclusions: The data represent the senior author’s outcomes of alar base reductions over the past 20 years. The 3 techniques we describe have been effective when used alone or in combination in reducing alar flare and in narrowing the nasal base. Patients should be counseled that dermabrasion of the wedge excision areas in the alar-facial groove may be necessary to diminish visible scars.

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Alar base reduction is an intriguing and often inadequately described technique of rhinoplasty. Numerous approaches to narrow the nasal base have been discussed. It is generally agreed that reduction of nasal base width should be considered when the interalar distance exceeds the intercanthal distance in the Caucasian patient (Figure 1). However, ethnic differences and personal preference may necessitate significant variation from this standard. Another common indication for reducing the alar width is to correct the sidewall flaring that retrodisplacement of the nasal tip may cause. Alar flaring is defined as the lateral aspect of the ala extending significantly beyond the alar-facial groove (Figure 2).

Once the need for alar base reduction has been ascertained, we use a combination of 3 basic techniques to effect this change. Classically described by Weir, with subsequent modification by Joseph and Aufricht, the modified Weir incision (or alar wedge excision) (Figure 3) is our technique of choice for excessive flaring of the ala for the frontal appearance of a wide nasal base. Our wedge excision technique spares entering into the nostril and violating the naturally curved internal nostril border. The goals of the wedge excision are to avoid overstraightening the ala, to preserve the natural curvature of the ala, and to avoid telltale incisions into the nostril opening. This maneuver may be used in concert with nasal sill excision, initially described by Aufricht, for correction of the excessive flare with enlarged nasal sill width (Figure 4). A relative indication for sill reduction is when the nostril is enlarged and has a horizontal axis. When the alar base is wide because of a large nasal sill and no flaring is present, the sill alone is directly narrowed, though this is very rare. If the lateral insertion of the ala is responsible for excessive nasal base width, then we reposion the alar insertion with a V-Y advancement, as defined by Bernstein (Figure 5).
The purpose of this article is to further explore the techniques available for alar base reduction by discussing the experiences of the senior author (R.W.H.K.), examining outcomes in 124 patients, and comparing this with what is presented in the current rhinoplasty literature. While this procedure is not appropriate for most rhinoplasties, it is still an essential tool for the rhinoplasty surgeon and deserves a thorough analysis. Overall, we intend to provide a review of this topic, simplify the analysis and approach, and aid the surgeon in achieving the most natural result attainable.

**METHODS**

Patients were selected from a review of medical charts from the senior author’s (R.W.H.K.) practice spanning almost 20 years of experience (May 3, 1983 to April 17, 2003). Inclusion criteria were history of wedge resection, nasal sill excision, and/or V-Y advancement during rhinoplasty. The exclusion criterion was patients who did not follow-up at the practice. Data were collected on length of follow-up, procedures performed, age, ethnicity, and sex. Procedures were also classified as primary or revision septrhinoplasty. Filemaker Pro (Macintosh, Cupertino, Calif) and Excel (Microsoft, Redmond, Wash) were used for database management.

**NASAL ANATOMY**

Preoperative evaluation of the base of the nose should include the size, shape, symmetry of the nostrils, the width and length of the columella, the relationship between the columnellar length and height of the lobule, and the thickness and contour of the alae. The classic Caucasian nasal base width should approximate the intercanthal distance (Figure 1). The Caucasian nasal base resembles an equilateral triangle, with the length of the columella being twice the height of the lobule and equal in length to the height of the upper lip (Figure 2). The nostrils should be pear-shaped, about the same width as the columella, and have their long axis oriented at approximately a 45° angle to the vertical axis of the columella.6,16,17 Farkas et al18 demonstrated the degree of variation that can be seen in the axis of the nostril in African American, Asian, or Mestizo subjects (Figure 6). The base of the classic Caucasian nose is most aesthetically pleasing when it is slightly taller than wide and has minimal alar flare. Porter8 together with Olson19 discuss at length the anthropomorphic features of African American women and men, noting that in men, the interalar ratio compared with the intercanthal distance is approximately 1.3:1, whereas the female ratio is 1.25:1 (Figure 7). Sim et al20 reviewed the facial features of 100 southern Chinese women and compared them with white North American women. They found that it was more common for the southern Chinese face to have a nasal width greater than the intercanthal distance. In addition, the alae were more flared, and the nostrils were more horizontally oriented. Choe et al21 describe that it is more common for the nasal base width in Korean Americans to actually be more narrow than the intercanthal distance. Bernstein15 elaborates further on the wide variability of the nasal base that may be encountered (Figure 8).

An additional anatomic consideration for alar base reduction is that of the alar axis. Sheen11 defined the alar axes to be...
divergent, straight, or convergent (Figure 9). Brissett and Sher-
ris22 noted that the convergent alar axis is not amenable to alar
base reduction and should be avoided.

Flaring, or the lateral aspect of the ala extending signifi-
cantly beyond the alar-facial groove, may result for a variety of
reasons. Ethnicity, trauma, cocaine use, or previous rhino-
plasty (ie, reduction rhinoplasty with retrodisplacement of the
tip or derotation) (Figure 10) may yield a widened nasal base.
Flaring may also take on the appearance of the lateral ala, as-
suming a more circular shape than that of a gentle curve. Nos-
tril asymmetry, often unnoticed by the patient, may be caused
by a wide columella, caudal septal deviation, prominent me-
dial crural feet, congenital defects, or nasal masses.23 The na-
sal sill is the posterior portion of the nostril between the ala
and the columella. The nasal sill is often greater than or equal
to the columellar width. Internal to the nasal sill is the nasal
floor, which is continuous with the nasal vestibule (Figure 2).

TECHNIQUE

Modification of the nasal base is not a routine part of rhino-
plasty and should be implemented in a conservative manner
as overresection is extremely difficult to correct. When in doubt,
we do not perform the excision at the time of the initial rhi-
noplasty. Rather, in such cases it is best to wait until the nose
heals and if the patient desires, the procedure is performed in
the office several weeks or months afterward. This should al-
ways be the last maneuver in rhinoplasty as deprojection may
increase the appearance of flare (Figure 11 and Figure 12).
Conversely, projection of the nose may reduce the need to per-
form alar base reduction. Of note, deprojection will not change
the nostril sill size, except when there is a significant tension
septum. The “tent pole” effect of the septum on the nasal skin
can stretch the nostrils to a larger size; hence, release of this
tension may diminish nostril size.

When incisions of the nasal base are strategically placed, scars
can become imperceptible. However, incisions may be visible
for a variety of reasons, especially if they violate the internal
alar border and go into the nostril. We strongly disagree with
techniques described in the literature that enter the nostril op-
ing via the lateral ala (Figure 13). Incisions into the nos-
tril should only be placed when excess nasal sill is present, and
then only through the horizontal portion of the nasal sill and
not via a lateral approach. One must always consider the ef-
ects of nostril reduction on the nasal aperture so that nasal sill
excision does not contribute to nasal airway obstruction. There-
fore, we recommend thorough evaluation and meticulous tech-
nique when undertaking base reduction.

Figure 5. V-Y Advancement. A, The hook is placed in the lateral aspect of the wedge incision in the area of the nasolabial fold. B, After suturing, this creates the
stem of the “Y,” which is aligned with the nasolabial fold.

Figure 6. Ethnic variations in the nostril axis (adapted from Farkas et al20).
To simplify the approach to the nasal base, we recommend focusing on alar flaring, sill excess, and overall nasal base width. As mentioned previously herein, nasal base width should roughly approximate the intercanthal distance in the Caucasian nose and should be larger in the African American or ethnic nose. Once it has been determined that the alar base is too wide, one can tailor their approach (Figure 14).

