Application of Umbilical Cord Tissue Allografts in Breast Augmentation Wound: A Case Study and Review of Literature

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Abstract

After significant weight loss, the patient in this study underwent an elective lower body lift in conjunction with a breast reduction and nipple-areolar transplant. The patient experienced postoperative wound dehiscence, creating a large open wound, warranting rapid wound closure to avoid further pain and infection. The patient was treated for eight weeks with conservative measures. After eight weeks of failed attempts to close her wound, she was referred for specialist care.

Upon initial examination, the wound measured 3.5 cm x 3.5 cm x 1.25 cm deep with no sign of epithelialization. After a single dose of Wharton's jelly and twelve hyperbaric oxygen therapy treatments over seven weeks, the wound healed entirely with 100% epithelialization overlying granulation tissue.

This case study demonstrates a precedent for applying Wharton's jelly flowable perinatal tissue allografts in complicated cosmetic post-surgical wounds. Future research efforts will be directed at the application of Wharton's jelly tissue allografts intra-operatively to decrease potential patient suffering, prevent emotional distress during recovery, and reduce unnecessary health care expenses from protracted wound care.

Introduction

•Breast reduction received a recent boom in popularity, with a 49% increase in patients from 2020 to 2021 (1,2).

•Breast reduction surgery is indicated for women experiencing negative symptoms from breast hypertrophy (3,4)

•Minor surgical complications may include hematoma, wound infection, and delayed wound healing. Major complications associated with breast reduction include wound dehiscence, flap necrosis, and nipple-areolar necrosis (5).

•The risk of post- operative infections nearly triples in surgeries exceeding 120 minutes (6).

•While Wharton's jelly is known for microarchitectural framework or extracellular matrix, few reports demonstrate success with application to complicated wounds (7).

•This study demonstrates Wharton's jelly potential to accelerate wound closure time and to prevent postoperative wound dehiscence.

Institutional Review Board Statement

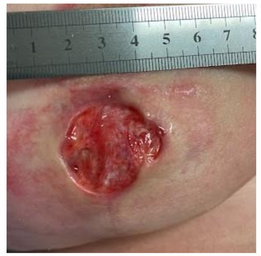
The study was conducted in accordance with the declaration of helsinki and approved by the Institutional Review Board of the Institute of Regenerative and Cellular Medicine (protocol code IRCM-2022-311 and approved on 12 January 2022).

Results

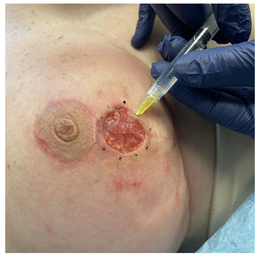
Applying Wharton's jelly allografts proved to be a critical component in timely wound epithelialization and closure with no involvement of infection.

Figure 1. (A-F)

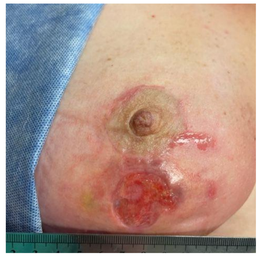
A: 09/01/22



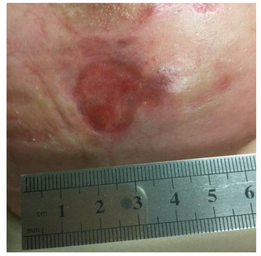
B: 09/02/22



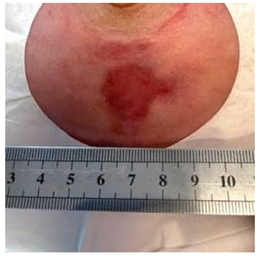
C: 09/07/22



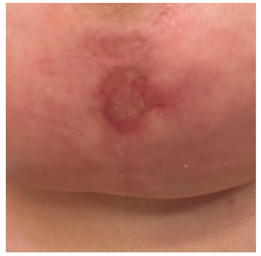
D: 09/14/22

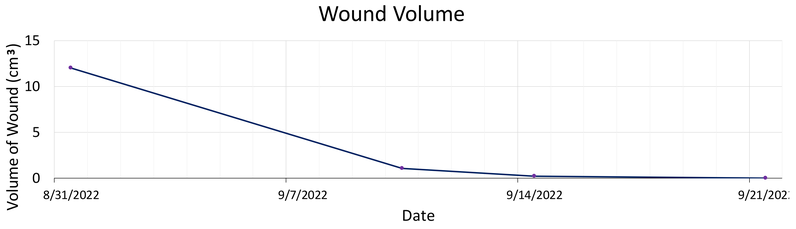


E: 09/21/22 Closed



F: 10/20/22





Date	Area (cm^3)	Measurements (cm)
8/31/2022	12.03	3.5 x 3.5 x 1.25
9/10/2022	1.07	2 x 2 x .5 (43% epithelialization)
9/14/2022	0.21	2 x 2 x .1 (80% epithelialization)
9/21/2022	0	100% epithelialization

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Case Presentation Section

All methods were completed in compliance with the FDA and American Association of Tissue Banks (AATB) standards.

Donation and Collection. Human umbilical cords were obtained from consenting mothers following full-term Cesarean section deliveries who had received medical, social, and blood testing prior to delivery. An independent certified laboratory tested all donations for infectious disease in accordance with Clinical Laboratory Improvement Amendments (CLIA) of 1988, 42 CFR part 493, and FDA regulations. Each birth mother was tested for several bloodborne diseases with an FDA-Approved testing kit. All test results were negative or non-reactive.

Preparation of Processed Umbilical Cord Tissue Samples Product. Wharton's jelly was aseptically dissociated from the rinsed umbilical cord. 100mg of Wharton's jelly was suspended in approximately 2mL of sterile Sodium Chloride 0.9% solution. The sample was not combined with cells, tissues, or articles other than the exceptions outlined in 21 CFR Part 1271.10(a)(3)

Allograft Application. Dr. Meglin, in a private medical setting, administered the allograft application. The skin was sterilized before application. Two ccs of Wharton's jelly flowable allograft diluted in 1cc of sterile saline were applied via 25 gauge needle evenly around the wound. The patient also received three HBOT treatments a week over a four week period starting two weeks prior to allograft application.

Patient History. A 43 year- old female received an elective reduction mammoplasty after losing 35 pounds post pregnancy. Her preoperative breast measurements were 44 DD and postoperative measurements were 44 C. She suffered postoperative wound dehiscence requiring rapid wound closure due to size and location of the wound.

Discussion

As observed in the present case study, the application of Wharton's jelly for the closure of wounds following reduction mammoplasty significantly improved wound closure time. Prior work has demonstrated the role of WJ as an extracellular matrix analog, sharing comparative quantitative and qualitative structure to collagen structural tissue matrices in load-bearing joints, intervertebral discs, and dermis. The average diameter of the skin collagen fibers is about 60 nm, and the average diameter of the WJ fibers is 65 nm. These similarities suggest that WJ is a suitable allograft alternative for the repair and replacement of structural tissue defects in the dermis. Although WJ is a viable tissue allograft, the primary function is the structural tissue supplementation made possible by the collagen matrix that contains hyaluronic acid, growth factors, cytokines, proteoglycans, and other GAGs. The present case provides a foundation for the application of Wharton's jelly allografts for post operative refractory wounds.

Conclusion

•WJ allografts augmented the wound's structural repair process. The patient failed standard-of-care methods for eight weeks

•WJ allograft produces favorable results consistent with current medical literature

•WJ allografts in combination with hyperbaric chamber therapy exponentially aided the overall closure of a necrosed surgical wound

•Further nonrandomized and randomized controlled trials are needed to establish protocols, efficacy based on wound staging, and prevention-based strategies during surgeries

Acknowledgment

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