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TITLE: Burden of Non-melanoma Skin Cancer in the US 1998-2007

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Purpose: Epidemiologic statistics on non-melanoma skin cancers (NMSC) including basal cell carcinoma and squamous cell carcinoma are generally excluded from nationally representative cancer registries. Therefore, information on the prevalence and burden of NMSC to healthcare providers and treatment patterns have not been fully evaluated.

Our primary goal was to evaluate the burden of NMSC in the US over the last 10 years. Our secondary goal was to estimate the proportion of skin cancers treated surgically by gender, age, race, geographic location, and according to physician specialty.

Design: This is a cross sectional analysis of the National Ambulatory Medical Care Survey (NAMCS) between 1998 and 2007. The NAMCS is an annual federal survey (National Center for Health Statistics) of office visits made by ambulatory patients to a sample of approximately 1,500 non-federally employed physicians. Practices are selected from the American Medical Association database, including all US physicians, based on multistage probability sampling techniques to yield a nationally representative sample. This weighted sampling technique allows for calculation of unbiased national estimates of the number of patient visits and patient characteristics. Specially trained interviewers visit the physicians prior to their participation in order to instruct them on how to complete the surveys. Each physician is randomly assigned to a 1-week reporting period. Data are obtained on patients' symptoms, physicians' diagnoses, medications, demographic characteristics, diagnostic procedures, and treatment. We restricted our analysis to patients over 18 years of age who had NMSC recorded as a reason for their physician visit (ICD9 codes 173, 232). Benign skin conditions including seborrheic keratosis, corns, scars (ICD9 216., 702.1, 700., 701., 709.) as well as actinic keratosis and malignant melanoma were also excluded (ICD9 702.0, 172.). All analyses were weighted to account for survey sampling in order to make results applicable to the entire US population. Statistical analysis was performed in SAS v10.0.

Summary: A total of 1586 physician visits for NMSC were identified, representing a total of 37.8 million (SD 2.2 million) NMSC visits across the US over the 10 years studied. Approximately 20 million were men, and 17.8 million were women. The majority (87.6%) visits for NMSC were in patients 50 years or older, however over 1.4 million cases were noted in patients younger than 40 years. Most cases were present in whites, however over 442,000 and 487,000 were noted in Hispanics and blacks respectively. 19.6 million of these visits (52%) were associated with a surgical procedure including biopsy, excision and chemosurgery/ Mohs surgery. Sixty percent of male patients underwent a surgical procedure compared to 56% female patients ($p=0.05$). We found that 67% of visits by dermatologists or dermatologic surgeons were associated with a surgical procedure, compared to 33% and 42% among surgical, and medical specialties respectively ($p<0.0001$). When analyzed by race, we found that while 59% of white patients with NMSC underwent a surgical procedure, only 56% of Hispanic and 35% of black patient visits were associated with a surgical procedure ($p=0.078$).

Conclusion: Non-melanoma skin cancer poses a significant burden to healthcare providers nationwide. The reasons for significant differences in the proportion of cancers treated surgically in men vs. women, blacks and Hispanics vs. whites and according to physician specialty are unclear, and deserve further study.

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TITLE: Survey of Mohs Surgeons in Management of Squamous Cell Carcinoma (SCC) of the Skin with Perineural Invasion (PNI)

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Purpose: While perineural invasion (PNI) of a tumor has traditionally been identified by extension of a tumor along the nerve sheath, there exists no formal definition of SCC with PNI among Mohs surgeons. There are variable practices in the management of SCC of the skin with PNI with regard to both excision practice and administration of adjuvant radiation therapy. We surveyed American College of Mohs Surgery (ACMS) members in order to identify variable management practices of SCCs of the skin that exhibit PNI.

Design: A voluntary, twelve-item, online survey regarding management of SCC with PNI was distributed to 795 registered ACMS members. Answers were collected in a secure database and frequency of response was observed. Respondents identified themselves as members of academic vs. private practice and by geographic region within the United States. Questions aimed to establish frequency of encounter of such tumors, accepted definition of PNI as observed on histology, excision practice of tumors with PNI, and the clinical settings in which adjuvant radiation therapy is a component of treatment.

Summary: One-hundred twenty-seven ACMS members (~16%) completed the survey. Most members defined PNI as either tumor cells identified around a nerve bundle or tumor cells invading the nerve itself. Among respondents, 122 (96.1%) use adjuvant radiation therapy in management of SCC with PNI, with most administering it between 75-100% of the time such a tumor is encountered. For non-facial SCCs, approximately half of respondents do not use anatomic location to decide whether or not adjuvant radiation is indicated.

Conclusion: Adjuvant radiation is a commonly administered therapy among ACMS members in management of SCC with PNI. A prospective trial for evaluating the role of post-operative radiation therapy for such tumors is needed to establish standardized guidelines for effective management.

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National Utilization Patterns and Treatment Outcomes of Mohs Micrographic Surgery for Malignant Melanoma and Melanoma In-situ

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Purpose: Although Mohs micrographic surgery (MMS) for the treatment of melanoma is controversial; a greater body of recent literature has demonstrated the optimal use of this surgical technique for melanoma in-situ and specific conditions of malignant melanoma. We will identify current physician practices in the community through identification of national utilization trends of MMS as compared with other types of surgical intervention for malignant melanoma and melanoma in-situ. In addition, we will determine the five year mortality outcome of these patients, treated surgically or with no surgical intervention.

Design: We performed a retrospective review of patients receiving surgical intervention for melanoma from 2002 through 2006 utilizing the Surveillance, Epidemiology and End Results (SEER) database, representing 26% of the US population with 18 SEER cancer registries throughout the country. Patient characteristics were collected including age, gender, race, tumor thickness/depth, lesion location, margin size, cause of death if applicable, and site of tumor registry.

Summary: There were 119,805 recorded cases of melanoma from 2002 through 2006, of which 72,706 were malignant and 47,009 were melanoma in-situ. Four percent of melanoma in-situ cases and 1.6% of malignant melanoma diagnoses were treated with MMS. Table 1 identifies the proportion of patients who died in the five year period of study with a primary diagnosis of melanoma in-situ or malignant melanoma which resulted in malignant melanoma as the cause of death; the remaining percentage of patients that were diagnosed with melanoma died of other causes.

Primary Diagnosis	MMS* N(%)	No Surgical Treatment N(%)	Surgical Treatment** (non MMS) N (%)
Melanoma In Situ	3(3.5%)	10(6.4%)	124(6.1%)
Malignant Melanoma	28(37.8 %)	1367(67.8%)	2677 (42.6%)

Table 1. Proportion of Patients who died from Malignant Melanoma within a five year period.

**MMS NOS, MMS with 1-cm margin or less, or MMS with more than 1-cm margin*

*** Includes shave biopsy followed by a gross excision of the lesion, punch biopsy followed by a gross excision of the lesion, incisional biopsy followed by a gross excision of the lesion.*

Conclusion: To our knowledge, these findings are the first to examine national patterns of MMS utilization in comparison to other treatment modalities for melanoma over time. As expected, there is a decreased survival in those with malignant melanoma who do not undergo surgery. However, the five year mortality is similar among each treatment group for melanoma in-situ. Also, MMS compared to standard excisional surgery appears to have similar five year mortality. Comprehensive statistical analysis of the treatment groups and further determination of the significance of such independent variables such as sex, race, age, survival time, and anatomical location are underway. Our goal is to better describe the treatment outcomes of MMS in the management of melanoma in-situ and malignant melanoma.

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TITLE: The Final Histologic Grade of Biopsy-proven Squamous Cell Carcinoma In-situ Sent for Mohs Micrographic Surgery

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Purpose: Squamous cell carcinoma in-situ (SCCis) is often treated without pathological confirmation of tumor clearance. It is unclear whether more aggressive disease such as squamous cell carcinoma (SCC) is harbored in lesions whose initial biopsy demonstrated SCCis. This study examines the final histologic tumor grade in whose initial biopsies showed SCCis.

Design: We prospectively recruited 29 consecutive patients with biopsy-proven squamous cell carcinoma in-situ who were sent for Mohs micrographic surgery. Each tumor underwent Mohs micrographic surgery. The central blocks of the Mohs debulking were horizontally sectioned at 30-micrometer intervals until exhausted. These sections were processed and examined by one Mohs surgeon and one dermatopathologist to determine the histological grade of the tumor.

Summary: Among the 29 subjects, 10 had SCCis and 4 had SCC. The remaining lesions showed scar and/or actinic keratosis. Approximately 14% of lesions showed evidence of invasive SCC.

Conclusion: Although biopsy-proven SCCis is most often treated with modalities (e.g., cryotherapy, electrodessication and curettage) that are best suited for superficial disease and do not involve pathologic review of the specimen, this study demonstrated that 14% of biopsy proven SCCis lesions harbored invasive SCC. This data suggests that treatment modalities that include histologic control of tumor removal should also be strongly considered for the treatment of selected biopsy-proven SCCis.

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TITLE: Skin Cancer Following Pancreas Transplantation

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Purpose: In this study, we describe the incidence and risk factors for skin cancer following a pancreas transplant.

Design: We calculated the cumulative incidence (CI) of skin cancer for 216 pancreas transplant recipients at a tertiary care center from 1996-2007. Death was a competing risk. Three transplant groups were analyzed together and separately: pancreas after kidney (PAK) (N=107), pancreas transplant alone (PTA) (N=67), and simultaneous pancreas-kidney (SPK) (N=42). Univariate Cox models with hazard ratios (HR) were used to examine the association of certain risk factors on the development of skin cancer in this patient population, namely age, sex, type of transplant (PAK, PTA, SPK), induction therapy, initial immunosuppressive regimen, and rejection status.

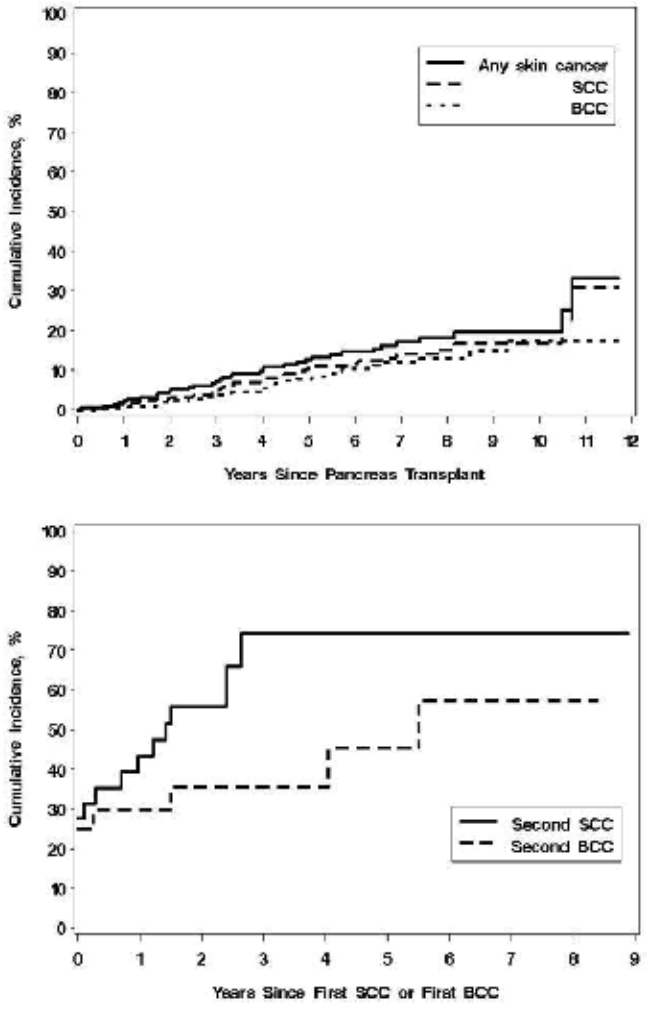

Figure 1.

