

## Pioneering technique using Acellular Dermal Matrix in the rescue of a radiation ulcer

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**SUMMARY: Pioneering technique using Acellular Dermal Matrix in the rescue of a radiation ulcer.**

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*Background. Radiotherapy as an adjuvant to mastectomy is integral to the treatment of breast cancer, but can result in skin ulceration. Skin ulceration following radiotherapy is traditionally managed by removing the implant and allowing the skin to heal by secondary intention.*

*Case report. A 42-year-old woman underwent radiotherapy fol-*

*lowing a breast reconstruction. She developed a 2 x 3cm radiation ulcer. The ulcer was managed by removing the implant and performing capsulectomy. A Beckers 50 expander was placed and reinforced with acellular dermal matrix inferolaterally. At follow-up the patient had a good cosmetic outcome.*

*Conclusion. Post-radiation skin ulcers present a challenge to treat with no current standardised management. The use of acellular dermal matrix may present a new technique to promote healing in these testing cases.*

KEY WORDS: Breast Cancer - Radiotherapy - Chronic ulcer - Acellular dermal matrix.

### Introduction

Radiotherapy as an adjuvant to mastectomy is integral to the treatment of breast cancer. Complications of radiation therapy in a reconstructed or implanted breast are well known. These include capsular contracture, implant loss and skin necrosis. The traditional treatment involves removal of the implant and allowing the skin to heal by secondary intention.

We present a case managed in our breast unit where the surgeon salvaged the reconstruction by using acellular dermal matrix.

### Case report

A 42-year-old woman was diagnosed with a locally advanced, multifocal grade 3 invasive ductomucinous cancer of the left breast. The patient underwent a left-sided

mastectomy, a level 3 axillary lymph node clearance and immediate reconstruction using an autologous latissimus dorsi flap reinforced with an implant.

Post-operatively she received chemotherapy and was started on Tamoxifen. The additional benefits and potential risks of adjuvant radiotherapy were discussed at length, specifically the cosmetic consequences. After a lengthy deliberation she chose to undergo radiotherapy. Radiotherapy to the reconstructed breast was given 6 months post-surgery. She received 50Gy in 25 fractions over 5 weeks.

### Follow-up

Her one-year review revealed a 2 x 3cm radiation ulcer at the lower pole of her left breast (Figure 1). The patient was extremely disappointed with this development. Re-exploration of the wound with washout, exchange of implant and capsulectomy was planned.

### Salvage procedure

The unhealthy skin around the ulcer was excised (Figure 2). The latissimus dorsi muscle appeared thinned out. The implant was removed, capsulectomy performed and the cavity washed with saline. A Beckers 50 expander was placed and reinforced with acellular dermal matrix inferolaterally. The overlying healthy skin closed using wise pattern technique (Figure 3).

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*Delayed diagnosed intermuscular lipoma causing a posterior interosseous nerve palsy in a patient with cervical spondylosis: the "priceless" value of the clinical examination in the technological era*



Fig. 1 - 2x3 cm radiation ulcer at the lower pole of breast surrounded by erythematous skin.



Fig. 4 - Final cosmetic outcome.



Fig. 2 - Unhealthy skin around the ulcer is excised.



Fig. 3 - The overlying healthy skin is closed using the wise-pattern technique.

#### **Outcome**

At 6 weeks post operation, the overlying skin appeared healthy, and the patient was pleased with the cosmetic outcome (Figure 4).

#### **Operative notes**

- 1) The triangular skin around punched out ulcer excised and sent to microbiology and histology for analysis.
- 2) No obvious purulent discharge visualised.
- 3) Latissimus Dorsi muscle appeared thinned out.
- 4) The implant was removed and the cavity was thoroughly washed out with saline.
- 5) Capsulectomy performed and sent for histology.
- 6) Becker's 50 expander/implant inserted and reinforced with acellular dermal matrix (Strattice) infero-laterally.
- 7) Suction drains x 2 placed.
- 8) Overlying healthy skin closed using wise pattern technique.
- 9) Lubricant dressing and bra support given.
- 10) Post op: broad-spectrum antibiotics prescribed for 7 days.

#### **Discussion and Conclusion**

"Radiotherapy as an adjuvant to mastectomy is integral to the treatment of breast cancer for both late-stage and early-stage disease" (1). Due to evidence confirming radiotherapy can limit locoregional spread and improve overall survival it is being increasingly offered to patients who have undergone breast reconstruction (2). Ionising radiation targets the rapidly dividing cells, such as tumour cells. But damage to non-cancerous cells results in radiation injury, the most susceptible include skin,



bone marrow and gastrointestinal tract cells (3). Radiation injury to the skin occurs acutely within several weeks or chronically over months-years.

