Mohs micrographic surgery

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Overall process

Background

- Method for precise tumor extirpation using circumferential (360°) microscopic margin control and precision mapping with immediate re-excision of remaining cancer
- Highest evidence-based cure rate for most cutaneous malignancies
- Physician must act as both the surgeon and pathologist
- Relies on the contiguous growth of tumors
  - Contiguous growth may be disrupted by prior incisional/excisional treatment
- Advantages
  - Tissue-sparing
  - Narrow margins taken because of increased confidence of clearance
  - Microscopic evaluation of ~100% of the margin (vs. 1-2% with traditional bread loaf processing)
  - Performed under local anesthesia
  - Low complication rates
  - MMS has higher cure rates and smaller defects compared to WLE
  - High patient satisfaction: 97% of patients willing to undergo future MMS if warranted at 1 month (smoking history and anticoagulation use may negatively affect these scores)

Indications for MMS

- Recurrent tumors
- Incompletely excised tumors
- Tumors located in high-risk anatomic locations
  - Area H: Central face, eyelids, eyebrows, nose, lips, chin, ear, periauricular, temple
  - Area M: Cheeks, forehead, scalp, neck, jawline, pretibial surface
  - Special sites: Hands, feet, nails, genitals
- Aggressive histologic subtype
- Perineural invasion
- Large size (>2 cm)
- Poorly defined clinical borders (lateral and/or deep)
- Rapid growth

Tumor features

Background skin features

- Chronic scar (Marjolin ulcer)
- Within field of prior ionizing radiation

Patient features

- Immunocompromised: solid organ transplant (heart is #1 risk), CLL, HIV, pharmacologic
- Underlying genetic syndrome
  - XP
  - Gorlin Syndrome
Essential steps in Mohs micrographic surgery: Case example

**Step 1.** The tumor is debulked (Gillette blade and/or curette) to allow for a more precise first stage tissue specimen. The red dot indicates 12 o’clock directionality for ex-vivo mapping. The tumor in the 11 o’clock position indicates sub-clinical spread of tumor (residual tumor).

**Step 2.** Epidermis is scored for orientation. 1-2 mm margins of clinically normal skin surrounding the tumor are identified.

**Step 3.** The dashed circular red line represents the chosen 1 mm excisional margins for the first stage. A 30-45° beveled excision is performed for stage I, removing a bowl-shaped tissue specimen for frozen section processing.

**Step 4.** The beveled, bowl-shaped specimen is oriented on the tissue map.

**Step 5.** The specimen may be bisected for easier processing and inked on the inner edges to aid with mapping orientation.

**Step 6.** The specimen is flattened, allowing for epidermis and deep dermis to lay in the same plane and thus 360° margin evaluation.

**Step 7.** The specimen is inverted to reveal the deep margin at the top of the block of tissue.
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Essential steps in Mohs micrographic surgery: Case example

Step 8. The specimen is placed in a mounting medium, frozen via heat extraction, and prepared for microtome slicing to generate slides.

Step 9. Within the mounting medium, the deepest margin sits most superficially in the tissue block. The microtome is used to slice the tissue into sections for slide generation.

Step 10. Example of how slides are generated with the “truest margin” closest to the frost of the slide in A-1. Further cuts into the block generate the remainder of specimens on the A-1 and A-2 slides.

Step 11. First stage is analyzed microscopically. Residual tumor is identified within the epidermal and deep margins of the stage I specimen.

Step 12. The residual tumor is marked on the surgeon’s map to direct the stage II excision.

Step 13. Local anesthesia is repeated. The second stage is obtained utilizing the surgeon’s map generated in step 14.

Step 14. Although not clinically visible, after removal of the second stage a residual area of tumor remains within the stage II defect.

Step 15. Second stage is analyzed microscopically.

No residual tumor is identified

Step 16. The surgeon’s map is completed with denotation of microscopically negative margins.

Step 17. Two stages were performed, resulting in a primary defect with extension in the northwest direction.

Step 18. The resulting defect after two stages. In this situation, linear closure is planned. Debeveling is performed and Burrow’s triangles are removed along the line of closure to assist with reapproximation.

References: