Use of a novel adhesive suture retention wound closure device to prevent patient follow-up visits during the COVID-19 pandemic

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Key words: adhesive retention suture device; coronavirus; COVID-19; fragile skin; SARS-COV-2; tension; wound closure.

INTRODUCTION

The outbreak of the novel coronavirus (COVID-19, SARS-COV-2) has resulted in most states recommending reduction of patient interactions for nonurgent conditions. Recommendations continue to evolve in terms of practice guidelines, and many state and consensus guidelines recommend minimizing nonurgent procedures and patient contact conserve personal protective equipment and limit patient and physician exposure.[1,2]

At the onset of the COVID-19 pandemic, before the state orders and determination of consensus guidelines, our practice was concerned about our patients' needs to return to clinic after surgery for superficial suture removal. Given that most of our patients are elderly and many have underlying comorbidities, they are considered the most vulnerable population for increased fatality to coronavirus. We sought to use wound closure methods that would adequately support their wound and reduce our need to have physical contact with them.[3,4]

We considered different wound closure techniques depending on the size of the wound. For smaller wounds, after placing dermal absorbable sutures, we could use adhesives (eg, acrylate) alone or fast-absorbing gut sutures. For larger wounds, we wished for a more durable superficial closure method that would not prematurely fail and could be removed easily by the patient at home. The use of an adhesive retention suture (ARS) device (HEMIGARD ARS device; SUTUREGARD Medical Inc; Portland, OR) has been reported to help bolster fragile skin during wound closure under tension.[5] This ARS device is a low-cost US Food and Drug Administration—registered class I suture retention device that bolsters the skin to allow high suture tension without ripping the skin. We elected to use this ARS device with retention suture as the main support for many of our wound closures prior to COVID-19, so that patients could avoid a follow-up visit.

Abbreviation used:

ARS: adhesive retention suture

CASE 1

An 84-year-old woman with a history of diabetes and hypertension presented for Mohs micrographic surgery on a recurrent invasive squamous cell carcinoma, previously treated with cryotherapy. The tumor was cleared with 1 stage, but the resulting defect measured 2.0 cm wide by 2.4 cm long on her right cheek bordering on the lower eyelid (Fig 1) and was unable to be apposed to allow linear closure. To avoid a flap and eliminate the patient's need for postoperative suture removal, we used the ARS to bolster the skin around the wound. One ARS strip was placed on each side of the wound with the reinforced and water-resistant holes facing the wound. A 2-0 nylon retention suture was placed through a hole on each side and was used to appose

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Funding sources: None.
Conflicts of interest: Dr Lear is a shareholder in SUTUREGARD (SUTUREGARD Medical, Portland, OR). The rest of the authors have no conflicts to disclose.

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JAAD Case Reports 2020;6:593-7.
2352-5126

https://doi.org/10.1016/j.jdcr.2020.04.032

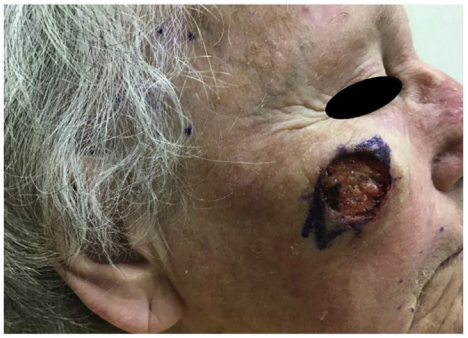

Fig 1. The right cheek defect (2.0 cm × 2.4 cm) after removal of an invasive squamous cell carcinoma by Mohs micrographic surgery.

the wound edges under tension. With the wound on either side of the ARS device now apposed and under minimal tension, absorbable dermal interrupted 4-0 Vicryl and superficial 5-0 fast-absorbing gut sutures were used to finish the closure (Fig 2). After allowing the wound to heal for 7 days, the patient removed the ARS device and single central 2-0 nylon suture at home (Fig 3). The patient tolerated the device well and appreciated that the ARS device limited the tendency for potential skin ripping.

