Challenges in Surgery of Cutaneous Melanoma: Indications for Margin Control Prior to Reconstruction

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Director of Dermatologic Surgery
Assistant Professor of Dermatology
I have no conflicts of interest or relevant ties with industry.
Surgical techniques to treat skin cancer

Wide local excision

Mohs surgery

Staged excision

Partial margin assessment *after* reconstruction

Comprehensive margin assessment *before* reconstruction
What surgical technique would you use for this melanoma?

- Wide local excision
- Mohs surgery
- Staged excision
What surgical technique would you use for this melanoma?

Options:
- Wide local excision
- Mohs surgery
- Staged excision
When do we choose Mohs and staged excision?

- When WLE has a high-risk of incomplete tumor removal
- When we need to confirm clear margins before complex reconstruction
NCCN guidelines for BCC and SCC define indications for margin control before reconstruction

Wide local excision

Mohs surgery

Staged excision

-When WLE has a high risk for incomplete excision
-When flap reconstruction is anticipated
NCCN guidelines for BCC and SCC define risk factors for incomplete excision

Ill-defined clinical margins
Specialty site location
Large tumor size
Recurrence after previous treatment
NCCN guidelines for BCC and SCC recommend verifying clear margins before flap reconstruction.
What about melanoma guidelines?

Do not identify risk factors for incomplete excision from WLE
Do not recommend delaying flap reconstruction for margin assessment
Do not specify indications for Mohs or staged excision
NCCN guidelines recommend WLE with predetermined surgical margins for all melanomas.

<table>
<thead>
<tr>
<th>Tumor Thickness</th>
<th>Recommended Clinical Margins$^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>In situ$^1$</td>
<td>0.5–1.0 cm</td>
</tr>
<tr>
<td>≤1.0 mm</td>
<td>1.0 cm (category 1)</td>
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• Margins may be modified to accommodate individual anatomic or functional considerations.
NCCN surgery recommendations are based on 6 prospective randomized trials in which 99% of melanomas were located on the trunk and proximal extremities.

<table>
<thead>
<tr>
<th>Table VII. Randomized prospective studies that evaluated surgical margins of wide excision of melanoma upon which the NCCN surgical margin guidelines for excision of melanoma are based.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Randomized melanoma trial</strong></td>
</tr>
<tr>
<td><strong>Vedder</strong> (1991)</td>
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<tr>
<td><strong>Cederna-Cedernahl</strong> (2000)</td>
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<td><strong>Khyatt</strong> (2003)</td>
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<td><strong>Thomsen</strong> (2004)</td>
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<td><strong>Gillgren</strong> (2011)</td>
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**Abbreviation:** T&E = trunk and extremity, T&PE = trunk and proximal extremity

37/3909 (0.9%) patients had specialty site melanomas.
WLE works well for well-defined melanomas located on the trunk and proximal extremities.

Complications after WLE are rare:

Rule of 2s

25% of melanomas are on specialty sites

- Head and neck
- Hands and feet
- Genitals
- Pretibial leg

Complications after WLE are common:
Rule of 10s
Underutilization of Mohs and staged excision for specialty site melanomas deprives patients of optimal outcomes

• 4% of melanomas are treated with MMS*, but >25% of melanomas arise on specialty sites

Mohs and staged excision remove specialty site melanomas with lower local recurrence rates than WLE.

<table>
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<tr>
<th>Surgical Technique</th>
<th>Local Recurrence Rate</th>
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<tr>
<td>WLE</td>
<td>10% (337/3372)*</td>
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<tr>
<td>MMS</td>
<td>0.99% (48/4826)**</td>
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<tr>
<td>Staged Excision</td>
<td>2.43% (51/2098)**</td>
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*Data for specialty site melanomas; from Rule of 10s paper JAAD 2019
**Data specifically for head and neck melanoma; unpublished data from systematic review
Patients prefer Mohs and slow Mohs over WLE for facial melanoma

94.3% rank local recurrence as most important attribute of surgery for facial melanoma
73% patients select MMS-I or slow Mohs for facial melanomas

JAAD 2018
We have data to support the following indications for Mohs or staged excision of melanoma

- Specialty anatomic location
- Previous treatment/recurrence
- Older patient age
- Larger tumor size
- Flap reconstruction

Tumor stage does *not* correlate with subclinical spread

Shin TM, Miller CJ et al. JAAD 2017
Indication: Specialty anatomic location
Complication rates are high after conventional WLE of specialty site melanomas

Specialty sites

Rule of 10s

Trunk and proximal extremities

Rule of 2s
Complication rates for WLE of specialty site melanomas

Rule of 10s

- Head and neck, hands and feet, genitals, pretibial leg
- Upstaging
- Positive excision margins
- Local recurrence
- Complex reconstruction

>10%

10x ↑
Rule of 10s versus Rule of 2s: Upstaging

<table>
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<tr>
<th>Specialty sites</th>
<th>Trunk and extremities</th>
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<td>10.7% (79/740)</td>
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Specialty site melanomas have >7-fold increased risk of upstaging compared to T&PE melanomas

\[ P < 0.001 \]
How and where would you biopsy?

Diagnosis: Melanoma, 4.3 mm
PRINCIPLES OF BIOPSY

- Excisional biopsy (elliptical, punch, or saucerization) with 1-3 mm margins preferred. Avoid wider margins to permit accurate subsequent lymphatic mapping.
How and where would you biopsy?

Diagnosis: Lentigo maligna
Partial preoperative biopsies are common on specialty sites and increase risk for upstaging.

