Objective: To evaluate the aesthetic and functional outcomes of a full-thickness skin graft and a separately harvested auricular cartilage graft for nasal alar defects created by Mohs micrographic surgery.

Design: Twenty patients with deep Mohs micrographic surgery defects of the nasal ala who underwent reconstruction with a full-thickness skin graft and an auricular cartilage graft were prospectively studied at a single tertiary care institution between 2010 and 2011 in a non-randomized, nonblinded study. An ordinal 5-point Likert scale evaluation of overall outcomes was performed by 4 independent surgeon raters.

Results: The mean outcome for use of the full-thickness skin and auricular cartilage graft construct was a score of 2.3 on a scale of 1 through 5, with 1 being excellent and 5 being poor. The mean duration of follow-up was 6 months, with a range of 5 weeks to 23 months. There were no clinically meaningful losses of constructs in the patients studied.

Conclusion: A full-thickness skin graft and a separately harvested auricular cartilage graft are valuable and reliable tools for reconstructing deep nasal alar defects that require support to prevent alar retraction or collapse, particularly when a single-stage procedure is preferred or necessary because of medical comorbidities.

The mean Likert rating for our series was 2.3, with the most common rating being 2, or very good, in 26 of 80 photographs (33%). A rating of 1 (excellent) was given in 21 photographs (26%); a rating of 3 (good) was given in 24 photographs (30%); and a rating of 4 (fair) was given in 9 photographs (11%). A rating of 5 (poor) was not given.

Nasal alar reconstruction using full-thickness skin grafts overlying a separately harvested auricular cartilage graft was performed in 20 patients (mean age, 69 years; age range, 47–90 years). Fourteen patients (70%) were male, and 6 (30%) were female. In all cases, the involved neoplasm was basal cell carcinoma. Six patients had diabetes, 1 of whom was insulin dependent. Eleven patients had hypertension. No patients were active smokers, although 9 (45%) had a smoking history.

Photographs used for surgeon rating were taken at postoperative visits at a mean follow-up of 6 months (range, 5 weeks–23 months). Defect size repaired with the full-thickness skin grafts overlying a separately harvested auricular cartilage graft had a mean area of 2.0 cm² (range, 0.8–5.9 cm²).

The mean Likert rating for our series was 2.3, with the most common rating being 2, or very good, in 26 of 80 photographs (33%). A rating of 1 (excellent) was given in 21 photographs (26%); a rating of 3 (good) was given in 24 photographs (30%); and a rating of 4 (fair) was given in 9 photographs (11%). A rating of 5 (poor) was not given.
The best combined rating was 4, which translated to an agreement of an excellent outcome among all 4 surgeons. This optimum outcome was seen in 3 different patients (15%). Two additional patients had only 1 slightly dissenting rating of 2 (overall combined rating, 5). The interrater reliability for the raters was measured with a weighted $\kappa$ of 0.36 to 0.67 (significant at $\alpha = .05$).

Nasal skin is one of the most common locations for malignant neoplasms, with approximately 85% being basal cell carcinoma, 14% squamous cell carcinoma, and 1% melanoma. Twenty-one percent of nasal skin cancers occur on the nasal ala. Common techniques for nasal alar defect repair include healing by secondary intention, primary repair, and skin grafts for small, superficial defects and cartilage with interpolated cheek or forehead flaps for deeper, larger defects. Regardless of the choice of reconstruction, adherence to the subunit concepts described by Burget and Menick will optimize the aesthetic outcome. In many cases of nasal alar reconstruction, a cartilage framework, such as auricular cartilage, is necessary to maintain alar contour, to resist contraction forces, and to provide a stable external nasal valve.

In this study, the surgeon ratings of full-thickness skin grafts overlying a separately harvested auricular cartilage graft resulted in a mean score of 2.3, approaching a Likert rating of very good. Figure 3 is an example of a good to very good outcome (mean score, 2.5), and Figure 4 is an example of a good to fair result (mean score, 3.5). Figure 4 is also included to illustrate an acceptable outcome in a patient with a larger defect (5.9 cm$^2$). Several patients had remarkable aesthetic results despite large nasal alar defects. The worst rating given in our series, fair (score, 4), was given in only 3 patients (11%); there were no poor ratings (score, 5). Previous reports raised concerns of graft necrosis and poor aesthetic outcome, which were not seen in our series. Our interrater reliability analysis using our ordinal Likert scale indicated fair to good agreement above chance.

When patients present with a large-volume mucosal-sparing nasal alar defect such as that seen in Figure 4, it is generally our practice to recommend an interpolated forehead flap (or interpolated cheek flap if an alar defect is primarily involved) with auricular cartilage. However, a staged reconstruction may be undesirable for patients who are unwilling or unable to undergo multiple operations. Other surgical options that meet the reconstructive goals of deep alar defects but are single stage would be highly desirable in this patient population. Our results indicate that a separately harvested full-thickness skin graft and an auricular cartilage graft can be combined in a single-stage operation to meet the reconstructive goals of deep alar defects while maintaining an acceptable aesthetic and functional result. Attempts to maximize skin graft contact with surrounding vascular tissue are recommended, although we ob-
Mucosal-sparing alar defect

- Risk of alar retraction
  - Yes
  - No

- Cartilage graft
- FTSG

- Large-volume defect
  - Absence of melolabial fold
  - Aesthetically demanding patient
  - Yes
  - No

- Camorbidities
  - Preference for single stage
  - Yes
  - No

- Forehead/interpolated check flap
- FTSG

Figure 5. Mucosal-sparing alar defect reconstructive guide. FTSG indicates full-thickness skin graft.

Our findings indicate that a full-thickness skin graft overlying a separately harvested auricular cartilage graft construct is a viable and valuable option in mucosal-sparing nasal alar defect reconstruction when a single-stage procedure is preferred for personal or medical reasons.

Accepted for Publication: July 30, 2012.
Published Online: December 3, 2012. doi:10.1001/2013.jamafacial.25

Correspondence: Jeffrey S. Moyer, MD, University of Michigan, 1500 E Medical Center Dr, TC 1904, Ann Arbor, MI 48109-5241 (jmoyer@med.umich.edu).

Author Contributions: Dr Moyer had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis. Study concept and design: Moyer. Acquisition of data: Zopf, Iams, Kim, Baker, and Moyer. Analysis and interpretation of data: Zopf and Moyer. Drafting of the manuscript: Zopf, Iams, and Moyer. Critical revision of the manuscript for important intellectual content: Zopf, Kim, Baker, and Moyer. Statistical analysis: Zopf. Administrative, technical, and material support: Iams, Baker, and Moyer. Study supervision: Kim, Baker, and Moyer.

Conflict of Interest Disclosures: None reported.

Previous Presentations: This study was presented in part at the American Academy of Facial Plastic and Reconstructive Surgery Annual Fall Meeting; September 9, 2011; San Francisco, California.

Additional Contributions: Andrew Joseph, MD, MPH, provided assistance with statistical analysis.

REFERENCES