CASE 2

A 57-year-old woman presented with a 1.4-cm × 1.4-cm melanoma in situ on her right forearm. She underwent wide local excision with 5.0-mm margins with a resulting 3.0-cm-wide by 7.5-cm-long defect. The wound could not be easily approximately with digital pressure (Fig 4). To avoid a flap or graft closure and to eliminate her need for a future suture removal, we decided to use the ARS device. The skin around the defect was cleaned and dried. An ARS strip was applied to the middle portion on each side of the wound (Fig 5). A 2-0 nylon retention suture was used to suture through the central holes of the ARS device using a simple interrupted pattern. The ARS device and retention suture resulted in a linear wound under minimal tension (Fig 6). Absorbable dermal Polysorb 4-0 sutures were placed along the wound for deep wound closure and acrylate glue (GluSeal, GluStitch; Vancouver, Canada) was placed over the top of the wound for epidermal closure (Fig 7). After 21 days, the patient was easily able to remove the ARS device and 2-0 nylon suture at home using large bandage scissors without any wound dehiscence or healing complications (Fig 8).

CASE 3

A 67-year-old woman presented with a 1.0-cm melanoma in situ on her left shin. She underwent wide local excision with 5.0-mm margins with a resulting 2.0-cm-wide by 4.5-cm-long defect. The wound was closed in a linear fashion. Given the patient's age and associated skin fragility and the high tension on the wound due to the location, the ARS device was used. The skin around the defect was cleaned and dried. An ARS device was applied to the middle portion on each side of the wound. A United States Pharmacopeia (USP) 2-0 nylon retention suture was used to suture through the central holes of the ARS device using a simple interrupted pattern. The resulting linear wound was under

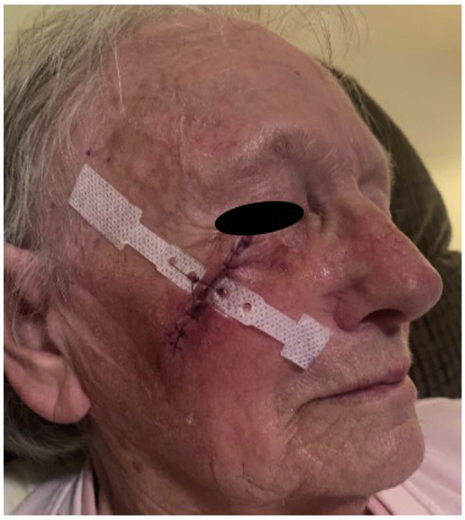

Fig 2. The right cheek defect closed using the HEMIGARD ARS device, absorbable 4-0 Vicryl dermal sutures and epidermal 5-0 fast absorbing gut sutures.

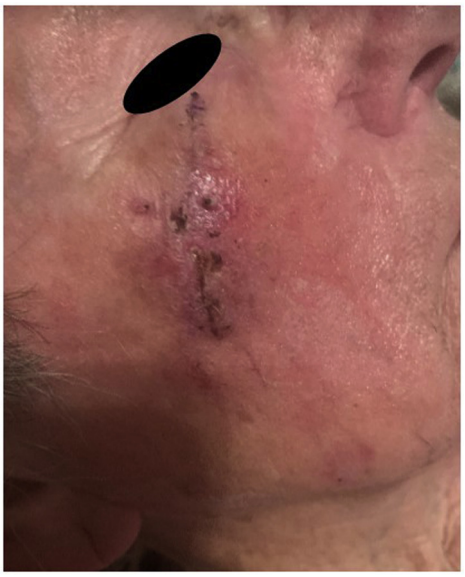

Fig 3. Well-healing right cheek defect after the patient removed the HEMIGARD ARS device and central 4-0 nylon suture at home.

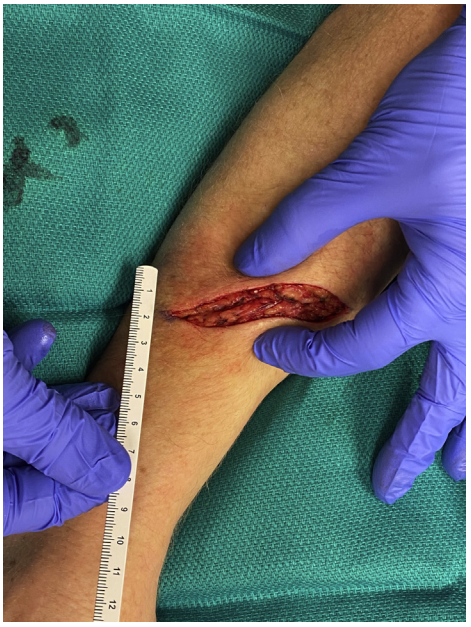

Fig 4. Surgical defect (3.0 cm × 7.5 cm) of the right forearm under tension. Defect cannot be approximated by digital pressure.