When performing wedge excisions (Figure 15), mark out skin incisions in the alar-facial groove to “preserve the curve” as diagrammed in Figure 3, or a teardrop deformity may result (Figure 13). To ensure a balanced excision, preoperative marking and calipers are very useful in the planning of wedge and sill excisions. Caution must be taken to avoid excising too much flare or the alae will look straight as they join the alar-facial groove. If sill excisions are not being done, make sure the incision does not violate the nostril. After injection (lidocaine hydrochloride with
1:100,000 epinephrine), a No. 15 blade is used to incise the wedge of tissue. Care is taken not to violate the muscle deep to the skin. Needle-point cautery is used for hemostasis. Careful reapproximation is necessary to avoid a step-off deformity (this is more common with sill excisions than with wedge excisions). An absorbable braided suture (3-0 Vicryl [polyglactin 910]) is placed in the deep tissue layer to relieve any tension on the edges of the incision, and 6-0 Prolene sutures are used for the cutaneous layer (Figures 12, 15, 16, and 17). Particular attention is paid to evertting wound edges along the sill region. If reapproximation of the incisional edges results in flattening or overstraightening of the ala, consider a modest V-Y advancement as described later in this article.

Sill excisions are most commonly performed with wedge excisions, with or without V-Y advancement (Figure 14). Though sill excisions could theoretically be performed alone or with a V-Y advancement, none of the procedures performed in our alar base series were done without wedge excisions. When planning the incision for the enlarged nasal sill, the most natural appearing results occur when the resection of the sill does not extend laterally past the long axis of the nostril or does not include too much of the vestibular lining (Figure 3). Care should be taken to avoid the mesial crus of the lower lateral cartilage. Additional undermining of the tissues is recommended at the nasal sill to avoid nostril notching. A 6-0 Prolene suture is used to precisely reapproximate the nostril border, and a deep 5-0 Vicryl suture is used, particularly to evert the skin edges at the nasal sill (Figures 4 and 18).

V-Y advancement is performed after either of the 2 maneuvers described herein (wedge or wedge with sill excision) (Figures 3 and 4). If sill excisions have been performed, the nostril sill must first be reapproximated with a single 6-0 Prolene suture. The lateral aspect of the open alar wedge incision is then drawn into the nasolabial fold with a single-pronged skin hook.

Simple, interrupted 6-0 Prolene sutures approximate the "V" to create the stem of the "Y" within the nasolabial crease (Figure 5B). The more sutures that are placed along the stem of the "Y," the further the ala will be medialized. In 3 days every other suture is removed, and at 5 days all sutures are removed (Figures 19, 20, 21, 22, and 23). Healing is surprisingly good, despite the density of sebaceous glands in this area.
Of the 124 medical charts reviewed, 31 patients (25%) were men and 93 (75%) were women (Table 1). Average follow-up was 2 years. All patients underwent wedge excision; 64 (51.6%) underwent alar wedge excision alone; 21 (16.9%), alar wedge and nasal sill excision; 19 (15.3%), alar wedge excision with V-Y advancement; and 20 (16.1%), alar wedge excision, nasal sill excision, and V-Y advancement. Thirty-one patients (25.0%) received dermabrasion postoperatively for persistent nasal flare. One patient had raised incisions but did not return for dermabrasion. Patients of each wedge resection subgroup requiring dermabrasion were compared with one another (Table 2). When compared with the group that received wedge excisions alone, only the group that underwent wedge and sill excision showed a statistically significant increase in the incidence of dermabrasion (P = .02). Dermabrasion was performed both along the wedge and sill portion of the incision when scars were conspicuous.

The history of alar base reduction reveals a great variety of surgical maneuvers. It has been known for some time that notching deformities may result from this endeavor. \(^1,6,9,10\) We believe that incision location is the primary reason for notching and nostril deformity. One technique described by Peck et al\(^24\) preserves the vestibular skin when resecting a triangle of tissue from the cutaneous nasal base, resulting in an intranasal “dog ear.” The redundancy flattens over time, leaving a closure that is resistant to notching.

