

2009 Accepted Abstracts

Tromovitch Award Abstract Session—Thursday, April 23; 9:30 – 10:30 am

9:34 – 9:42 am

PRESENTER: Joy H. Kunishige, MD

TITLE: **Surgical Margins for Excision of Melanoma in Situ**

AUTHORS: *Joy H. Kunishige, MD; John A. Zitelli, MD; David G. Brodland, MD, FACMS*

Purpose: Although 5 mm margins are frequently recommended for excision of melanoma in situ, several studies have shown 5 mm margins to be inadequate. Further, dermatologists are increasingly managing melanoma in situ and inadequate treatment frequently leads to recurrence as invasive melanoma. It is time to reconsider the guideline in view of new evidence since the 1992 consensus.

Our purpose was to develop evidence-based guidelines for predetermined surgical margins for excision of melanoma in situ.

Design: A prospectively collected series of 1256 consecutive patients with 1330 melanoma in situs was studied. All lesions were excised by means of fresh tissue technique of Mohs micrographic surgery with frozen section examination of the margin. After 2003, MART-1 immunostains were used. The surgical margin needed for excision of melanoma was determined by measuring the invisible extensions of tumor around the melanoma. The minimal surgical margin was 6 mm and the total margin was calculated by adding additional 3 mm for each subsequent stage to remove the tumor completely.

Summary: 84.96 percent of melanoma in situs were successfully excised with a 6 mm margin. 9 mm removed 99.1% of melanoma in situs. Margins to remove melanoma in situs on the face were greater than that for other locations (scalp, neck, trunk, extremities, hands and feet). Margins to remove melanomas more than 2 cm in diameter were greater than that for smaller-diameter melanomas.

Conclusions: The frequently recommended 5 mm margin for melanoma is inadequate. Predetermined surgical margins for standard surgical excision should include 9 mm of normal-appearing skin for melanoma in situs. Larger margins should be considered when possible for melanoma in situ located on the face or greater than 2 cm in diameter. Required width of surgical margins for melanoma in situ is similar to that recommended for early invasive melanoma.

9:42 – 9:50 am

PRESENTER: Maya Thosani, MD

TITLE: **Office Surgery Incidents: What Nine Years of Florida Data Show Us**

AUTHORS: *Maya Thosani, MD; Brett M. Coldiron, MD, FACP, FACMS*

Purpose: There are increasing amounts of medical legislation that are being passed in an endeavor to protect patients, and reduce medical errors. In this effort, state medical boards and legislatures are drafting regulations which will have a considerable impact on patient access to medically necessary procedures, and should therefore be based on sound data. This report summarizes 9 years of prospective data from the state of Florida, the best data available on office surgery incidents.

The objective was to determine the nature and incidence of hospital transfers and deaths resulting from physician office procedures.

Design: This study is a compilation of mandatory reporting by Florida physicians to a central

agency of all in-office adverse incidents resulting in death, serious injury, or hospital transfer in the state of Florida from March 2000 to the present. Telephone and internet follow-up was conducted to determine physician board certification, hospital privileges, and office accreditation.

Summary: Analysis of 9 years of data shows that approximately half the injuries and deaths are due to cosmetic procedures performed under general anesthesia by plastic surgeons. The remainder of deaths and injuries are a wide mix of medically necessary procedures.

Conclusions: The data does not support that requiring board certification, office accreditation, or hospital privileges would improve matters. There were no deaths attributed to dermatologists, and no injuries or deaths from Mohs surgery or liposuction performed with dilute local anesthesia.

We also report on mandatory reporting from other states and compare this to the Florida data.

9:50– 9:58am

PRESENTER: Vinh Q. Chung, MD

TITLE: The Public's Perception of Dermatologists as Surgeons

AUTHORS: Vinh Q. Chung, MD; Herbert Alexander, MD; Michelle Pavlis, BS; Melissa Alexander, PhD; Suephy Chen, MD, MS; Carl V. Washington, Jr., MD

Purpose: Although dermatologists perform more surgical procedures to treat skin cancers than physicians from any other medical specialty, some patients may not be aware that skin surgery is an integral component of the training and practice of dermatologists. We hoped to determine whether dermatology patients and the general population have preconceived ideas regarding the ability of different medical specialists to perform skin surgeries.

Design: We recruited subjects from 2 sites: the university student center (N=250) and the clinic (N=250). The majority of the subjects from the first site were students while those from the second site were patients and/or their family members.

Participating subjects were asked to complete a 15-question survey regarding the relative skill levels of five medical specialists--dermatologists, emergency medicine physicians, family practitioners, general surgeons, and plastic surgeons. They then rated the cosmetic appearance of a set of 16 images of surgical scars using a visual analog scale ranging from 1 to 10. The 16 images were duplicated and arranged in the same order in four different binders. A label under each image indicated that the surgery was performed by a dermatologist, plastic surgeon, general surgeon, or "unknown." The label differed in each binder for the exact same image; i.e., in binder A, image #1 read "dermatologist," in binder B, it read "general surgeon," in binder C, "plastic surgeon," and in binder D, "unknown." Subjects were given only one binder to rate, and the binders were rotated with each subsequent subject.

For images designated "unknown," the subjects were asked to specify which of the three medical specialists (i.e., dermatologist, plastic surgeon, or general surgeon) he/she believed performed the surgery based on the cosmetic appearance of the scar. This helped determine if a bias existed towards a particular medical specialist.

Summary: Results from both sites were similar and statistically significant. Plastic surgeons received the highest rating when subjects were asked which medical specialist is capable of achieving the best result when performing skin surgery. Dermatologists received the second highest score, followed by general surgeons.

Plastic surgeons received the highest score for all parameters related to skin surgery: level of training, number of surgical procedures performed, advanced surgical instruments, advanced surgical skills, confidence in performing skin surgery on the face for cosmetic reasons, and confidence in performing skin surgery on the face to treat skin cancer. Dermatologists and

general surgeons shared the second and third rank for most of these parameters. When the subjects were asked who performed the greatest number of surgical procedures in the past year, dermatologists ranked 4th, behind plastic surgeons, general surgeons, and emergency medicine physicians. The majority of subjects at both sites did not perceive dermatologists as surgical specialists.

Subjects generally perceived scars as more cosmetically acceptable if they believed the scars were created by a plastic surgeon. Images labeled "plastic surgeon" received higher scores for cosmetic appearance than images labeled "dermatologist," "general surgeon," and "unknown." Subjects also attributed the more cosmetically acceptable scars to plastic surgeons. Statistical analyses are pending.

Conclusions: The public has preconceived ideas about which medical specialists have the greatest ability to perform cutaneous surgeries and leave cosmetically acceptable scars. Beyond their reported biases, the subjects' own evaluation of the cosmetic appearance of a scar is influenced by who they think performed the surgery.

Subjects reported the greatest confidence in plastic surgeons in performing skin surgery for cosmetic reasons as well as for treatment of skin cancer. They also reported that plastic surgeons have the greatest level of training, do the greatest number of surgical procedures, have the most advanced instruments, and have the most advanced surgical techniques. Dermatologists received evaluations comparable to general surgeons. Subjects in general did not perceive dermatologists as surgical specialists.

When evaluating a surgical scar, subjects more frequently attributed cosmetically acceptable scars to plastic surgeons than to dermatologists or general surgeons. They also perceived scars as more cosmetically acceptable if they believed that the scars were created by a plastic surgeon than if they thought the scars had been created by a dermatologist or a general surgeon.

Since dermatologists perform more skin cancer surgeries than any other medical specialist and since the patient's confidence in the physician is integral to the patient-doctor relationship, dermatologists must continue to educate the public about the depth and breadth of our field. We must also identify strategies to promote the public's confidence in dermatologic surgeons.

9:58 – 10:06 am

PRESENTER: Larisa Ravitskiy, MD

TITLE: Safety and Efficacy of Oral Midazolam for Perioperative Anxiolysis of Patients Undergoing Mohs Surgery

AUTHORS: Larisa Ravitskiy, MD; Randall K. Roenigk, MD; P. Kim Phillips, MD; Amy Weaver; Jill Killian; Clark C. Otley, MD

Purpose: Preoperative and perioperative anxiety can complicate any outpatient procedure performed on an unsedated patient by causing elevation in blood pressure and heart rate with resultant increase in intra- and post-operative bleeding. Anxiety may also impair patient's ability to remain motionless during delicate surgery. Finally, anxiety reduces patient comfort and satisfaction with the surgical experience, which could result in unwillingness to obtain subsequent necessary healthcare. Midazolam is an efficacious short acting benzodiazepine with an excellent safety record. It has been widely used for anxiolysis in outpatient gastroenterology and dentistry, but little experience has been documented in outpatient dermatologic surgery.

The main objective of this study was to establish the safety and efficacy of orally administered midazolam in skin cancer patients undergoing outpatient Mohs micrographic surgery.