**Biopsy for malignant melanoma – are we following the guidelines?**

S TADIPARTHI, S PANCHANI, A IQBAL

- Physicians employ a wide variety of biopsy techniques for melanoma
  - Excision
  - Punch
  - Shave
  - Incision
  - Curettage

Upstaging may affect surgical management

<table>
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<tr>
<th>Chance that upstaged tumor will change margin recommendations</th>
<th>Chance that upstaged tumor will qualify for SLNB</th>
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<td>62% (32/52)</td>
<td>27% (14/52)</td>
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Etzkorn JR, Miller CJ et al. Frequency of and risk factors for tumor upstaging after WLE of primary cutaneous melanoma. JAAD 2017
## Rule of 10s versus Rule of 2s

**Positive margins**

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Risk factors for positive or equivocal margins after wide local excision of cutaneous melanomas

Christopher J. Miller, MD, Thuzar M. Shin, MD, PhD, Joseph F. Sobanko, MD, John M. Sharkey, BA, John W. Grunyk, BA, Rosalie Elenitsas, MD, Emily Y. Chu, MD, PhD, Brian C. Capell, MD, PhD, Michael E. Ming, MD, and Jeremy R. Etzkorn, MD

Philadelphia, Pennsylvania

5x increased risk for positive margins if melanomas are located on specialty sites or excised with narrow margins

Miller CJ, Etzkorn JR et al. JAAD 2017;77:333-40
What’s the clinical margin?
What’s the surgical margin?

Melanoma, 0.30 mm
### PRINCIPLES OF SURGICAL MARGINS FOR WIDE EXCISION OF PRIMARY MELANOMA

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*Margins may be modified to accommodate individual anatomic or functional considerations.*
What’s the clinical margin?
What’s the surgical margin?

Diagnosis: MIS

Inaccurate clinical margins = Inaccurate surgical margins
### PRINCIPLES OF SURGICAL MARGINS FOR WIDE EXCISION OF PRIMARY MELANOMA

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- Margins may be modified to accommodate individual anatomic or functional considerations.
A first prospective population-based analysis investigating the actual practice of melanoma diagnosis, treatment and follow-up

Elisabeth Livingstone a, Christine Windemuth-Kieselbach b, Thomas K. Eigentler c, Rainer Rompel d, Uwe Trefzer e, Dorothee Nashan f, Sebastian Rotterdam g, Selma Ugurel h, Dirk Schadendorf a,*

Recommended margins were used in only 67.8% of standard excisions of melanomas on the head neck

Insufficient margin of excision (i.e., less than recommended) independently associated with tumor location on the head and neck

Specialty of surgeon did not affect compliance with recommended margins

Narrow margins increase the risk of incomplete excision

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<th>Non-compliant surgical margins</th>
<th>Compliant surgical margins</th>
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<td>22.6% (7/31)</td>
<td>3.2% (41/1282)</td>
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# Rule of 10s versus Rule of 2s

## Local recurrence

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1 cm specimen:
2500 serial sections
Rule of 10s

10x increased likelihood of complex reconstruction

Subsequent excision and reconstruction is more complex

Judgment analysis:
You removed this melanoma with WLE.
Do you reconstruct immediately?

Stage IA melanoma
0.3 mm
No ulceration
No mitoses
Judgment analysis:
You removed this melanoma with WLE. Do you reconstruct immediately?
What if we apply NCCN-defined indications for Mohs and staged excision to melanoma?

12,189 keratinocytic carcinomas versus 1,475 melanomas of the head and neck.
Compared to BCC and SCC, head and neck melanomas are more likely to be larger, recurrent, ill-defined, and require flap reconstruction.

<table>
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<th>Risk factor</th>
<th>Melanoma</th>
<th>BCC and SCC</th>
<th>P-value</th>
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<tr>
<td>Subclinical spread</td>
<td>32% (468/1475)</td>
<td>27% (3233/12189)</td>
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<td>Preop size</td>
<td>2.1 cm</td>
<td>1.3 cm</td>
<td>&lt;0.0001</td>
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<td>Recurrent</td>
<td>5.08% (75/1475)</td>
<td>3.91% (477/12189)</td>
<td>0.031</td>
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<tr>
<td>Flap reconstruction</td>
<td>42% (580/1475)</td>
<td>31% (3551/12189)</td>
<td>&lt;0.0001</td>
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Indication:
Recurrence after previous treatment

Linear scar previous surgery

4x more likely to have subclinical spread if previously treated

Indication: Older age

>4x increased risk for subclinical spread if >65 yo

Indication: Larger preoperative size

~2x increased risk for subclinical spread if >1 cm

Surgical techniques to treat skin cancer

- **Wide local excision**
  - Partial margin assessment
    - *after* reconstruction

- **Mohs surgery**
  - Comprehensive margin assessment
    - *before* reconstruction

- **Staged excision**
What surgical technique would you use for this melanoma?

- Wide local excision
- Mohs surgery
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Mohs and staged excision remove specialty site melanomas with lower local recurrence rates than WLE.

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**Data specifically for head and neck melanoma; unpublished data from systematic review
Mohs surgery and staged excision meet the 3 conditions for optimal surgery of melanomas

- Accurate pathologic staging prior to reconstruction
- Clear microscopic margins
- Reconstruction in tumor-free skin
We have data to support the following indications for Mohs or staged excision of melanoma

• Specialty anatomic location
  – Rule of 10s versus Rule of 2s
• Previous treatment/recurrence
• Older patient age
• Larger tumor size
• Flap reconstruction

Tumor stage does not correlate with subclinical spread

Shin TM, Miller CJ et al. JAAD 2017
Developing guidelines with clear indications for Mohs and staged excision will improve outcomes for challenging subsets of melanomas

Do not identify risk factors for incomplete excision from WLE
Do not recommend delaying flap reconstruction for margin assessment
Do not specify indications for Mohs or staged excision