Another factor noted by some to contribute to notching is carrying the modified Weir incision into the deep muscle layer in the alar base,\(^1\) though some authors describe using this technique of muscle transection when performing the alar cinch procedure described by Miller.\(^2,25\) This technique is used primarily for patients undergoing surgery for cleft lip, and it makes use of laterally pedicled alar flaps. The tissue is deepithelialized and inset medially in the nostril floor to effect narrowing of the nasal base. For stability of the closure, the flaps are sutured to the columella.\(^2,25\) We consider this to be a combination of a sill excision and an alar bunching technique.

Daniel\(^2\) discusses a nasal base reduction modification of the procedure described by Sheen\(^11\) that classifies wedge excisions according to postoperative objectives. A type I wedge excision is limited to the alar base and will reduce alar flare only. Type II wedge excisions involve both the alar base and the nostril sill, hence decreasing both the nasal base and the nostril size. Type III wedge excisions include the alar base and nostril sill and extend into the nostril floor to achieve a decrease in interalar width.\(^2\)

An additional technique described to minimize postoperative asymmetry is the “Calibrated Weir Operation” as described by Cinelli.\(^26\) It involves drawing a midcolumellar line from the nasolabial angle to the midpoint of the upper vermilion border, then bisecting this line and the columella with another perpendicular line. From the intersection of the 2 lines, one may measure the distance to the medial and lateral borders of a nasal base excision.

![Figure 14. Algorithm to determine performing wedge excision alone, wedge excision plus sill excision, or wedge excision plus sill excision plus V-Y advancement](https://jamanetwork.com/)

![Figure 15. Alar wedge excision. Deep 5-0 Vicryl (polyglactin 910) suture placement decreases skin edge tension. Closure is accomplished with simple interrupted 6-0 Prolene sutures](https://jamanetwork.com/)
Figure 16. Alar wedge resection. A, Wedge excision completed on the left and planned on right. Note the alar flare, the incision in the alar-facial groove, and the preservation of the nostril sill. B, Wedge excision. C, Placement of deep stitch. D, Simple interrupted closure. E, Reduced flare (base view). F and H, Preoperative photos showing alar flare. G and I, Incisions are well healed at 1-month follow-up. Note that some of the curvature of the lateral ala is preserved to maintain a natural appearance. Too great a removal causes lateral alar straightening. At no point does this incision enter the nostril opening.
Overall, our alar base reduction techniques of wedge excision, sill excision, and V-Y advancement have resulted in a high degree of patient satisfaction. We propose a simple algorithm (Figure 14) to yield a consistent and reliable tool for the rhinoplastic surgeon. Our goal is to accomplish a natural result and preserve the natural curvature of the lateral ala. Furthermore, preoperative counseling and adjusting patient expectations about the potential need for dermabrasion is critical to patient satisfaction. It is also important to realize that...
one may decrease nasal flare by increasing tip projection or by increasing tip rotation; hence, it is important to perform base reductions as the last maneuver in the procedure.

In our experience 15% to 20% of deprojection rhinoplasties require wedge resections. This is similar to what is reported by Rees and Gilbert. Additional nasal base reduction maneuvers described Tardy et al include excision of the nostril floor internal to the nose and without violating the sill region.

Outcomes in our patient series were improved with the use of dermabrasion in the alar-facial groove in 25% of patients. Increased density of sebaceous glands in the area of the alar-facial groove undoubtedly plays a role in the visibility of Weir incisions. We did not find that scarring incidence increased when adjusting for ethnicity or sex (Table 1). In general, the literature also discusses skin incision placement 1 to 1.5 mm anterior to the highly sebaceous alar-facial groove. However, we have found that these incisions may also be quite visible. This patient population underwent incisions placed within the alar-facial groove, which may have contributed to the increased need for postoperative dermabrasion. Of note, incisions placed in the nasal sill, when combined with wedge excisions, were most likely to require dermabrasion (Table 2). This emphasizes the importance of careful placement of sill incision and proper eversion of these wound edges.