Design: We examined 44 patients randomized in a double-blind placebo-controlled study of a single-dose midazolam syrup (10 mg) for efficacy in producing safe anxiolysis of short duration. In

addition, a second group of 31 patients wishing to receive oral midazolam in a non-blinded fashion were evaluated as well. Data on vital signs, anxiety, adverse events, and overall satisfaction with the anxiolytic agent were collected. Analysis of covariance model was employed to compare the outcome measures (e.g. visual analog scale (VAS) anxiety scores) between the two treatment arms, thereby allowing for the adjustment of the baseline VAS anxiety score and potential confounders (e.g., age and gender).

Summary: All groups were similar in age, sex, weight, education level, history of Mohs surgery, and number of tumor sites. There was no statistical difference in tumor type, size, location, or maximum layers to clearance. Repair types, type and amount of anesthetic were similar. All groups had no statistical differences in baseline vital signs. There was no clinically significant difference between the groups in pulse oximetry and respiratory rate over the course of the study. At 30 min post drug administration, in both midazolam groups there was a small, but statistically significant, decrease in median systolic and diastolic blood pressure (BP) that became more pronounced at 60 min. This was associated with a compensatory increase in heart rate (HR). Notably, BP in the control group increased over time, while the midazolam groups experienced reduction in BP. BP in the treatment groups reached nadir at about 60 min, then began recovery towards baseline, while HR peaked at 20 min and continued to decrease over the next 100 min.

At baseline, patients in prospective midazolam pM group were statistically significantly more anxious both self-reported and noted by staff. There was no difference in self-reported or staff noted baseline pain, alertness, or mini-mental examination scores. At 60 min, there was clinically and statistically significant reduction in anxiety in the pM group from 3.0 to 0.0 on VAS ($p < 0.001$). A less dramatic decrease in anxiety occurred in randomized midazolam rM (0.5 to 0.0, $p = 0.065$) and control (1.0 to 0.1, $p = 0.002$) groups. This was accompanied by a statistically significant decrease in alertness in the treatment groups. There was no paradoxical increase in pain in the treatment groups.

Forty three of 44 patients in the randomized arm and 28 of 31 patients in prospective completed a next-day questionnaire. Patients in the treatment groups had difficulty recalling either entire or parts of the procedure ($p = 0.004$). There was no difference between groups in postoperative nausea, vomiting, headache, cough, hiccups, involuntary muscle movement, insomnia, unusual sleepiness, increase in anxiety, nightmares, or difficulty speaking. Finally, patients in all three groups were equally satisfied with their experience. Over the course of the study there were no significant adverse events, such as hypoventilation, hypoxia, apnea, or increased pain perception.

Conclusions: Oral midazolam is an effective and safe anxiolytic for perioperative anxiety in outpatient dermatologic surgery patients. Oral midazolam is not associated with substantial intra- and post-operative complications, including hypoventilation, hypoxia, apnea, or increased pain perception. The rapid onset and short duration of midazolam are particularly suitable for short procedures such as Mohs surgery. Midazolam caused minor changes in systolic BP and HR which did not result in clinically impactful outcomes. The primary benefit of midazolam on perioperative anxiety is in self-proclaimed apprehensive patients. The study is limited by a small number of patients enrolled.

10:06 – 10:14 am

PRESENTER: Jens Thiele, MD

TITLE: Mohs Surgery for Periocular Skin Cancers: A Retrospective Series of 553 Cases

AUTHORS: Jens Thiele, MD; Gary D. Monheit, MD; Christopher B. Harmon, MD

Purpose: There is a lack of large U.S. based case series on Mohs surgery for periocular skin cancers. Purpose of this study is to identify the location, histologic sub-types, pre-operative and defect sizes, and number of Mohs layers needed to clear periocular basal cell cancers (BCCs), squamous cell cancers (SCCs), and melanomas (MM).

Design: Data were obtained from a retrospective chart review of 553 consecutive patients (from January 2005 through September 2008) with confirmed periocular skin cancers requiring Mohs surgery and oculoplastic repair.

Summary: Our 553 patients were all Caucasians (Fitzpatrick phototypes I, II, and III) and included 346 (62.6%) males and 207 (37.4%) females. Skin cancers included a total of 435 (78.7%) BCCs, 105 (19.0%) SCCs, 10 (1.8%) MM, and 3 other tumors (0.5%; sebaceous carcinoma, trichoepithelioma, and dermatofibrosarcoma protuberans). BCCs were most frequently located on the lower eyelid (246/56.6%), followed by the medial canthus (122/28.0%), the upper eyelid (43/9.9%) and lateral canthus (24/5.5%). SCCs were also most common on the lower eyelid (64/61.0%), followed by the medial canthus (18/17.1%), the upper eyelid (16/15.2%), and the lateral canthus (7/6.7%). MMs were most common on the lower eyelid (6/60.0%). Remarkably, 8 out of 10 MM patients were females.

Pre-operative and defect sizes of BCCs were smallest in upper eyelid locations (0.47cm and 1.61cm, respectively), and largest in medial canthus BCCs (1.42cm and 2.33cm, respectively). The mean number of Mohs layers needed for BCC clearance ranged from 1.33cm (lateral canthus) to 1.42cm (medial canthus). SCC pre-operative and defect sizes were generally larger than those of BCCs and ranged from upper eyelid (smallest; 1.00cm and 1.48cm, respectively) to medial canthi (largest; 3.0cm and 3.37cm, respectively). The mean number of Mohs layers needed to clear SCCs was lowest in the lateral canthi (1.14) and highest in medial canthus locations (1.50).

Conclusions: To the best of our knowledge, this is the largest U.S. based case series on periocular Mohs surgery focusing on BCCs, SCCs and MM. Our data confirm results from large Australian databases demonstrating that both BCCs and SCCs are most prevalent in the lower eyelid, but indicate a two-fold higher occurrence of SCCs on the upper eyelid than previously reported. Despite its larger pre-operative sizes, periocular SCCs required a lower number of Mohs layers than BCCs, with the exception of medial canthus SCCs. The latter tumors displayed the largest pre-operative and defect sizes as well as the highest number of Mohs layers needed for complete tumor removal.

Further analysis of the presented data will focus on histologic subtypes and recurrence rates.

10:14 – 10:22 am

PRESENTER: Melissa Pugliano-Mauro, MD

TITLE: Mohs Surgery is Effective for High-Risk Squamous Cell Carcinoma

AUTHORS: *Melissa Pugliano-Mauro, MD; Glenn D. Goldman, MD*

Purpose: The effectiveness of MMS has been clearly demonstrated for invasive SCC. As a subgroup, high-risk SCC present a challenge to the dermatologic surgeon and historically have a more guarded prognosis. We report the detailed outcome of ten years of MMS for high-risk SCC in a single practice by a single surgeon using a standardized approach.

Design: Patients with high risk SCC were defined by standard criteria: invasive tumors of lip and ear, tumors over 2cm in diameter, immunocompromise, perineural involvement, rapid growth. All tumors invaded into or deeper than subcutis. 280 cases were treated by MMS by one surgeon. Reconstructions were performed at the time of MMS or shortly thereafter. In cases with large (named) nerve perineural involvement, postoperative radiation therapy was recommended. Long-term follow-up was obtained by the treating MD in the majority of cases and by the referring dermatologist in the remainder. All patients were followed at 4 to 6 month intervals for at least 2 years, and the average follow-up is now greater than 5 years. Photos were obtained of all lesions for presentation.

Summary: We have been successful in obtaining detailed follow-up for greater than 90% of patients, and will obtain follow-up on every patient if feasible.

Mohs surgery was extremely effective at removing high risk SCC and preventing local recurrence. Of 280 tumors removed, 2 have recurred locally for a recurrence rate of 0.7%.

Extensive large nerve perineural (PN) disease was identified in 8 cases, all of whom received adjuvant RT. None of these patients has had local recurrence, and all but one (who died of cardiac disease) have had sequential follow-up for greater than two years with the treating physician and are alive, asymptomatic and well.

Small nerve PN disease was common and treated with surgery alone, and there have been no recurrences and no metastases in these patients.

There have been 6 metastases, all of which occurred within the first year, and one of which was synchronous with tumor removal. All metastases were from well-differentiated tumors. Three of these patients are alive and well more than two years after lymphadenectomy, partial parotidectomy, and adjuvant radiation therapy. One died (without recurrence) from unrelated causes.

Two deaths occurred from metastatic disease. One was from a penile carcinoma with synchronous metastasis and one was in a transplant patient with two explosive SCC on the finger who suffered brachial plexus and pulmonary metastases within months.

Data is currently under analysis for age of onset, sex, comorbid conditions, lesions size, number of stages required per tumor, and reconstruction.

Analysis revealed several ancillary findings:

Patients with one high risk SCC were highly-likely to develop secondary SCC. Up to 70% of patients presenting with one high-risk SCC developed another invasive SCC within the 5 years following presentation.

Patients with high risk SCC have an exceptionally high incidence of death from other causes within the 5 years following surgery, with a very high death rate from other forms of metastatic cancer. Analysis is ongoing.

Patients with high risk SCC have a substantial risk of developing malignant melanoma with subsequent metastasis. Three of our patients died from metastatic, nodular malignant melanoma, and one is alive with widespread metastases. Numerous other patients (data in progress) have been diagnosed with superficially-invasive MM.

