

A Novel Purse-String Suture and Dehydrated Human Amnion/Chorion Membrane Allograft Closure Technique for the Repair of Defects Following Mohs Micrographic and Excisional Surgery

Keywords: Mohsmicrographic surgery; Purse string; Repair; Dehydrated human amniotic/chorionic membrane allograft (dHACM); Pulsed dye laser (PDL)

The unique characteristics, needs, and preferences of the elderly undergoing Mohs micrographic (MMS) and excisional surgery can be barriers to subsequent repair and reconstruction, particularly when presented with large surgical defects and burdensome wound care.

Four elderly patients with multiple comorbidities, polypharmacy, and social issues requested surgical management of sizeable, symptomatic skin cancers: basal cell carcinomas (BCC), squamous cell carcinoma (SCC), and melanoma. All patients desired closure methods that would avoid extensive reconstruction and minimize wound care responsibilities. In this retrospective case series, we investigated outcomes, cosmesis, and ease of wound care following reconstruction with combination of purse-string suture and single application dehydrated human amnion/chorion membrane allograft (dHACM) closure technique for the repair of MMS and excisional surgery defects in a medically fragile patient population.

Case 1

An 84-year-old male with chronic lymphocytic leukemia on bendamustine and history of laryngeal SCC presented with a bleeding infiltrative BCC of the left temporal scalp. Four MMS stages were required to clear the tumor margins, yielding an 18 cm² defect. Partial closure of the tips reduced the defect size to 7.2 cm².

A central purse-string further minimized defect to 2.0 cm². A dHACM (EpiFix[®], MiMedx Group, Inc., Marietta, GA) was applied to the site. At three weeks, one treatment with low-level pulsed dye laser (PDL, Vbeam[®], Syneron Candela, Wayland, MA) was performed. Complete healing was noted at five weeks.

Case 2

An 85-year-old female with history of metastatic nasal BCC on antiplatelet therapy presented with a painful nodular and infiltrative BCC on the occipital scalp. Three MMS stages were necessary to



Kelly K. Park^{1*}, Erika Hagstrom², Ricardo Berrios³ and Rebecca C. Tung¹

¹Division of Dermatology, Loyola University Medical Center, Building 54, Room 101 2160 S, First Avenue, Maywood, IL 60153, USA

²Department of Medicine, Loyola University Medical Center, Maywood, Illinois, USA

³Brandon Dermatology, Brandon, Florida, USA

*Address for Correspondence

Kelly K. Park, Division of Dermatology, Loyola University Medical Center, Building 54, Room 1012160 S, First Avenue, Maywood, IL 60153, USA, Tel: 708-216-6533; Fax: 877-991-4957; E-mail: kyunghwamd@gmail.com

Submission: 25 March, 2016

Accepted: 29 March, 2016

Published: 02 April, 2016

Copyright: © 2016 Park KK, et al. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Reviewed & Approved by: Dr. S. Brian Jiang, Department of Dermatology, University of California, USA

clear the tumor, leaving a defect measuring 15.0 cm². The wound edges were cinched using the purse string technique to a size of 4.4 cm². This was covered with dHACM. After three weeks, the patient began a series of four weekly low-level PDL treatments. Complete reepithelialization was noted at six weeks.

Case 3

A 101-year-old caregiver-dependent male with extensive cardiac history on fish oil and aspirin presented with a painful SCC on the right dorsal hand. Two MMS stages were necessary to clear tumor, leaving a defect of 10.5 cm² (Figure 1). Purse-string technique was used to decrease the final defect to 3.74 cm². A dHACM was placed in the wound bed. Three weeks afterwards, four weekly low-level PDL treatments were performed. Complete healing was seen six weeks (Figure 2).



Figure 1: Case 3: Defect following MMS for treatment of SCC of the right dorsal hand.

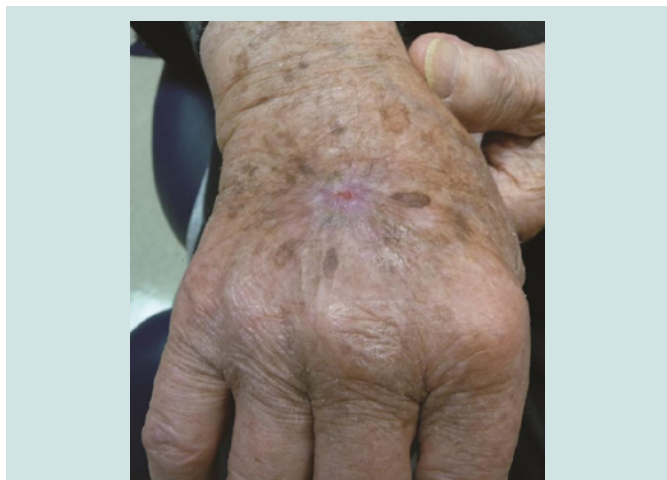


Figure 2: Case 3: Near complete healing seen 4 weeks after MMS, purse string suture placement, and application of dHACM. Complete healing was noted 6 weeks postoperatively.



