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Progressive Healing and Sustained Closure of an Infected Dehisced Knee Wound After Total Knee Arthroplasty During Use of a Silica-Based Fiber Matrix and Topical Cream

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Abstract

An 81-year-old woman developed a streptococcal postoperative wound infection after total knee arthroplasty (TKA). The anterior knee incision subsequently dehisced. Orthopedic surgery, infectious disease, and wound care clinicians managed the wound with systemic antibiotics, immobilization, and ongoing wound care. On postoperative Day 91, designated Treatment (Tx) Day 0, a twice-daily topical regimen using SiOxD Wound Matrix and SiOxC Cream was introduced as an adjunct to care: the matrix was applied when the injury site was wet, and the cream when the site was covered and dry. Serial photographs documented a persistent dark wound covering during the first month after product initiation, evolving wound-bed appearance at Tx Days 57-121, and progressive closure of the visible wound area through Tx Day 151. The photograph obtained on Tx Day 192 showed an apparently epithelialized scar. At the one-year follow-up after TKA, the treating physician confirmed wound closure, without reported recurrent ulceration or dehiscence. The patient reported no irritation, allergic reactions, maceration, application-related pain, bleeding, recurrent infection, or treatment discontinuations. This case describes sustained wound closure during multidisciplinary care that included adjunctive use of a silica-based matrix and topical cream; the contribution of either product cannot be determined from a single case.

Categories: Plastic Surgery, Therapeutics, Trauma
Keywords: case report, postoperative wound dehiscence, silica-based fiber matrix, surgical wound, topical cream, total knee arthroplasty, wound healing, wound management

Introduction

Wound dehiscence after total knee arthroplasty (TKA) is clinically consequential because breakdown of the soft-tissue envelope can complicate wound coverage and coexist with or raise concern for prosthetic joint infection (PJI). In a prospective multicenter cohort of 1,019 hip and knee arthroplasty patients, moderate-to-heavy drainage in the third postoperative week and new drainage after a week without drainage were strongly associated with PJI, underscoring the importance of careful assessment and coordinated management of postoperative wound complications [1].

Management depends on wound depth, tissue viability, infection status, and exposure of the prosthesis or other deep structures. Options include surgical debridement, systemic antibiotics when indicated, and definitive soft-tissue coverage; negative-pressure wound therapy may be used as a temporary measure in selected cases. Substantial defects or exposed implants may require flap reconstruction. Topical wound products are adjuncts to, rather than substitutes for, appropriate infection management and indicated surgical coverage [2].

SiOxD Wound Matrix is a synthetic silica-based, nonwoven, porous fiber matrix designed to conform to the wound bed, absorb fluid, and support a moist wound environment. Its device description also proposes a scaffold role for cellular infiltration and vascularization [3,4]. SiOxC Cream is a separate topical emulsion containing milled amorphous silica fibers, intended to support hydration of dry intact skin; its instructions exclude use on open or compromised skin [5]. Silica-based fiber wound matrices have been described in case reports involving different wound types. A recent report described use of a matrix and topical cream in a post-Mohs dorsal hand defect, while another described matrix use in a partial-thickness thermal burn [6,7]. These reports provide clinical context for the use of this approach.

We report the course of an anterior knee wound that dehisced after TKA and subsequent surgery for a reported streptococcal infection. The reported twice-daily regimen used SiOxD Wound Matrix when the injury site was wet and SiOxC Cream when the site was covered and dry. Serial photographs document progressive wound contraction and an epithelialized appearance, with physician-confirmed closure at the one-year postoperative follow-up. The case adds a distinct postoperative wound context and extended follow-up to the published case literature.

Case Presentation

An 81-year-old woman underwent TKA. A postoperative streptococcal infection was reported within the first month after surgery. The available clinical history described further surgery to remove infected tissue and close the wound without a skin graft; the wound subsequently dehisced over the anterior knee. A photograph from postoperative (PO) Day 38 showed the postoperative incision with surrounding discoloration; by PO Day 90, an elongated open wound with a substantial dark central covering was visible (Figure *1*). Throughout this report, PO days are referenced to the TKA, and Treatment (Tx) Day 0 corresponds to PO Day 91. The available information was insufficient to classify the infection as superficial incisional, deep incisional, or PJI. Species-level identification, the exact specimen source, diagnostic criteria, detailed operative findings, and implant management details were unavailable for this retrospective report. Prosthetic joint involvement could therefore neither be confirmed nor excluded.



FIGURE 1: Postoperative knee wound before the initiation of SiOxD Wound Matrix and SiOxC Cream

Representative photographs obtained on PO Days 38 and 90 show the postoperative incision and subsequent anterior knee wound dehiscence. Treatment with SiOxD Wound Matrix and SiOxC Cream began on PO Day 91 (Tx Day 0). The dark central covering is described by its visible appearance; the photographs alone do not establish its composition or tissue viability.