Conclusions: MMS is a very effective treatment for high-risk cutaneous SCC. Large nerve perineural involvement treated by MMS followed by adjuvant radiation therapy has a success rate far above historic norms. Metastasis is more common than local recurrence, and generally occurs within one year. Cure of metastatic disease is feasible in many cases, especially with early regional node metastasis. Patients with high-risk SCC have many comorbidities, frequently have other cancers, have an exceptionally high incidence of second squamous carcinoma and malignant melanoma, and have a shorter than expected life expectancy from all causes. Only rarely, however, do they die of metastatic cutaneous squamous carcinoma.



This squamous cell carcinoma metastasized to submental LN.

10:22 – 10:30 am

PRESENTER: Humza Ilyas, MD

TITLE: Sebaceous Carcinoma of the Eyelids Treated with Mohs Micrographic Surgery

AUTHORS: Humza Ilyas, MD; Nancy Kim, MD, PhD; Regina M. Yavel, MD; Mark J. Lucarelli, MD; John G. Rose, MD; Stephen N. Snow, MD

Purpose: Sebaceous cell carcinoma (SbCC) is a rare tumor of the eyelids. Management is usually by complete excision but is complicated by the fact that the tumor can be multicentric or demonstrate pagetoid spread¹. Despite its potential for discontinuous spread, however, there have been reports 2-4 detailing Mohs surgery for SbCC. We present a case series of 16 SbCC patients treated with MMS over the last 21 years.

Design: A retrospective case review of all patients with sebaceous cell carcinoma of the ocular adnexa seen by a university Mohs surgery clinic between 1987 and 2008. The postoperative follow-up period ranged from 7 months to 14 years with a mean duration of 4.5 years. The main presenting parameters of interest included the presence of pagetoid spread, number of Mohs layers taken, final defect size, and time from symptom onset to diagnosis. Outcome measures of particular interest included local recurrence, metastatic disease, and mortality from sebaceous cell carcinoma.

Summary: In the current series, there were 16 cases of ocular adnexal sebaceous cell carcinoma. 9 (56%) cases originated on the upper lid and 7 (44%) on the lower lid. One patient was found to have orbital extension at the time of initial treatment and was exenterated. The remaining cohort underwent Mohs surgery and achieved clear margins. Of these, one patient was lost to follow up immediately after surgery. One of the remaining 14 patients, (7%) developed local recurrence 1.5 years after Mohs surgery and underwent exenteration with no evidence of further disease 12 years later. Twelve patients (93%) had no evidence of local recurrence with a follow-up of 7 months to 14 years. A single patient had parotid metastases diagnosed and was treated with parotidectomy and neck dissection prior to the evaluation of the primary tumor and subsequent radiotherapy. Of 14 patients treated with Mohs and with documented follow-up, 6 (43%) showed histologic evidence of pagetoid spread. The number of Mohs stages taken ranged from 1 to 6 with a median of 4. Mean defect size measured 3.7 cm². No deaths attributable to sebaceous cell carcinoma occurred.

Conclusions: Sixteen cases of sebaceous cell carcinoma treated with Mohs micrographic surgery are presented. Patient demographics and tumor distribution were compatible with prior series of ocular adnexal sebaceous cell carcinoma. Pagetoid spread was discovered in 42% of the cases which was consistent with other reports. Our outcomes are comparable with published series with conventional wide excision with frozen or paraffin margin controls. These findings indicate that Mohs surgery appears to be an effective form of surgical treatment for primary sebaceous cell carcinoma when orbital extension is not present and management is coordinated with a Mohs surgeon experienced with sebaceous carcinoma.

Research Abstract Session—Thursday, April 23; 3:30 – 4:30 pm

3:33 – 3:41 pm

PRESENTER: Basil S. Cherpelis, MD

TITLE: Innovative 19 Minute Rapid Cytokeratin Immunostaining of Non-melanoma Skin Cancer in Mohs Micrographic Surgery

AUTHORS: Basil S. Cherpelis, MD; Logan Turner, MD; Sharron Ladd, BS; L. Frank Glass, MD; Neil Fenske, MD

Purpose: Our objective was to develop an effective ultra-rapid cytokeratin (CK) frozen section immunostain to be used during Mohs micrographic surgery (MMS) in cases of non-melanoma skin cancer (NMSC) with dense or perineural inflammation.

Dense inflammation can obscure non-melanoma skin cancer on frozen sections which can lead to missed tumor and recurrence. Dense inflammation often prompts removal of additional layers to ensure negative margins. CK immunostaining in MMS has been examined in the past and found useful, but is limited by lengthy 1 hour processing.

Design: Twenty-one patients underwent MMS for biopsy-proven NMSC (11 cases of BCC and 10 of SCC). The frozen sections were stained with H&E and our 19 minute cytokeratin (AE1/AE3 monoclonal antibody) protocol. Additional sections from each case were also submitted for permanent (formalin fixed, paraffin embedded) H&E and CK immunostain processing by standard methods, for comparison. A thickness of 4 microns was used for all sections. For cases of BCC, permanent sections were also stained with Ber-EP4 and compared with cytokeratin stained sections.

Each tumor was debulked prior to the initial Mohs layer, and this material served as a positive control for the AE1/AE3 cytokeratin antibody. The epidermis and adnexal structures overlying and adjacent to the tumor provided additional internal controls for AE1/AE3. All frozen sections staining deemed positive or negative for tumor with the rapid immunostain protocol were confirmed by immunostaining of permanent sections.

Summary: The ultra-rapid CK protocol stained all of the cells in each of the 21 examples of BCC and SCC in frozen tissue in an equivalent way as immunostains applied to permanent sections. In each of the twenty-one cases of NMSC, islands of tumor and single cells were clearly labeled by CK immunostaining in both frozen and permanent sections. This rapid stain was useful in identifying perineural invasion and in confirming the presence or absence of cancer cells in areas of dense inflammation.

Conclusions: This innovative 19 minute ultra-rapid CK immunostain can be used to detect trace quantities of NMSC in frozen sections during MMS. This protocol is able to significantly reduce the time required for CK immunostaining compared to previous methods, thus making it more appealing and practical for MMS.

3:41 – 3:49 pm

PRESENTER: Glen M. Bowen, MD

TITLE: Topical Imiquimod Versus Imiquimod and Tazarotene for Lentigo Maligna Followed by Staged Excision

AUTHORS: Glen M. Bowen, MD; Mark A. Hyde, MMS, PA-C

Purpose: In a pilot study we found that in patients with lentigo maligna (LM) treated with imiquimod 5% cream for three months, about 70% of lesions had no sign of residual tumor when a staged excision was performed using two millimeter margins. In an effort to improve response rates a study was designed to add tazarotene 0.05% gel to topical imiquimod to see if disruption

of the stratum corneum would improve drug penetration and consequently improve the response rates to imiquimod. Results would be evaluated by performing staged excisions of the entire lesions and analyze the tissue for complete responses.

Design: A randomized prospective study was designed and approved by the internal review board at the University School of Medicine. Ninety patients with histologically defined lentigo maligna were randomized to one of two groups: group one was treated with imiquimod 5% cream five days a week for three months followed by two months of recuperation and then a staged excision was performed to document whether or not a complete response was achieved with the topical agent. A second group received imiquimod on the same schedule but also received tazarotene 0.05% gel two days a week. Degrees of inflammation were recorded in each group. A drug holiday of one week was taken if erosion or seeping was noted on examination.

Summary: Of the ninety patients enrolled in the study, seventy-seven reached the intent to treat: forty-one in the imiquimod only group and 36 in the imiquimod combined with tazarotene group. One person dropped out of the first group due to side effects whereas four dropped out due to side effects in the combined group. After completing three months of topical treatment, sixty-three percent of patients (26/41) had no residual tumor in the imiquimod-only group whereas eighty-one percent (29/36) had no residual tumor in the combination group. Although a trend tended to favor the combined treatment group, the difference between the two groups did not reach statistical significance ($p = 0.08$).

Conclusions: Topical imiquimod 5% cream applied five times a week for three months can lead to complete tumor resolution in the majority of cases and the addition of topical tazarotene gel 0.05% did not overcome the failure to completely respond in nineteen percent of patients. However, pre-treatment of LM with topical imiquimod with or without tazarotene can greatly reduce the morbidity of the surgery required to verify negative histologic margins. Roughly eight out of ten patients treated with combined therapy had negative margins beginning with two millimeters of excision as opposed to only forty-eight percent of untreated patients having negative margins beginning with a five millimeter surgical margin in a previous study at our institution. It is our opinion that topical imiquimod can be very useful in decreasing surgical defect sizes as an adjuvant to staged surgical excisions for LM. Five-year follow-up is underway to compare recurrence rates in imiquimod-treated patients followed by conservative two millimeter surgical margins.