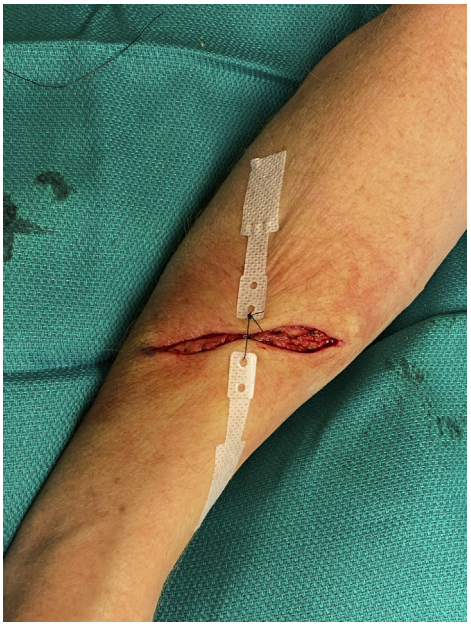

Fig 6. After tightening 2-0 nylon retention suture, the wound is apposed, and the HEMIGARD strips are protecting the fragile skin wound edges from ripping.

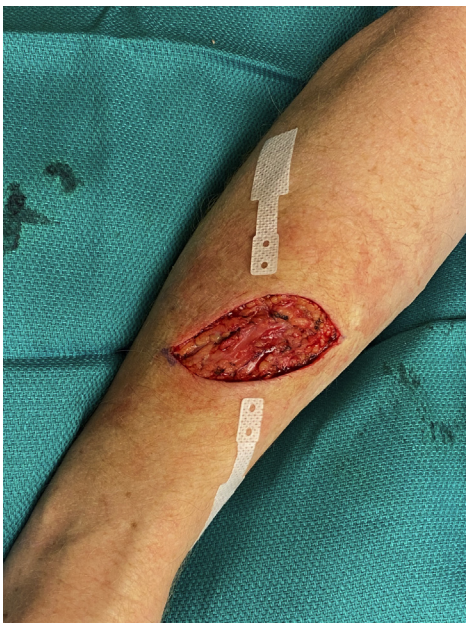

Fig 5. HEMIGARD ARS strips applied to each side with reinforced holes facing the wound.

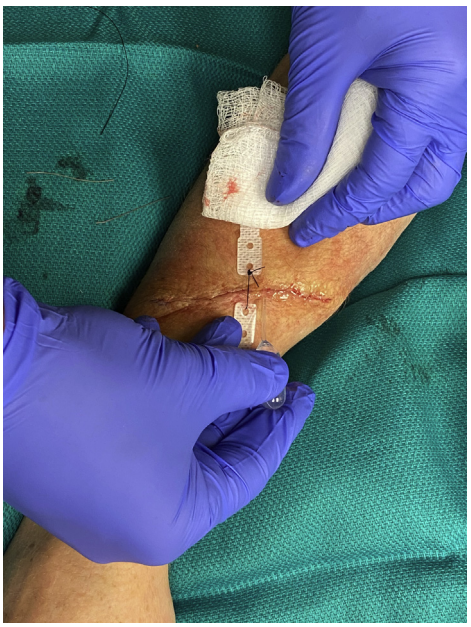

Fig 7. The right forearm after 4-0 dermal absorbable sutures are placed and the application of acrylate glue to the wound.

minimal tension and was closed with absorbable dermal 4-0 Polysorb sutures and superficial acrylate glue (GluSeal) was placed over the top to cover the wound. The HEMIGARD was removed at 14 days by the patient at home, and the wound was well approximated and healing appropriately (Fig 9).

DISCUSSION

With the novel coronavirus pandemic resulting in the recommendation for cessation of all nonurgent surgical procedures and decreased person-to-person contact, dermatologic surgery providers need to consider wound closure techniques that are

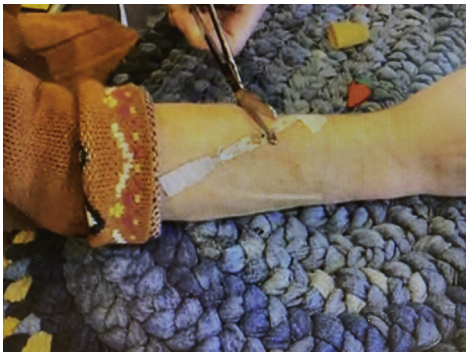

Fig 8. The patient removing the HEMIGARD adhesive retention suture device at home after 21 days using large bandage scissors.

