The Use of a Novel Synthetic Matrix* in the Rapid Closure of Tunneling Wounds and Soft Tissue Flaps

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Introduction

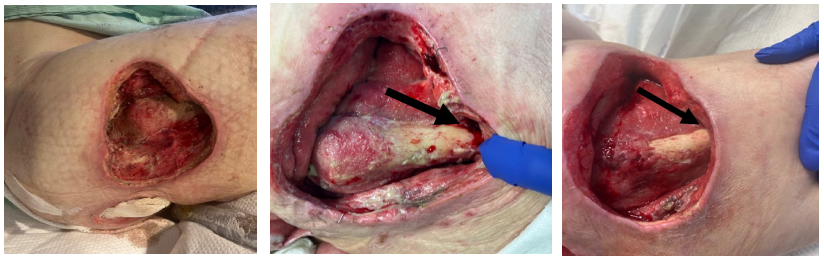
Tunneling wounds created by pressure, infection or surgery are uniquely challenging to the healthcare provider. Reconstruction often necessitates large operations for tunnel marsupialization and/or rotational or free flaps. Often patients are sarcopenic and malnourished, leading to complications or poor outcomes. Patients often progress to hip disarticulation or other amputation. We postulate that operative sterilization of the wound followed by application of a synthetic electrospun fiber matrix can rapidly cause sealing of these challenging wounds, obviating the need for complex reconstruction.

Methods

We present a series of patients (n=11) with challenging wounds from multifactorial sources with a plethora of co-morbidities whose tunneling wounds or large soft tissue flaps were rapidly sealed after a single or serial applications of a synthetic matrix. Wounds were sterilized in the OR first with sharp excision prior to application. MRI or white blood cell sequestration nuclear medicine scans in conjunction with bone spectrometry were used to guide debridement when osteomyelitis was present and to verify resolution of infection after wound closure.

Results

We found that tunneling wounds caused by osteomyelitis and other etiologies, in addition to avulsed soft tissue flaps can be healed without large operative reconstruction. Wounds were anywhere from acute to chronic for >2 years and were traumatic, iatrogenic, or secondary to pressure ulcers with active osteomyelitis. In all cases, the wound healed or the soft tissue flap closed and where possible, post-healing MRI or white blood cell sequestration showed no further evidence of osteomyelitis. Follow up from 6 to 18 months have shown durable results with no further wounds or signs of infection.



A 58-year-old paraplegic male with a pressure injury on the right posterior thigh. The patient had undermining present in the distal portion of the wound. After multiple failed debridements, The SEFM was placed within distal potion of the undermined wound area, as well as the wound bed. One month after initial application, the cavity was sealed.

Resection of a benign pififormis lesion complicated by infection on the right hip, resulting in a tunneling wound. Prior incision and drainage, surgical debridements, and muscle flaps failed. Closure and collapse of the cavity wound was achieved 6 weeks follow initial application of micronized SEFM

An 84-year-old male with peripheral arterial disease and chronic kidney disease sustained a large wound with necrosis wound on the right knee after a fall. 1 liter of hematoma was evacuated leaving an area of undermining over the entire knee. The SEFM was applied to the surface wound as well as the undermined area in conjunction with negative pressure wound therapy (NPWT). The undermining portions of the wound had resolved one month following SEFM application, and the wound bed was significantly re-granulated. Complete closure sure of the entire wound was achieved 23 weeks following initial application

Discussion

An engineered synthetic, resorbable, electrospun fiber matrix in sheet or micronized form is successful in rapid closure of tunneling wounds or large soft tissue envelopes. More studies should be performed to determine patient populations who would be best served by this technique.

Trademarked Items *Restrata® Acera Surgical, Inc., St. Louis, MO