3:49 – 3:57 pm

PRESENTER: Robert H. Cook-Norris, MD

TITLE: Complications of Cutaneous Surgery in Patients Who Are Taking Clopidogrel

AUTHORS: Robert H. Cook-Norris, MD; Jason D. Michaels, MD; P. Kim Phillips, MD; M. Amanda Jacobs, MD; Randall K. Roenigk, MD; Clark C. Otley, MD

Purpose: Perioperative management of anticoagulant therapy during surgery remains controversial; however, there is increasing evidence suggesting the risk of severe hemorrhagic complications is not significantly increased in those continuing anticoagulant therapy. Therefore, continuation is recommended given the potential for life-threatening thromboembolic complications associated with perioperative discontinuation of medically necessary aspirin or warfarin. Clopidogrel is an increasingly prescribed anticoagulant for primary and secondary prevention of cardiovascular disease. The frequency of postoperative bleeding and other complications in patients taking clopidogrel at the time of cutaneous surgery has not been established.

Our objective was to determine the frequency and severity of perioperative complications in patients taking clopidogrel and to evaluate if withholding one or more anticoagulant leads to postoperative thromboembolic complications.

Design: A search of the master diagnosis index at our institution was queried from 2004 to 2008 to identify patients who underwent Mohs micrographic surgery while taking clopidogrel. A retrospective chart review was conducted to extract the following data: patient demographics, anticoagulant and platelet-inhibiting medications taken or withheld perioperatively as well as indication, indication for surgery, tumor size, type of closure, final size, and post-operative course. Telephone interviews were conducted to ensure accurate follow-up information. Cases were compared to age and gender matched (1:1) controls of two groups, those not on anticoagulants and those taking aspirin.

Summary: (Preliminary Analysis): A total of 245 patients, undergoing 417 procedures on 297 different occasions, met criteria for inclusion. Indications for surgery included basal cell carcinoma (241, 57.8%), squamous cell carcinoma (162, 38.9%), lentigo maligna (9, 2.2%), atypical fibroxanthoma (2, 0.5%), extramammary Paget's disease (2, 0.5%), and trichoepithelioma (1, 0.2%). Initial tumor size ranged from 0.3 to 13.0 cm with a median of 1.2 cm. There were 271 (65%) primary closures, 77 (18.5%) secondary closures, 50 (12%) flaps, and 19 (4.5%) grafts. Final closure size ranged from 0.4 to 21.5 cm with a median of 3.5 cm.

Severe complications were encountered in 8 of 297 operative events. Patients taking clopidogrel were 4.5 times more likely to develop a severe complication following their Mohs procedure than patients taking aspirin only (95% CI, 0.9-21.3, $p=0.060$) and 4.4 times more likely than patients not on anticoagulants (95% CI, 0.9-20.7, $p=0.064$). There were 19 moderate complications and 19 mild complications in patients taking clopidogrel. Patients taking aspirin encountered 2 severe, 3 moderate, and 8 mild complications among 287 operative events. Those not taking anticoagulants experienced 3 severe, 1 moderate, and 10 mild complications among 287 operative events.

At the time of the 297 procedures, 208 (70.0%) were also taking aspirin, 12 (4.0%) were taking warfarin, and 10 (3.4%) were on both aspirin and warfarin. Indications for anticoagulation included cardiovascular stent (126, 42.4%), severe coronary artery disease (97, 32.7%), stroke (59, 19.9%), transient ischemic attacks (40, 13.5%), post myocardial infarction (19, 6.4%), unstable angina (14, 4.7%), atrial fibrillation (13, 4.4%), and history of non-ST-elevation myocardial infarction (12, 4.0%). 59 patients (61 procedures) had one or more anticoagulant withheld prior to surgery, of which, one life-threatening postoperative thromboembolic complication was encountered in a patient who held aspirin therapy 2 days prior to surgery.

Telephone interviews have yet to be finalized; therefore, the aforementioned complication rates in patients taking clopidogrel may be underestimated.

Conclusions: Mohs micrographic surgery in patients receiving clopidogrel is associated with a strong trend of increased risk of severe complications. Given the risk associated with discontinuation of clopidogrel perioperatively, especially in those taking medically necessary dual antiplatelet therapy (i.e. recent coronary artery stent placement) with thrombosis occurring in 29% of patients discontinuing therapy prematurely (7.5% increased mortality rate), continuation is recommended in most situations. Similarly to the perioperative management of aspirin and warfarin, the patient's medical history and risk factors must be considered.

3:57 – 4:05 pm

PRESENTER: Murad Alam, MD

TITLE: Treatment of Rare and Uncommon Non-melanoma Tumors by Mohs Surgery: A Meta-Analysis of 1232 Cases

AUTHORS: Murad Alam, MD; Christopher Wickman, M4; Daniel Danahey, MD; Simon S. Yoo, MD; Natalie Kim, BS Clinical; Alfred Rademaker, PhD

Purpose: Mohs surgery is routinely used for treatment of common non-melanoma tumors, basal

cell carcinoma and squamous cell carcinoma. Less often, Mohs is used for the treatment of other non-melanoma skin cancers for which tissue sparing and microscopic margin control may be beneficial. The purpose of this study was to characterize the utility of Mohs in the treatment of uncommon and rare non-melanoma skin cancers of various types.

Design: Meta-analysis of case reports and case series from MEDline, 1950-2007, and older articles obtained from bibliographic searches. Uniform fields, including demographic information (patient age, sex), tumor characteristics (anatomic location, apparent clinical surface area), and treatment-specific variables (treatment type, post-operative defect size, duration of post-treatment follow-up, recurrence, death from disease) were extracted from published reports. Means and variation of descriptive variables were recorded. Association of demographic and tumor characteristics with likelihood of recurrence was assessed.

Summary: Data was extracted for 1232 tumors including (in parentheses after each tumor type: median preoperative size in sq. cm.; ratio of post-operative size to preoperative size, median; % recurring during follow-up period): atypical fibroxanthoma (1.8, 2.8, 13.3); angiosarcoma (5.8, 3.6, 12.5); dermatofibrosarcoma protuberans (7.1, 9.7, 1.5); extramammary Paget's disease (36.7, 2.1, 20.3); eccrine porocarcinoma (1.1, 2.4, 0.0); granular cell tumor (1.2, 1.4, 0.0); lymphoepithelioma-like carcinoma of the skin (2.1, 9.4, 0.0); leiomyosarcoma (7.6, 5.6, 14.3); microcystic adnexal carcinoma (1.7, 6.0, 7.0); Merkel cell carcinoma (1.5, 3.4, 35.4); malignant fibrous histiocytoma (7.1, 11.4, 21.4); primary mucinous carcinoma (0.5, 3.2, 21.1); sebaceous carcinoma (0.6, 4.7, 11.1); trichilemmal carcinoma (1.0, 4.0, 16.7). Overall, mean follow-up in months was 39, by which point 3.6% were alive with disease and 1.4% were dead with disease. However, for Merkel cell carcinoma, after just 27 months of follow-up, 11.3% were alive with disease and 14.4% were dead of disease.

Conclusions: On average, for the tumors studied, preoperative tumor size was 3.6 sq. cm; postoperative tumor size as measured by the final Mohs defect was 4.4 times larger in area. Mean recurrence rate was 9.4% during 3.5 years of follow-up. There was significant variation across tumor types, with some having markedly worse prognosis. For unusual non-melanoma skin cancers, this study provides tumor type specific benchmark data for: (1) the likely size of the post-operative defect as a function of the apparent clinical tumor size before treatment; and (2) the likelihood of medium-term recurrence and mortality after Mohs. This information can be useful in planning surgeries and counseling patients. A high ratio of post-operative to pre-operative tumor size and a low rate of recurrence after removal both suggest the utility of the tissue sparing and microscopic margin control elements inherent in Mohs surgery. Mohs surgery appears to be a useful modality for treatment of uncommon and rare non-melanoma tumors.

4:05 – 4:13 pm

PRESENTER: Jerry D. Brewer, MD

TITLE: Malignant Melanoma in Solid Transplant Recipients, Collection of Database Cases with Comparison to SEER Data for Outcome Analysis

AUTHORS: Jerry D. Brewer, MD; Leslie J. Christenson, MD; Amy L. Weaver; Roger Weenig; Katherine K. Lim, MD; James H. Keeling, MD; Clark C. Otley, MD

Purpose: Malignant melanoma (MM) is considered an immune responsive tumor. There has been concern that MM may have worse outcomes in immunosuppressed hosts compared to the general population. Currently, little is known regarding the outcomes and prognostic factors of MM in immunosuppressed organ transplant recipients (OTRs).

The primary objective of this study was to determine the MM-specific and overall survival in patients diagnosed with MM after receiving an organ transplant and compare with a national sample of patients with MM.

Design: A retrospective review was conducted of OTRs with MM identified from the surgical and medical index databases at the Clinic from 1978 to 2007, the Organ and Procurement and Transplantation Network/United Network for Organ Sharing database (UNOS) from 1999 to 2006, and from the Israel Penn International Transplant Tumor Registry from 1953 to 2005. Demographic and prognostic information was abstracted on as many cases as possible. Prognostic analyses were conducted by Breslow depth and Clark's level. The subcategory of patients with MM developing as a result of transmission from the organ donor was not evaluated in this study. Among the OTR patients, MM-specific and overall survival following MM diagnosis were calculated using the Kaplan-Meier method. For comparison, overall and MM-specific survival estimates were obtained using the actuarial method for 91,063 cases reported to the NCI SEER program with a diagnosis of MM of the skin between 1988 and 2003.

