

# Quantity and Characteristics of Flap or Graft Repairs for Skin Cancer on the Nose or Ears: A Comparison Between Mohs Micrographic Surgery and Plastic Surgery

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## PRACTICE POINTS

- Patients and nondermatologist physicians may be unaware of how frequently Mohs surgeons perform complex surgical repairs compared to other specialists.
- Compared to plastic surgeons, Mohs surgeons performed a larger number of complex skin cancer repairs on the nose or ears with similar-sized defects.
- Primary care physicians and other specialists may be more likely to involve dermatology in the care of skin cancer through awareness of this type of data.

One benefit of Mohs micrographic surgery (MMS) is maximal tissue sparing compared to standard excisional surgery techniques. It also has the highest statistical cure rate for appropriately selected nonmelanoma skin cancers (NMSCs) in cosmetically sensitive areas, making it a preferred choice for many self-referred patients or their referring physicians. Patients and nondermatologist physicians may be unaware of how frequently Mohs surgeons perform complex surgical repairs compared to other specialists. Our objective was to compare the quantity and characteristics of flap or graft repairs on the nose or ears following skin cancer extirpation performed by either a fellowship-trained Mohs surgeon or plastic surgeons at 1 academic institution. A retrospective chart review of all skin cancer surgeries was performed to collect data on all flap or graft repairs on the nose or ears at Baylor Scott & White Health (Temple, Texas) from

October 1, 2016, to October 1, 2017. We collected secondary data on final defect size prior to the repair, skin tumor type, referring specialty for the procedure, and patient demographics. We found that Mohs surgeons performed a larger number of complex repairs on cosmetically sensitive areas compared to plastic surgeons following skin cancer removal, which may be unrecognized in several specialties that refer patients for management of skin cancers, creating a possible practice gap. More data may aid referring providers in optimally advising and managing patients with cutaneous malignancies.

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The incidence of nonmelanoma skin cancer (NMSC) is steadily increasing, and it accounts for more annual cancer diagnoses than all other malignancies combined.<sup>1,2</sup> For NMSCs of the head and neck, Mohs micrographic surgery (MMS) has become a preferred technique because of its high cure rates, intraoperative margin control, and improved tissue preservation in cosmetically sensitive areas.<sup>3</sup> The nose and ears are especially sensitive anatomic locations given their prominent positions and relative lack of skin reservoir and laxity compared to other areas of the head and neck. For the nose and ears, both patients and referring providers may question who is best suited to surgically remove a malignancy and repair the defect with positive functional and cosmetic results, as a large portion of the defects following tumor extirpation will require a flap or graft for repair.

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The notion of plastic surgery is strongly associated with supreme cosmesis for many patients and providers, as the specialty trains in several surgical and nonsurgical elective techniques to preserve and improve appearance. Consequently, patients commonly ask dermatologists if they should be referred to a plastic surgeon for skin cancer removal in cosmetically sensitive areas, especially areas that may require more complex surgical repairs. However, recent Medicare data indicate that dermatologists perform the vast majority of reconstructive skin surgeries, with more than 15 times the number of intermediate and complex closures and more than 4 times the number of flaps and grafts as the next closest specialty.<sup>4</sup> Earlier studies using Medicare data revealed similar findings, with dermatologic surgeons performing more reconstructions of head and neck skin than both plastic surgeons and otorhinolaryngologists.<sup>5</sup> However, these studies did not address the characteristics of the tumor, defects, or repairs performed by the specialties for comparison.

We sought to compare the quantity and characteristics of flaps or grafts performed for skin cancer on the nose or ears by fellowship-trained Mohs surgeons and plastic surgeons at 1 academic institution.

## Methods

We performed a retrospective chart review of all skin cancer surgeries requiring a flap or graft on the nose or ears at Baylor Scott & White Health (Temple, Texas) from October 1, 2016, to October 1, 2017. This study was approved by the Baylor Scott & White Health institutional review board.

**Data Collection**—The analysis included full-time, fellowship-trained Mohs surgeons and all full-time plastic surgeons who accepted skin cancer surgery patient referrals as part of their practice and performed all procedures within our hospital system. We reviewed individual provider schedules for both outpatient consultation and operating room notes to capture each procedure performed. To ensure we captured all procedures for both Mohs and plastic surgeons, we used billing codes for any flap or graft repair done on the nose or ears to cross-reference and confirm the cases found by chart review. The total number of flaps or grafts on the nose or ears were collected. Data also were collected regarding the anatomic location of the skin cancer, final defect size prior to the repair, skin tumor type, repair type (flap or graft), and flap (transposition vs advancement) or graft (full thickness vs partial thickness) type. All surgical data were collected from operative notes. Demographic data, including age, race, and sex, also were collected. We also collected data on the specialty of the physicians who referred patients for surgical management of biopsy-proven skin malignancy.

