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Skin Breakdown and Implant Exposure after Laser Treatment for Telangiectasia

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Abstract

Telangiectasia are benign, but esthetically displeasing, skin lesions that commonly develop after external beam radiation therapy. Non-ablative laser therapy is a standard treatment modality for telangiectasia with few serious side effects. However, the local effects are similar to those caused by external beam radiation, and include local inflammation, fibrosis, and increased collagen deposition. These effects may damage the skin overlying implants used for breast reconstruction. Here, we present a series of three cases in which laser therapy of telangiectasia on irradiated skin overlying an implant-based breast reconstruction was associated with skin breakdown and implant exposure. A review of relevant literature is also discussed.

Keywords

Telangiectasia; External beam radiation; Breast reconstruction; Fibrosis

Introduction

Telangiectasia are benign but esthetically displeasing skin lesions. Development of telangiectasiais a well-known complication of radiation therapy for breast cancer [1, 2]. The incidence of telangiectasia formation after radiation therapy for breast cancer is 3-13 percent [3, 4], and after breast reconstruction women may seek treatment of these lesions to improve cosmesis.

Non-ablative laser therapy has been found to be a safe and effective modality for treating radiation-induced telangiectasia [5-7]. These treatments use specific wavelengths of light that are selectively absorbed by the oxyhemoglobin that is abundantly present in cutaneous vascular lesions [8].The thermal energy absorbed by the target causes coagulation, vessel wall necrosis, and perivascular collagen destruction, which eventually lead to destruction of the lesion [9]. Histologic studies suggest that inflammatory and fibrotic changes in laser-treated skin result in increased collagen deposition and possibly overall thickening of the dermal and epidermal layers [10]. The most common modalities used in treatment of telangiectasia are pulsed dye laser (PDL), intense pulse light (IPL), and potassium-titanyl-phosphate (KTP) devices [9, 11].While largely successful, there still exists a small risk of complications, including pain, purpura, edema, dyspigmentation, epidermal disruption and necrosis, and atrophic scarring [6, 9].

Implant exposure and extrusion are rare but serious complications associated with breast reconstruction using tissue expansion and implant placement. Incidence is even higher when expansion and implants are used to reconstruct a previously radiated breast. Radiotherapy is known to cause atrophy, desquamation, and fibrosis of the skin [1, 2, 7, 11], and radiotherapy preceeding reconstruction has been found to be a significant risk factor for wound dehiscence and implant failure [12-14]. In tissue expansion, mechanical stretch stimulates new skin production through the activation of a number of cellular cascades [15, 16]. On the tissue level, this initially results in slight epidermal thickening and significant dermal thinning that tend to correct over time [16]. Prior treatment with radiotherapy inhibits the skin's ability to respond to stretch, and increases the likelihood of skin breakdown and implant exposure after reconstruction [7]. Selective non-ablative laser therapy causes local skin changes that are similar to those caused by oncologic radiation therapy[10], but have not been associated with skin breakdown over tissue expanders, or implant exposure. Here, we describe three cases of this particular complication.

Case Presentation 1

A 60 year-old female was referred to the senior author for delayed breast reconstruction following a left breast mastectomy and radiation for treatment of a primary breast cancer. Her past medical history was significant for obesity and previous bariatric surgery. After a thorough discussion regarding various reconstructive options, the patient elected for a two-stage reconstruction involving re-establishment of the breast mound with a saline-filled tissue expander before definitive implant replacement. The expander was implanted 1 year after the completion of radiation therapy, and final implant insertion (Allergan Inspira N-TRX595g) 9 months thereafter. These surgeries went well, and no complications were noted.

Approximately 9 months after final implant placement, the patient saw a dermatologist for laser therapy to treat a previously-present telangiectasia she had on the breast mound. A 595nm laser was applied during several sessions. The patient reported that there was a scab over the treatment site shortly after therapy. When this scab eventually sloughed off there was a 1 cm defect with exposed implant remaining. She presented immediately to the senior author. To regain closure, two attempts at down sized implant exchange were made before finally removing the implant, excising the wound, and using an advancement flap for defect closure. Unfortunately, despite multiple surgical interventions, the surrounding skin would not heal over the small defect, and a large subcutaneous cavity persisted in spite of regular packing. This was resolved by extending the defect to open the underlying pocket and allow the application of a vacuum-assisted closure (VAC) dressing. While this was successful in closing her wound, it has led to greater scar contracture and thinner areas directly over the radiated bed. She is left with a severe deformity, adherent tissue to the chest wall, and no possibility of local tissue reconstruction in the future. She is currently under consideration for autologous reconstruction.

Case Presentation 2

Our second case is another 60 year-old female referred to the senior author for delayed breast reconstruction. The patient had undergone left sided breast mastectomy and adjuvant chemotherapy and radiation therapy for treatment of a primary breast cancer, and presented approximately 10 years post-operatively. Her past medical history was only significant for type 2 diabetes mellitus. Similarly to

Case 1, a thorough discussion regarding options for reconstruction took place, and the patient elected for two-stage reconstruction. A tissue expander was inserted at the time of mastectomy, and was expanded 5 months of expansion to a maximum of 500cc without incident. The expander was left at this final volume for 4 months before exchange to the final implant (Allergan N-27-FX140-560g). Placement of the final implant was successful and there were no perioperative complications.

