

# Defects from post-Mohs Surgery on the vermilion borders of the lip by a combination plastic surgeon and Mohs surgeon team: a cross-sectional study

## Abstract

**Background:** Skin cancer can affect the lips and Mohs micrographic surgery is the ideal mode of removal. However, how are post-Mohs defects affecting the vermilion border approached by a clinic with both a plastic surgeon and Mohs surgeon team?

**Method:** A cross-sectional study was designed of 8 consecutive Mohs cases with a post-Mohs defect affecting the vermilion border in a practice with a Mohs surgeon and plastic surgeon. These were the only vermilion defects out of 358 consecutive Mohs procedures. The participants ranged in age from 30-82 years of age. Their post-Mohs defects were between 1-3.5cm in greatest diameter, but 2.5cm was the mean diameter. The surgical procedures were performed by a two-surgeon team for post-Mohs defects. For each case, information was gathered, including patient age, type of tumor, tumor location, greatest diameter of the tumor, Mohs stages for clear margins, and the greatest diameter of the final wound size. Also, the techniques used in the defect repair were documented. The one patient who needed more than one repair technique was assessed.

**Results:** Basal cell carcinoma (BCC) was the only tumor that affected the vermilion border. The defects were closed primarily by advancement flaps. The philtrum defect that involved the vermilion was closed primarily with an advancement flap. The greatest number of defects affected the left upper lip, and the areas were closed equally by an advancement flap, an island pedicled flap, a full thickness skin graft (FTSG), and a myocutaneous flap. The right lower lip was not affected in our patient pool. Men outnumbered women in BCC of the vermilion border. The combined closure of the lip involved the left upper lip and consisted of an island pedicled flap and a FTSG.

**Conclusion:** Men and overwhelmingly affected with BCC of the vermilion border and advancement flap is the most common closure technique.

**Keywords:** lips, vermilion border, mohs, facial plastic surgery, basal cell carcinoma

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Omeed Michael Memar,<sup>1</sup> Benjamin Caughlin<sup>2</sup>

<sup>1</sup>Academic Dermatology & Skin Cancer Institute, USA

<sup>2</sup>Department of Surgery/Division of Otolaryngology, University of Illinois Health Hospital System, USA

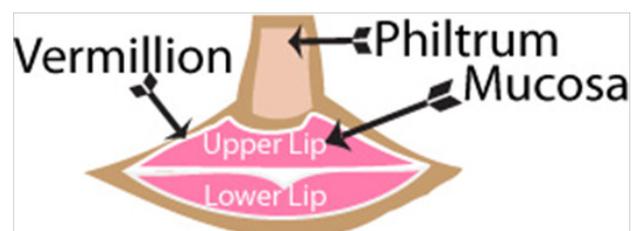
**Correspondence:** Omeed Michael Memar, Academic Dermatology and Skin Cancer Institute, 130 N. Garland Ct, Chicago, IL 60602, Tel 3122 3001 80, Email omeedmemar@gmail.com

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**Abbreviations:** BCC, basal cell carcinoma; FTSG, full thickness skin graft; MMS, mohs micrographic surgery; SCC, squamous cell carcinoma; ADSCI, academic dermatology and skin cancer institute

## Introduction

Mohs micrographic surgery (MMS) is a precise method of removing unwanted malignancy with minimal removal of normal tissue.<sup>1</sup> MMS has shown to have the highest curative rate for lip cancers.<sup>2</sup> Ultrasound and other imaging techniques have attempted to reproduce histology, but the tools are difficult to use and not consistent.<sup>3</sup> Skin cancer can affect the lips and squamous cell carcinoma (SCC) is the most common cancer of the lips.<sup>4</sup> The lip has multiple cosmetic units that border the vermilion (Figure 1). Mohs surgeons, who are mainly dermatologists, close most of the lip wounds post-Mohs surgery via and their closure of choice is primary repair and advancement flap, and refer out only 13.2% to outside physicians, presumably plastic or facial plastic surgeon.<sup>5</sup> The plastic surgeon has a distinct and ever evolving role in reconstructing post-Mohs defects. We published 358 post-Mohs defects that involved management by a Mohs and plastic surgeons.<sup>6</sup> We showed that the two offered a greater range of closure techniques for post-Mohs reconstruction.<sup>7</sup>