Summary: Patients were excluded if a confirmed pathology report of MM could not be found, or if there was no documentation regarding transplant history, yielding 703 cases of MM in 633 patients diagnosed after transplant. Among OTRs with MM after transplant, Breslow depth and Clark's level were available in 125 and 152 patients, respectively.

The 5 year overall survival of OTRs who subsequently developed MM with Breslow depths of <0.75, 0.76-1.50, 1.51-3.0, and >3.0mm was 88.1%, 87.1%, 51.1%, and 62.8% respectively. The 5 year MM-specific survival for these patients with the same Breslow depths was 97.3%, 94.7%, 64.1%, and 68.5%, respectively. These 5 year MM-specific survivals were not significantly different ($p>0.05$) from the estimates for MM cases in the SEER database for these same Breslow categories (96.8%, 92.6%, 80.6%, and 61.8% respectively).

The 5 year MM-specific survival for Clark's level I, II, III, IV, and V in OTRs with subsequent MM was 100%, 96.6%, 75.5%, 68.5%, and 88.9%, respectively. The 5 year MM-specific survival for the same Clark's level for SEER patients with MM was 98.6%, 95.1%, 85.2%, 92.4%, and 63.0%, respectively. These 5 year MM-specific survivals for Clark's level were also not significantly different ($p>0.05$) for OTRs with subsequent MM compared to SEER MM cases.

Conclusions: This is the largest report of cases to date in regards to prognostic data in patients with MM who are also OTRs. This retrospective study does not demonstrate an increased tendency towards mortality due to MM in OTRs compared to non-immunosuppressed patients with MM, stratified by Breslow depth and Clark's level. The limitations of this study include the small number of cases analyzed after exclusion criteria were enforced. There may also be bias due to the voluntary nature of reporting from individual institutions. Further work in this area is needed and prospective and collaborative data collection would be beneficial.

4:13 – 4:21 pm

PRESENTER: Robert J. MacNeal, MD

TITLE: Mohs Micrographic Surgery for the Treatment of Lentigo Maligna, the University Experience

AUTHORS: Robert J. MacNeal, MD; Christopher J. Arpey, MD; Carrie E. Cera-Hill; Marta J. Van Beek, MD

Purpose: The purpose of this study was to review the clinical characteristics, rate of recurrence and outcomes in lentigo maligna treated with Mohs micrographic surgery (MMS) without the use of adjunctive techniques (e.g. rush permanent sections and immunostaining) at the University Hospitals and Clinics. Additionally, since invasive disease carries a significantly different prognosis than LM, we sought to examine the rate of invasion found in debulking specimens in the patients we examined. This finding has not been widely published in the literature.

Design: We performed a retrospective chart review of 70 consecutive patients from a tertiary care center with a history of lentigo maligna treated with Mohs micrographic surgery from 1998-

2008, of these 50 had adequate follow-up and satisfied the criteria of LM, without invasion on initial biopsy, treated with MMS. Variables analyzed include anatomic location, size, age, sex, previous treatment, number of Mohs stages, invasion found in debulking layer, surgical defect size and recurrence rate.

Summary: Lentigo maligna (LM), or melanoma in situ arising in sun-damaged skin, typically presents as a slowly enlarging hyperpigmented patch on the head, neck, or upper extremities of elderly patients. Although melanoma in situ carries a 100% survival rate at 5 years, an estimated 5% of lentigo maligna progresses to invasive melanoma, or lentigo maligna melanoma. Surgical excision with 0.5cm margins remains standard of care for these neoplasms. Treatment of Melanoma in situ, including lentigo maligna type, with Mohs Micrographic surgery (MMS) is becoming increasingly common since initially proposed by Dr. Frederic Mohs in 1950 and popularized by Dr. John Zitelli in the 1990's. While recent data shows increased clearance and cure rates when compared to standard excision, its use remains controversial. Reported recurrence rates of LM treated with MMS have ranged from 0.5-30% in the literature. Immunostaining and rush paraffin sectioning techniques have been developed in hopes of improving clearance rates, however their use results in increased cost and procedure time. Additionally there are no studies, to our knowledge, showing improved outcomes when immunostaining is used. In this study a chart review was performed of all patients treated with Mohs surgery for lentigo maligna (LM) at the University over the past 10 years. 70 charts were identified and 50 cases were verified and ultimately analyzed. The average age was 66.5 years and 57% of patients were women. Average follow up was 24.4 months (range of 3 weeks to 103 months) and there were no recurrences. 3 (6%) patients were found to have invasive (LMM) in the debulking layer with an average Breslow depth of 0.4mm. This rate of invasive disease is similar to what was found (5%) in the only other study in the literature that we found to report this statistic. All tumors were located on the face except 2 which were located on the scalp vertex. 10% of tumors were recurrent at the time of initial MMS. It took 1.4 stages of MMS on average to achieve clearance. The average lesion size was 2.6cm and defect size 3.3cm.

Conclusions: From this data we can gather several important points. First, our data is consistent with the majority of previous reports describing extremely high cure rates using MMS for LM. Also supported is the notion that, in experienced hands, H&E frozen section alone without aid of immunostaining or rush sectioning, is sufficient to achieve this high cure rate. Noteworthy is the finding that 6% of debulking specimens had an invasive component in a tumor originally believed to be LM. We therefore encourage the practice of sending debulking layers for permanent section to examine for invasive disease. This practice has the potential to change both the management and prognosis of the patient. Finally, the difference between the mean lesion and defect size of 1.3cm supports the often espoused notion that the guidelines of 0.5cm margins for LM are too conservative and will likely often result residual tumor being left behind.

Clinical Pearls Abstract Session—Friday, April 24; 3:00 – 4:00 pm

3:03 – 3:11 pm

PRESENTER: Thomas G. Lewis, MD

TITLE: Nasal Valve Repair Using Double Lateral Suture Suspension

AUTHORS: Thomas G. Lewis, MD; Heidi B. Donnelly, MD

Purpose: The nasal valve area is a common site of nasal airway obstruction. Mohs micrographic surgery and reconstruction of the lateral nose may lead to nasal valve impairment. Diagnosis of nasal valve obstruction is made with the classic Cottle test, in which the medial cheek is retracted superiolaterally, opening the nasal valve. If the patient's breathing improves, the test is positive. Numerous techniques have been described to correct nasal valve obstruction, including use of spreader grafts, flaring sutures, butterfly grafts, batten grafts, lateral crus pull-up, alar expansion and reinforcement, and intranasal Z-plasty. Most of these described techniques require an external rhinoplasty approach. Nasal valve lateralization by suspension, in contrast, mimics the

Cottle maneuver to improve nasal obstruction without requiring an extensive invasive surgical approach.

Design: A detailed description of a double suture suspension to correct nasal valve obstruction will be provided. Two successful case reports of nasal valve suspension will be used to illustrate the technique. The first is a 66 year-old man who reported decreased airflow on the right following Mohs surgery and nasal reconstruction with a cartilage strut and medially based bilobe flap for a deep right alar groove defect. The second is a 77 year-old woman who complained of persistent unilateral nasal blockage after Mohs surgery and repair with a laterally based spade lobe flap for a lateral nasal tip defect.

Summary: Both patients reported subjective improvement of obstructive symptoms following nasal valve suspension. A common side effect of nasal valve suspension is widening of the middle third of the nose and flattening of the nasofacial sulcus that occurs as the nasal valve is pulled superior laterally. This was an acceptable side effect for each patient, however, the first patient elected to have the suspension performed bilaterally to achieve better facial symmetry. The second patient experienced postoperative erythema and tenderness over the site of the suspension sutures that subsided with oral antibiotics.

Conclusions: While several treatment options for nasal valve obstruction may be effective, nasal valve suspension has the advantage over many other techniques. In general, it is less time consuming, easier to perform, has faster healing times, and does not require a separate donor site for cartilaginous grafts. The use of two suspension sutures on either side better lateralizes the nasal valve and decreases the chance of failure compared to one suture. These two case reports, along with a handful of similar case series in the literature, show that nasal valve suspension can be a reliable, low risk, alternative for the treatment of nasal valve obstruction.

3:11 – 3:19 pm

PRESENTER: Kevin J. Mott, MD

TITLE: The Hughes Tarsconjunctival Flap: A Useful Flap for Repair of Full-Thickness Lower Eyelid Defects Following Mohs Surgery

AUTHOR: Kevin J. Mott, MD

Purpose: The author believes that this flap is underutilized for full thickness eyelid repair, but well within the skill set of most Mohs surgeons.

Design: The indications, design, and execution of the flap will be presented in a step-by-step format utilizing clinical digital photos of two cases in a power point presentation.

Conclusions: The Hughes tarsconjunctival flap is a useful flap for reconstruction of full-thickness lower eyelid Mohs surgery defects involving 50-75% of the lid margin.