Acute effects of radiation therapy result from cell necrosis. Radiation inhibits the replication of the epidermis, hair follicles and sebaceous glands (4). Clinically, this results in radiodermatitis where the skin is red, dry and oedematous. Ultimately this leads to a reduction in the number of stem cells in the dermis and epidermis. In most cases the stem cells repopulate the area and allow for healing. If this fails, acute ulcers can develop.

Chronic effects of radiation therapy are thought to be due to hypoxia and ischaemia, secondary to progressive obliterative endarteritis of the microvasculature (5). This leads to a thinner, drier, hypovascularised epidermis, which is prone to ulceration from minimal trauma. These delayed ulcers are commoner than acute (4). They heal slowly, a process which often takes several years.

Many studies have identified the increase in complication rate (from two to 15-fold) in implant-based reconstructions subject to radiotherapy compared to those where adjuvant radiotherapy was not used (1). These include capsular contracture, implant loss and of particular relevance to this case, skin breakdown. The traditional treatment is removal of the implant followed by secondary healing of the overlying skin.

Few consistently effective techniques for managing radiation ulcers have been described in the literature. Local wound care is paramount; minimising infection with antiseptics and antibiotics, maintaining a moist environment with dressings and debridement of necrotic tissue (4). Although essential these methods do not always result in wound healing and adjuvant therapies have been described, such as Pentoxifylline (6), hyperbaric oxygen therapy, cytokines and ultimately surgical treatments (7).

Several methods for surgical intervention have been sug-

gested and have shown to be useful from case reports and case series (4). These include simple re-approximation of the wound edges, skin grafts and myocutaneous flaps.

Few, if any case reports have been published following the use of Acellular Dermal Matrix (ADM) in the rescue of a reconstruction. The case presents a technique of salvaging the implant by using ADM in a radiation ulcer.

Recent advances in plastic surgery have led to the development of biological allografts. These are made from human or animal dermis which is purified of any living cellular components. This mesh of collagen matrix is infiltrated by host fibroblasts and host blood vessels and acts as a scaffold for natural tissue growth (8). They are most commonly used in breast implant-based reconstruction between the implant and the poorly-vascularised mastectomy skin (8). This acts to improve consistency and reproducibility of the reconstruction (8).

The evidence of ADM in patients who are due to undergo radiotherapy is still emerging. Early experience indicates that there is no increase in postoperative complications when ADM is subject to adjuvant radiotherapy (1). The presented case highlights the use of ADM to manage a radiation ulcer in a reconstructed breast following radiotherapy. Pre or postoperative radiotherapy does not appear to decrease the ability of ADM to recellularise or re-vascularise (1). It is important to mention that the acceptance of ADM has not been universal. Some surgeons are hesitant to use this novel material due to the potential risk of increased seroma formation and infection (8).

In conclusion, increasing use of radiotherapy in implant-based reconstructions will result in an increase in skin complications. These post-radiation skin ulcers present a challenge to treat with no current standardised management. The use of ADM may present a new technique to promote healing in these testing cases.

## References

1. Israeli R, Feingold RS. Acellular Dermal Matrix in Breast Reconstruction in the Setting of Radiotherapy. *Aesthetic Surgery Journal*. 2011;31(7S):51S-64S.
2. Kronowitz SJ, Robb GL. Advances and surgical decision making for breast reconstruction. *Cancer*. 2006;107:893-907.
3. Herndon DN. *Total Burn Care*. London: WB Saunders, 1996.
4. Olascoaga A, Vilar-Compte D, Poitevin-Chacon A, et al. Wound healing in radiated skin: pathophysiology and treatment options. *International wound journal*. 2008;5(2):246-56.
5. Vivas A, Tang JC, Escandon J. Postradiation Chronic Scalp Ulcer: A Challenge for Wound Healing Experts. *Dermatol Surg*. 2011;37:1693-1696.
6. Futran ND, Trotti A, Gwede C. Pentoxifylline in the treatment of radiation-related soft tissue injury: preliminary observations. *Laryngoscope*. 1997;107:391-5.
7. Iyer S, Balasubramnian D. Management of radiation wounds. *Indian Journal of Plastic Surgery*. 2012;45(2):325-331.
8. Sbitany H, Lanstein HN. Acellular Dermal Matrix in Primary Breast Reconstruction. *Aesthetic Surgery Journal*. 2011;31(7S): 30S-37S.