**Case Report**

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# Long Standing Intercostal Drainage a Boon or a Curse: Our Experience

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## Abstract

Seroma, wound infection, skin flap necrosis, nipple necrosis (after nipple-areolar sparing mastectomy [NSM]), are all complications of mastectomy. ICDs (intercostal chest drains) are frequently employed in medical, surgical, and critical care settings. Incorrect placement or management of intercostal chest drains can lead to significant morbidity and even mortality. The risk of acquired infection is directly proportional to the duration of ICD placement in-situ. For patients with sepsis and septic shock, therapeutic priorities include securing the airway (endotracheal intubation and mechanical ventilation), correcting hypoxemia, and establishing vascular access for the early administration of fluids and antibiotics. Hence, ICD tubes that are kept in-situ for a long duration must be managed according to the approved guidelines by qualified personnel and under adequate supervision.

**Keywords:** MRM complications; ICD (Intercostal chest drains); Sepsis; Tube Thoracostomy.

## Introduction

An Modified Radical Mastectomy(MRM) is a complete removal of the breast and the underlying fascia of the pectoralis major muscle, along with the level I and II axillary lymph nodes. Seroma, wound infection, skin flap necrosis, nipple necrosis [after nipple-areolar sparing mastectomy (NSM)], chest wall pain, phantom breast syndrome, and arm morbidity are all complications of mastectomy. After breast and axillary surgery, seroma development (a collection of serous fluid under the skin flaps) is prevalent.[1,2] Untreated seroma formation results in delayed wound healing, wound infection, wound dehiscence, flap necrosis, delayed recovery, and poor cosmetic outcome.[3]

ICDs (intercostal chest drains) are frequently employed in medical, surgical, and critical care settings. Incorrect placement or management of intercostal chest drains can lead to significant morbidity and even mortality. In 1 to 3 percent of patients, pneumonia or empyema complicate the insertion of a thoracostomy tube or catheter. Increasing duration of tube or catheter placement and retained hemothorax increases the risk of infection, which is more common in patients sustaining penetrating chest trauma.[4,5]

Sepsis is a clinical syndrome characterized by systemic inflammation due to infection Sepsis can range in severity from infection and bacteremia to sepsis and septic shock, all of which can result in multiple organ dysfunction syndrome (MODS) and mortality. Septic shock is a type of vasodilatory

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or distributive shock. Septic shock is defined as sepsis that has circulatory, cellular, and metabolic abnormalities that are associated with a greater risk of mortality than sepsis alone. For patients with sepsis and septic shock, therapeutic priorities include securing the airway (endotracheal intubation and mechanical ventilation), correcting hypoxemia, and establishing vascular access for the early administration of fluids and antibiotics.

## Case Report

A 61 year old female, known diabetic on treatment, was diagnosed to have Carcinoma right breast 10 years back following which she underwent right modified radical mastectomy (MRM) ; HPE reported invasive ductal carcinoma(IDC)-T2N0M0. She then received adjuvant chemotherapy and radiotherapy. Post RT she was started on hormonal therapy (tamoxifen from 2012-2015 and letrozole from 2015-2018).

10 years later (2021), she developed pus discharge from the MRM scar and eventually an ulcer formed; gradually progressed to maggots infestation. PET-CT taken showed osteoradionecrosis and osteomyelitis of right chest wall (3,4,5,6 ribs).

She then underwent debridement for the same with resection of right chest wall along with the involved ribs with reconstruction with bovine pericardium and Latissmus Dorsi (LD) flap; ICD tube was inserted Post surgery; she developed flap necrosis(infected); underwent wound debridement and VAC therapy.



**Fig. 1:** Image depicting post MRM flap necrosis with muscle exposed; purulent drainage in ICD (subxiphoid position).

Following this, she was admitted in our institution with ICD in-situ (unchanged). On examination ICD tube was found to be placed in right sub-xiphoid position (figure 1) with normal column movement(2cm) (no air leak/bleeding) and pus draining. LD flap status: skin necrosis with muscle exposed (figure 2).



**Fig. 2:** image showing flap necrosis with exposed muscle and scar site infection.

Cross-consultations were taken from general medicine, Pulmonary. Medicine, CTVS, psychiatry and orders were followed. Patient then underwent 2 procedures and ICD tube was removed during the second procedure on CTVS opinion despite empyema.