One could speculate that the large ethnic population (44%) of our patient series may contribute to the increased use of dermabrasion. However, the data do not statistically support that premise because 19% of Caucasian patients also underwent dermabrasion. One may also consider that the ethnicity demographics could be skewed based on the lack of appropriate categorization. The increasing rise of interracial couples often blurs the lines of distinction between ethnic groups. Ethnicity declared by the patient may not fully reflect the ethnic diversity of their parents (Table 1).
The V-Y advancement described by Bernstein has been particularly useful when additional narrowing of the nasal base cannot be accomplished by the wedge and sill excisions alone. The wedge excision may reduce the appearance of the nasal base width from the frontal view; however, it does not significantly change the interalar distance. Surprisingly, there has been little mention of this technique in the literature since 1975. In our series we used this technique in 31% of patients.

Measuring before removal of tissue and careful reapproximation of skin edges can minimize asymmetry. Exact symmetry may not always be possible. To avoid this problem, we feel that deep sutures are helpful to appropriately reapproximate the mobilized ala. Caution should be exercised in the nasal base that has a preoperative asymmetry. We feel that with the exception of cleft lip and trauma, most nostril asymmetries are attributable to correctable causes (tip or columellar deflection, nasal masses). Asymmetrical alar flare without history of trauma, surgery, or congenital cleft lip or mass is extremely rare.

Unilateral alar base reduction may be of use in patients with cleft lip, particularly if the nasal floor is too wide or if excessive flare is present. In addition to the techniques described in this section, Mazzola describes a Z-plasty that appears to effect a similar change. Using vestibular lining, a columellar-based flap Z-plasty is designed to move the alar insertion medially. The rotated flap places the intranasal skin lateral to the ala, allowing significant medialization.

Bafqeeh and Al-Quattan present an interesting discussion on the potential devascularization of the nasal flap when open rhinoplasty is combined with alar base resections. Recognizing the 5 major arteries of the nose (Dorsal nasal artery, external nasal branch of the anterior ethmoidal artery, lateral nasal artery, alar branches of the angular artery, and the columellar artery), he recommends keeping the alar base excision below the alar groove and degloving the nasal skin superficial to the lateral crura to avoid damage to the lateral nasal arteries. Also, defatting of the nasal tip was discouraged to preserve the nasal tip plexus. We have not found devas-
cularization of the nasal tip to be an issue in this patient series. To preserve nasal blood supply, we recommend leaving the deep musculature intact.

The rhinoplastic surgeon must also take into consideration the risk of further nasal airway obstruction when narrowing the nasal base or nostrils. It has been shown via acoustic rhinometry that reduction rhinoplasty can reduce the cross-sectional area at the nasal valve 22% to 25%. To maintain the nasal airway, the rhinoplastic surgeon is encouraged to consider the use of spreader grafts and turbinate reductions. An interesting study performed by Khosh et al noted that in a series of 53 patients with nasal valve obstruction, 79% of the obstructions were determined to be caused by previous rhinoplasty. In addition to the inherent risk of nasal airway obstruction that comes with rhinoplasty, one must be aware...
of the potential for worsening the airway by narrowing the opening into the nostrils with sill excision or V-Y advancement. If any doubt exists concerning postoperative functional or cosmetic outcomes from nasal base excision, defer this portion of the procedure for 6 to 8 weeks. At that time the nose may be reevaluated, and minor nasal base excisions can be performed in the office if deemed necessary.\textsuperscript{9,10}