**Figure 1** Cosmetic subunits of the lip involving the vermilion border.

Here, we present 8 post-Mohs defects that involved the lip vermilion border and the combined management in a practice with a Mohs surgeon and a facial plastic surgeon. We present the age, sex and other features of the patients involved, including the one patient who required multiple labial reconstructive methods. The reconstructive techniques selected by a Mohs and plastic surgeon team *vis-a-vis* type of tumor, labial subunit location, and analyzing the patient who needed more than one reconstructive method.

## Methods

Patients undergoing Mohs micrographic surgery for skin cancer at Academic Dermatology and Skin Cancer Institute (ADSCI) were

studied. At ADSCI, patients could be treated by both the Mohs surgeon and facial plastic surgeon. Three hundred and fifty-eight consecutive defects were studied and of those, 8 defects were labial defects affecting the vermillion, needing repair. The patients treated all had BCC. For each Mohs case, patient age, type of tumor, tumor location, tumor diameter in cm, Mohs stages needed to clear the margins and the size of the final defect diameter were documented. Also, the techniques used in the repair of the defects were documented. These methods were: primary closure (including complex layered closure); advancement flap, rotation flap; island pedicled flap; skin graft; myocutaneous flap; or outside referral to other sub-specialized plastic surgeons. The one patient who required multiple closure methods was also studied. The statistical analysis was done as described previously.<sup>6</sup>

## Results

The statistically analysis of the data of Mohs stages against different repairs was significantly different (ANOVA,  $p < .001$ ). The findings in Table 1 show that the average age of patients was 54.6 years, with female patients being younger than male patients. The only patient

requiring more than one closure technique was 82 years old, who also had one of the largest post-Mohs defect sizes. The average age of the entire 358 Mohs cases was 68.9 years old, with a 50<sup>th</sup> percentile age at 70, and a range of 40. The findings in Table 2 present the diagnoses of the 8 patients, and all were basal cell carcinoma (BCC). Advancement flap was the reconstructive technique of choice. None of the patients with vermillion post-Mohs defects were referred to outside sub-specialists for reconstruction. The findings in Table 3 present the different units of the vermillion lip involvement against gender. The majorities of repairs were on the philtrum and left upper lip, with all the BCC on the philtrum were on men. Women developed BCC on the upper lip. The right lower lip had no malignant involvement. The one patient requiring more than one repair technique had a BCC on the left upper lip. The findings in Table 4 present the different cosmetic subunits and areas of the vermillion lip. The left upper lip was most involved and the defects were closed by a multitude of methods, while the repair of choice for the philtrum was an advancement flap. Furthermore, the one patient that needed multiple closures had a FTSG and an Island pedicled flap on the left upper lip.

**Table 1** Patients with Mohs surgery on the vermillion lip

	Total numbers of the 8 cases	50 <sup>th</sup> percentile of total	Range of total	Male pts	50 <sup>th</sup> percentile amongst male pts	Female pats	50 <sup>th</sup> percentile amongst female pts	Pts requiring multiple closures	50 <sup>th</sup> percentile of pts with multiple closures
Average age	54.6	48	30-82	56.5	48	49	49	82	82
Tumor Size (diameter, cm)	0.98	1.2	0.6-1.2	1.0	1.2	0.9	0.9	1.2	1.2
Average Stage	2.8	3	1-4	2.8	3	2.5	2.5	3	3
Post-Mohs Defect Size (diameter, cm)	2.5	2.5	1-3.5	2.6	2.8	2.2	2.2	3.5	3.5

**Table 2** Total number of closure methods based on diagnosis

Closure type	Basal cell carcinoma	Squamous cell carcinoma	Baso-squamous carcinoma	Sebaceous carcinoma	Squamous cell carcinoma, in situ	Melanoma, in situ
Linear	1					
Advancement	5					
Rotation	1					
Island Pedicle (V to Y)	1					
Skin graft	1					
Myocutaneous flap	1					
Referred out	0					