Summary: The sample had 111 males (51%) and a mean age of 43.4 years (range 21-71) (Table 1). Allogenic pancreas transplant recipients had a skin cancer CI of 4.7%, 12.7%, and 19.6% by 2, 5, and 10 years post-transplant, respectively (Figure 1). For squamous cell carcinoma (SCC), the 2, 5, and 10 year CI was 2.8%, 10.3%, and 16.7%, respectively; for basal cell carcinoma (BCC), the 2, 5, and 10 year risk was 2.4%, 7.8%, and 17.4%, respectively (Figure 1). For patients who developed an SCC, the CI of developing a second SCC was 56% at 2 years; for patients who developed a BCC, the CI of developing a second BCC was 36% at 2 years (Figure 1). Analyses for cancer development in the sub-groups followed similar trends. None of the following variables were associated with an increased risk of skin cancer: type of transplant (PAK, PTA, SPK), induction therapy, initial immunosuppressive regimen, rejection status, or sex. Only age was predictive for the development of skin cancer (HR=1.05, p=0.01) (Table 1).

Demographics				
Gender	Frequency	Percent		
Male	105	48.6		
Female	111	51.4		
Type of Transplant				
PAK	107	49.5		
PTA	67	31		
SPK	42	19.4		
Age				
Mean	Standard Deviation	Median	Min	Max
43.4	9.0	43 .0	21	71
Predictors for Developing Any Skin Cancer				
Variable	Hazard Ratio	95% Confidence Interval		p-value
Age	1.05	1.01	1.09	0.01
Male (vs. Female)	0.94	0.48	1.82	0.84
Transplant type				
PTA vs. PAK	0.71	0.32	1.58	0.4
SPK vs. PAK	0.83	0.36	1.94	0.67
Induction therapy				
Anti-thymocyte globulin vs. muromonab CD3 and steroid	1.4	0.52	3.75	0.51
Initial immunosuppressive regimen				
Tacrolimus and mycophenolate mofetil vs. Combined Group*	0.50	0.18	1.43	0.20
Rejection status	1.27	0.60	2.67	0.53

Table 1: Demographics of patient population and predictors of skin cancer

**Combined Group: cyclosporin A (CSA) and mycophenolate mofetil, OR CSA and sirolimus, OR tacrolimus and zidovudine, OR tacrolimus and sirolimus.*

Conclusion: SCC and BCC commonly occur in recipients of pancreas transplants, and those patients who have a prior history of non-melanoma skin cancer have a very high likelihood of further skin cancer development. As such, intensive educational and preventive strategies should be targeted at the pancreas transplant population.

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TITLE: The "X" Relaxing Incision for Tissue Flattening in Mohs Micrographic Surgery

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Purpose: This abstract describes a clinical pearl for the preparation of Mohs micrographic sections: the "X" relaxing incision for tissue flattening.

Evaluation of the complete surgical margin is a mandatory component of Mohs micrographic surgery. In some situations this may be more challenging, particularly when thick tissue specimens are encountered, or, when for the sake of tissue preservation, it is more desirable to excise the tumor using a 90 degree angle. In these situations, to obtain a complete evaluation of the margin, a technique for tissue flattening may be required. Several methods for tissue flattening have been previously described (Figures 1 and 2). We describe a simple, fast, and novel technique, the "X" relaxing incision, for tissue flattening that is less involved than previously described methods and does not interrupt the surgical margin.

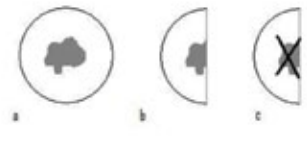

Figure 1: a) Mohs section; b) Mohs section bisected; c) eccentric "X" shaped relaxing incision made

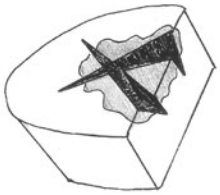

Figure 2: "X" shaped relaxing incision

Design: The Mohs layer is removed in the typical fashion with an excision bevel of 45 to 90 degrees. After the tissue is excised, an eccentric X-shaped relaxing incision is made through the epidermis into the dermis (Figures 1 and 2). The tissue may then be flattened with downward pressure and processed in the usual fashion.

Summary: We have used the "X" relaxing incision successfully on numerous specimens and our histotechnicians feel it provides excellent tissue flattening.

Conclusion: We describe a simple method to achieve tissue flattening for Mohs micrographic surgery. This method does not interrupt the surgical margin and is relatively fast. If desired by the surgeon, it could also be performed in-vivo.

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2. Wanitphakdeedecha R, Nguyen TH, Chen TM. In vivo intraoperative relaxing incisions for tissue flattening in Mohs micrographic surgery. Dermatol Surg. 2008; 34(8):1085-7.

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TITLE: Partial Subunit Island Pedicle Flap for Defects of the Upper Cutaneous Lip

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Purpose: For defects on the upper cutaneous lip, the island pedicle flap (IPF) affords maximal tissue sparing and reconstruction with skin of similar color, texture, and hair density. However, the flap can sometimes pincushion and leave an unaesthetic scar if one arm of the IPF is placed centrally within the cosmetic subunit. For both small and large defects of the lateral upper cutaneous lip, we present a variation -- the "partial subunit IPF" -- that allows placement of the side limbs of the IPF within the cosmetic subunit junction lines of the melolabial fold and the vermilion cutaneous junction and produces a single scar within the relaxed skin tension lines running radially from the vermilion lip. The flap is termed a "partial subunit" repair since it corresponds to the entire portion of the cutaneous upper lip subunit lateral to the defect.

Design: We present flap indications, design, execution, and tips for success in a step-by-step manner using clinical photos. We report our experience in 20 patients using a partial subunit island pedicle flap of the upper cutaneous lip, including anatomic and technical considerations.

Summary: Twenty patients underwent Mohs micrographic surgery for tumors of the cutaneous upper lip. All patients were successfully repaired with a partial subunit island pedicle flap. All patients had excellent cosmetic and functional outcomes with preservation of the normal position and contour of the upper lip free margin, nasal ala, philtrum, and melolabial fold. Some patients required minor revision surgery to correct downward push of the free margin.

Conclusion: The partial subunit island pedicle flap is a reliable reconstruction option that results in reproducibly excellent cosmetic and functional outcomes for cutaneous upper lip defects. This simple modification of the traditional IPF has multiple advantages, including reconstruction within one cosmetic unit, suitable tissue quality, color, and texture match, preservation of hair follicles, lack of distortion of anatomic boundaries between cosmetic units, excellent blood supply and mobility, sparing of tissue around a surgical defect, minimal wound tension, and preservation of free margin position.

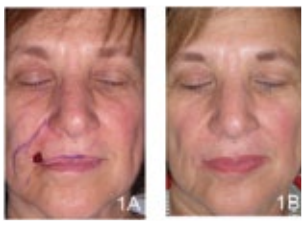

Figure 1. Defect (A) and postoperative result (B) 6 weeks after reconstruction with partial subunit IPF.

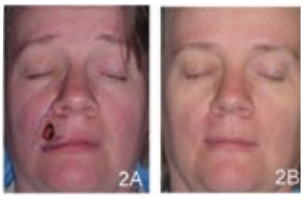

Figure 2. Defect (A) and postoperative result (B) 6 months after reconstruction with partial subunit IPF.

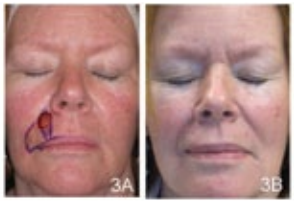

Figure 3. Defect (A) and postoperative result (B) 10 weeks after reconstruction with partial subunit IPF.

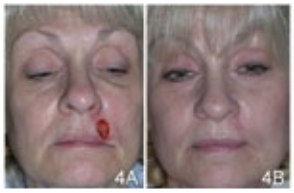

Figure 4. Defect (A) and postoperative result (B) 3 months after reconstruction with partial subunit IPF.

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TITLE: Dual Staining of Mohs Surgery Specimens with S100 and Cytokeratin for the Detection of Perineural Invasion in Non-melanoma Skin Cancers

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Purpose: Perineural invasion (PNInv) of non-melanoma skin cancers, namely basal cell carcinoma (BCC) and squamous cell carcinoma (SCC), is a well-known risk factor for recurrence and metastasis. Identification of PNInv can often be difficult, with small foci of tumor often located within larger aggregates of inflammatory cells, so-called "perineural inflammation" (PNInf). Our group has identified a specific dual immunohistochemical staining protocol with both cytokeratin antibodies (to stain tumor cells) and S100 antibodies (to stain the nerves which are encircled by tumor) which has proven useful in these cases.

Design: Some medical centers are fortunate to have a dermatopathology laboratory with the capability to produce immunohistochemically-stained specimens. Mohs surgery with traditional frozen section tissue processing is effective in identifying PNInv, and in some cases more sensitive (unpublished data). Perineural inflammation (PNInf) can be a harbinger of PNInv not clearly identified on frozen sections (unpublished data). In select cases with the concern of PNInv we have managed these tumors with excision in the Mohs fashion yet processed with permanent sections ("slow Mohs", or "staged excision"). Herein we describe our technique utilizing a dual-stain technique to ascertain if it aids in the identification of PNInv. Specimens are immunohistochemically stained with two primary antibodies: mouse monoclonal anti-pancytokeratin (Z0622, Dakocytomation, Denmark) diluted 1:500 and rabbit polyclonal anti-S100 (PA0900, Leica, UK) diluted 1:100. 4-micron sections are cut from tissue previously fixed in formalin and embedded in paraffin blocks. Sections are then mounted to positively charged slides, dried at 60°C for 30 minutes and are then placed into the immunohistochemical processor (Bond system, Leica) where the slides are deparaffinized, hydrated and rinsed. Immunohistochemistry is then performed sequentially with pancytokeratin applied first and then S100 using commercial equipment (Bond Polymer Refine Detection System, Leica). This system contains biotinylated anti-mouse and anti-rabbit antibodies which form a complex with peroxidase-conjugated streptavidin molecules. For the dual stain color development, 3, 3'-diaminobenzidine is used with the pancytokeratin primary antibody and 3-amino-9-ethylcarbazole is used with the S100 antibody to stain the tumor epithelial cells red and the nerves brown, respectively. Slides are then counterstained with hematoxylin and manually washed with deionized water, dehydrated through graded alcohols and xylene, and then cover slipped. Negative controls are prepared in the same manner without primary antibodies. Turnaround time for the dual staining process is approximately six hours, and the cost to prepare the slides is approximately $30.

Conclusion: Perineural invasion (PNInv) of non-melanoma skin cancer is a well-documented harbinger of both deep extension and in some cases, eventual metastasis. Extra care is certainly warranted in managing these tumors, including a multidisciplinary approach with medical and surgical colleagues when appropriate. While it is not our practice to perform immunohistochemical stains on our Mohs frozen sections, the separate use of both cytokeratin and S100 to stain Mohs frozen sections has been well-documented. Given this, the adaptation of this technique to frozen sections would certainly seem reasonable. Although it has been suggested that S100 staining of frozen sections to detect melanocytic lesions does not provide the clarity needed to reliably diagnose these tumors, for the purposes of the current discussion simply identifying the nerves will suffice. Advanced techniques such as those described here will likely allow detection of smaller foci of PNInv in Mohs sections, the detection of which are often limited by a lack of tumor bulk given prior biopsy and debulking procedures, and the fact that the first stage of Mohs often will clear any residual tumor, leaving little to direct the histologic examination. The dual cytokeratin-S100 protocol in our experience has highlighted subtle PNInv in some cases which may or may not have been detectable by other means. Plans for further study include identification of cases in which histologically occult PNInv was detected by this protocol and how care may have been improved as a result by such interventions as earlier referral for multidisciplinary care, increased attention to local nodal basins, peri-operative imaging, and potential radiation therapy.

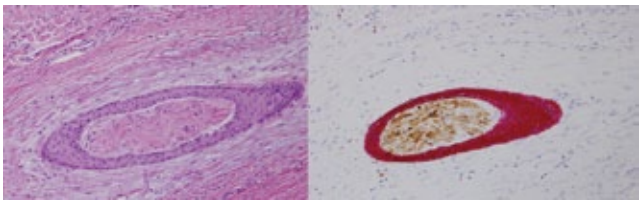

Figure 1: Dense focus of SCC enveloping a cutaneous nerve shown with H+E (left) and the dual cytokeratin-S100 stain (right).