The patient received systemic antibiotics followed by oral penicillin. The reported approximately six-month oral antibiotic course and penicillin had been discontinued by PO Day 336. Orthopedic surgery, infectious disease, and wound care clinicians remained involved in her care, with wound care visits reportedly occurring weekly. Immobilization was also part of her management. Standardized baseline and serial wound dimensions (length, width, and depth), documentation of exposed structures, graded drainage assessments, and inflammatory laboratory results were unavailable for this retrospective report. A contemporaneous clinical characterization of the dark central covering was also unavailable. Photographs were therefore assessed qualitatively; no image-derived wound area or percentage reduction calculations were performed.

On PO Day 91 (Tx Day 0), topical care with SiOxD Wound Matrix (silica-based fiber wound matrix; SiOxMed, Winston-Salem, NC) and SiOxC Cream (SBC1; SiOxMed) was introduced as an adjunct to ongoing care (Figure *2*). According to the retrospective application history, the regimen was performed twice daily throughout the treatment period, with product selection based on wound appearance: the fiber matrix was applied to the injury site when wet, and the cream was applied when the site was covered and dry. Daily saline cleansing was also reported by the family. Family members took frequent photographs and communicated with the product team during wound care. Adherence was not prospectively measured, and the report does not include independently corroborated application logs.



FIGURE 2: SiOxMed products used during wound care

(A) SiOxD Wound Matrix packaging. (B) SiOxD Wound Matrix. (C) SiOxC Cream. In the reported twice-daily regimen, the matrix was applied to the injury site when wet, and the cream was applied when the site was covered and dry. These descriptions reflect the application history, not confirmation of complete epithelialization at each cream application.

At approximately Tx Day 20, the wound care clinician reportedly commented on the wound's favorable appearance and advised the family to continue the regimen. This assessment was relayed retrospectively by the family. Serial photographs document the subsequent wound course (Figure *3*). The dark central covering remained visible on Tx Day 20. By Tx Day 57, less dark covering was visible, with more yellow and red tissue apparent. The visible wound area was smaller by Tx Day 86 and continued to contract in later photographs. On Tx Day 121, a smaller wound with predominantly red tissue and areas of pale covering remained; by Tx Day 151, the residual surface defect was narrower. The Tx Day 192 photograph shows an apparently epithelialized scar at the former wound site. For this descriptive report, apparent epithelialization refers to the photographic appearance of surface closure rather than a prospectively verified clinical endpoint.



FIGURE 3: Serial photographs of the knee wound after initiation of SiOxD Wound Matrix and SiOxC Cream

Photographs show the wound on Tx Days 20, 57, 86, 121, 151, and 192, corresponding to PO Days 111, 148, 177, 212, 242, and 283, respectively. Across the series, the visible wound area progressively decreased, with an apparently epithelialized scar in the final photograph. Comparisons are qualitative; no standardized planimetry is reported. Tx Day 192 identifies the documented photographic appearance rather than the exact date of closure.

After the wound had closed and was covered by intact skin, SiOxC Cream was applied to the healed area to maintain hydration during continued tissue maturation. At the one-year postoperative follow-up after the TKA, the treating physician confirmed wound closure. No recurrent ulceration or dehiscence was reported. The patient was reportedly walking without a walker, although knee range of motion remained limited. The patient reported no irritation, allergic reactions, maceration, application-related pain, bleeding, recurrent infection, or treatment discontinuations during the topical treatment period. The principal clinical milestones are summarized in Table *1*.

PO day	Tx day	Event or observation
0	Not applicable	Index total knee arthroplasty
Within the first month	Not applicable	Reported postoperative streptococcal infection
Within the first month	Before initiation	Further surgery and wound reclosure reported; subsequent dehiscence
Within the first month	Before Tx Day 0	Systemic antibiotic treatment followed by oral penicillin
38	Not applicable	Photograph of the postoperative incision (Figure 1)
90	Not applicable	Open anterior knee wound with dark central covering (Figure 1)
91	0	Start of twice-daily topical care: matrix when wet; cream when covered and dry
111	20	Dark covering persisted; favorable clinician assessment reported by family
148	57	Less dark covering; more yellow and red tissue visible
177	86	Smaller visible wound area
212	121	Further contraction; predominantly red tissue with pale covering
242	151	Narrower residual surface defect
283	192	Apparently epithelialized scar in the presented photograph
By 336	By 245	Oral penicillin had been discontinued; exact cessation date unavailable
1-year surgical follow-up	Not exactly dated	Physician confirmed closure; no recurrent ulceration or dehiscence reported. Walking without a walker; limited knee range of motion

TABLE 1: Clinical timeline and treatment milestones

For post-initiation milestones, PO Day = Tx Day + 91. The one-year visit is referenced to the index TKA; an exact visit date is not reported. "By Tx Day 245" does not establish that antibiotics were taken for exactly 245 days.

PO, postoperative day from index TKA; Tx, treatment day from initiation of the topical products.