3:19 – 3:27 pm

PRESENTER: Brian C. Leach, MD

TITLE: Revisionary Technique for Alar Rim Notching: The Stair-Step Flap

AUTHORS: *Brian C. Leach, MD; Joel Cook, MD*

Purpose: The undesirable outcome of alar rim elevation or notching may occur following improperly designed nasal reconstructions or subsequent to overt flap or graft failure at the alar rim. Revision is often difficult and frequently requires multiple procedures or graft donor sites to accomplish, with a highly variable aesthetic outcome. The stair-step flap affords a single stage operative revision for the correction of excessive alar elevation without the need for cartilage grafting.

Design: A case report and review are given, and a thorough explanation of the flap's design and execution is presented.

Summary: The stair-step flap can produce reliable aesthetic and functional revision of the alar rim in a single operative procedure without the need for cartilage batten grafting.

Conclusions: Alar notching, one of the most troublesome aesthetic and functional complications of facial reconstruction, may be corrected with a single operative procedure, the stair-step flap. The stair-step flap is a useful revisionary tool in the armamentarium of any dermatologic or facial reconstructive surgeon.

3:27 – 3:35 pm

PRESENTER: Michael W. Chen, MD

TITLE: Reconstruction Pearl: A Proximally-based Alar Hinge Flap for a Nasal Soft Triangle Defect

AUTHORS: *Michael W. Chen, MD; Richard G. Bennett, MD*

Purpose: For thru-and-thru soft triangle defects, turnover hinge flaps have been described previously, either based superiorly and flipped inferiorly or based distally in the columella and flipped proximally. Oftentimes, secondary to previous surgery and scar formation, healthy tissue is not available superiorly in the nose tip or distally in the columella. This case report presents a simple and reliable, one-stage procedure for reconstructing defects of the nasal soft triangle with a proximally-based hinge flap.

Design: Two cases of thru-and-thru soft triangle defects following Mohs micrographic surgery and the step-by-step reconstruction are described. In each case, a rectangular flap proximal to the defect is elevated and flipped into the defect to reline the nasal mucosa. The recipient wound comprised of the donor site of the hinge flap and the underside of the hinge flap is then

reconstructed with a postauricular skin graft. Follow-up photographs from one patient taken 1 month after the initial defect show the healed repair.

Summary: The proximal alar hinge flap is a simple and reliable technique for recreating the nasal soft triangle in one stage.

Conclusions: The proximal alar hinge flap is a simple and reliable technique for recreating the nasal soft triangle in one stage.



3:35 – 3:43 pm

PRESENTER: Juan-Carlos Martinez, MD

TITLE: Standardized Photography in Facial Reconstructive Surgery: Clinical Pearls to Simplify a Complicated Task

AUTHOR: Juan-Carlos Martinez, MD

Purpose: Accurate and reproducible photographic images are critical for the documentation, comparison, and academic presentation of pre- and post-surgical appearance. The issue of standardized photography has not been discussed in the dermatologic surgical literature for over 20 years. With the advent of digital photography, the ease and rapidity with which numerous images can be obtained, reviewed, and displayed has vastly increased. As can be observed in many dermatologic publications regarding facial reconstruction, ideal images are seldom obtained. This makes fair and accurate assessment of the techniques or concepts described in the corresponding manuscript difficult, if not impossible. Inconsistencies in the patient's position, inappropriate lighting, or a distracting background commonly lead to sub-par photographs.

Design: Tips for proper patient positioning using anatomic landmarks can aid in the reproducible acquisition of comparable serial images. These pearls are described and demonstrated for head-on, oblique, profile, and swimmer's views. Common pitfalls will be reviewed and demonstrated to highlight their sometimes subtle, though often distracting, effects on the image. In addition, the use of standard camera settings and proper subject framing will be reviewed.

Summary: Accurate, reproducible, and anatomically consistent pre- and post-operative

photographs are critical for documentation, comparison, and academic presentations. Digital photography has made the rapid acquisition, download, and review of numerous high resolution photographs easier and less expensive than ever before. Tips for acquiring reproducible images with relatively inexpensive equipment are presented in the hopes that surgeons will strive to obtain more ideal images.

Conclusions: Although clinical photographs of the highest quality may require expensive and elaborate photographic suites and equipment, with some consideration and attention to minor details, modern handheld digital cameras can be used, with impressive simplicity, to provide reliably comparable images.

3:43 – 3:51 pm

PRESENTER: Ravi S. Krishnan, MD

TITLE: Using Rotation Flaps to Repair Large Scalp Defects without the Aid of Tissue Expanders

AUTHOR: *Ravi S. Krishnan, MD*

Purpose: Large defects of the scalp are commonly encountered by Mohs surgeons after the extirpation of cutaneous malignancies. The repair of such defects can often present the surgeon with a significant challenge. The use of large scalp flaps for the repair of such defects has been described by several authors. Unfortunately, there is a common misperception that these types of reconstructions are too large or complicated for use in a typical Mohs surgery practice. In our view, this is inaccurate. We shall describe our technique for reconstructing large defects of the scalp with multiple rotation flaps, which is technically uncomplicated and yields excellent results.

Design: We shall describe the use of this technique in 10 patients with large scalp defects (up to 30 square centimeters). The critical steps of the technique involve the design of very large flaps, anesthesia with a tumescent anesthetic solution, undermining of the entire scalp, and approximation of the flaps with minimal to no "dog-ear" repair.

Summary: In all patients, this technique was performed without difficulty or post-operative complications. All patients tolerated the procedure well and had excellent cosmetic results. Most patients complained of transient numbness and tightness which resolved in approximately six months.

Conclusions: In summary, local rotation flaps are an excellent choice for repairing large scalp defects without the aid of tissue expanders. The reconstructive technique we have described can be readily performed in the office under local anesthesia and offers several advantages over the traditional reconstructive methods: it allows preservation of hair-bearing skin, it provides an excellent color and texture match, it is much less likely to result in a depressed scar, and it reduces the healing time and the patient's wound care responsibilities. Given the ease with which this technique can be executed and the excellent results it can achieve, we are certain that it will be an excellent addition to the Mohs surgeon's armamentarium.

Research Abstract Session—Saturday, April 25; 12:00 – 1:00 pm

12:03 – 12:11 pm

PRESENTER: Quenby L. Erickson, DO

TITLE: Can Flash Freezing of Mohs Layers Expedite Slide Turn Around Time and Minimize Sample Distortion (Freezing Artifact)?

AUTHORS: *Quenby L. Erickson, DO; Trishina Clark; Cassandra Larson; Tri H. Nguyen, MD; T. Minsue Chen, MD*

Purpose: To compare flash freezing to the traditional method of freezing tissue in the cryostat in

Mohs micrographic surgery (MMS). In MMS, the tissue is traditionally frozen in the cryostat. This step in tissue processing is time sensitive; a delay in embedding may cause drying artifact and tissue autolysis. It is oftentimes the rate-limiting step to slide turn around time (TAT). Additionally, tissue samples that are slowly frozen in a cryostat have an increased chance of microscopic ice crystal formation, expansion, and sample distortion (freezing artifact). Flash freezing is utilized in frozen section processing of general pathology specimens to expedite slide TAT, as well as, enhance frozen section slide quality by minimizing ice crystal formation.

Design: Mohs layers that were divided into at least 2 pieces (set) were enrolled in the study. After tissue flattening on a glass slide with a cryospray, one half was flash frozen in an isobutane histobath (-56 to -62C); the other half was frozen in the cryostat (-27 to -30C). The Mohs histotechnicians evaluated the differences in tissue separation from the embedding media, how the tissue cut, ease of achieving smooth, wrinkle-free sections, as well as, time required for each method. Physician was blinded to the method of freezing and asked to rate each piece of the set as best and worst or equal in terms of quality of the overall histology.

Summary: A total of 41 sets were enrolled. Freeze time for the histobath method was on average 22 seconds (range 15 to 40 seconds) versus 144 seconds in the cryostat (range 90 to 240 seconds), a difference of 122 seconds. Histobath frozen tissue sections were easier for the Mohs histotechnicians to achieve smooth, wrinkle-free sections in 90% of sets. Physicians strongly favored histology from specimens flash frozen in the histobath the majority of the time over the traditional method of cryostat freezing (Fig 1).

In addition to this technique producing higher quality and more rapid frozen sections the supplies are very inexpensive after the initial purchase of the histobath (\$3600) (Fig 2). The isobutane costs \$68.00 per gallon and lasts 4-6 months in our lab. No other additional supplies are required for this alternative freezing method.

Conclusions: Flash freezing in the histobath expedites slide turn around time for Mohs micrographic surgery. It can also produce superior tissue section histology and overall slide quality by minimizing freeze artifact sample distortion.