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TITLE: Factors Predictive of Complex Mohs Surgery Cases

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Purpose: Mohs surgery allows excision of skin cancer in a tissue-sparing fashion that minimizes recurrence risk. Factors predictive of complex Mohs cases are not well-studied. The purpose of this was to determine patient, tumor, and surgeon characteristics associated with Mohs cases requiring four or more stages to achieve clear margins.

Design: A retrospective chart review was performed for a 3 year period (7/2006 – 6/2009) at our academic (3 Mohs surgeons) and private (1 Mohs surgeon) institutions to identify Mohs cases requiring 4 or more stages ("complex"), and a control population requiring 3 or less stages ("noncomplex"). A 2:1 ratio of complex to noncomplex cases was selected.

Summary: In total, 77 complex Mohs cases were identified (51 academic, 26 private) and were compared against 154 control cases. There were no significant differences between the groups in patient age (69.0 ± 14.6 years complex vs. 66.0 ± 14.0 years noncomplex), gender (62% male complex; 57% male noncomplex), presence of immunosuppression (5% complex; 6.5% noncomplex), or history of prior skin cancer (69% complex, 57% noncomplex). Similarly, no significant differences between the groups were seen between academic (2.7% of total cases complex) vs. private practice (3.5% of total cases complex), or years experience of the primary Mohs surgeon (under 5 years post-fellowship vs. >10 years post-fellowship).

Recurrent tumors were highly associated with complexity (p<0.001; OR 6.88, 95% CI 2.8-17). Basal cell carcinoma with infiltrative or morpheaform histology was significantly associated with complexity (p=0.0019; OR 3.0, 95% CI 1.5-6.3). Tumors of the nose (p=0.0168; OR 2.05, 95% CI 1.1-3.7) and especially nasal tip (p = 0.0103; OR 3.68; 95% CI 1.3-10.6) and ear (p=0.0178; OR 3.0, 95% CI 1.2-7.9) and especially helix (p=0.00744; OR 5.9, 95% CI 1.5-22.7) were significantly more likely to be complex, as were tumors involving more than one cosmetic subunit (p=0.0072; OR 5.0, 95% CI 1.5-16.7). Tumors with pre-operative size >1 cm or >2 cm were significantly more likely to be complex (p=0.018; OR 2.0, 95% CI 1.1-3.6 for >1 cm; OR 3.0, 95% CI 1.2-7.9 for >2 cm). Complex tumors had a significant greater pre-operative maximal diameter (1.4 ± 0.54 cm vs. 0.92 ± 0.54; p= 0.0008), post-operative area (10.6 ± 1.3 vs. 3.6 ± 0.7; p<0.0001), and were significantly more likely to require flap or graft repair (p<0.0001; OR 6.9, 95% CI 3.7-13.1).

Conclusion: Recurrent tumors, BCC with aggressive histology, tumors over 1 cm pre-operatively, and tumors on the nose and ear are significantly more likely to prove surgically complex. Advanced knowledge of these factors may be useful pre-operatively as Mohs surgeons plan their scheduled cases.

	COMPLEX (N=77)	NONCOMPLEX (N=154)	p value	Odds Ratio (95% Confidence Interval)
Gender (M:F)	48:29	88:66	0.45	1.24 (0.71-2.17)
Age	69.0 ± 14.6 (range 35-93)	66.0 ± 14 (range 28-91)	0.13	
Recurrent tumor (%)	19	7	<0.0001	6.88 (2.75-17.2)
Pre-op tumor size >1 cm	30	37	0.018	2.02 (1.12-3.63)
Pre-op tumor size >2 cm	11	8	0.018	3.04 (1.17-7.9)
Selected Tumor Sites				
All Facial Sites	73	135	0.105	2.57 (0.84-7.83)
Nose	29	35	0.0168	2.05 (1.13-3.73)
Nasal Ala	13	15	0.117	1.88 (0.85-4.19)
Nasal Tip	10	6	0.0103	3.68 (1.29-10.55)
Ear	11	8	0.0178	3.04 (1.17-7.91)
Helix	8	3	0.00744	5.9 (1.5-22.7)
All Non-facial Sites	4	19	0.105	0.39 (0.13-1.19)
Tumor involves >1 anatomic subunits	9	4	0.0072	5.0 (1.5-16.7)
Selected Histology				
BCC (all)	63	120	0.61	1.28 (0.64-2.55)
Morpheaform BCC	6	1	0.0061	12.9 (1.5-109)
Infiltrative BCC	16	17	0.046	2.11 (1.0-4.5)
SCC	9	31	0.11	0.53 (0.24-1.17)
Repair: Linear	16	100	<0.0001	0.14 (0.07-0.27)
Repair: Flap or graft	60	52	<0.0001	6.9 (3.67-13.1)

Selected Tumor and Patient Characteristics

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TITLE: Unknown Primary Merkel Cell Carcinoma

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Purpose: To further understand the characteristics and behavior of unknown primary Merkel cell carcinoma.

Design: A multi-center, retrospective, consecutive study reviewing 23 subjects diagnosed with unknown primary Merkel cell carcinoma (UPMCC) between 1981 and 2008 was completed. Data from three academic medical centers was collected and combined for analysis.

Summary: The average age at diagnosis was 66.0 years; the majority of subjects were male (87%) and Caucasian (100% of those reported). The most common lymph node basin involved was inguinal (7/23), followed by cervical (4/23), axillary (4/23), and parotid (4/23). One subject was immunosuppressed, and 39% had a history of other cancer. Following the initial biopsy, 16 patients had further evaluation of the lymph node basin. Half of these had additional positive nodes (8/16). Of the 23 total subjects, the majority had lymph node basin involvement only (78%), while the remaining had distant metastasis (22%). The median size of the involved lymph node at diagnosis was 5.0 cm. Overall survival at 2 years was 62.8%. When compared to stage III known primary MCC, patients with UPMCC had no statistically significant difference in overall survival (hazard ratio for known versus unknown primary, 1.5 (95% CI 0.7-3.1).

Conclusion: The data presented represents the largest collection of data on unknown primary Merkel cell carcinoma in the literature. Our data demonstrated no difference in overall survival in patients with UPMCC versus those with stage III known primary MCC. Due to the

unpredictable natural history of MCC, we recommend individualization of care based on the details of each patient's tumor and clinical presentation.

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TITLE: Translational Research Pearl: Mirrored Bread Loaf Processing of Mohs Melanoma In-situ Debulk Tissue for Drug Testing

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Purpose: The debulk tissue from Mohs excision of melanoma in-situ (MIS) is an ideal source of fresh melanoma tissue for research purposes. Debulk tissue from Mohs excision of MIS is often sent for pathologic review to confirm or determine the depth of any residual cancer. At our institution, about 50% of the Mohs MIS debulk tissues show residual melanoma on histopathological examination. These specimens are processed by cutting them into several smaller specimens then sectioning 3-5 micrometer "slices" off the edges of each of these smaller specimens. This "bread loafing" approach allows microscopic evaluation of approximately 5% of the debulk specimen with the remaining tissue left in the unsectioned tissue blocks. A simple alteration of the bread loafing approach allows the use of this remaining tissue to be used for in-vitro drug testing without compromising the diagnostic testing of the debulk specimen.

We used fresh MIS debulk tissue to test the selectivity of a novel drug that targets melanoma through these cells' tendency to increase the uptake of hyaluronan. Interruption of normal hyaluronan function impedes melanoma growth and metastasis in a murine tumor model and holds promise for human therapy. Conjugation of hyaluronan to doxorubicin can target melanoma in-vivo in a murine tumor model and in cultured human melanoma tissue. Use of tissue sections from bread loafed specimens of Mohs MIS debulk tissue allows safe testing of melanoma-specific uptake of hyaluronan bioconjugate in whole tissue.

Design: Immediately after harvesting, the debulk MIS specimen is bread loafed into three smaller specimens by making through and through incisions perpendicular to the skin surface. The middle specimen is cut to a thickness of approximately 3 mm and is used for investigational purposes. Diagnostic staging sections are cut from the other specimens and are used to confirm the diagnosis and depth of penetration of malignant cells. These sections are taken from the vertical surfaces facing the middle specimen and they "mirror" the histology of the corresponding surfaces of the middle specimen, thereby obviating the need to cut sections from middle specimen for staging purposes. The middle specimen is then incubated with the doxorubicin-hyaluronan bioconjugate for several hours and then fixed in formalin, processed and cut. The cut sections are then stained with antibodies to doxorubicin and evaluated to determine the presence or absence of doxorubicin in melanoma cells. The central hypothesis of the project is that doxorubicin will be enriched within the melanoma cells in the fresh tissue sections harvested from MIS debulk specimens using this approach.

Summary: Seven Mohs MIS debulk specimens were submitted for study. Four of the seven specimens demonstrated residual MIS. None of the specimens contained evidence of invasive melanoma, which was consistent with the pre-Mohs evaluation of the biopsy specimens.

Conclusion: Mirrored bread loaf processing of Mohs MIS debulk tissue gives access to fresh tissue for translational investigation of chemotherapy physiology without compromising patient care.

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TITLE: Stem Cell Therapy for Dermatologic Surgery: GCSF Can Accelerate Mouse and Human Wound Healing

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Purpose: There is evidence that stem cells can accelerate wound healing and reduce scarring. Stem cells may therefore be used to enhance wound healing during Mohs surgery reconstructions (whether by secondary intention, linear closures, flaps, or grafts). We have previously reported a method where we aspirated stem cells out of the bone marrow, grew the cells in tissue culture plates, and then placed the (autologous) stem cells on Mohs surgery defects (Falanga, Iwamoto, et al. Tissue Engineering, 2007, 13: 1200-1312). Since then, we have been seeking to make stem cell therapy more usable for Mohs surgery reconstructions by optimizing a method that avoids bone marrow biopsies and in-vitro cell culture. Such a method is presented here. We present early results of an approach to stem cell therapy that only involves injections of a cytokine----granulocyte colony stimulating factor (GCSF)---to mobilize stem cells out of the bone marrow, into the peripheral blood, and then to the wound site. Our objectives were to optimize parameters for this method using mouse models and to test safety in human subjects.

Design: Mice were injected for five days with two different formulations of GCSF and compared to controls. To monitor stem cell mobilization (how effectively stem cells moved from the bone marrow to the peripheral blood), flow cytometric measurements of Sca-1 and c-Kit, and colony forming cell (CFC) assays were performed. Full thickness tail wounds were created and monitored for clinical evidence of healing. To measure connective tissue formation, polyvinyl alcohol sponges were implanted to monitor collagen content as a function of time. To monitor bone marrow stem cell homing to wound sites, chimeric mice transplanted with Green Fluorescent Protein (GFP)

bone marrow cells were scanned by live imaging. We have been enrolling patients for an approved human subjects study comparing the rates of healing of chronic wounds (refractory to standard care) treated by systemic GCSF to those without stem cell therapy.

Summary: (1). The concentration of peripheral blood stem cells increased between three to five days following the initiation of GCSF administration, as shown by flow cytometric data and as confirmed preliminarily by CFC assays. (2). GCSF treatment resulted in cleaner, less crusted wound beds in mouse-tail wounds. (3). There was a small increase of connective tissue formation in GCSF treated mice. (4). Live imaging revealed an increasing accumulation of bone marrow-derived cells at the tail wound for at least eight days after wounding. (5). At this writing, one patient has completed a course of GCSF. The wound of our single human subject treated with systemic GCSF showed an increase in granulation tissue, followed by nearly a 50% decrease in the ulcer area.

Conclusion: Stem cell therapy using GCSF to mobilize stem cells to the wound site shows promise for improving wound healing.

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TITLE: Management of Advanced Cutaneous Squamous Cell Carcinoma: A Case Study

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Purpose: The treatment of locally advanced or metastatic cutaneous squamous cell carcinoma remains difficult, with no evidence based data on a standard chemotherapy regime. When traditional therapies, such as surgical excision or radiotherapy, fail clinical management of these patients often becomes difficult. We present a case that demonstrates the efficacy of the epidermal growth factor receptor (EGFR) inhibitor cetuximab in treating metastatic squamous cell carcinoma after limited success with other chemotherapeutic agents. This case also highlights the need for a flexible and diverse approach to these complex cases.