In conclusion, conservative wedge excisions are useful for the appropriately selected patient with excess alar flare. Nasal sill excisions are effective for decreasing the size of a nostril and converting horizontal nostril axes to those that are more vertically oriented. Moreover, the V-Y advancement techniques described by Bernstein\textsuperscript{29} are reliable and predictable methods of medializing the nasal base. What makes the ala look natural is a preserva-

Figure 23. This patient underwent increased tip projection, wedge excision, and V-Y advancement with postoperative dermabrasion for scarring. A and E, Preoperative views reveal increased alar flare, sill, and interalar distance. B and F, Postoperative views. C and D, Incisions are imperceptible after dermabrasion.
excision alone).

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Table 1. Characteristics of 124 Patients Undergoing Alar Base Reduction*

<table>
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<tr>
<th>Characteristic</th>
<th>Caucasian (n = 69)</th>
<th>Hispanic (n = 26)</th>
<th>African American (n = 16)</th>
<th>Middle Eastern (n = 5)</th>
<th>Mediterranean (n = 3)</th>
<th>Asian (n = 3)</th>
<th>Indian (n = 2)</th>
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<tbody>
<tr>
<td>Male</td>
<td>8 (12)</td>
<td>10 (39)</td>
<td>6 (38)</td>
<td>3 (60)</td>
<td>2 (67)</td>
<td>1 (33)</td>
<td>1 (50)</td>
<td>31 (25)</td>
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<tr>
<td>Female</td>
<td>61 (88)</td>
<td>16 (62)</td>
<td>10 (63)</td>
<td>2 (40)</td>
<td>1 (33)</td>
<td>2 (67)</td>
<td>1 (50)</td>
<td>93 (75)</td>
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<tr>
<td>WE + SE</td>
<td>37 (54)</td>
<td>15 (58)</td>
<td>6 (38)</td>
<td>2 (40)</td>
<td>1 (33)</td>
<td>3 (100)</td>
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<td>64 (51.6)</td>
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<td>WE + V-Y</td>
<td>9 (13)</td>
<td>7 (27)</td>
<td>3 (19)</td>
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<td>0</td>
<td>0</td>
<td>2 (100)</td>
<td>21 (16.9)</td>
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<tr>
<td>WE + SE + V-Y</td>
<td>8 (12)</td>
<td>3 (12)</td>
<td>6 (38)</td>
<td>3 (60)</td>
<td>0</td>
<td>0</td>
<td>2 (100)</td>
<td>31 (25.0)</td>
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<td>Dermabrasion</td>
<td>13 (19)</td>
<td>7 (27)</td>
<td>5 (31)</td>
<td>3 (60)</td>
<td>1/3 (33)</td>
<td>0</td>
<td>2 (100)</td>
<td>31 (25.0)</td>
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<td>Age range (mean), y</td>
<td>15-59</td>
<td>16-58</td>
<td>23-54</td>
<td>25-38</td>
<td>20-40</td>
<td>31-43</td>
<td>28-36</td>
<td>15-59 (30.4)</td>
</tr>
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</table>

Abbreviations: SE, sill excision; V-Y, V-Y advancement; WE, wedge excision.

*Data are given as number (percentage) except where indicated. Average patient follow-up, 2 years.

Table 2. Procedures of 31 Patients Requiring Dermabrasion*

<table>
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<th>Procedure</th>
<th>Patients, No./Total No. (%)</th>
<th>P Value</th>
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<tr>
<td>Wedge excision alone</td>
<td>11/64 (17)</td>
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<tr>
<td>Wedge and sill excision</td>
<td>9/21 (43)</td>
<td>.02</td>
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<tr>
<td>Wedge excision and V-Y advancement</td>
<td>4/19 (21)</td>
<td>.70</td>
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<tr>
<td>Wedge and sill excisions and V-Y</td>
<td>7/20 (35)</td>
<td>.09</td>
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*The x2 test was used to calculate the P values (compared with wedge excision alone).

REFERENCES


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