# Photographic assessment of postsurgical facial scars epidermally sutured with rapidly absorbable polyglactin 910 or nylon: A randomized clinical trial

Benvon Moran, MB, FRCPI, FACMS,[a,b] Shannon Humphrey, MD, FRCPC, FAAD,[a] Alexander Seal, MD, FRCSC,[c] Jonathan Berkowitz, PhD,[d] and David Zloty, MD, FRCP, FAAD[a]
*Vancouver and Kingston, Canada*

***Background:*** Surgeons use absorbable and nonabsorbable sutures for epidermal wound closure. No large, randomized studies have compared the effect of these suture types on facial scar appearance.

***Objective:*** To assess postsurgical facial scar appearance using either rapidly absorbable polyglactin 910 or nylon for epidermal closure.

***Methods:*** Randomized, blinded, split-scar clinical trial. A total of 105 patients with facial wounds resulting from Mohs micrographic surgery excisions were randomly assigned for epidermal closure with rapidly absorbable 5-0 polyglactin 910 (Vicryl Rapide) on one half of the repair and 5-0 nylon (Ethilon) on the other half. Two physicians (1 dermatologist and 1 plastic surgeon), unaware of the original suture location, examined photographs of each healed wound at 6 months after surgery and graded the appearance of each half of the scar using the visual analog scale, wound evaluation scale, and Stony Brook Scar Evaluation Scale.

***Results:*** At 6 months, there was no significant difference in the combined mean (standard deviation) visual analog scale scores (83.1 [14.2] and 83.0 [13.7]), Stony Brook Scar Evaluation Scale scores (4.3 [0.9] and 4.4 [0.9]), or wound evaluation scale scores (5.3 [1.1] and 5.2 [1.1]) for rapidly absorbable polyglactin 910 versus nylon ($P$ = .72, .57, and .21, respectively).

***Limitations:*** Single institution.

***Conclusions:*** Both rapidly absorbable polyglactin 910 and nylon sutures placed through the epidermis resulted in an equivalent photographic appearance of facial scars at 6 months after surgery. (J Am Acad Dermatol 2020;83:1395-9.)

***Key words:*** facial surgery; Mohs micrographic surgery; nonabsorbable suture; randomized controlled trial; rapidly absorbable suture; scar cosmesis; scar outcomes; skin cancer; visual analog scar scale; Stony Brook Scar Evaluation Scale; wound evaluation scale.

Epidermal closure options for facial reconstruction include nonabsorbable or absorbable sutures. There remains concern among surgeons that use of epidermal braided absorbable sutures can lead to increased inflammatory response, infection, and poor scar appearance when compared to nonabsorbable sutures that are removed in a timely fashion.

From the Department of Dermatology and Skin Science, University of British Columbia, Vancouver, Canada[a]; Division of Dermatology, Queen's University, Kingston, Ontario, Canada[b]; Division of Plastic and Reconstructive Surgery, University of British Columbia, Vancouver, Canada[c]; and Sauder School of Business, University of British Columbia, Vancouver, Canada.[d]

Funding sources: None.
Conflicts of interest: None disclosed.
IRB approval status: Reviewed and approved by the Research Ethics Board at the University of British Columbia (study number H13-01961).

Accepted for publication June 4, 2020.
Reprints not available from the authors.
Correspondence to: Benvon Moran, MB, FRCPI, FACMS, Division of Dermatology, Queen's University, 94 Stuart St, Kingston ON K7L 3N6, Canada. E-mail: benvon.moran@queensu.ca.
Published online June 10, 2020.
0190-9622/$36.00

https://doi.org/10.1016/j.jaad.2020.06.016

Increasing evidence now refutes this belief.[1-8] The use of braided, rapidly absorbable suture for epidermal closure can eliminate or reduce suture removal and, thus, reduce or eliminate follow-up visits, avoid patient discomfort and anxiety, and reduce medical costs. Several recent meta-analyses support equivalency between absorbable and nonabsorbable sutures for epidermal closure but are limited by small cohort sizes, varying assessment methods, and short follow-up periods.[1,3,4] We thus designed a study to overcome these limitations.

**CAPSULE SUMMARY**

- Traditionally, nonabsorbable sutures are used for epidermal closure on the face because of concerns about inflammatory response or infection with braided absorbable suture use.
- In this randomized clinical trial of 105 patients, no significant difference in facial scar appearance was found between rapidly absorbable polyglactin 910 and nylon suture.

## METHODS

### Study design

Patients were continuously enrolled from October 2013 to March 2014 in the Dermatologic Surgery Centre at the University of British Columbia. Final follow-up scar photography was completed at least 6 months after surgery, by September 2014. Scar assessment on photographs was performed by 2 physicians not involved in the surgery and blinded to suture location. A split-wound/split-scar model was used to minimize the number of uncontrolled variables.[8-10] Ethical approval was obtained from the University of British Columbia Research Ethics Board before study commencement.