Design: A 75 year-old male patient presented with an aggressive squamous cell carcinoma of the scalp that had recurred after both excision and radiotherapy. At the time of presentation, the patient had inoperable local disease on the scalp and the decision was made to treat with capecitabine, an oral analogue of 5-fluorouracil. After three months of therapy, the patient had an improvement in local disease on capecitabine and an attempt was made to resect the residual scalp tumor. The excision had widely positive margins, and within two months the patient presented with recurrent local disease, as well as an enlarged supraclavicular node (2.5 cm) positive for squamous cell carcinoma. Given the presence of metastatic disease, the patient was started on paclitaxel chemotherapy. After four months of therapy, the patient had improvement of his local disease and lymph node involvement, but persistent squamous cell carcinoma remained on his scalp. He also had multiple hospitalizations for infections on his scalp that were felt to be related to the paclitaxel treatment. Given the patient's residual disease and the poor tolerability of single agent paclitaxel, the decision was made to change the patient's chemotherapy regime. The patient's paclitaxel dose was reduced and cetuximab, an EGFR inhibitor, was added.

Summary: Within two months on this chemotherapy regimen of cetuximab and paclitaxel, the patient had complete resolution of all residual squamous cell carcinoma on the scalp and his affected lymph node remained small and stable. The patient was treated with this combination for six months total with gradual tapering of the cetuximab dose and discontinuation of the paclitaxel. The treatment was well tolerated, with the patient noting mild fatigue and the typical rash induced by EGFR inhibitors. The patient is currently stable on single agent cetuximab, with no evidence of cutaneous disease, a single stable and unchanging supraclavicular lymph node (1 cm), and no other evidence of metastatic disease on clinical or radiological examination.

Conclusion: This case highlights the promise that the targeted therapy of EGFR inhibitors holds in the treatment of advanced squamous cell carcinoma of the skin, in combination with other therapies or as single agent chemotherapy. It also emphasizes the need to try multiple and diverse approaches when attempting to manage aggressive disease in these patients. Controlled trials will be needed to elucidate the most effective chemotherapy regimen for locally advanced and metastatic cutaneous squamous cell carcinoma.

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TITLE: Ultraviolet-light Fluorescent Tattoo Localization of Non-melanoma Skin Cancer

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Purpose: With the usual wait time between the biopsy of a lesion suspicious for non-melanoma skin cancer (NMSC) ranging between 1 week to 3 months, the original site of biopsy can be difficult to locate at the time of the definitive surgical removal. The biopsy scar often can camouflage in a background of severe chronic sun damage or hide as a well-healed scar. The lack of close anatomic landmark can make tools such as photography and triangulating measurements ineffective. A prior study has shown that wrong-site surgery is a top cause of lawsuit against Mohs surgeons. An unequivocal method of identifying and documenting the biopsy site prior Mohs surgery is of utmost importance.

The objective of this study seeks to investigate the safety and applicability of UV-fluorescent tattoo to localize the biopsy site. The UV-fluorescent tattoo used in this study (UV Titanium White) is coated by biocompatible polymethymethacrylate beads and is most visible under fluorescent light and minimally visible under ambient light.

Design: The UV-fluorescent tattoo used in this study (UV Titanium White) is coated by biocompatible polymethymethacrylate beads and is most visible under fluorescent light and minimally visible under ambient light.

The fluorescent tattoo dye was initially applied to infant foreskin samples to examine the ease of application, permanence and stability of fluorescence and visibility under Wood's lamp and fluorescent microscopy.

Summary: An initial study to the applicability of the fluorescent tattoo dye was completed on infant foreskin culture. The fluorescent tattoo appears to be compatible and permanent. The fluorescence of the tattoo was localized and visible under gross visual inspection under Wood's lamp and histological examination under fluorescent microscopy.

In the clinical study of the fluorescent tattoo, been one subject with one lesion that has been suspected to be a basal cell carcinoma and consented to the biopsy with UV-fluorescent dye. The lesion is confirmed to be a basal cell carcinoma by histological examination. At a follow-up, 2 months after the date of biopsy, the subject has difficulty correctly localizing the biopsy site on his back. A dermatologist blinded to the study also could not identify the biopsy site. With the help of a Wood's lamp, the correct biopsy site is subsequently identified. The subject denies any noticeable side effect from the tattoo, including localized site reaction. The UV-fluorescent tattoo remains fluorescent under Wood's lamp 3 months after the date of the biopsy.

Conclusion: This report supports the applicability, safety, and permanence of the fluorescent tattoo as a tool to localize biopsy site for lesions that are highly suspicious for non-melanoma skin cancer. The fluorescent tattoo will be a valuable tool to facility identifying and documenting biopsy site prior to Mohs surgery.

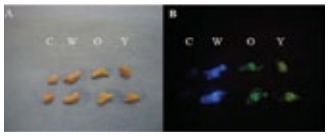

Figure 1. The cultured foreskin specimens on day 7 (A) as seen under visible light and (B) as seen under Wood's lamp (C=Control, W=White Tattoo, O=Orange Tattoo, Y=Yellow Tattoo).

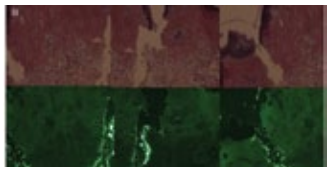

Figure 2. Tattooed specimen viewed by standard visible light microscopy (upper panels) and by fluorescent microscopy (lower panels). The fluorescent dye is seen in the vertical tracks made by the biopsy punch in the lower panels but not in the upper panels.

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TITLE: Management of Multiple Granular Cell Tumors: Treatment by Mohs Surgery and Review of the Literature

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Purpose: Granular cell tumors (GCT) are uncommon neoplasms with a high rate of local recurrence after surgery. Although rare, malignant transformation is possible. Up to 25% of patients may present with multiple GCT; however, there are no published guidelines for the management of such tumors. To our knowledge, there are only five published reports of GCT treated by Mohs micrographic surgery (MMS) and no previous reports of MMS in a patient with multiple granular cell tumors. We were presented with an otherwise healthy 20 year-old man with multiple new and recurrent biopsy-proven GCT. We present recommendations for management of multiple granular cell tumors based on our experience and literature review.

Design: We present clinical and histologic images from our case along with relevant literature. We performed a comprehensive review of the English-language medical literature. Related articles and references were reviewed.

Summary: Our case illustrates several key points in the management of granular cell tumors:

- Recurrence rates after standard excision are high. Evaluation of 100% of the microscopic margin may be necessary to detect subclinical spread, especially perineural spread.

- Potentially fatal malignant GCT may be histologically indistinguishable from benign GCT; therefore, patients with large, rapidly growing, or locally aggressive tumors require judicious clinical follow-up.

- Patients with multiple GCT warrant a thorough history and physical exam to rule out signs or symptoms of associated systemic abnormalities.

Local recurrence rates for benign GCT following standard excision with clear margins range from 2% to 8%. When surgical margins are positive, recurrence rates of 21% to 50% have been reported. GCT exhibit perineural involvement in 75% of cases. Reports indicate that 1% to 7% of GCT are malignant. Malignant GCT are usually larger (4cm or greater) and may grow rapidly. Many malignant GCT demonstrate areas of nuclear pleomorphism and increased mitotic activity; however, some are impossible to differentiate from benign GCT on pathology and are identified only following nodal and metastatic spread. Malignant GCT are aggressive and nearly universally fatal. Wide excision is recommended for malignant lesions. Mohs micrographic surgery may be indicated for GCT located in functionally or cosmetically sensitive areas or for aggressive tumor variants. For our patient, we elected to treat a recurrent, enlarging, symptomatic GCT on the right ulnar wrist by MMS given its functionally sensitive location. Of patients with multiple GCT, only 14% have been reported to have systemic findings suggestive of a syndrome, and the vast majority of these cases are children.

Conclusion: Patients with multiple granular cell tumors present management challenges. In cosmetically or functionally sensitive locations, evaluation of the entire microscopic margin is desirable to identify subclinical spread and perineural invasion. Close clinical follow-up is warranted for large or rapidly growing tumors. In adults with multiple granular cell tumors, a thorough history and physical exam should be performed to rule out any signs or symptoms of associated systemic abnormalities.

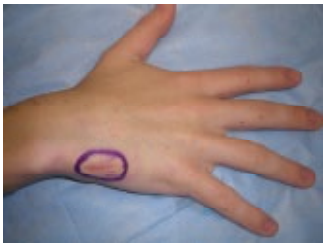

Figure 1. Recurrent granular cell tumor on ulnar wrist.

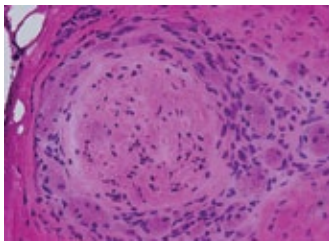

Figure 2. Perineural invasion encasing superficial branch of ulnar nerve (40x).

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TITLE: The Helix Jellyroll Flap: A Modification of Helical Advancement Flaps to Reconstruct the Helical Rim

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Purpose: Postauricular advancement flaps can lead to undesirable attenuation of the fleshy helix due to tension and contractile forces on the leading edge of the flap. In addition, tension on the leading edge of the flap can "uncurl" the natural anterior curvature of the underlying helical cartilage. To prevent this untoward outcome, we demonstrate an alternative anchoring technique, for both one and two-stage helical advancement flap procedures, that restores the tuft of tissue over the helical rim. This is accomplished by rolling the flap forward in a "jellyroll" configuration to recreate the anterior helical fold.

Design: The proposed jellyroll technique places the leading portion of a postauricular advancement flap under compression rather than tension. It rolls the leading edge of the flap over itself creating a tissue redundancy at the anterior helical rim. The basis of this technique lies in the placement of the anchoring sutures of the helix to the wound's adjacent fixed skin. The first suture is a horizontal mattress placed approximately 5 mm behind the leading edge of the advancing flap (the larger the defect, the further back is suture placement from the leading edge of the flap). The flap is advanced and the suture is anchored anteriorly, but not at the anterior wound margin. Rather, it is placed into the scaphoid fossa or antihelix beyond the wound margin, in a horizontal mattress. This version of the jellyroll flap differs from the traditional approach, which sutures the apposing wound edges directly together. When flap-edge sutures are used to tension the wound into position, maximal flap stress occurs at the wound margin. This tension attenuates the tissues. The helix jellyroll flap prevents attenuation of the flap by creating a redundancy that rolls the flap's leading edge over itself and places the wound's leading edge under compression. The skin and cartilage of the scaphoid fossa and the adjacent antihelix are relatively fixed and inflexible. Anchoring the flap at this fixed position prevents back-pull on the flexible helical cartilage until the healing process fixes the flap in position, preventing uncurling of the delicate curvature.

Conclusion: The anchoring technique in the helix jellyroll flap improves the cosmetic outcome of a traditional postauricular advancement flap by preventing attenuation of the helical tuft while preserving the more natural anterior curvature of the underlying helical cartilage. The helix jellyroll flap is a simple modification of the traditional approach that should be utilized to maximize the cosmetic repair of helical surgical wound defects.

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TITLE: Free Cartilage Grafts for Alar Defects Coupled with Secondary Intention Healing

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Purpose: Repairing the alar subunit of the nose after Mohs surgery is a challenge and can be a lengthy procedure. The inability to let it heal by second intention because of alar retraction, nasal valve collapse, and unacceptable scar leads to long procedures involving flaps, composite grafts and a combination of both to recreate the contour of the nose. The standard opinion about second intention healing over cartilage is not considered favorable because of the risk of desiccation necrosis. We describe a technique that is time conscious, reproducible, and helps to prevent nasal valve collapse. This method is mentioned in the plastic surgery literature and our findings concur.

Design: This technique allows the surgeon to recreate the alar subunit of the nose by second intention healing. This technique also adds support in the alar region and aims to prevent external valve collapse and alar retraction. This method maybe useful in for defects in the soft triangle, as recreating this anatomical surface is difficult.