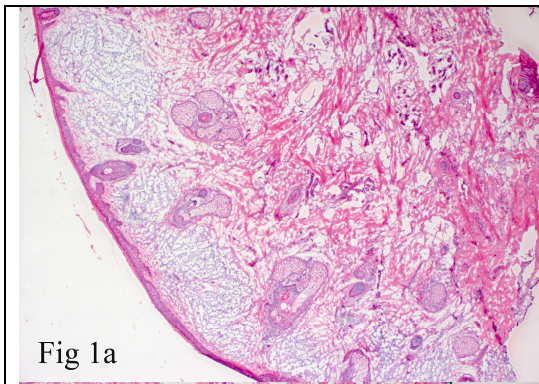


Fig 1a

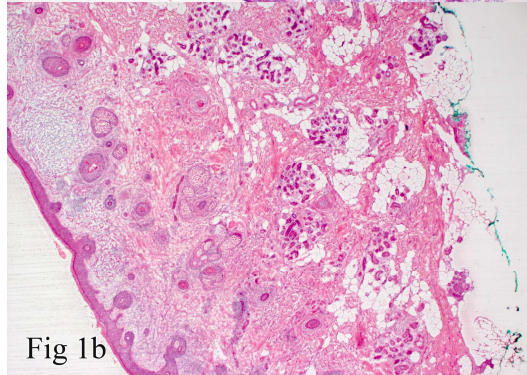


Fig 1b

Fig 1. Frozen section histology illustrating sample distortion. Fig 1a. Cryostat frozen section exhibiting freeze artifact, shrinkage and separation of dermis; note the lost structure of eccrine glands and fat. Fig 1b. Histobath frozen section exhibiting normal appearance of epidermis, dermis, fat and eccrine glands.



Fig 2. Histobath. After placing the specimen on the glass slide and covering it in embedding media, the specimen is lowered into the histobath with tongs where it rapidly freezes.

12:11 – 12:19 pm

PRESENTER: Christian L. Baum, MD

TITLE: Mohs Micrographic Surgery for the Treatment of Atypical Fibroxanthoma

AUTHORS: Christian L. Baum, MD; Marta J. Van Beek, MD; Christopher J. Arpey, MD

Purpose: The purpose of the current study was to review the clinical characteristics and outcome of atypical fibroxanthomas treated with Mohs micrographic surgery at our institution.

Design: We performed a retrospective chart review of 26 consecutive patients with primary atypical fibroxanthoma treated with Mohs micrographic surgery from 1990-2008. Included in our

data is the anatomic location of the tumor, tumor size, patient age, number of Mohs layers, size of the surgical defect, and recurrence rate.

Summary: Atypical fibroxanthoma (AFX) is a rare spindled-cell neoplasm that most often presents as a nodule on sun-exposed areas in patients over the age of 50. Although AFX is generally considered a low-grade malignancy, the tumors may be locally aggressive with significant subclinical extension. Furthermore, cases of metastatic AFX have been reported. Optimal treatment of AFX consists of surgical resection. Previous reports have demonstrated decreased recurrence and increased tissue conservation in patients with an AFX treated with Mohs micrographic surgery (MMS) compared to those treated with wide local excision. Recurrence rates of AFX treated with MMS have ranged from 0-6.9%. We present 26 consecutive cases of primary AFX treated with MMS from 1990 to 2008 at our institution. The average age of the patient at the time of diagnosis was 72 years. 100% of the lesions were located on the head and neck. The average size of the clinically-evident lesion was 1.13 cm. The average number of MMS layers was 1.6. The average size of the surgical defect was 2.8 cm. Follow-up was available for 21 patients with an average follow-up period of 30.1 months. The recurrence rate for patients not lost to follow-up was 14.3% (n=3) with recurrence being diagnosed, on average, 8.7 months after MMS. The average size of the surgical defect of tumors that eventually recurred was 4.0 cm compared to 2.8 cm for non-recurrent tumors.

Conclusions: To our knowledge, this is the largest series of primary AFX treated with MMS in the literature. Our data indicate a higher recurrence rate (14.3%) of AFX treated with MMS compared to previously described reports that ranged from 0-6.9%. These results, however, are lower than previously reported recurrence rates of up to 16% with wide local excision. Together the size of the current series, favorable recurrence rates compared to wide excision and potential for subclinical extension of AFX support the utilization of MMS for the treatment of AFX.

12:19 – 12:27 pm

PRESENTER: John C. Perrotto, DO

TITLE: The Value of Immunohistochemistry in Discriminating Primary from Secondary Extramammary Paget's Disease

AUTHORS: John C. Perrotto, DO; Roger I. Ceilley, MD; Jared Abbott; Iftikhar Ahmed, MD

Purpose: Extramammary Paget's disease (EMPD) is categorized into two groups: primary EMPD or EMPD secondary to underlying malignancy. Primary EMPD has a better prognosis and the ability to distinguish between the two subsets has clinical relevance. Recent studies have suggested that immunostains including CK7, CK20, and BRST-2 distinguish between the two groups. We analyzed a large series of EMPD patients with an expanded immunohistochemical panel to assess its value in distinguishing primary from secondary disease.

Design: Formalin-fixed, paraffin-embedded sections of 98 EMPD specimens from 61 patients (45 primary /16 secondary) were immunostained with cytokeratins 7 and 20, Her-2/neu, BRST-2, CDX2, and cyclin D1. The study included 44 females and 17 males (median age: 73 years). Median follow-up time was 47 months.

Summary: All EMPD specimens were vibrantly positive for CK7. The frequency of positivity for all EMPD samples was: CK20 (31%), BRST2 (34%), Her-2/neu (64%), CDX2 (10%), and cyclin D1 (69%). For primary EMPD, the frequency of positivity was: CK20 (22%), BRST2 (44%), Her-2/neu (69%), CDX2 (2%), and cyclin D1 (73%). For secondary EMPD, the frequency of positivity was: CK20 (56%), BRST2 (25%), Her-2/neu (50%), CDX2 (31%), and cyclin D1 (56%). Notably, all 7 cases of EMPD secondary to an anorectal adenocarcinoma were Her-2/neu negative and 5 of those seven cases (71%) were CDX2 positive.

Conclusions: The role of CK7, CK20, and BRST-2 in distinguishing between primary and secondary EMPD is limited since CK20 and BRST-2 were positive in large subsets of both

groups. An expanded immunohistochemical panel including Her-2/neu and CDX2 may be useful in discriminating primary EMPD from EMPD secondary to anorectal adenocarcinoma but fails to distinguish primary EMPD from EMPD secondary to urothelial or prostatic malignancy. The consistent over expression of Her-2/neu in primary EMPD suggests a role for trastuzumab therapy in patients with recurrent disease.

12:27 – 12:35 pm

PRESENTER: Murad Alam, MD

TITLE: Floaters in Mohs Micrographic Surgery: Expert Consensus of Mohs Surgeons and Histotechnologists

AUTHORS: *Murad Alam, MD; Sumaira Z. Aasi, MD, FACMS; Ashish Bhatia, MD; Steven J. Goulder, MD; Vivek Iyengar, MD; Nanette Liégeois-Kwon, MD, PhD; Kishwer S. Nehal, MD; Anjali D. Shah, MD*

Purpose: Floaters in Mohs surgery are tissue fragments that are dislodged from their in vivo locus during tissue harvesting or preparation. Floaters, typically evident upon microscopic examination of a tissue sample, may be comprised of tumor cells, with this complicating the clearance of tumor by the Mohs technique. The purpose of this study was to elicit expert opinions and develop expert consensus among Mohs surgeons and Mohs histotechnologists regarding the causes, management, and prevention of floaters.

Design: 8 Mohs surgeons and their histotechs were asked via structured interviews to provide their views regarding the causes, management, and prevention of floaters. The same subjects were also asked: (1) to estimate the incidence of floaters in their practice; and (2) select what they considered the most likely causes from an investigator-prepared list of possible causes. For the 5 surgeons in the state, one of the investigators (ADS) visited each Mohs practice, examined the Mohs laboratory, and asked the relevant histotechs to identify equipment or steps in the preparation process that may produce floaters. Finally, glass slides and photomicrographs of representative floaters were obtained from the participating surgeons for illustrative purposes.

Summary: Most surgeons interviewed believe incidence of floaters is affected by tumor histology, with basal cell tumors seen as more friable and thus likely to develop loose tumor fragments. Floaters are generally believed to be native (arising from the same patient) than foreign (arising from a different patient), and the majority of native floaters are thought to arise from surgical technique, curetting, sectioning, and embedding. The incidence of floaters is affected by the quality of the tissue sample, including poor epidermal quality and/or overlying ulceration. The curetting step itself is believed to increase the incidence of floaters by freeing friable fragments. Most surgeons interviewed believe that floaters are more common in bulkier tumor specimens than flat specimens; that floaters are more likely to occur during the first rather than subsequent stages of Mohs; that wiping the microtome blade between cuts does reduce the risk of a floater; and that the surgeons' not changing gloves between curettage and taking of the layer is not likely to be a major factor in floater creation. Most histotechnologists believe that insufficiently clean microtome blades can increase the risk of floaters.

Regarding floater management, most surgeons try to correlate floater histology to tumor histology; assess the tissue section for holes; and take an additional Mohs stage if a floater is found on an otherwise negative stage.

Conclusions: Tissue floaters are a significant complicating feature of Mohs slide processing. Given a growing consensus regarding the possible causes, future directions may include: (1) studies to confirm that these hypothesized causes have a significant effect; (2) interventions to reduce the incidence of floaters.