Figure 3: Case 4: Defect following excisional surgery of melanoma of the left parietal scalp.

Case 4

An 80-year-old male with a history of quiescent metastatic melanoma with significant cardiac history on garlic, vitamin E, and omega-3 fatty acids opted for wide local excision down to the fascia for a growing recurrent melanoma of the scalp (Breslow depth 1.85 mm). The final defect measured 7.28 cm² (Figure 3). The dermis was cinched with a purse string suture to a size of 3.4 cm² and dHACM was placed centrally. At three weeks, two low-level PDL treatments were performed a week apart. Near complete reepithelialization was seen at six weeks and complete healing at nine weeks (Figure 4).

Technique

Following tumor extirpation, patients had sizable defects that were unsuitable for primary closure. In all cases, a subcuticular purse-string suture using absorbable suture material was placed to partially close the defect.

Absorbable suture was passed as a running stitch in and out along the dermal edge of the circular wound in such a way that the two ends could be drawn tightly and secured with a knot, effectively reducing wound areas by 53.3-72.2% in each case.

To the resulting smaller central defect, a trimmed allograft was placed and moistened with normal saline used to promote adherence, assist with hemostasis, reduce pain and accelerate epithelialization.

A sterile pressure dressing was applied and left intact between wound care visits. Surgical sites were assessed at 1-2 week intervals to determine cosmetic outcomes, scar satisfaction, healing time, and adverse events. Low-intensity 595 nm PDL (settings ranged from 5-7 mm spot size, 7-7.5 joules, and 6 m sec pulse duration) was performed after three weeks to enhance healing and maximize cosmesis.

Discussion

All defects rapidly healed without complications and patients were pleased with their outcomes. Rationale for employing both surgical and allograft methods of reconstruction stemmed from the goal to facilitate wound healing.

Cohen et al. observed that cuticular purse-string suture alone can partially or fully close defects and decrease defect size by an average of 60% [1]. This repair method is fast, distributes wound tension, provides hemostasis, and minimizes healing duration while maintaining function and providing excellent scar outcomes [1]. A randomized trial demonstrated via patient report that purse-string closures healed faster than secondary intention (5.62 weeks vs. 7.43 weeks) [2]. It is a reliable closure method for patients on anticoagulant and antiplatelet agents and reasonable alternative to flap or graft closure [1].

When compared to secondary intention healing after MMS or excisional surgery, a bi-layered tissue-engineered, foreskin-derived biological dressing produced more pliable and less vascular scars that were more cosmetically acceptable [3]. Similarly, dHACM has been shown to facilitate overall healing in wounds refractory to aggressive management and reduces healing times [4]. These allografts attenuate wound inflammation, have antibacterial activity, and possess scar and pain reduction properties [3]. These characteristics are thought to be due to its composition of basement membrane layers, cytokines, intrinsic factor, and secretion of angiogenic factors [3].

Prior successful use of dHACM in combination with low



Figure 4: Case 4: Nearly imperceptible scar seen at 9 weeks after excision, purse string suture placement, and dHACM application.

intensity PDL was also reported in an immunosuppressed patient who underwent MMS for SCC complicated by infection [5]. The adjuvant use of PDL as low-level laser therapy was utilized in this report and series for its antimicrobial and potential wound healing properties [3].

Conclusion

The use of combination purse-string suture and dHACM closure technique for reconstruction of surgical defects following micrographic or excisional surgery led to high patient satisfaction, excellent cosmetic outcomes, acceptable healing times, and low wound care burden. This closure method may be a consideration for the repair of cutaneous surgical defects in select medically challenged patient populations.

References

1. Cohen PR, Martinelli PT, Schulze KE, Nelson BR (2007) The cuticular purse string suture: a modified purse string suture for the partial closure of round postoperative wounds. *Int J Dermatol* 46: 746-753.
2. Joo J, Custis T, Armstrong AW, King TH, Omlin K, et al. (2015) Purse-string suture vs second intention healing: results of a randomized, blind clinical trial. *JAMA Dermatol* 151: 265-270.
3. Gohari S, Gambla C, Healey M, Spaulding G, Gordon KB, et al. (2002) Evaluation of tissue-engineered skin (human skin substitute) and secondary intention healing in the treatment of full thickness wounds after Mohs micrographic or excisional surgery. *Dermatol Surg* 28: 1107-1114.
4. Sheikh ES, Sheikh ES, Fetterolf DE (2014) Use of dehydrated human amniotic membrane allografts to promote healing in patients with refractory non healing wounds. *Int Wound J* 11: 711-717.
5. Fancher W, Desai S, Peterson A, Tung R (2015) Aggressive squamous cell carcinoma within a burn scar complicated by *M. fortuitum* infection: combination treatment with antibiotic therapy, mohs surgery, amnion-chorion graft, and low-intensity pulsed dye laser. *Dermatol Surg* 41: 1079-82.

Acknowledgements

We would like to thank the MiMedx Group, Inc. for their in-kind donation of Epifix® product.