The alar defect and ipsilateral helix are cleansed with chlorhexidine antiseptic solution, infiltrated with a local anesthetic. The ipsilateral helix is used unless there is an obvious contraindication. The length of the defect is measured and 4 mm is added to the measurement to insure the batten will fit snuggly inside the subcutaneous pockets of tissue. The width of the defect is measured to ensure that the batten width is just slightly less than that of the defect by 2-3 mm. A skin flap is incised over the antihelix and retracted back, the cartilage is harvested taking special attention to leave an intact perichondrium. The perichondrium provides an optimal environment for granulation tissue. The helical skin flap is sewn together with 6-0 absorbable suture. Two pockets of tissue are made with a scalpel on the lateral most edges of the round defect as buried subcutaneous pockets in which the cartilage will fit snuggly. These pockets may also help with vascular supply to the free cartilage graft. The graft is removed from the saline and slipped into the buried dermal pockets, first one side then the other. At this point a 5-0 absorbable suture is used to tie 2 buried figure eight sutures into the defect. The cartilage is now firmly imbedded into the defect with pericondrium intact. This is covered with petroleum jelly and a pressure bandage for 48 hours. Figure 1 illustrates this technique with a fairly deep left alar Mohs defect 5 mm from the

alar rim measuring 1.1 x 0.7 cm. The cartilage batten is placed and the patient is seen 8 weeks later. In Figure 2 a right alar defect measuring 1.4 x 1.2 cm is repaired with a cartilage batten and the patient was seen 10 weeks later with a slight hypertrophic scar. In both cases there was complete re-epithelialization by secondary intention. Both patients and physicians were pleased with this cosmetically acceptable result that kept the form and function of the nose and the nasal valves intact.

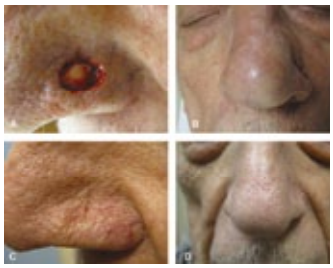

Figure 1. (A, B) Cartilage graft, (C, D) Post-op 8 weeks

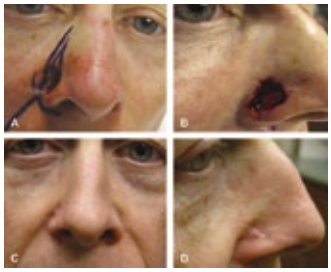

Figure 2. (A, B) Cartilage batten, (C, D) Post-op 10 weeks

Summary: This technique of a free cartilage graft coupled with secondary intention healing allows for a satisfactory cosmetic outcome with little morbidity.

Conclusion: A free cartilage batten is a good alternative for a medium to deep repair on the nasal ala.

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TITLE: Microcystic Adnexal Carcinoma Associated with Multiple Benign Syringomatous Proliferations: A Report of Two Cases

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Purpose: We report two cases of microcystic adnexal carcinoma (MAC) associated with multiple benign syringomatous proliferations. Surgical management in both cases was challenging. Overlapping histologic features between MAC and syringoma made it difficult on intraoperative frozen sections to separate the peripheral border of the MAC from the background of multiple benign lesions, especially since, to our knowledge, no such scenario (MAC associated with multiple subclinical benign syringomatous proliferations) has previously been reported.

Design: Case 1: A 47-year-old white female initially presented to the dermatologist complaining of patchy hair loss and scaling of the scalp and intermittent pain and burning on the right scalp for several months. On examination, an ill-defined pink tender plaque with overlying alopecia was noted on the right parietal scalp. A biopsy showed a microcystic adnexal carcinoma with perineural invasion.

Case 2: A 73-year-old white male presented to the dermatologist after noting a palpable lesion on the right cheek. On examination was a 2 cm plaque on the right cheek. A biopsy revealed a microcystic adnexal carcinoma.

Summary: Case 1: Mohs micrographic surgery was performed. Frozen sections during Mohs surgery showed classic basophilic strands, cords, and ductal structures in a desmoplastic stroma consistent with a MAC. Six stages of Mohs surgery were initially required to clear the tumor, resulting in a 6 cm defect. Additional peripheral and deep margins around the entire defect were excised and sent for permanent sections to rule out residual tumor. In the permanent section evaluation by dermatopathology, focal syringomatous proliferations in the dermis were found extending to peripheral margins. Although the syringomatous foci were indistinguishable from benign syringomas histologically, in the context of an adjacent MAC, it was difficult to exclude the possibility that the foci could be peripheral syringoma-like extensions of the MAC. Therefore, the patient underwent further Mohs surgery. In stages seven and eight, superficial syringomatous proliferations were seen; in stage nine, there was only a single ectatic sweat duct confined to the superficial dermis. Given the presence of additional small distinct syringomatous foci, which after three dimensional mapping of the lesions based on permanent sections were clearly separated from each other and the main MAC tumor by normal skin, it seemed most plausible that the syringomatous foci were benign lesions. However, this conclusion could only be draw with confidence after all permanent sections had been reviewed. During intraoperative frozen section analysis, it was difficult to be definitive, which is why additional tissue peripheral to the sites of syringomatous foci was excised and reviewed. The final margin showed benign skin with no tumor seen. The final tumor-free area was a 7 cm defect to periosteum. Plastic surgery used a split thickness graft to repair the defect.

Case 2: A wide excision was performed by plastic surgery. The patient underwent two additional re-excisions because pathologists reported MAC at peripheral margins. The patient was then referred to radiation oncology for further treatment. Pathology slides were reviewed at a cancer center. In the first excision a lesion with features consistent with a microcystic adnexal carcinoma was identified. Review of the subsequent excisions showed multiple benign syringomatous proliferations confined to the dermis that were separated from each other by intervening benign skin. The proliferations had the appearance of a syringoma. All of them were confined to the dermis. None of the foci extended into the subcutis or showed perineural invasion. Therefore these syringomatous proliferations most likely represented benign syringomatosis.

Conclusion: MAC is a locally aggressive tumor with extensive unpredictable subclinical extension; therefore Mohs surgery is the treatment of choice. While margin assessment of a MAC on frozen sections is usually straightforward, we encountered two unusual scenarios that made margin assessment and surgical management very difficult, because of the unusual constellation of a MAC arising in a subclinical background of multiple benign syringomatous proliferations. It is important for Mohs surgeon to be aware of this phenomenon.

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TITLE: Atypical Fibroxanthoma in the Setting of Chronic Lymphocytic Leukemia

AUTHORS: ***Michael B. Colgan, MD***[1]*; Jerry D. Brewer, MD*[1]*; Amy L. Weaver, MS*[2]*; Randall K. Roenigk, MD*[1]*; Clark C. Otley, MD*[1]

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Purpose: To further understand the characteristics and behavior of AFX in the setting of concomitant CLL.

Design: Institutional review board approval was obtained for a retrospective chart review. The master diagnosis index was queried for AFX and lymphoma from 1980 to 2008. A total of 11 patients were identified with both the diagnosis of AFX and lymphoma. A retrospective chart review was then conducted.

Summary: The 11 identified patients with AFX and lymphoma did not demonstrate an increased risk of recurrence, metastasis, or mortality due to AFX compared to previous case reports in the literature. No patients treated at this institution in the past 26 years have had a true case of metastatic AFX. In addition, patients with AFX and CLL did not fare worse compared to patients with AFX and other types of lymphoma.

Conclusion: AFX does not behave more aggressively in the setting of concomitant lymphoma; however more studies are needed to definitively evaluate the characteristics and behavior of AFX in this patient population.

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TITLE: VIDEO - Videos in Dermatology Education Online

AUTHORS: ***Matthew A. Molenda, MD****; David R. Lambert, MD*

INSTITUTION: Division of Dermatology, The Ohio State University Medical Center, Columbus, OH, United States

Purpose: The availability and use of streaming video has exploded online. Websites such as YouTube™ have paved the way for online video sharing that requires relatively little computer knowledge for both the publisher and end user. Such technology presents an opportunity for dermatologic surgeons to utilize a rich online multimedia experience to teach surgical concepts and techniques to patients and students.

Dermatologic surgery is particularly well suited for online video instruction. For example, many patients (and even physicians in non-dermatologic specialties) do not understand the benefits of Mohs surgery versus simple excision. A 3-D video contrasting Mohs sectioning to standard "bread-loaf" sectioning, for example, would prove to be a valuable tool in enhancing patient understanding. In addition, medical students and residents can enhance their learning of dermatologic surgery techniques (biopsy techniques, suturing techniques, flaps, lasers, cosmetic procedures, assistance techniques, etc.) using this same technology.

Design: The first author of this abstract has developed a website that allows physicians within his practice setting to display videos in a manner similar to YouTube™. While it may be less expensive (for now) to develop videos and post them on YouTube™, there are numerous benefits of hosting the videos on a physician-run website. Such benefits include: (1) ability to maintain of control over who accesses videos with user-level authentication (e.g. videos of flaps may not be appropriate for public viewing, and patients may be less likely to agree to be recorded if the video will be publicly available); (2) ability to maintain copyright and ownership of videos; (3) YouTube™ is losing hundreds of millions of dollars annually, so a pay-per-view model could soon be introduced; (4) videos will not be limited by size, time, or content constraints imposed by YouTube™ ; (5) ability to avoid YouTube™ placement of advertisements over videos; (6) quality control of videos that are backed or endorsed by an academic institution or organization (e.g. a University, Hospital, or organization such as Mohs College), thereby adding to the credibility of the information; and (7) ability to place internal and external links to reliable educational resources, surveys, and printable forms that the patient will see while viewing a video.

Summary: No formal surveys have been conducted. Several videos have been made and used for patient education during office visits. Patient response to these videos has been extremely positive, as has physician satisfaction with the time saved.

The presentation will include: discussion of online videos in dermatologic surgery; how streaming videos can be incorporated into a website independent of YouTube™; the pros and cons of privately hosting videos; a demonstration of a website that has its own authentication system and videos that can be designated as public or private.

Conclusion: Dermatologic surgery is particularly well suited for online video instruction. Not only do videos save physician time spent on repetitive counseling, but they can also effectively be used to train students of surgery and to further educate patients. Videos that are backed by a reliable entity may be perceived as being more credible than videos posted on YouTube™. Some videos may not be suitable for unrestricted public viewing, so maintaining control over the videos is important.

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TITLE: An Interesting Observation in Lip Reconstruction

AUTHORS: ***Carin Litani, MD***[1, 2]*; Joel Cook, MD*[2]*; John C. Maize, MD*[2]

INSTITUTIONS: 1. Newton Wellesley Hospital, Wellesley, MA, United States 2. Dermatology, Medical University of South Carolina, Charleston, SC, United States

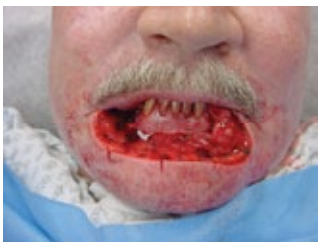
Purpose: The reconstruction of surgical defects of the cutaneous or vermilion lip may prove to be a challenging task for the dermatologic surgeon. While mandating the restoration or preservation of form and function for operative success, the aesthetic appearance of the lip must also be maintained. Excessive scarring or distortion due to a repair is likely to disappoint both the patient and

the surgeon. A wide variety of reconstruction options are available for repair. We present a case of a full thickness lip defect after Mohs surgery to extirpate a squamous cell carcinoma repaired with a radial forearm free flap. Longitudinal follow-up of the patient has demonstrated the apparent clinical transformation of the keratinizing volar forearm skin into mucosa when placed in the mouth. We further noticed similar changes with less complex repairs such as full thickness skin grafts used to repair partial thickness wounds of the lip. This paper investigates and discusses the utility of reconstructing defects encompassing both the vermilion and cutaneous lip with a local flap or graft that crosses the cosmetic boundary of the vermilion line by analyzing this mucosal transformation.

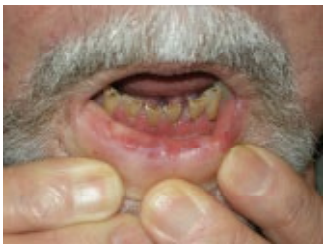
Design: In effort to determine if the pathological findings echoed the clinical mucosal transformation, biopsies for comparison were obtained from the transformed surface of the flap, the native mucosa, and the native donor forearm skin from the contralateral arm. Additional case analysis showed the successful use of full thickness skin grafts and local flaps used to repair partial thickness defects involving both the cutaneous and vermilion lip as one cosmetic unit due to this transformative process.

