Digital Photomapping (DPM) in Mohs

BY MICHAEL B. LIPP, DO; ALYX ROSEN, MD; MARTIN N. ZAIAC, MD

One key part to the success of Mohs Micrographic Surgery (MMS) is the ability to replicate the position and orientation of a skin cancer within the histologic slide using freehand drawings or digital photomapping (DPM). Artistic ability in replicating complex three-dimensional locations, precise interpretation and documentation of the pathology, and distorted anatomy from multiple staging, attribute to limiting the accuracy of MMS. The use of polaroid photography and digital photography with computerized mapping have both helped to minimize errors that may occur during the mapping process; however, they also add another layer of impracticality to workflow and can be time consuming. Herein, we describe how we use DPM in MMS.

HOW WE DO DPM IN MMS

Before the start of each MMS, a photo of the skin cancer (Figure 1A) is taken using the EZDERM electronic medical record (EMR) on an office iPad. Next, the first Mohs layer is taken and processed by a histotechnician in office. The first stage defect is documented photographically directly in EZDERM and made available for DPM. The image auto-populates with the patient’s name (blocked out for HIPPA compliance), sex, age, birthday, procedure, location, tumor type, date and time, stage and case number (Figure 1B). Additionally, there is a menu with options to type or draw (six different colors including: red, yellow, green, blue, purple, black) directly on the photo without distorting the image (Figure 1B-C). If there are positive margins after the first stage, they are marked directly on the patient’s DPM to guide the Mohs surgeon in second stage cuts (Figure 1C-D). This process is repeated until margins are cleared (Figure 1E). A final photo of the closed defect is then taken for documentation and stored into the patients EMR (Figure 1F).
**DISCUSSION**

MMS is a methodical process that involves identifying the correct biopsy site, excising and orienting the cancer for processing, identifying and mapping any residual cancer, and correctly excising the positive margins remaining in the tumor site for an additional stage. This process may be repeated several times until all margins are clear. If at any time an error is made during this process, the efficacy of the surgery is compromised, potentially leading to poor outcomes, such as future recurrence of the cancer being treated. DPM is one way that can minimize human error and result in better efficacy.

Most of the time identifying the involved biopsy site is straight-forward; however, when there is a question as to location of the tumor, this may lead to delayed treatment. A clinical photo of the biopsied site gives visually rich information (i.e., skin topography) not otherwise appreciated in a standard hand drawn diagram documenting the biopsy site or from a written description. This allows for quick and decisive triangulation of the lesion prior to proceeding with surgery.

Another advantage of photomapping is the efficiency compared with other methods described in the literature; which often require photographing the site, transferring to a computer, opening the digital file in a photo-editing program, marking using paint tools, and printing and transferring these files into a medical record. Using any iOS mobile operating system device (i.e., iPad or iPhone), a photograph can be directly saved into the patient’s EZDERM EMR and its photo-editing menu can be utilized for DPM. The accessibility and portability of an iOS device allows for efficiency in the office. Additionally, the photo quality is more dynamic, allowing for zooming features with finger gesturing on the photo, providing high quality images that might otherwise be limited to the quality of the printer being used.

High quality photos of the defect using DPM, instead of diagrams of the face or other body parts, in our opinion, allows for a more accurate transposition of positive margins identified on the histology slide onto the Mohs defect. This may be especially helpful on difficult areas with complex three-dimensional anatomy such as the ear and nose, as well as with defects distorted by multiple stages and blocs. Figure 2 shows a Mohs case of a large surgical defect with multiple blocs. The piecemapped sections are digitally photomapped showing positive margins in sections 4 and 5, highlighting with great accuracy where residual tumor cells are in the Mohs site.

Lastly, a report is synthesized that can be easily sent to other physicians (i.e., referring physicians, plastic surgeons, pathologists) involved in supporting the comprehensive care of the patient. This can also be helpful in unfortunate medical-legal cases, as DPM can give a detailed synopsis of the surgery.

**CONCLUSION**

DPM is an important advance in the workflow of MMS. We believe our method is more efficient, allows for more precise and accurate documentation, and helps reduce potential errors that can occur while mapping tumors in MMS.

The authors have no conflicts of interest to report.

Martin N. Zaiac, MD is Chairman, Department of Dermatology, Herbert Wertheim College of Medicine, Florida International University and Director, Greater Miami Skin and Laser Center, Mount Sinai Medical Center in Miami Beach, FL.

Michael B. Lipp, DO is at Lake Erie Consortium for Osteopathic Medical Training (LECOMT)/Larkin Community Hospital Palm Springs Campus in Hialeah, FL.

Alyx Rosen, MD is in the Department of Dermatology, University of Miami in Miami, FL.