12:35 - 12:43 pm

PRESENTER: Kyung H. Chang, MD, PhD

TITLE: An Automated 16-Minute Technique for Processing Mohs Sections for Melanoma

AUTHORS: Kyung H. Chang, MD, PhD; Daniel T. Finn, MD; Dennis Lee, MD; Gary S. Rogers, MD

Purpose: The challenge of complete tumor extirpation of melanoma relies on the diagnostic accuracy in the evaluation of surgical margins during Mohs micrographic surgery (MMS). Frozen sections stained by H&E are difficult to interpret. The time consumption and significant variability of staining quality has been the limiting factors in utilizing MART-1 immunohistochemical (IHC) stain for MMS. The goal of the study is to determine if an automated 16-minute protocol for MART-1 stain is a reliable tool during MMS for melanoma.

Design: A novel automated instrument that performs MART-1 staining in 15 minutes 20 seconds was used to stain a total of 40 cases of sun-protected skin, sun-damaged skin, melanoma negative control skin and melanoma positive control skin. The frozen sections were compared to permanent paraffin sections of MART-1 and H&E stains to serve as golden standards. Melanocyte density and distribution were blindly evaluated in each section by a Mohs surgeon. Statistical analysis was performed.

Summary: No statistical difference ($p>0.05$) was observed in the melanocyte density and distribution in automated MART-1 stained frozen sections compared to the paraffin sections. The MART-1 stained melanocytes in frozen and paraffin sections correlated with the H&E stained melanocytes in the paraffin sections. Frozen and paraffin sections stained with MART-1 showed no difference in both sun-protected and damaged skin.

Conclusions: Automated MART-1 IHC stain is a rapid and reliable adjunctive diagnostic method to aid in the interpretation of surgical margins during MMS for melanoma. The technique is superior to frozen or permanent H&E sections alone, and is equivalent to permanent IHC sections. The automated protocol allows rapid and consistent IHC staining with minimal labor, which enhances the accuracy and efficiency of the Mohs procedure.

12:43 – 12:51 pm

PRESENTER: Emily P. Tierney, MD

TITLE: Randomized Controlled Trial: Rapid Absorbing Gut Suture Versus Tissue Adhesive in the Closure of Linear Repairs

AUTHORS: Emily P. Tierney, MD; David J. Kouba, MD, PhD; Ronald L. Moy, MD

Purpose: The healing of surgical wounds and the impact of both suturing technique and suture material on cosmetic outcome is of utmost importance to Mohs surgeons. Cyanoacrylate (CA)-based tissue adhesives promote wound closure by self-polymerization to join the two edges of the wound and aid in re-epithelialization. 2-octylethylcyanoacrylate (OCA), a novel epidermal wound closure methodology, has theoretical benefits of elimination of trauma and suture tract marks in surgical scars. While OCA has been utilized as a wound closure technique over the past decade, there are few evidence-based trials comparing its efficacy to standard suturing techniques. The purpose of this study was to compare aesthetic outcomes and wound healing of OCA and rapid absorbing gut suture in skin closures.

Design: During the surgery, all wounds were closed using a linear, bilayered closure method, where the buried intradermal absorbing sutures (4-0 polyglactin 910) were placed along the length of the incision. The majority (75%) of these wounds were the closure of donor sites from skin graft harvesting. Patients were randomized for epidermal closure with one half of the wounds with fast absorbing gut suture and on the other half with OCA. Patients were seen for evaluation at post-operative visits at both 1 week and 3 months after the procedure. Incidence of wound dehiscence and itching, bleeding and pain were assessed at 1 week. Patient preference of closure technique and side effects were assessed at 3 months. Cosmetic outcome of wound closure technique (dyspigmentation, scar thickness, wound approximation, overall cosmetic

outcome) were assessed by 2 blinded physicians at 3 months.

Summary: At 3 months, a blinded physician performed an analysis of scar healing and cosmetic outcome utilizing 4 variables: dyspigmentation, scar thickness, wound approximation and overall cosmetic outcome on a quartile scale (1-4, 1=poor scar wound healing, does not match surrounding skin, 4=excellent wound healing, scar matches surrounding skin). In terms of dyspigmentation, the half of each scar treated with fast absorbing gut had an improved outcome (mean value, 3.50) relative to that treated with OCA (2.75, $p < .05$). In terms of scar thickness, the two closure techniques had highly equivalent values at 3 months post-wound closure (mean value, 3.88, fast absorbing gut, 3.75, tissue adhesive, $p > .05$). Similarly, for wound approximation the results were equivalent between the two closure techniques (3.75, fast absorbing gut, 3.63, tissue adhesive, $p > .05$). In terms of differences in overall cosmetic outcome between the two closure techniques, the half of each scar treated with fast absorbing gut (mean value 3.56) had an improved overall outcome relative to that treated with OCA (mean value 3.19, $p = .05$).

At 3 months post-wound closure, patients were also questioned as to their preference of wound closure method and the overall cosmetic outcome of each half of their scar (Table 2, Figure 2). Half of the patients ($n = 4/8$, 50.0%), reported that they had no preference in closure technique method. An equivalent proportion of the remaining patients reported a preference for fast absorbing gut ($n = 2/8$, 25.0%) and OCA ($n = 2/8$, 25.0%). In terms of patient scores for cosmetic outcome of the resultant scar at 3 months post-wound closure, there was no significant difference detected between the two methods, where OCA received an average score of 3.56, whereas fast absorbing gut received an average score of 3.50 ($p > .05$).

Conclusions: We found slightly higher cosmetic outcomes for the half of the wound treated with fast absorbing gut suture relative to OCA. Interestingly, the only variable in scar outcome which was greater for tissue adhesive relative to suture was incidence of dyspigmentation. In 3/8 wounds (37.5%), greater incidence of dyspigmentation was noted on the side treated with OCA, likely representing a greater inflammatory reaction to tissue adhesive in the adjacent skin relative to suture. The incidence of dyspigmentation correlated with an overall lower cosmetic outcome score in these patients. Both OCA and suture were highly equivalent in terms of approximation of wound edges and wound edge eversion. Likely the uniform placement of deep sutures in all wounds by the same surgeon allowed for equivalent approximation and wound edge. In conclusion, it is clear from the data reported herein as well as from the surgical literature that cyanoacrylate derivatives, such as octyl-2-cyanoacrylate, are safe and effective when used for closure of wounds in dermatologic surgery, varying from Mohs defects, lacerations and cosmetic surgery. Based on this study, it appears that OCA may not be as effective in achieving optimal cosmesis for defects after Mohs on the trunk and extremities in follow-up at 3 months.

12:51 – 12:59 pm

PRESENTER: Aerlyn G. Dawn, MD, MBA

TITLE: Subclinical Spread of Amelanotic vs. Pigmented Melanomas: Amelanotic Tumors Require More Stages of Mohs Surgery

AUTHORS: Aerlyn G. Dawn, MD, MBA; Christopher J. Miller, MD

Purpose: Melanomas in situ (MIS) are often clinically ill-defined. Prior studies have demonstrated that the standard recommended surgical margin for MIS of 5 mm around the clinically visible tumor is frequently inadequate. Accurate clinical assessment of tumor extent is particularly challenging for amelanotic melanomas. Authors have increasingly advocated Mohs micrographic surgery (MMS) for MIS on sun-damaged skin; however, there are no published case series describing MMS for amelanotic melanomas. The purpose of this study was to evaluate the characteristics of amelanotic melanomas treated by MMS to determine the number of stages required and the size of surgical defects compared to pigmented melanomas.

Design: Cases of amelanotic melanomas treated by Mohs surgery at our institution, including

amelanotic MIS and amelanotic malignant melanoma (MM), were retrospectively analyzed. For comparison, all cases of pigmented MIS, lentigo maligna melanoma, or pigmented malignant melanoma treated by Mohs surgery over the same 2 year period at our institution were also evaluated. For all tumors, rapid MART-1 immunostaining was used to enhance frozen section examination of tissue and to facilitate margin assessment. Data collected included patient age, anatomic site, clinical dimensions of the tumor when examined under surgical lighting and Wood's lamp, number of stages of MMS required to achieve clear margins, and dimensions of the resulting surgical defect.

Summary: Five cases of amelanotic melanomas treated by MMS were identified (see Table 1), and 91 cases of pigmented melanomas treated by MMS over the same 2 year period were identified. The mean patient age for amelanotic melanomas was 70.8 years (range 48 – 81) vs. 65.4 years (range 29 – 93) for pigmented melanomas (see Table 2). The mean number of MMS stages required to achieve clear margins for amelanotic cases was 4.8 stages (range 2 to 7 stages) vs. 1.3 stages (range 1 to 3 stages) for pigmented melanomas. The mean ratio of surgical defect to clinical size was 12.1 for amelanotic tumors vs. 4.0 for pigmented melanomas. For amelanotic melanomas, a mean margin of at least 3.6cm would have been required to achieve tumor clearance vs. a margin of at least 1.2cm for pigmented melanomas.

Conclusions: Amelanotic melanomas treated by Mohs surgery in this series demonstrated substantial subclinical spread. The number of MMS stages required to achieve clear margins and the size of resulting surgical defects was much greater for amelanotic melanomas than for pigmented melanomas. Surgical excision with standard recommended margins would clearly have been grossly inadequate for these amelanotic tumors. This data demonstrates the advantages of MMS over other treatment modalities for amelanotic melanomas.