Summary: The results show that while the transformed flap mucosa more closely resembled the native mucosa in regards to thickness and architecture, it still retained some cutaneous features. Overall, the flap clinically mimics native mucosa and histologically resembles a hybrid of native skin and mucosa with its own unique features of increased inflammation, candida, and subepithelial granulation tissue.

Conclusion: We encourage dermatologic surgeons to consider utilizing a full thickness cutaneous skin graft or flap to repair such defects involving both the cutaneous and mucosal lip and reassure the patient that transformation into mucosa is likely to occur as the graft/flap matures in its new environment.



Full thickness defect after Mohs surgery of the lower vermilion and cutaneous lip.



Note the clinical mucosal appearance after reconstruction with a radial forearm free flap.

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TITLE: Bovine Triple Helix Collagen Wound Dressing Obviates the Need for Delayed Full Thickness Skin Graft for Sub Centimeter Alar Mohs Surgery Defects

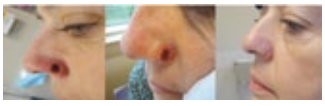
AUTHORS: *Joshua A. Tournas, MD; Scott W. Fosko, MD;* ***Quenby L. Erickson, DO***

INSTITUTION: Dermatology, St. Louis University, St. Louis, MO, United States

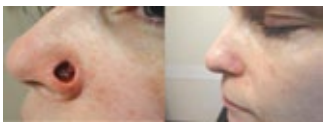
Purpose: Small but deep alar MMS defects present a common reconstructive challenge. Although defects 1cm or less are relatively small, second intention healing can result in contraction leading to notching of the alar rim. Reconstructive options for small alar defects such as flaps and grafts have significant limitations. Flaps often involve violating the cosmetically important alar crease and a delayed full thickness skin graft results hypopigmented "patch" and an additional wound, the donor site. These reconstructive imperfections present a special challenge given that the wounds are so small. The use of an acellular triple helix collagen wound dressing in small but deep alar MMS defects has resulted in beautifully healed wounds with an excellent color texture match and restored contour without the ever-feared alar notching.

Design: On two occasions young women presented with basal cell carcinoma on the ala which resulted in relatively deep but small defects. After thorough discussion of reconstructive options, these women opted for placement of an acellular collagen xenograft which was sutured into place with Fast Absorbing Gut followed by evaluation 10 days later for possible delayed full thickness skin graft. The patients both used a small piece of thin Duoderm over the xenograft while the wound was healing. At the 10 day follow up, the wounds were fully granulated and it was determined that a skin graft was unnecessary. The wounds healed remarkably well, without alar notching.

Conclusion: The use of an inexpensive acellular collagen microscaffold wound dressing as a xenograft on small but deep alar MMS defects presents an excellent alternative reconstructive option for these challenging defects.



Left panel: 0.7 mm alar Mohs defect; central panel: acellular collagen xenograft sutured into defect with absorbable suture; right panel: one month post operative photo without alar notching.



Left panel: 1.1 cm alar defect; right panel: one month post operative photo after acellular collagen xenograft placement; note no alar notching.

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TITLE: Vulvar Melanoma Screening and Case Analysis

AUTHORS: ***Michael Krathen, MD****; Daniel S. Loo, MD*

INSTITUTION: Dermatology, Tufts Medical Center, Boston, MA, United States

Purpose: The standard of care with respect to the female genital examination during dermatologic "full skin examination" is unclear. The goal of this pilot study is to assess physician perspective and behavior regarding screening for vulvar melanoma, one of the most aggressive and deadly forms of melanoma. Furthermore, a second goal is to examine the portal by which these patients entered the medical system and the clinical characteristics of the cases of both malignant melanoma in-situ (MMIS) and malignant melanoma (MM).

Design: Two physician groups (attending gynecologists and dermatologists) were assessed via separate survey instruments. Cases from 1980 to 1994, and 2000 to 2009 of melanocytic vulvar neoplasms were identified via pathology database. Pathologic data and available clinical charts were reviewed.

Summary: Thirteen gynecologists and 7 dermatologists completed the survey instrument.

Nine of 13 gynecologists perform annual gynecologic exams as part of their practice, 12 of 13 always examine the vulva when performing an examination, and 13 of 13 either agree or strongly agree that routine visual inspection of the vulva is their responsibility as a gynecologist. 12 of 13 either agree or agree strongly that the diagnosis of vulva melanoma is their responsibility and 11 of 13 agree or agree strongly that it is the co-responsibility of the dermatologist to diagnose vulvar melanoma.

One of 7 dermatologists reported always examining the vulva on routine annular examinations; 4 sometimes examined the vulva and 2 did so often. When presented with a female patient and a single risk factor for melanoma, 4 of 7 dermatologists report offering vulvar examination although 6 of 7 agree or strongly agree that vulvar examination for such patients is their responsibility. 2 of 7 dermatologists disagree or strongly disagree that routine examination of the vulva is their responsibility.

Three cases with atypical melanocytic hyperplasia, 4 cases of MMIS, 1 metastatic melanoma to the vulva, and 13 cases of MM were identified.

For the MM patients (10 charts available for review), the average depth of invasion was 4.1 mm and the mean age was 69 years, at least 7 were white, at least 4 cases developed metastatic disease, 2 cases each had a brother who died from MM, and 5 lesions initially presented as persistent genital bleeding, itching, or a non-healing erosion. 8 of 10 MM patients (at least) were either self referred or referred by another service to gynecology for evaluation and ultimate biopsy.

For the MMIS patients (3 charts available for review), the average age 24 years, 1 case had a second degree relative (paternal aunt) with a history of MM, 2 were discovered incidentally while at the gynecologist for other reasons (dysmenorrhea, abdominal pain), and 1 brought the lesion to the attention of the gynecologist because of concerning vulvar pigment. 2 of 3 MMIS patients (at least) were either self referred or referred by another service to gynecology for evaluation and ultimate biopsy.

Conclusion: Routine vulvar examination is the standard of care in gynecology whereas this is less clear in dermatology. The development of vulvar MM may be associated with older age, white race, family history of MM, and symptoms of genital bleeding and itching. 2 of 3 cases with MMIS were detected early due to routine inspection of the vulva during unrelated gynecologic evaluation. Regular examination of the vulva may be indicated for female patients when at least 1 first- or second-degree family member has a history of MM.

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TITLE: Island Pedicle Double Rotation Flap: A Novel Method of Closure for Large Nasal Defects

AUTHORS: ***Theresa L. Ray, MD****; Sarah Schram, MD; Peter K. Lee, MD, PhD*

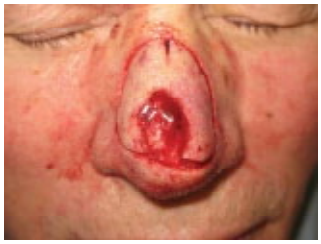
INSTITUTION: Dermatology, University of Minnesota, St. Louis Park, MN, United States

Purpose: The reconstruction of large defects on the nasal tip, dorsum and ala can be quite challenging. It is difficult to maintain the normal nasal architecture while simultaneously restoring the color and texture of the tissue unique to this area. When the defect is large, the options for closure are few and may be limited to a two-staged closure, such as a paramedian forehead flap. While two-staged procedures provide adequate tissue for closure, they require a donor site outside of the cosmetic unit, which leads to complications in tissue matching as well as an additional scar. Here we report a series of 14 cases using a novel island pedicle double rotation flap as an alternative for closing large and difficult defects of the nasal tip and dorsum.

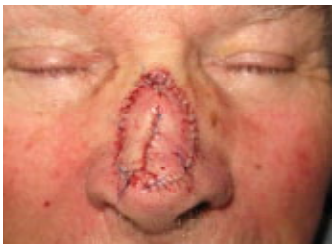
Design: We used the island pedicle double rotation flap for closure of 14 large nasal defects generated after Mohs micrographic surgery. Donor tissue was identified superior and lateral to the defect. The perimeter of the donor tissue was incised to generate a horseshoe shape around the defect. The lateral aspects of the donor area were then undermined circumferentially below the nasalis muscles in the submuscular plane. Thus, an island pedicle flap was created with its subcutaneous blood supply in the center of the flap. A vertical incision was then placed at the upper pole of the island pedicle to provide greater mobility of the lateral rotating arms of the flap, which were rotated downward to cover the primary defect. The lateral aspects of the donor tissue were then sutured into place and the secondary defect at the superior margin was closed linearly.

Summary: In all cases the tissue closely matched that of the defect area and proper nasal architecture was restored. There was viability of the tissue graft in all cases with only a few experiencing slight distal flap necrosis.

Conclusion: This flap design combines the robust blood supply of an island pedicle flap with the mobility of a rotation flap. Additionally, it utilizes donor skin from the same cosmetic unit allowing for excellent tissue match with minimal distortion of nasal architecture. Another advantage of the island pedicle double rotation flap is the tissue economy it provides with lack of a distant donor site. This allows for same day closure and avoidance of a two-staged procedure, resulting in a localized closure option for large nasal defects using less extensive flap design with a good cosmetic outcome.



Defect is seen centrally and inferiorly and involves the nasal tip and dorsum. The flap is outlined around the defect with a small cutback seen at the superior pole.



Flap after placement

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TITLE: Triage in Mohs Surgery

AUTHORS: ***Jonathan L. Bingham, MD***[1, 2]*; J. Ramsey Mellette, Jr., MD*[2]

INSTITUTIONS: 1. Dermatology, National Naval Medical Center, Silver Spring, MD, United States 2. Mohs Surgery, University of Colorado Denver Medical Center, Aurora, CO, United States

Purpose: Validation study for triage scheduling system for university-based Mohs surgery practice based on tumor characteristics of clinical, location, size, and type.

Design: All tumors referred for Mohs surgery from 01 July to 31 Dec 2008 where triaged (categorized) as a large or small tumor based on the following criteria:

Triage Categorization (see Table 1).

If any criteria for a "large" tumor was met, the tumor was classified as such.

Large and small tumors were then compared to number of stages required to clear the tumor and types of repair for the subsequent defect.

Clinical		
Large		**Small**
Recurrent		
Location		
Large		**Small**
Nose		Scalp
Ear		Forehead
Lip		Cheek
Eyelid		Neck
Genitalia		Trunk
Fingers		Extremity
Toes		
Size		
Scalp >2cm		Scalp <=2m
Forehead >1cm		Forehead <=1 cm
Cheek >1cm		Cheek <=1cm
Neck >2 cm		Neck <=2cm
Trunk >2 cm		Trunk <=2 cm
Extremity >2 cm		Extremity <=2cm
Histology		
Large		**Small**
Melanoma in situ		Superficial BCC
Melanoma		Nodular BCC
Desmoplastic BCC		Micronodular BCC
Morpheaform BCC		Well-differentiated SCC
Sclerosing BCC		SCC-KA type
Poorly-differentiated SCC		
Perineural invasion		
AFX		
MFH		
Merkel Cell Carcinoma		
DFSP		
MAC		
Paget's Disease		

Table 1: Triage Categorization

Summary: Number of Stages to Tumor Clearance

Large 2.1

Small 1.8

Type of Repair

(see Table 2)

Type of Repair	Large (N=265)	Small (N=218)
Flap	20.3%	6.5%
Complex	25.9%	61.0%
FTSG	19.2%	5.5%
Xenograft	3.4%	3.7%
2nd Intention	30.5%	22.9%

Table 2: Comparison of Type of Repair

Conclusion: The study did not demonstrate a significant difference in number of stages required to clear tumor between the two categories but there were significant differences in the types of repairs used to repair the subsequent defects. The results, with respect to type of repair, did validate the use of this triage system for the scheduling and prioritizing of Mohs surgery cases for our institution.