**Table 3** Defects of cosmetic subunits in men versus women requiring multiple repairs at time of closure

	Total repairs	Total repairs on men	Total repairs on women	Total multiple repair	Multiple repair on men	Multiple repair on women
Philtrum with vermillion involvement	3	3				0
Left upper lip, with vermillion involvement	3	2	1	1	1	0
Right upper lip, with vermillion involvement	1	0	1			0
Left lower lip, with vermillion involvement	1	1				0
Right lower lip, with vermillion involvement		0				0

**Table 4** Number of repairs associated with each closure type at different areas of the lip

Closure type	Philtrum with vermillion involvement	Left upper lip, with vermillion involvement	Right upper lip, with vermillion involvement	Left lower lip, with vermillion involvement	Right lower lip, with vermillion involvement
Linear					
Advancement	3				
Rotation					
Island Pedicle (V to Y)					
Skin graft					
Myocutaneous flap					

## Discussion

We presented 8 Mohs patients with labial vermillion involvement. The vermillion is a unique anatomic site, differing in color and shine with both oral mucosa and keratinized skin. Furthermore, the vermillion has superficial capillaries and squamous epithelium that lack pilosebaceous units. Our 8 patients were out of a total of 358 Mohs cases in Chicago, Illinois. Some of our findings conflicted with published data and other findings were in line with published data. Avg age of patients with vermillion skin cancer was 54.6, while the entire Mohs cases had an average age of 68.9 years. Other differences included the diagnosis of BCC in all 8 cases. Amongst the 358, there was a combination diagnoses, including BCC, squamous cell carcinoma (SCC), sebaceous carcinoma, basosquamous carcinoma, and melanoma in situ.<sup>6</sup> In the literature, 81% of lip cancers occur on the lower lip, with men outnumbering women,<sup>8</sup> while our patient pool presented with cancers on the left upper lip, most commonly. The fact that the left was the predominant side is explained by the fact that the driver's side, which is left, tends to get more sun.<sup>9</sup> One explanation is the small number of patients in our pool compared to the cited study. Furthermore, the majority of lower lip cancers were SCC in the literature,<sup>10</sup> while our only lower lip cancer was a BCC. Our numbers were consistent with most upper lip cancers being BCCs in the literature.<sup>11</sup> A variety of reconstructive methods were employed; however, the philtrum was only reconstructed by advancement flaps. However, the most common site affected amongst our patients was the left upper lip. Our approach to the vermillion lip defect is neither an algorithmic approach nor non-full thickness defects. The lower lip mucosa defects that affect the vermillion are treated by primary closure if <0.6cm and if large, then advancement flap. The lower lip vermillion defects that have cutaneous involvement are treated by either advancement flap or rotation flap.

On the upper lip, non-full thickness defects are also treated algorithmically. If only vermillion and mucosa are involved, lesions less than 0.6cm are closed primarily, while those greater than 0.6cm and advancement flap is used. If cutaneous and vermillion involvement presents on the upper lip, defects less than 0.6cm an advancement flap is preferred, and if the lesion is >0.6cm, an island pedicle of mucosa can be used, or a mucosal FTSG and a rotation nor advancement flap on the cutaneous sided. Other options for larger defects are a myofasciocutaneous advancement flap of the lips. Wedge advancement, in the form of an A to T is a great option for upper or lower lip, but the vermillion edge needs to be perfectly aligned. On the philtrum, small defects can be closed by advancement, especially inferior mucosal advancement flaps. FTSG is a good option if the entire philtrum is replaced. Dermal fillers or fat grafts can be used post surgically to enhance the philtrum.

## Conclusion

We have presented a small number of patients with vermillion involvement and found that all patients had BCC with a male preponderance. The most common site of involvement in our population in Chicago, Illinois was the left upper lip. However, our choice of treatment varied for the upper lip, but when it came to the philtrum, our choice was an advancement flap, especially a mucosal advancement flap.

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## Statement of ethics

The study was conducted in accordance with research ethics.

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## Conflict of interest

Authors declare that there is no conflict of interest.

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