Written informed consent was obtained from the patient for open-access publication of the de-identified clinical information, patient-generated photographs, retrospective wound analysis, and clinical course described in this report. Clinical information was obtained from retrospective family reports, a contemporaneous family-maintained diary, and time-stamped photographs. SiOxMed supplied SiOxD Wound Matrix and SiOxC Cream to the family, who initiated the topical regimen. The family was in communication with the SiOxMed team on how to use the products in alignment with the instructions for use. The family reported applying SiOxC Cream directly to dry areas of the wound, a use outside the product's FDA-cleared indications and instructions for use, which are limited to dry, intact skin. The reported application practices reflect the family's account of actual product use and should not be interpreted as evidence that all applications were consistent with the product's instructions for use.

Discussion

This case documents progressive closure of a complex anterior knee wound following TKA and subsequent surgery for a reported streptococcal infection. During a twice-daily care regimen that used SiOxD Wound Matrix when the injury site was wet and SiOxC Cream when the site was covered and dry, serial photographs showed a decreasing visible wound area, followed by an apparently epithelialized scar. Wound closure was confirmed by the treating physician at the one-year postoperative follow-up. The course is notable given the patient's postoperative infection and prolonged healing process, although she also received systemic antibiotics, surgical management, immobilization, and regular wound-care follow-up.

The wound was still open on PO Day 90, before the topical products were introduced. Subsequent photographs therefore document improvement after their introduction, but this sequence does not establish

a treatment effect. In particular, the interval from the index TKA is not equivalent to the duration of wound dehiscence, and no standardized pretreatment wound trajectory is reported for comparison. As such, this case cannot determine whether either product accelerated healing, prevented additional surgery, or offered an alternative to negative-pressure wound therapy or flap reconstruction. The family's impression that healing improved after the products were introduced, and the wound care clinician's reported advice at approximately Tx Day 20 to continue the regimen, are encouraging observations. However, both observations were relayed retrospectively by the family and do not provide objective evidence of a treatment effect.

The patient's participation in home wound care, including daily saline cleansing and the reported twice-daily, wound status-directed topical regimen, is also relevant. Repeated topical application was incorporated into a home-care routine alongside reportedly weekly professional wound-care visits. Because the two products were used within the same uncontrolled care regimen, their individual contributions cannot be determined. The patient-reported absence of the specified local symptoms, bleeding, recurrent infection, or treatment discontinuations further supports patient tolerability.

This report has several limitations. It describes one patient and has no comparator group. The infection classification, detailed microbiological and operative findings, standardized wound measurements, drainage assessments, and inflammatory laboratory results were unavailable for this report. The photographic record cannot establish the precise date of complete epithelialization or provide microbiological evidence of infection resolution, although closure was subsequently confirmed by the treating physician at the one-year postoperative visit. Multiple components of care, including surgery, antibiotics, immobilization, clinician-directed wound care, saline cleansing, and both topical products, prevent attribution of the outcome to either product alone. The twice-daily application history and the clinician's early favorable assessment were reported retrospectively; product-specific exposure was not quantified. Safety findings were patient-reported rather than prospectively monitored.

Prospective studies should evaluate the matrix and cream within standardized care protocols, using objective wound measurements, predefined closure criteria, safety monitoring, and follow-up for recurrence and function. Separate recording of each product's application site, frequency, and duration would improve interpretability. Serial culture or microbiome sampling could test whether microbial community changes accompany closure, while adherence measures could assess the feasibility of repeated home application. Comparative trials will be needed to determine whether either product provides benefit beyond usual multidisciplinary care.

Conclusions

In this case, serial photographs documented progressive contraction and apparent closure of a dehisced postoperative knee wound during multidisciplinary care that included SiOxD Wound Matrix and SiOxC Cream. The reported twice-daily home regimen involved active patient and family participation, with matrix application when the injury site was wet and cream application when covered and dry. The treating physician confirmed wound closure at the one-year follow-up after the index TKA; this was not one year after wound closure. The patient reported no irritation, allergic reactions, maceration, application-related pain, bleeding, recurrent infection, or treatment discontinuations. Because the patient also received surgery, antibiotics, immobilization, and professional wound care, the individual contribution of either product cannot be determined. Prospective comparative studies using objective wound measurements, predefined closure criteria, and safety assessment are warranted; longitudinal microbiological sampling could separately investigate whether microbial community shifts accompany wound repair.

Additional Information

Author Contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

Concept and design: Adam M. Jorgensen, William L. Hickerson

Acquisition, analysis, or interpretation of data: Adam M. Jorgensen

Drafting of the manuscript: Adam M. Jorgensen

Critical review of the manuscript for important intellectual content: Adam M. Jorgensen, William L. Hickerson

Supervision: Adam M. Jorgensen

Disclosures

Human subjects: Informed consent for treatment and open access publication was obtained or waived by all participants in this study. **Conflicts of interest:** In compliance with the ICMJE uniform disclosure form, all authors declare the following: **Payment/services info:** All authors have declared that no financial support was received from any organization for the submitted work. **Financial relationships:** Adam Jorgensen, William Hickerson declare(s) employment and stock/stock options from SiOxMed . Drs. Jorgensen and Hickerson are employed by SiOxMed and have equity interest in the company. SiOxMed may benefit financially from the findings in this study. **Other relationships:** All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

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