**Statistical Analysis**—Sample characteristics were described using descriptive statistics. Frequencies and percentages were used to describe categorical variables. Medians and ranges were used to describe continuous

variables due to nonsymmetrically distributed data.  $\chi^2$  tests (or Fisher exact tests when low cell counts were present) for categorical variables and Wilcoxon signed rank tests for continuous variables were used to test for associations in bivariate comparisons between MMS and plastic surgery.

## Results

A total of 7 physicians (1 fellowship-trained Mohs surgeon and 6 plastic surgeons) at our institution met the inclusion criteria. The Mohs surgeon performed a significantly higher number of flaps and grafts ( $n=276$ ) than the plastic surgeons ( $n=17$  combined; average per plastic surgeon, 2.83) on the nose or ears in a 12-month period ( $P<.05$ ) (Table). The median final defect size was not significantly different between MMS (1.5 cm) and plastic surgery (1.8 cm) ( $P=.306$ ). Flap repairs were more common in patients undergoing MMS (80%) vs plastic surgery (53%) ( $P=.022$ ) (Figure). For flap repair, advancement flaps were used more commonly (MMS, 53%; plastic surgery, 35%) than transposition flaps (MMS, 27%; plastic surgery, 12%) by both specialties.

Patient age was similar between MMS (median, 74 years) and plastic surgery (median, 73 years) patients ( $P=.382$ ), but a greater percentage of women were treated by plastic surgeons (53%) compared with Mohs surgeons (33%). The predominant skin tumor type for both specialties was basal cell carcinoma (MMS, 85%; plastic surgery, 76%). Dermatology was the largest referring specialty to both MMS (98%) and plastic surgery (53%). Family medicine referrals comprised a much larger percentage of cases for plastic surgery (24%) compared to MMS (1%).

## Comment

This study supports and adds to recent studies and data regarding the utilization of MMS for the treatment of NMSCs. Although the percentage of all skin cancer surgery is increasing for dermatology, little has been reported on more complex repairs. This study highlights the volume and complexity of skin surgery performed by Mohs surgeons compared to our colleagues in plastic surgery.

**Defect Size**—The defect sizes prior to repair were not statistically different between the 2 types of surgeries, though the median size was slightly larger for plastic surgery (1.8 cm) compared to MMS (1.5 cm). These non-statistically significant differences may be explained by potentially larger tumors requiring repair by plastic surgeons in an operating room. Plastic surgeons, however, may be more likely to take a larger margin of clinically unaffected tissue as part of the initial layer. Plastic surgeons also may be less likely to curette the lesion prior to excision to obtain more clear tumor margins, possibly leading to more stages and a subsequently larger defect. Knowing the clinical sizes of these NMSCs prior to biopsy would have been beneficial to our study, but these data often were not available from the referring providers.

### Characteristics of Skin Cancer Surgeries on the Nose or Ears Performed by Mohs and Plastic Surgeons

	MMS (n=276)	Plastic Surgery (n=17)	P Value <sup>a</sup>
Median (range) age at time of surgery, y	74 (39–96)	73 (40–92)	.382
Sex, <sup>b</sup> n (%)			.067
Male	186 (67)	8 (47)	
Female	90 (33)	9 (53)	
Race, <sup>b</sup> n (%)			1.000
White	270 (98)	17 (100)	
Hispanic	6 (2)	0 (0)	
Median (range) final defect size, cm	1.5 (0.7–4.4)	1.8 (0.6–4.0)	.306
Repair type, n (%)			.022
Flaps	220 (80)	9 (53)	
Grafts	50 (18)	7 (41)	
Flap and graft	6 (2)	1 (6)	
Flap or graft type, n (%)			
Advancement	145 (53)	6 (35)	
Full-thickness skin graft	40 (14)	7 (41)	
Full-thickness skin graft + transposition flap	3 (1)	1 (6)	
Split-thickness skin graft	10 (4)	0 (0)	
Transposition	75 (27)	2 (12)	
Advancement + transposition	0 (0)	1 (6)	
Advancement + full-thickness skin graft	3 (1)	0 (0)	
Skin tumor type, n (%)			.006
Basal cell carcinoma	234 (85)	13 (76)	
Squamous cell carcinoma	42 (15)	2 (12)	
Melanoma in situ	0 (0)	1 (6)	
Melanoma	0 (0)	1 (6)	
Referring specialty, n (%)			<.001
Dermatology	270 (98)	9 (53)	
Family medicine	4 (1)	4 (24)	
Plastic surgery	2 (0.7)	3 (18)	
Otorhinolaryngology	0 (0)	1 (6)	