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TITLE: A Case of Intravascular Basal Cell Carcinoma Without Evidence of End-Organ Metastasis

AUTHORS: ***Jordan Slutsky, MD****; Kavita Mariwalla, MD; Evan C. Jones, MD*

INSTITUTION: Dermatology, Stony Brook University Medical Center, Stony Brook, NY, United States

Purpose: We present a case of intra-arteriolar BCC without evidence of metastatic basal cell carcinoma (MBCC). Intravascular BCC (IVBCC) represents the "gray-zone" between locally invasive BCC and MBCC, and may be a sign of in-transit metastases. Despite the fact that BCC is a stroma-dependant neoplasm and the hypothesis that most BCC cells do not remain viable within the lumen of vessels, a case of intra-arterial BCC with subsequent pulmonary and lymph node metastasis has been reported (1). There is a lack of literature on IVBCC without metastasis and the prognostic significance and the need for adjuvant treatment in such cases is unknown. Patients with high risk BCC including IVBCC should be carefully monitored in follow-up, as a literature review found that the median time between primary BCC and MBCC was nine years (1). We are conducting a survey of Mohs surgeons in order to determine the prevalence of IVBCC, facilitate a better understanding of this pathology, and to aid in formulating evidence-based treatment algorithms.

Design: A 60-year-old Caucasian man was seen in consultation for a biopsy proven infiltrative BCC on the right anterior parietal scalp. The previously untreated lesion was symptomatic with bleeding and poor healing for two years. The BCC measured 1.5 x 1.1 cm and was treated via Mohs micrographic surgery. Peripheral and deep margins were cleared of tumor, however intravascular invasion was observed on frozen H & E sections. The surgical defect measured 2.8 x 2.0 cm and the closure was performed by plastic surgery. The intra-arteriolar invasion was confirmed with permanent H & E staining which demonstrated BCC inside the wall of a small arteriole which stained positively for smooth muscle actin (Figures 1 and 2). Lymph node examination and computed tomography (CT) scans of the head, neck, and chest were negative, and the patient did not have evidence of metastasis. He was evaluated by radiation oncology and head and neck oncology for external beam radiation therapy, which was deferred secondary to lack of evidence regarding the significance of IVBCC without positive surgical margins, perineural invasion, or metastasis. The patient was healthy without signs of local recurrence, lymphadenopathy, or metastasis at one-year follow-up.

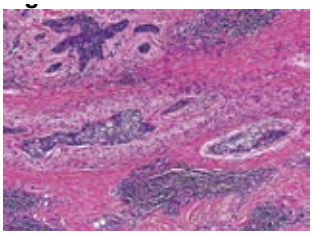

Figure 1.

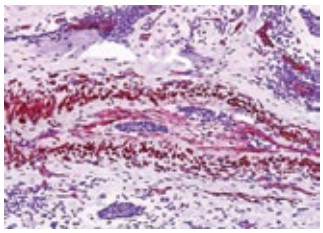

Figure 2.

Conclusion: BCC is generally considered to be a slow-growing, locally invasive tumor with low risk of metastasis (1). MBCC is extremely rare with a reported incidence of 0.003% to 0.55% and approximately 300 reported cases in the literature (1). MBCC has a poor prognosis and occurs most often in regional lymph nodes, but may also spread hematogenously to the lungs and bone (1). There is a lack of literature on IVBCC without metastasis and the necessity of adjuvant treatment in such cases is unknown. Close clinical follow-up and possibly serial imaging of patients with intravascular BCC should be the standard of care, as cases of MBCC have been reported to occur years after Mohs excision with negative surgical margins (1). It has been hypothesized that most intraluminal BCC cells may not remain viable to implant in a capillary bed, and that immunologic surveillance may impair distant tumor growth (1). More cases and studies of IVBCC are needed in order to determine the prevalence, incidence, and prognostic significance of this pathology, and to formulate evidence-based treatment and monitoring algorithms.

(1)Robinson JK, Dahiya M. Basal cell carcinoma with pulmonary and lymph node metastasis causing death. Arch Dermatol.2003;139:643-8.

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TITLE: Maximizing Sun Protection for the Skin Cancer Patient

AUTHOR: ***Jennifer L. Linder, MD*** [1, 2]

INSTITUTIONS: 1. Jennifer Linder MD, PLLC, Scottsdale, AZ, United States 2. Assistant Clinical Professor, WOS, Department of Dermatology, University of California San Francisco, San Francisco, CA, United States

Purpose: Recent studies regarding sunscreen safety and vitamin D production have raised unnecessary concern with patients all over the world. A review of the clinical and scientific data provided by these studies will assist the physician in recommending the most efficacious sun protection products and regimens.

Design: Multiple legitimate studies have been performed and although some have been misconstrued by the mass media, their results support sunscreen usage. A comprehensive review of research conducted at the University of California, Riverside, the Dermatology Service, Memorial Sloan-Kettering Cancer Center, Stanford University Medical Center and the University of Hawaii at Manoa will provide evidence of lifestyle changes that can be made to support sunscreen benefits. Knowledge of these changes will assist the physician in conducting the most effective patient education concerning sun protection.

Summary: Studies performed at the University of California, Riverside, indicate that improper application and usage of sunscreen products may lead to reactive oxygen species production and cellular oxidation. The research also suggests that the addition of topical antioxidants and appropriate re-application of sunscreen may resolve this concern. Research conducted by the Dermatology Service, Memorial Sloan-Kettering Cancer Center, suggests that patient knowledge regarding sunscreen usage, safety, and efficacy is insufficient. The debate regarding vitamin D is ongoing and unfortunately misleading to the patient. Studies performed by the Stanford University Medical Center show that vitamin D levels may help to reduce the occurrence of non-melanoma skin cancers, leading to even more confusion among the patient. A recent study conducted at the University of Hawaii at Manoa however, provides adequate evidence that the sun is not only a dangerous means of vitamin D production but also an unreliable

source.

Conclusion: Despite media reports, recent studies support the fact that sunscreens are not only safe when used as directed but also support overall health. Patient education regarding sunscreen is lacking, and the physician must be prepared to answer inquiries in order to preserve and protect healthy skin. Sunscreen selection depends upon appropriate ingredient blends to ensure maximum broad-spectrum protection. The UV absorbing and reflecting capacity of all FDA-approved sunscreen ingredients has been evaluated, and the best protective agents can be identified. The addition of topical antioxidants to daily patient routines and oral supplementation of vitamin D will provide further protection and support skin and body health.

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TITLE: Juxtatumoral Plasma Cell Density as a Histologic Clue to Squamous Cell Carcinoma

AUTHORS: ***Keith L. Duffy, MD***[1]*; Bryce J. Cowan, MD, PhD, FRCPC*[1]*; Magdalena Martinka, MD, FRCPC* [2]*; David M. Zloty, MD, FRCPC*[1]

INSTITUTIONS: 1. Dermatology, University of British Columbia, Vancouver, BC, Canada 2. Pathology, University of British Columbia, Vancouver, BC, Canada

Purpose: Most cutaneous tumors have variable densities of mononuclear cell infiltrates in the surrounding stroma. In the field of pathology, before the advent of immunohistochemistry, mononuclear cell infiltrates were used to signal to pathologists that tumor might be close to a margin or tumor cells may be obscured by the inflammatory infiltrate. Most Mohs surgeons rely on routine frozen H and E or toludine blue stained sections without the aid of immunohistochemical stains to clear cutaneous tumors. Mononuclear cell density and quality can still be very valuable to us in Mohs surgery. Previous studies have shown that high densities of plasma cells are associated with invasive squamous cell carcinoma. Our preliminary study was designed to determine if plasma cell infiltrates can be helpful in identifying tumor that was very close to the margin in our examined sections or tumor that could be obscured by inflammation.

Design: We prospectively screened all cases of invasive squamous cell carcinoma for aggregates of plasma cells. We included cases with signification mononuclear inflammation and a prominent population of plasma cells. Initial sections had no histologically discernable tumor in the sections but tumor was demonstrated on deeper Mohs levels. Only primary tumors without previous surgical manipulation were examined.

Summary: Five cases were identified that fit our criteria. Case 1 showed a significant lymphoplasmacytic infiltrate in the base of the lesion without obvious tumor. The first 4 sections were negative for tumor but the 5 and 6th sections showed obvious invasive SCC. Case 2 had only moderately dense plasma cell aggregates at the deep margin of a bisected specimen with no identifiable tumor. The other half of the bisected specimen showed plasmacytic aggregates as well as obvious invasive SCC. Case 3 had a dense lymphohistioplasmacytic infiltrate with a central epithelioid nest that was not diagnostic for SCC. Deeper levels on the specimen revealed obvious SCC in the center of the plasmacytic infiltrate. Case 4 had multiple lymphoplasmacytic aggregates in the deep dermis with no obvious tumor. Additional, deeper levels on the same block revealed obvious invasive squamous cell carcinoma. Case 5 exhibited large collections of lymphohistioplasmacytic aggregates in the papillary and reticular dermis. Deeper levels on the same block revealed obvious invasive SCC.

Conclusion: These cases demonstrate that plasma cell aggregates may act as a surrogate marker for invasive squamous cell carcinoma. Plasma cells can be easily identified on hematoxylin and eosin staining characterized by their amphophilic (purple) staining, prominent peri-nuclear hoff and eccentrically placed and clock-faced nuclei. In cases of suspected invasive squamous cell carcinoma, finding a significant amount of plasma cells within the infiltrate can be helpful in deciding whether a tumor might warrant an additional Mohs layer or at the very least a deeper level on the current block to ensure an adequate margin of resection.

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TITLE: Evaluation of Residual Basal Cell Carcinoma after Intraoperative Biopsy by Mohs Micrographic Surgery

AUTHORS: ***Joseph Alcalay, MD****; Ronen Alkalay, MD*

INSTITUTION: Skin and More Medical Center, Tel Aviv, Israel

Purpose: To determine the incidence of residual basal cell carcinoma after intraoperative biopsy during Mohs micrographic surgery.

Design: A prospective study was performed on patients undergoing Mohs surgery for primary basal cell carcinoma. The tumor was removed using a No. 15 blade at the clinical borders like a shave biopsy (Mohs shave). The base of the tumors were sectioned at the middle and cut to the periphery at 20 microns intervals till the edge.

Summary: Fifty-one patients were evaluated. In forty patients residual basal cell carcinoma was found at the base of the intraoperative biopsy site (78%).

Conclusion: Intraoperative shave biopsy performed during Mohs surgery for basal cell carcinoma is "curative" in 22% of the patients. However as with preoperative biopsy the majority of patients show residual tumor. This study strengthens the fact that a preoperative biopsy of basal cell carcinoma is a diagnostic tool only and Mohs surgery is needed for complete removal of the tumor.

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TITLE: A Novel Method for Repair of the Oral Commissure: Partial Purse String Closure with Subsequent Secondary Intention Healing

AUTHORS: ***Kenny J. Omlin, MD*** [1, 2]*; Melanie Tuerk, MD*[2]

INSTITUTIONS: 1. Kaiser Permanente, Vacaville, CA, United States 2. University of California at Davis, Medical Center, Sacramento, CA, United States

Purpose: Repair of perioral defects following Mohs surgery presents a unique challenge to the surgeon. The oral commissure is particularly difficult in that it is the intersection of layers of oral mucosa, perioral muscles including orbicularis oris, vermilion borders, and perioral skin. Maintenance of oral sphincter competence is of upmost importance. Additionally, aesthetics play an integral role in facial reconstruction. Techniques described in the literature include free flaps for large defects, conversion to full thickness defects, or disruption of intact vermilion borders. We present a novel method for repair of a defect of the oral commissure utilizing a partial purse string stitch combined with secondary intention.

Design: A 46-year-old female presented with a micronodular basal cell carcinoma involving the right lower cheek and right oral commissure. Tumor extirpation resulted in a 1.9 cm x 1.3 cm surgical site defect (Figure 1). After meticulously undermining the surgical site, an intradermal partial purse string stitch was placed in the cutaneous portion of the oral commissure, carefully avoiding placement of suture into vermilion portion (Figure 1b). The strategic placement of the purse string stitch serves as a trussel for the initial stages of wound healing. The vector forces guide skin growth in such a manner as to reproduce the unique topography of this complex region. The vermillion portion of the defect was allowed to granulate (Figure 2a).

Summary: After six weeks the patient achieved full oral competence and excellent aesthetic outcome (Figure 2b, 2c).

