Second Intention Healing for Mohs Defects of Specific Anatomic Locations of the Lower Extremities: Identifying Indications and Mitigating Challenges

Kunal Malik MD,[1] Tracy Ngo BS,[2] Parth Patel MD,[1] Amor Khachemoune MD, FAAD, FACMS[2]

1. Dept. of Dermatology, Icahn School of Medicine at Mount Sinai, New York, NY; 2. Division of Dermatology, Dept. of Medicine, Albert Einstein College of Medicine, Bronx, NY; 3. Dept. of Dermatology, SUNY Downstate Medical Center

The authors report no relevant financial disclosures

BACKGROUND

Prior to the development of Mohs Micrographic Surgery (MMS), surgical defects were often closed with sutures due to the general conception that primary closure produced superior cosmesis versus secondary intention healing (SIH). The terms "leg" and "lower leg" are used uniformly to reference the anatomic area from just below-the-knee to the malleoli whereas "lower extremity" references the entire anatomic area from below-the-knees to the toes. Healing of lower extremity defects is often viewed as challenging due to unfavorable tissue properties and increased risk of complications, however significant regional tissue variability in this area warrants further exploration. Furthermore, wound characteristics and outcomes of SIH for MMS defects of specific lower extremity sites is not well described in the literature.[1,2] To address possible underutilization of SIH on the lower extremity, site-specific indications and challenges of SIH below-the-knee need exploration.

METHODS

A systematic review of the literature from inception of databases to January 2, 2021 using PubMed, EMBASE, and Cochrane Library using search terms: 1) Mohs surgery and lower extremity, leg, foot and 2) Mohs and lower extremity, leg, foot was performed. Abstracts were screened for articles pertaining to MMS of lower extremity cancers and secondary intention healing. This review was conducted in concordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines.

Inclusion and Exclusion Criteria

All articles published in English were included. All other articles were excluded. Case reports with unspecified reconstruction/wound healing after MMS were excluded.

Data Extraction

To screen for relevance, abstracts were perused and those without abstracts underwent full-text review. Duplicate articles were identified and removed. Articles that met the inclusion criteria were subjected to full-text review.

RESULTS

50 unique articles describing MMS of lower extremity cancers and secondary intention healing were found (Fig. 1). These included case report/series/report and review (26, 52%), chart reviews (10, 20%), cohort studies (5, 10%), clinical trials (4, 8%), reviews (2, 4%), surveys (1, 2%), statistical analyses (1, 2%), and cross-sectional study (1, 2%). We covered 15 unique malignancies (adenosquamous carcinoma, atypical intraepidermal, melanocytic proliferation, basal cell carcinoma, Bowen's Disease, dermatofibrosarcoma protuberans, eccrine porocarcinoma, leiomyosarcoma, malignant adnexal tumors, malignant granular cell tumor, melanoma all subtypes, non-Hodgkin's lymphoma, squamous cell carcinoma, subungual epidermoid carcinoma, superficial malignant nerve sheath tumor, verrucous carcinoma, treated with MMS in locations from upper leg to the plantar foot

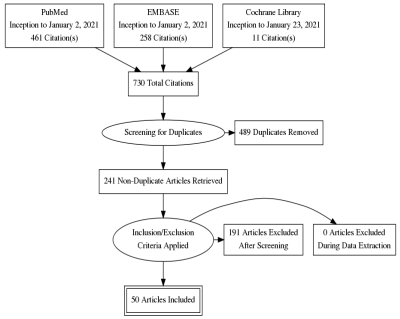

Figure 1. PRISMA flow diagram of literature search and study selection

SIH on the Leg and Foot

In a retrospective study identifying risk factors for complications after below-the-knee MMS, most defects (74%) were healed by SIH.[3] The complication rate of SIH (16%) was favorable compared to flaps and grafts (both 50%), but inferior to primary closure (8%); conclusions were limited by small sample size.[3] In a case series of acral melanomas of the feet, most defects were healed by SIH (63.6%). This study had a small sample size and did not stratify by treatment modality.[4] In a prospective study to determine rates of bleeding and wound healing complications in outpatient dermatologic surgery, only 2.5% were left to heal with SIH.[5] Though this study had a large sample size, it included both MMS (1369, 72%) and surgical excision (542, 28%).

SIH can also produce acceptable cosmetic and functional outcomes in larger, deeper surgical defects.[3,6,7] A survey consisting of 293 respondents from ACMS revealed that Mohs surgeons with over 15 years of experience were significantly more likely to elect to heal deeper and larger surgical defects secondarily than surgeons with 5 or less years of experience ($p < .05$)—suggesting that SIH may be underutilized by less experienced surgeons.[6]

A retrospective study exploring factors associated with surgical site infections of the lower extremity found no difference in infection rate between SIH and surgical repair, SIH had a lower odds ratio (2.1, 95% confidence interval 0.9 -5.0; $p = .1$) than complex layered closure (4.5, 95% confidence interval 1.5-13.2; $p = .006$).[8] SIH on the foot was also found to have superior clinical, functional, and cosmetic outcomes compared to split-thickness and full-thickness skin grafts without the added initial procedure time and creation of a secondary defect.[3,7,9,10]

CONCLUSIONS

1. SIH should be considered as a simple, affordable, and equivalent if not superior alternative to surgical repair for patients without comorbidities that significantly delay or impair wound healing
2. SIH is a good option for surgical defects on the leg due to its utility in high visibility areas with active infection and excessive tension; resulting wound contraction allows for a smaller scar with preserved skin tone, contour, and function.
3. Wound healing on the foot can be difficult due to constant sheer forces and high pressure, but SIH on the feet can allow for earlier mobilization since the granulation tissue acts as a cushion for ambulation.
4. Given the lack of robust studies, randomized control trials and comparative studies with large sample sizes should be conducted to better characterize properties, indications, and challenges of SIH on all parts of the lower extremity.

CLINICAL RELEVANCE

SIH is potentially underutilized on the lower extremity, which is often viewed as a challenging wound healing location due to unfavorable tissue properties and increased complication risk. However, significant regional tissue variability exists in the lower extremity, and defects left to heal by SIH can have similar if not superior functional and cosmetic outcomes in certain situations.

REFERENCES

1. Liu KY et al. Ann Plast Surg 2020;85(S1 Suppl 1):S28-s32.
2. Mott KJ et al. Dermatol Surg 2003;29(7):712-22.
3. Honaker JS et al. Dermatol Surg 2016;42(4):568-70.
4. Hutcheson AC et al. Dermatol Surg 2007;33(1):1-10.
5. Bordeaux JS et al. J Am Acad Dermatol 2011;65(3):576-583.
6. Vedvyas C et al. Dermatol Surg 2017;43(3):415-423.
7. Audrain H et al. Dermatol Surg 2015;41(4):493-8.
8. Nathan NR et al. J Am Acad Dermatol 2020;83(1):274-276.
9. Oganesyan G et al. Dermatol Surg 2013;39(9):1334-9.
10. Schoenfeld J et al. Dermatol Online J 2017;23(2).