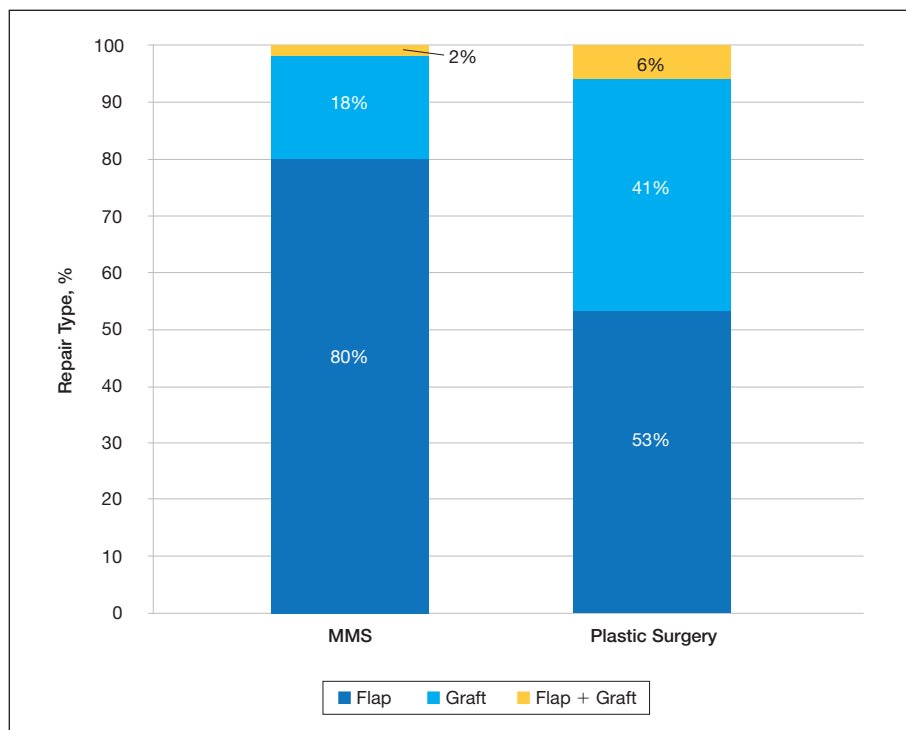
Abbreviation: MMS, Mohs micrographic surgery.

<sup>a</sup>Using Fisher exact test.

<sup>b</sup>Sex and race are described on the patient level, as some of the same patients had multiple surgeries.

**Repair Type**—Most patients who underwent MMS had surgical defects repaired with a flap vs a graft, and a much higher percentage of patients who had undergone MMS vs surgical excision with plastic surgery had their defects repaired with flaps. Using a visual analog scale score and Hollander Wound Evaluation Scale,

Jacobs et al<sup>6</sup> found flaps to be cosmetically superior to grafts following tumor extirpation on the nose. The more frequent use of grafts by plastic surgeons could be at least partially explained by larger defect size or by a few outlier larger lesions among an otherwise small sample size. Larger studies may be needed to see if



A retrospective chart review of repair techniques on the nose or ears following patient tumor extirpation by either Mohs micrographic surgery (MMS) or plastic surgery indicated that Mohs surgeons utilized flaps in a higher percentage of cases (80%) compared to plastic surgery (53%) ( $P=.022$ ).

a true discrepancy in repair preferences exists between the specialties.

**Referring Specialty**—Primary care physician referral comprised a much larger percentage of cases sent for treatment with plastic surgery (24%) compared to MMS (1%). This statistic may represent a practice gap in the perception of MMS and its benefits among our primary care colleagues, particularly among female patients, as a much higher percentage of women were treated with plastic surgery. Important potential benefits of MMS, particularly tissue conservation, cure rates for skin cancer, and the volume of repairs performed by Mohs surgeons, may need to be emphasized.

**Scope of Practice**—Our colleagues in plastic surgery are extremely gifted and perform numerous repairs outside the scope of most Mohs surgeons. They are vital to multidisciplinary approaches to patients with skin cancer. Although Mohs surgeons focus on treating skin cancers that arise in a narrower range of anatomic locations, the breadth and variety of surgical procedures performed by plastic surgeons is more diverse. Skin cancer surgery may account for a smaller portion of procedures in a plastic surgery practice.

**Limitations**—There are several limitations to this study. We did not compare cosmesis or wound healing in patients treated by MMS or plastic surgery. The sample size, particularly with plastic surgery, was small and did not allow for a larger, more powerful comparison of data between the 2 specialties. Finally, our study only represents 1 institution over the course of 1 year.

## Conclusion

To provide the best care possible, it is imperative for referring physicians to possess an accurate understanding of the volume of cases and the types of repairs that treating specialties perform on a regular basis for NMSCs. This knowledge is particularly important when there is a treatment overlap among specialties. Our data show Mohs surgeons are performing more complex repairs and reconstructions on even the most cosmetically sensitive areas; therefore, primary care physicians and other specialists may be more likely to involve dermatology in the care of skin cancer.

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