### Study group

Inclusion criteria for study enrollment included age 18 years or older, regardless of immune status, with a facial post—Mohs micrographic surgery defect requiring a wound repair at least 4 cm in length. Patients were excluded if they had a history of keloid formation or prior radiation to the wound area.

### Randomization, allocation, concealment, and interventions

Randomization to determine which half of the wound would be sutured with rapidly absorbable polyglactin 910 was completed for 105 patients before study initiation using a randomization list generated from a web service (http://www.randomization.com). Participants underwent Mohs micrographic surgery in standard fashion. All Mohs defects were completely closed without tension with buried 4-0 or 5-0 polyglactin 910 sutures (Vicryl, Ethicon, Somerville, NJ) so that tension was taken off the epidermal edges. Epidermal running sutures of rapidly absorbable polyglactin 910 (Vicryl Rapide, Ethicon) on a P-3 needle were placed along half of the wound, and epidermal running sutures of nylon (Ethilon, Ethicon) on a P-3 needle were placed on the other half. Sutures were spaced approximately 3 to 4 mm apart, 2 to 3 mm from the wound edge, with closing tension just sufficient to allow complete wound edge apposition. Standard postoperative care with petroleum jelly or fusidic acid ointment followed. The monofilament nylon suture was removed at the 1-week postoperative visit. The rapidly absorbable polyglactin 910 suture, if still present, was left in place.

### Assessments

The primary outcome was scar appearance on photographs at 6 months after surgery. Two physicians (SH and AS), who were not present during the surgical repairs, evaluated scar appearance from standardized photographs taken with a digital camera and ring flash. These physicians did not know which half of the scar had been sutured with nylon and which half had been sutured with rapidly absorbable polyglactin 910. Three scar evaluation scales were used: the visual analog scale (VAS), wound evaluation scale (WES), and Stony Brook Scar Evaluation Scale (SBSES).[11-15] The presence of any complication was assessed directly by the principal investigator (DZ) during patient visits at 1 week, 2 months, and 6 months after surgery.

### Statistical analysis

Data were analyzed based on the intention-to-treat principle. We applied summary statistics to describe baseline demographic and clinical characteristics of the patient population. As comparison between suture types occurred for each patient, we used paired *t* tests to compare suture types on each scale for each reviewer. These tests were supplemented by Wilcoxon signed rank tests to account for possible nonnormality in scale distributions. Bonferroni-type corrections for multiple testing were considered in the event that any differences indicated possible statistical significance.

## RESULTS

A total of 121 patients were screened; 16 patients were excluded, 105 patients were randomized, and 4 patients were lost to follow-up, leaving 101 patients

*Abbreviations used:*

SBSES: Stony Brook Scar Evaluation Scale
VAS: visual analog scale
WES: wound evaluation scale

evaluated at 6 months. Table I provides patient demographic and operative data.

No significant difference was found in our primary outcome measure, the 6-month combined mean postoperative VAS, SBSES, and WES scores from the physician assessors (Table II).

In the 90 of 101 patients who were directly assessed at both 1 week and 2 months, no infection, hematoma, dehiscence, or necrosis was documented. One patient had 5% epidermal sloughing on the nylon side, which resolved without sequelae after 2 months. One suture abscess occurred at 3 months on the nylon side. The abscess was treated with incision and drainage and resolved by 4 months. Contrary to the 7- to 10-day reported absorption time of rapidly absorbable polyglactin 910, we found that the suture remained in place for up to 4 weeks if patients did not adequately hydrate the suture with ointment.

**Table I.** Study population demographics and surgical procedure data

| Characteristic | Finding (N = 105) |
|---|---|
| Sex, % (n) | |
| Men | 51 (54) |
| Women | 49 (51) |
| Age, y, mean (SD), range | 70.6 (11.6), 36-93 |
| Phototype, % (n) | |
| I | 21 (22) |
| II | 48 (50) |
| III | 31 (32) |
| IV | 1 (1) |
| Diagnosis, % (n) | |
| BCC | 79 (83) |
| SCC | 17 (18) |
| SCCIS | 1 (1) |
| LM/LMM | 3 (3) |
| Anatomic unit, % (n) | |
| Nose | 36 (38) |
| Cheek | 32 (34) |
| Forehead | 25 (26) |
| Lip | 7 (7) |
| Repair type, % (n) | |
| Side to side | 51 (52) |
| Flaps | |
| Rotation | 24 (24) |
| Bilobed | 18 (18) |
| Melolabial | 5 (5) |
| Rhombic | 2 (2) |
| Scar length, cm, mean (SD), range | 7.23 (3.1), 4.0-18.9 |
| Location of polyglactin 910, % (n) | |
| Superior/medial | 49 (51) |
| Inferior/lateral | 51 (54) |

*BCC*, Basal cell carcinoma; *LM*, lentigo maligna; *LMM*, lentigo maligna melanoma; *SCC*, squamous cell carcinoma; *SCCIS*, squamous cell carcinoma in situ; *SD*, standard deviation.