Conclusion: The strategic placement of a partial purse string intradermal stitch can provide an excellent option for oral commissure surgical defects. The circumferential vector forces created by the purse string stitch reproduce the natural creases of this unique anatomic location, resulting in an aesthetically pleasing outcome in an otherwise challenging site.

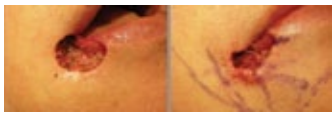

Figure 1. - Surgical defect: 1a; Purse string suture in place: 1b

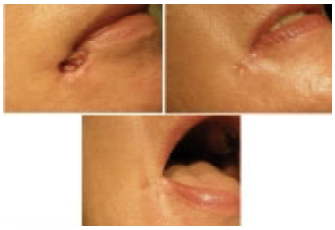

Figure 2. - Final outcome: 2a; Three weeks: 2b; Six weeks: 2c

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TITLE: Pathological Correlation Between Preoperative Biopsy and Intraoperative Positive Mohs Sections

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Purpose: This study examines the pathological correlation between preoperative biopsy and intraoperative positive Mohs sections for non-melanoma skin cancers (NMSC). Determining the frequency and nature of any discrepancy is imperative to our understanding of the adequacy of preoperative biopsies. As patients with NMSC are managed with other treatment modalities, this study will provide important information regarding treatment and biopsy recommendations for patients with primary and recurrent NMSC that are more aggressive or found to be a different tumor morphology than the initially biopsy would suggest.

Design: We performed a retrospective review of all patients referred for Mohs surgery to the clinic in a 12 month period with a preoperative biopsy of NMSC. At the time of surgery, information was obtained regarding the tumor type, pathological subtype, primary or recurrent nature, size of the biopsy, and any biopsy comments. The intraoperative tumor type and subtype and number of layers required for clearance were also recorded. Statistical analysis will be preformed on the collected data to determine the degree of correlation and account for any discrepancies.

Summary: Preliminary data has shown that pathologic discrepancy exists between preoperative and intraoperative tumor types and subtypes. Statistical analysis is currently underway to assess the nature/ frequency of the discrepancy. Potential causes may include inadequate preoperative biopsy, sampling error, and recurrence of a previously treated tumor.

Conclusion: Numerous treatment modalities exist for NMSC and we rely on our biopsies to formulate our treatment plans. This study demonstrates that there exists a discrepancy between the preoperative and intraoperative tumor subtype. A potentially more aggressive subtype noted intraoperatively may directly affect our treatment decisions. Upon further examination of the data we hope to identify patients at risk for more aggressive NMSC subtypes and subsequently develop better diagnostic and treatment recommendations.

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TITLE: The Sun Exposure Behavioral Index Questionnaire: A Method to Assess Skin Cancer Risk

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Purpose: To produce a simple questionnaire to assess a patient's cumulative sun exposure and validate this instrument against skin cancer risk. Sun exposure has been linked to an increase in non-melanoma skin cancer (NMSC), though no validated measurement tool has been designed to quantify the risk of sun exposure or sun behaviors on skin cancer development.

Design: An immunosuppressed cohort was used in this study due to their increased incidence of NMSC, enabling validation in a small cohort. 251 organ transplant recipients (ORTs) attending an immunosuppression and skin cancer clinic completed a SEBI (Sun Exposure Behavioral Index) questionnaire composed of 16 questions, assessing 3 domains; current sun behavior, current sun exposure, and prior sun exposure. The internal consistency of the SEBI was assessed by reliability analysis, using Cronbach's alpha.

Summary: Cronbach's alpha for SEBI was acceptable for each domain tested, indicating good internal consistency; current sun behavior 0.73, prior sun exposure 0.68, current sun exposure 0.62. Of 251 patients, 35% (n=87) had a history of skin cancer. Those with Fitzpatrick skin types IV, V and VI had a low risk of NMSC (n=4/87, 4.5%). Prior sun exposure was evaluated based on number of sunburns, blistering sunburns, tanning bed use, and estimate of lifetime sun exposure relative to the average person. Those with prior sun exposure scores above the mean were twice as likely to develop NMSC as those below the mean. History of sunburn predicted development of NMSC (p=0.016) and the number of blistering burns increased this risk in a dose-dependant manner. Tanning bed use and history of living in a warmer climate were not significant predictors of NMSC in this patient population, so these will be eliminated from future versions of the SEBI.

Fitzpatrick Skin type	N(total)	# NMSC	Percentage (%)
I	24	15	62.5%
II	51	23	45.1%
III	83	38	45.8%
IV	52	3	5.8%
V	16	1	6.3%
VI	18	0	0.0%
Unknown	7	7	100%

Distribution of NMSC relative to Fitzpatrick skin type

Conclusion: Based upon the results of this first validation study, the prior sun exposure domain predicted skin cancer risk, providing construct validation of this portion of the SEBI as a tool to estimate skin cancer risk. Current sun exposure and current sun behavior domains did not correlate with cancer risk in this group, possibly because those with a history of cancer do more to avoid/protect themselves from the sun. Questions from these domains may be useful in assessing the impact of sun education programmes but may only be seen to impact skin cancer risk in larger longitudinal studies. Further validation of the SEBI and its domains is planned in a larger population.

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TITLE: Expanding Mohs Surgery in the 21st Century: Assessing Mohs Surgical Missions Abroad

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Purpose: Skin cancer is a world wide epidemic. While Mohs surgery is available in several countries, there are many emerging countries which have a high rate of skin cancer, but do not have access to Mohs surgery. In these countries there are thousands of skin cancer patients who must wait many months to be treated by a plastic surgeon. Some of these patients do not receive treatment at all. There is a long tradition of American doctors going abroad to volunteer their services. While not as developed as other fields, the Mohs College does have members who volunteer abroad. The purpose of this study is to present the experiences and results of one team of Mohs surgeons who have performed Mohs surgery in the emerging countries of Chile, Romania, and Greece over the past 5 years.

Design: This is a case based study of three examples of Mohs surgery abroad by a team of Mohs College members, histotechnicians, and nurses. The methods of organizing and assessing patients, educating host country dermatologists, performing the surgery, and following the patients will be described and evaluated.

Summary: The average number of skin cancer patients treated per mission was 15. The team actually evaluated an average of 25 patients. These numbers were limited by the facilities including the challenge of processing the Mohs slides. There was a low complication rate, and to our knowledge, there were no recurrences. The host dermatologists unanimously acknowledged the value of the didactic sessions, and the ability to view Mohs surgery live or by simultaneous video. The best experiences for the host dermatologic surgeons were when they assisted the team members in the surgeries.

Conclusion: In order for Mohs surgery missions abroad to be successful, the host country must have at least one "point" dermatologist invested in the process; there must be adequate preoperative evaluation both via digital images and an on-site visit; there must be a didactic component; the host dermatology team must organize follow up. While Mohs surgery and the reconstructions have aided numerous underserved patients abroad, there are limitations in the actual overall change that these trips make. In the future, there needs to be local dermatologists who are fellowship trained in Mohs surgery, and possibly permanent surgery centers where American Mohs surgery teams can volunteer on a regular basis.

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TITLE: Mohs Micrographic Surgery for the Treatment of Cutaneous Leiomyosarcoma

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Purpose: Cutaneous leiomyosarcoma is an extremely rare, malignant mesenchymal tumor of smooth muscle origin, and is thought to arise from the arrector pili muscle of the hair follicle. This tumor is often misdiagnosed clinically, and the correct diagnosis is most often achieved after histologic examination with the aid of immunohistochemical staining. Although primary cutaneous leiomyosarcoma is generally considered a low-

grade malignancy, there may be significant local invasion and subclinical extension. Rare cases of metastasis have been reported. We sought to review the clinical characteristics and outcome of patients with primary cutaneous leiomyosarcoma referred to and treated with Mohs micrographic surgery (MMS) at our practice.

Design: We performed a retrospective chart review of 11 consecutive patients who had cutaneous leiomyosarcoma treated with MMS from 1995-2009. Patient demographic data, tumor size, tumor location, information regarding previous treatment, number of Mohs stages to obtain tumor clearance, size of the surgical defect, duration of follow-up, and presence or absence of recurrence were compiled and tabulated. Duration of follow-up was measured as the length of time from MMS to the most recent outpatient follow-up either in our office or that of the referring physician. For patients who had died or moved away, telephone contact was obtained with the patient, relative of the patient, or referring physician to determine whether or not the tumor recurred.

Summary: Our 11 patients were all Caucasians (Fitzpatrick phototypes I, II, III), and included 7 (63.6%) males and 4 (36.4%) females. The average age of patients at the time of diagnosis was 51 years (range 7 to 84 years). Three (27.3%) lesions were located on the head and neck, and 5 (45.4%) of lesions were located on the extremities. Three (27.3%) lesions were located on the trunk. The average preoperative clinical lesion size was 6.56 cm^2. The average number of MMS stages required for tumor clearance was 2.4. The average size of the surgical defect was 19.33 cm^2. One lesion was recurrent at the time of presentation after excision at an outside institution, and all remaining tumors were primary (untreated). The overall recurrence rate, average follow-up period, average time to diagnosis of recurrence for this cohort of patients is currently being determined by contacting patients, patients' families, and/or referring doctors as none of the patients to this point have returned to our practice with a tumor recurrent after MMS. This data will be available for presentation at the 2010 ACMS meeting.

Conclusion: Cutaneous leiomyosarcoma is a rare spindle cell malignancy that is not commonly encountered by practicing dermatologists, and as a result standards for evaluation and management of these tumors are not clearly defined in the literature. Recent literature has demonstrated successful treatment with both narrow margin excision and MMS although no comparisons to wide local excision have been performed. Reported recurrence rates for cutaneous leiomyosarcoma vary widely from 0% to 50% due to variation in treatment modality and duration of follow-up, and recurrence rates for cutaneous leiomyosarcoma treated with MMS are reported to be as low as 14% in the recent literature. This is the largest series of cutaneous leiomyosarcoma treated with MMS in the current literature. After review of our preliminary recurrence data we expect that our data will support utilization of MMS for the treatment of cutaneous leiomyosarcoma.

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TITLE: Integra® Dermal Regeneration Template for the Repair of Large Scalp Defects Extending to Bone

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Purpose: Mohs surgeons frequently are faced with large, complex scalp defects that present unique reconstructive challenges. Defects extending to bone are especially challenging as they exclude the use of skin grafts and may require large rotation flaps, galeal hinge flaps, or bone burring. Such techniques may be undesirable in frail or elderly patients, individuals on multiple anticoagulants or in the repair of high risk tumors. We present two cases in which scalp defects extending to bone were successfully repaired with Integra®, an acellular dermal regeneration template that allows formation of neodermis and subsequent re-epithelialization.

Design: Two elderly patients each presented for Mohs micrographic surgery of a squamous cell carcinoma on the vertex of the scalp. The first patient had a poorly differentiated SCC with perineural involvement and his Mohs defect measured 5.4 by 3.7 cm. The second patient was a 95 year old man with 6.3 by 5.2 cm well-differentiated SCC that resulted in a Mohs defect of 7.5 by 7 cm. In both cases Integra® was chosen to repair the wound to decrease the risk of postoperative bleeding and minimize the complexity of the closure in a frail patient. Integra® was sutured into place using non-absorbable suture in an interrupted fashion. Sutures were removed at one week postoperatively. Patients were seen every one to two weeks until re-epithelialized. Patient 1 was placed on cephalexin at the time of his Mohs procedure and had a porcine xenograft placed at week 4. His wound had intact epidermis at week 5 with no subsequent loss of his xenograft evident. Patient 2 was allowed to re-epithelialize without use of a xenograft or autologous skin graft. He was not placed on post-operative antibiotics and developed a wound infection with resulting loss of 40% of the Integra® down to bone by week 2. He was placed on ciprofloxacin and within 2 weeks his wound size had decreased by 25-30%. His wound was fully granulated by week 6 and re-epithelization was almost complete by week 9. Both patients tolerated the procedure and post-operative course well and were pleased with the surgical outcome.

Conclusion: Large scalp defects extending down to bone can be successfully repaired with Integra®. The benefits of this closure method include the speed and ease of the procedure, the tolerability for patients, minimal risk of post-operative bleeding or dehiscence, and good surgical results.