Ultrasound in a Treatment Protocol for the Postoperative Red Breast in Implant Based Breast Reconstruction

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Introduction

Patients undergoing implant based breast reconstruction that return postoperatively with a red breast can present a diagnostic challenge. Six of the most common causes of red breast include seroma, hematoma, infection, radiation, vascular insufficiency, and acellular dermal matrix hypersensitivity (red breast syndrome). A focused approach to the evaluation of a red breast is vital in ruling out pathology that warrants expander explantation. Understanding of the entities that may lead to a red breast in the postoperative period and a protocol for evaluation and treatment is essential in differentiating those patients who need emergent exploration, drained for salvage, or have no infectious processes.

Postoperative Infection

• Most common postoperative cause of erythema following breast reconstruction utilizing tissue expanders
• Rate of infection
  - 5.7% for first stage expander
  - 2.5% for second-stage
  - 9.9% for direct-to-implant reconstruction
• Risk factors for infection:
  - BMI greater than 30, Aesthetic ADM, diabetes, seroma formation, mastectomy skin flap necrosis
• Average time to infection: 30.7 days post operatively
• Presentation:
  - Erythematous, painful breast, with or without fever
  - Induration and a poorly defined expanding margin or erythema
• Elevated serum markers of inflammation:
  - WBC, ESR, CRP

Etiology:

• Staphylococcus epidermidis: most common cause of postoperative infection
• Biofilm formation
• Group B strep
• Morganella morganii

Treatment:

• Oral broad-spectrum antibiotics for treatment of superficial infections proximal to the incision.
• Levofloxacin or Ciprofloxacin
• IV antibiotics for treatment of evolving infections or infections diffuse at presentation
• Vancomycin, Gentamicin, Imipenem
• Antibiotic therapy failure → explantation

Radiation

• Adjuvant radiation therapy as a component of breast cancer treatment
• Radiation dermatitis
  - acute, subacute and chronic
  - Incidence: 80% of patient experience moderate to severe radiation dermatitis
• Diagnosis: thorough history and physical with emphasis on radiation exposure
• Treatment: meticulous skin hygiene, moisturization, topical application of hydrocortisone and aloe vera gels

Seroma/Hematoma

• Seroma
  - Incidence: 15-90%
  - Commonly transient with spontaneous resolution
• Hematoma
  - Incidence: 1-6%
  - Presentation:
    - Different etiologies presenting as a similar clinical picture
    - Erythematous, tender, enlarging breast
    - Large underlying fluid collection may lead to a firmness of the overlying breast
  - Timing:
    - Hematoma: within the 1st week of surgery
    - Seroma: variable
• Diagnosis: Ultrasound of the breast
• Treatment:
  - Prevention:
    - Hematoma: systematic and thorough hemostasis
    - Seroma: drain placement
  - Interventional management
    - Hematoma: open drainage and hemostasis
    - Seroma: needle aspiration

Necrosis

• Incidence: up to 7% of implant based breast reconstruction
• Risk factors: smoking, large breast size, obesity
• Presentation:
  - Pale breast flaps secondary to vascular insufficiency
  - Montel and congested skin from venous outflow obstruction
  - Erythema and blistering with necrosis followed by eschar formation
• Treatment:
  - Prevention: intraoperative monitoring of flap perfusion, avoidance of tissue expander overfill
  - Excision of non-viable skin and closure of the wound

Acellular Dermal Matrix Hypersensitivity (Red Breast Syndrome)

• Noninfectious erythematous breast occurring in breast reconstructions with acellular dermal matrix
• Presentation:
  - No fever, pain, warmth and other signs of acute infection
  - Erythema limited to the area over the site of acellular dermal matrix
• Incidence: unknown due to difficulty differentiating RBS from other causes of breast erythema postoperatively
• Prevalence: 3-10% of women who present with a red breast post ADM implantation
• Diagnosis of exclusion
• Treatment:
  - Corticosteroids
  - Motulskak
  - Self limited process that resolves over months to weeks

References: See attached sheet

Discussion

As multiple entities may present as a red breast, a strategic protocol for use in the workup and treatment of the patient presenting with breast erythema during the postoperative period is useful. The protocol’s intent is to efficiently and effectively identify flap necrosis or an infectious process that would mandate operative intervention and allow for the potential for device salvage where prudent. A history and physical examination identifies flap necrosis and radiation dermitis. An infectious process requires either explantation or an attempt at treatment and salvage. The treatment algorithm (Figure I) developed guides decision making during this process. Evaluation generates a data set that includes vital signs, markers of inflammation including leukocyte count, CRP, and a breast ultrasound. The breast ultrasound will identify a periprosthetic collection that likely represents an abscess not likely to respond to antimicrobials. Morbidity associated with infected periprosthetic infections includes lengthy hospitalizations, readmission, and delay of chemotherapy. As such, it is generally more prudent to move to explantation in this setting. Those patients with no periprosthetic collection who are hemodynamically normal, may then be trialed on IV antimicrobials. Serologic and clinical improvement is anticipated over the next 48 hours in those devices that are salvaged. Plateaueing of status or progression of the process warrants explantation.

Figure 1: Treatment Protocol for the Postoperative Red Breast in Implant Based Breast Reconstruction