## DISCUSSION

No statistically significant difference in scar appearance was evident at 6 months between rapidly absorbable polyglactin 910 and nylon, as judged by 2 independent physician assessors. The equivalence between suture types was consistent regardless of reconstruction option or anatomic unit. Adverse events did not differ between study groups.

Our single institution study, restricted to wounds on the face and enrolling primarily elderly, white patients, brings a set of biases and limitations. A multi-institutional study would bring a greater range of physician surgical styles, which could affect results. Elderly, white skin tends to heal with less visible scarring compared to younger or darker skin. Generally, nonfacial surgical sites are closed under greater tension. Results from the present study may not be valid in these clinical scenarios. The present study did not compare outcomes based on surgeon experience, although a previous study by the senior author found no difference.[9]

Scar evaluation studies can be criticized because of the subjective nature of scar assessment. The present study used 3 outcome instruments to increase assessment validity. The VAS has shown good interobserver agreement of 0.75 to 0.87.[16] The US Food and Drug Administration has adopted the WES as 1 of the required outcome measures of wound repair clinical trials. Similar to the WES, the SBSES, being based on specific criteria, is more comprehensive then the VAS.

The scars were assessed at 6 months; this timepoint may underrepresent erythema and proliferative changes. Direct assessment of the surgical site at 1 week and 2 months by the principal investigator (DZ) using all 3 scales showed no statistically significant differences between the suture types. In addition, comparison of direct assessment at 2 months with independent physicians' assessments at 6 months, showed no statistically significant differences.

All masked scar assessments were based on photographs, which may not mimic the true in vivo scar appearance. Previous studies using various scar assessment tools, on both surgical and burn scars, have shown good reliability between photographic and in vivo assessments.[17-20] Because

**Table II.** Physician scar evaluation at 6 months after surgery

| Assessor specialty and scar assessment scale | Rapidly absorbable polyglactin 910, mean (SD) | Nylon, mean (SD) | *t* test *P* value | 95% CI for difference |
|---|---|---|---|---|
| Dermatologist | | | | |
| VAS | 79.7 (13.6) | 80.2 (13.2) | .77 | −3.9 to 2.9 |
| SBSES | 4.2 (1.1) | 4.3 (1.0) | .57 | −0.4 to 0.2 |
| WES | 5.2 (1.3) | 5.3 (1.1) | .24 | −0.5 to 0.1 |
| Plastic surgeon | | | | |
| VAS | 86.5 (14.8) | 85.8 (14.3) | .67 | −2.6 to 4.0 |
| SBSES | 4.5 (0.8) | 4.5 (0.8) | .58 | −0.2 to 0.3 |
| WES | 5.4 (1.0) | 5.2 (1.1) | .19 | −0.1 to 0.4 |

*CI*, Confidence interval; *SBSES*, Stony Brook Scar Evaluation Scale; *SD*, standard deviation; *VAS*, visual analog scale; *WES*, Wound Evaluation Scale.

the primary goal in scar outcome is patient satisfaction, it can be argued that study patients should have evaluated their own scores. However, previous studies have validated good concordance between physician and patient assessment of wounds.[9,21]

Varying methodology and suture types make comparison of our results with those of other studies problematic. Meta-analyses looking at scar outcomes between absorbable and nonabsorbable sutures suggest equivalence,[1,3,4] but "the overall quality of evidence was poor,"[1(p1682)] and there was a definite need for "well-designed randomized controlled trials with sufficient follow-up."[3(p598)] A study by Crispin et al,[2] using methodology similar to the present study, found no difference between 5-0 nonabsorbable polypropylene versus 5-0 fast-absorbing gut. A small, nonrandomized, nonblinded study of 18 pediatric patients found equivalency between nylon and fast-absorbing gut.[6] Parell and Becker[8] compared polyglactin 910 to nylon in 37 pediatric facial wounds, evaluating photographic stitch scar outcomes in a nonblinded fashion. No statistically significant difference was found. To our knowledge, the present study is the largest randomized controlled trial supporting equivalence of absorbable versus nonabsorbable sutures on facial cosmetic scar appearance.

The use of absorbable sutures may increase patient convenience by avoiding the need and discomfort of suture removal, and clinic efficiency can be increased. Although reduced need for suture removal may lessen medical costs, this will be partially mitigated by the generally higher cost of rapidly absorbable polyglactin 910.

## CONCLUSION

This study shows that 5-0 monofilament nylon and 5-0 rapidly absorbable braided polyglactin 910 give an equivalent photographic appearance for epidermal repair of facial wounds. There was no difference in complications. Physicians can choose suture material for epidermal closure based on physician and patient preference and scheduling logistics.