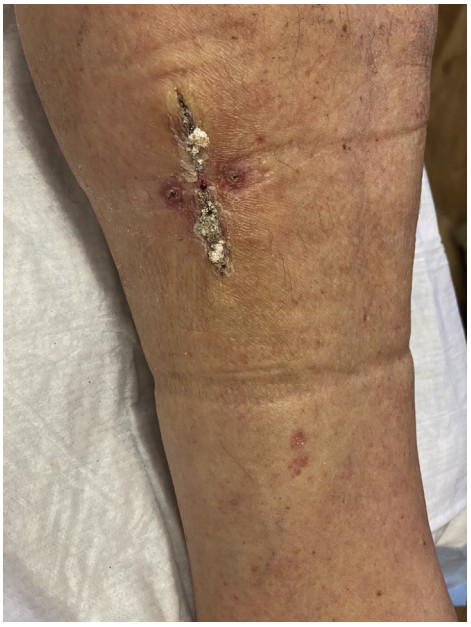

Fig 9. The left shin excision site well approximated after at the patient removed the HEMIGARD ARS device and middle suture at home after 14 days.

amenable to this new practice model. It is early in our understanding of the epidemiology of SARS-COV-2, and it is unclear what type of immunity is provided to previously infected individuals or if a second wave of cases may develop over the coming months.[3,6] Therefore, it is important that our patients be able to remove their own sutures to eliminate further patient visits for COVID-19 avoidance and decreased spread, patient convenience, and reduction of health care provider—patient interaction. For example, our patient in case 2 lives hours away from the office, making at-home suture removal especially appealing. Providing patients with the convenience of removing sutures at home saves time, personal protective equipment, and health care—associated costs.

Two factors combine to result in easier removal of the retention suture by the patient with the ARS device. First, the ARS device, which is approximately 30 thousandths of an inch thick, slightly elevates the suture above the skin surface. This process eliminates the problem of ingrown sutures, which would significantly complicate patient removal. Ingrown sutures can lead to complications such as increased patient pain, wound bleeding, incomplete suture removal, and possibly wound dehiscence.[7] Second, the large bite retention suture, over the course of 2 weeks of retention, will gradually stretch out, making it easier to get the scissors underneath the circle of suture. In our case, the patient had only large scissors but was still able to easily cut the retention suture.

Other techniques for wound closure that have decreased in-office follow-up can also be considered such as topical adhesives or fast-absorbing gut suture. We believe that use of these alone without the ARS device would not provide effective closure for wounds under high tension. Previous studies have found similar cosmetic outcomes between cyanoacrylate and fast-absorbing gut for closure of linear wounds on the face, but other studies found fast-absorbing gut was superior to cyanoacrylate for linear closures of high-tension wounds on the trunk and extremities.[8,9] The use of fast-absorbing gut is limited by tensile strength, which is maintained for about 5 days leading to an increased risk for wound dehiscence especially on fragile skin under tension. The high inflammatory tissue response to fast gut should also be considered, as this can be distressing to patients and affect the cosmetic outcome.[8] In contrast to ARS, other adhesive closure devices such as Clozex, (Clozex Medical Inc; Wellesley, MA) and Zip Surgical (Stryker Corporation; Kalamazoo, MI) are meant to provide only superficial wound support. They are meant to be used on wounds that have tension reduced with some other closure technique (eg, standard buried absorbable sutures, barbed sutures, or retention sutures). We have not done cases in which we combined the ARS with Clozex, Zip Surgical, or other superficial closure device. When we have omitted superficial absorbable sutures, we have successfully used acrylate glue for superficial wound support. Acrylate glue has the added benefit of reduced wound exudate to reduce wound care.

We have used the ARS on more than 50 wounds with no cases having a contact allergy or intolerance to the adhesive. We advise most patients keep the wound clean and dry postoperatively. Patients

routinely tell us that the device is well tolerated and gives them a sense of security that the skin will not tear. A controlled study comparing the use of the ARS device to suture alone on leg excisional wounds will provide clarity on reduction of wound dehiscence and any adverse effects.

Dermatoporosis can be particularly difficult to manage in terms of dermatologic surgery, as it may contribute to delayed wound healing and an increased risk for skin tearing.[10]

The ARS device has been shown to be beneficial in decreasing the tension across wounds and allowing for closure of fragile skin with good cosmetic results.[5] The ARS device is typically left in place 14 to 21 days prior to removal, thus providing additional support during the important initial weeks of wound healing. Over the next few months, as dermatologic surgeons adjust to the constant changing of our practice due to COVID-19, we hope that the method outlined in this case series give providers and patients additional tools for wound closure. Until the COVID-19 pandemic has cleared, the ARS device method outlined in this case series can allow surgeons to avoid the need for more complex flaps or grafts and minimize patient interactions.

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