Approximately 1 year following implant placement – the patient underwent multiple treatments of laser therapy using a pulsed-dye laser to treat a benign telangiectasia on the breast mound. Shortly after completing these treatments, the patient developed a significant cellulitis, and despite prolonged treatment with IV antibiotics, the wound progressed until there was exposure of her implant. The patient was taken to the operating room for capsulotomy, implant removal and replacement with a smaller implant (Allergan N-27-FX 135-495g). The patient tolerated this well, and has had no further complications, but the result will be esthetically sub optimal because the size and shape are not as symmetrical relative to the contralateral side after implant down sizing.

Case Presentation 3

The final case in our series is a 49 year-old woman with a past medical history significant for hypertension referred for delayed breast reconstruction after mastectomy and radiation for treatment of a primary breast cancer. A tissue expander was inserted approximately 13 months after radiation treatment, and expanded to a final volume of 600cc over 4 months. The final implant, (Allergan N-27-FX 140-560g) was placed after 2months of overexpansion. These procedures were completed as planned, and there were no complications. The patient was satisfied with the results. As with the previous cases, this patient also underwent cosmetic laser treatment with a 595nm laser for a benign telangiectasia on the reconstructed breast mound close to the planned site of the areola 10 months after final implant placement. At her follow-up visit 1 month after laser treatment, there were no abnormalities reported. Then, 2 months later she had tattooing of the areola presented with a cellulitis over the laser treatment site. This caused a minor desquamation at the site, which subsequently became severely infected. The implant was not exposed. She was started empirically on Cephalexin while waiting for a peripherally inserted central catheter (PICC) line for intravenous antibiotics. After 6 weeks of antibiotic therapy, the cellulitis had resolved. The implant was salvaged, and although this patient is satisfied with the shape and size match, there is grade II-III capsular contracture in the reconstructed breast.

Discussion

Non-ablative laser removal of telangiectasia using pulsed-dye lasers or intense pulsed light is a commonly used and effective technique. It has proven to be especially helpful in correcting esthetically displeasing telangiectasia that may arise following radiation therapy for breast carcinoma [5-7].Common complications include pain, purpura, edema, infection, and dyspigmentation; rare but more serious complications such as blistering, epidermal necrosis, and atrophic scarring may also occur[6, 9]. Wound dehiscence and implant exposure have not previously been associated with laser treatment of radiation-related dermatitis. However, here we describe three cases demonstrating this association.

Radiotherapy is known to increase the frequency of complications associated with alloplastic breast reconstruction [12-14,16]. In particular, rates of reconstruction failure were 28 to 37 percent in previously irradiated patients as opposed to eight to ten percent in non-irradiated patients 12-14; our

failure rate in this setting is approximately 11%. Frequency of wound dehiscence has been shown to rise from 1.8 to 23.5% with prior radiotherapy [13]. Following radiation, skin changes including atrophy, desquamation, fibrosis, and decreased ability to respond to stretch have been described, providing a likely explanation for the increase in risk of complications following reconstruction [1, 2, 7, 11].

In addition to the skin changes found following breast irradiation, tissue expansion stimulates new skin production viastretch, resulting in epidermal thickening but also significant thinning of the dermis [16]. Given these chronic changes to the characteristics of irradiated and expanded skin, it is plausible that laser therapy of telangiectasia in irradiated and expanded skin has an increased risk of skin ulceration, necrosis, and possibly implant exposure.

In the cases described above, each patient had undergone delayed breast reconstruction of an irradiated breast successfully, and did not encounter any documented post-operative complications. However, following laser therapy of telangiectasia on the reconstructed breast mound, these patients developed infections that in two cases led to the exposure of the implant. Periprosthetic infections are well described by Spear et al [18]. The management of the cases in this report follow the recommendations outlined by Spear et al: Cases 1 and 2 represent Spear type 6 infections (device exposure with mild infection). These were treated, as outlined by Spear et al, with antibiotic therapy, capsulectomy, device exchange with downsizing. This was successful in one case, but the other required removal of the implant with no plans to replace. Our third case represented a Spear type 2 infection (severe cellutlitis) that resolved with prolonged antibiotic therapy as described by Spear et al [18].

A patient seeking out cosmetic treatment of a telangiectasia on their newly reconstructed breast mound is likely a sign of a satisfactory reconstruction. However, the examples presented in this series should serve as a warning to the reconstructive surgeon: Although non-ablative laser therapy is an effective modality for the treatment of radiation-related telangiectasia, and is not commonly associated with chronic complications, we have observed a correlation between this treatment and periprosthetic infection and implant exposure. Our work also provides examples of the successful application of the classification and treatment of periprosthetic infections outlined by Spear et al [18]. Our consultation with patients has benefitted from this experience, but future research regarding the true incidence, and pathophysiology of this phenomenon will improve our understanding and help provide better care.

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