## REFERENCES

1. Gillanders SL, Anderson S, Mellon L, Heskin L. A systematic review and meta-analysis: do absorbable or non-absorbable suture materials differ in cosmetic outcomes in patients requiring primary closure of facial wounds? *J Plast Reconst Aesthet Surg*. 2018;71:1682-1692.
2. Crispin MK, Zhuang AR, Eisen DB. Use of 5.0 Prolene vs 5.0 fast absorbing gut during cutaneous wound closure: a randomized evaluator-blinded split wound comparative effectiveness trial. Presented at the 49th Annual Meeting of the American College of Mohs Surgery April 27, 2017 in San Francisco, California.
3. Xu B, Xu B, Wang L, et al. Absorbable versus nonabsorbable sutures for skin closure: a meta-analysis of randomized controlled trials. *Ann Plast Surg*. 2016;76:598-606.
4. Sajid MS, McFall MR, Whitehouse PA, Sains PS. Systematic review of absorbable vs non-absorbable sutures used for closure of surgical incisions. *World J Gastrointest Surg*. 2014;6:241-247.
5. Regan T, Lawrence N. Comparison of poliglecaprone-25 and polyglactin-910 in cutaneous surgery. *Dermatol Surg*. 2013;39:1340-1344.
6. Luck R, Tredway T, Gerard J, Eyal D, Krug L, Flood R. Comparison of cosmetic outcomes of absorbable versus nonabsorbable sutures in pediatric facial lacerations. *Pediatr Emerg Care*. 2013;29:691-695.
7. Brackeen AR, Wells MJ, Freed JM. Irradiated polyglactin 910 (Vicryl Rapide) for placement of full-thickness skin grafts. *Dermatol Surg*. 2005;31:1707-1709.
8. Parell GJ, Becker GD. Comparison of absorbable with nonabsorbable sutures in closure of facial skin wounds. *Arch Facial Plast Surg*. 2003;5:488-490.
9. Blouin MM, Al Jasser M, Demianczuk A, Berkowitz J, Zloty D. Continuous versus interrupted sutures for facial surgery repair: a randomized prospective study. *Dermatol Surg*. 2015;41:919-928.
10. Sklar LR, Pourang A, Armstrong AW, Dhaliwal SK, Sivamani RK, Eisen DB. Comparison of running cutaneous suture spacing during linear wound closures and the effect on wound

cosmesis of the face and neck: a randomized clinical trial. *JAMA Dermatol*. 2019;155:321-326.
11. Quinn JV, Drzewiecki AE, Stiell IG, Elmslie TJ. Appearance scales to measure cosmetic outcomes of healed lacerations. *Am J Emerg Med*. 1995;13:229-231.
12. Quinn JV, Wells GA. An assessment of clinical wound evaluation scales. *Acad Emerg Med*. 1998;5:583-586.
13. Kia KF, Burns MV, Vandergriff T, Weitzul S. Prevention of scar spread on trunk excisions. *JAMA Dermatol*. 2013;149:687-691.
14. Hollander JE, Singer AJ, Valentine S, Thode HC, Henry MC. Wound registry: development and validation. *Ann Emerg Med*. 1995;25:675-685.
15. Singer AJ, Arora B, Dagum A, Valentine S, Hollander JE. Development and validation of a novel scar evaluation scale. *Plast Reconstr Surg*. 2007;120:1892-1897.
16. deWaard J, Trimbos B, Peters L. Cosmetic results of lower midline abdominal incisions: donati stitches versus a continuous intracutaneous suture in a randomized clinical trial. *Acta Obstet Gynecol Scand*. 2006;8:955-959.
17. Shao K, Parker JC, Taylor L, Mitra N, Sobanko JF. Reliability of the patient and observer scar assessment scale when used with postsurgical scar photographs. *Dermatol Surg*. 2018;44:1650-1652.
18. Kantor J. Reliability and photographic equivalency of the Scar Cosmesis Assessment and Rating (SCAR), an outcome measure for postoperative scars. *JAMA Dermatol*. 2017;153:55-60.
19. Master M, McMahon M, Svens B. Reliability testing of a new scar assessment tool, Matching Assessment of Scars and Photographs (MAPS). *J Burn Care Rehabil*. 2004;26:273-284.
20. Crowe JM, Simpson K, Johnson W, Allen J. Reliability of photographic analysis in determining change in scar appearance. *J Burn Care Rehabil*. 1998;19:183-186.
21. Singer AJ, Church AL, Forrestal K, Werblud M, Valentine SM, Hollander JE. Comparison of patient satisfaction and practitioner satisfaction with wound appearance after traumatic wound repair. *Acad Emerg Med*. 1997;4:133-137.