**Fig. 3:** Image showing patient admitted and managed in ICU.

3 days later patient went into septic shock and initial resuscitation was given. Attenders were not willing for endotracheal intubation and mechanical ventilation (figure 3), despite being counselled regarding the morbidity and mortality of their decision (informed consent was taken). Patient eventually succumbed later in the evening and was declared.



**Fig. 4:** Patient receiving O2 by mask; attenders not willing for intubation and mechanical ventilation.

## Discussion

### *MRM-Complications*

The rates of postoperative wound infection after breast surgery are low because these are clean procedures.[6] In a study conducted, the wound infection rate after breast surgery was 2.9 percent in a study of 1400 patients.[7] Obesity, smoking, older age, and diabetes mellitus have been identified to be associated with an increased risk of infection after breast surgery.[8] Smoking increases the risk of wound infection fourfold after breast surgery.[9]

A meta-analysis of 2587 surgical breast procedures found a wound infection rate of 3.8 percent.[10] The majority of infections are staphylococcal infections produced by skin flora.

Most postoperative cellulitis can be treated with oral antibiotics, but nonresponsive or extensive infection requires intravenous antibiotics. A small number of postoperative infections will develop into an abscess requiring drainage by reopening the original surgical incision.

The rate of skin flap necrosis from modified radical mastectomy (MRM) or simple mastectomy is estimated at 10 to 18 percent.[11,12] Full-thickness skin flap necrosis requires surgical debridement and may require skin grafting and result in delays in adjuvant treatment and diminished cosmetic outcome.[13] Prior radiation treatment, obesity, older age, and a smoking history can increase the rates of flap necrosis. Technical methods of decreasing the risk of skin flap necrosis include minimizing the use of electric cautery method in dissection, maintaining appropriate skin flap thickness, and avoiding tension on closure of the incision.

Postmastectomy radiation is indicated for patients at high risk for local recurrence, such as T4 tumors and patients with positive margins and/or positive axillary lymph nodes. If postmastectomy radiation is likely, the choice of mastectomy type, choice of the reconstructive approach, and optimal timing of the breast reconstruction (immediate versus delayed) may be affected. Thus, preoperative coordination of care between the breast surgeon, the reconstructive surgeon, and the radiation oncologist assures the best outcome. Prior to mastectomy, an SLN biopsy can potentially be helpful in determining which patients would require postmastectomy radiation.

Radiation therapy kills cancer cells by producing DNA damage, which leads to cell death. Tumor cells are particularly vulnerable to radiation damage because they commonly develop abnormalities in the DNA repair mechanisms that allow healthy cells to recover from radiation damage. Excessive radiation doses, on the other hand, can overwhelm even normal cells with DNA damage, resulting in local tissue alterations and necrosis. During cancer treatment, osteoradionecrosis (ORN) is a significant consequence of radiation therapy in which radiated bone becomes necrotic and exposed.

A weakened immune system, or immunosuppression, is one of the numerous potential adverse effects of cancer and its therapies, making the person prone to infections.

## ICD

Collop et al1 reported a 3% early complication rate, which included misplacement and pneumothorax, and an 8% late complication rate, which included dislodgement, infection, and kinking, in 1997.

The clinician's experience and training, the indication for placement, and the conditions under which the tube is inserted all influence morbidity and mortality after thoracostomy tube or catheter placement (ie, elective versus emergency).[14,15] Malposition, infection (eg, empyema, pneumonia),

intercostal nerve or artery injury, organ injury (eg, lung, diaphragm, heart, liver, or spleen), and pulmonary edoema associated to re-expansion pulmonary edoema are all complications of thoracostomy tube or catheter implantation (RPE). In 1 to 3 percent of patients, pneumonia or empyema complicate the insertion of a thoracostomy tube or catheter. Increasing duration of tube or catheter placement and retained hemothorax increases the risk of infection, which is more common in patients sustaining penetrating chest trauma.[4,5]

### *Septicemia*

A dysregulated host response to infection causes sepsis, a clinical condition characterised by physiologic, biologic, and biochemical abnormalities. Multiple organ failure syndrome and mortality can result from sepsis and the inflammatory response that follows. From sepsis to septic shock, there is a spectrum of severity. When shock is present, mortality has been estimated to be between 10% and 40%, according on the population investigated.[1,2]

In the care of patients with sepsis and septic shock, securing the airway (if needed), treating hypoxemia, and obtaining venous access for the early delivery of fluids and antibiotics are all essential.[3,4] Routine laboratory studies, serum lactate, arterial blood gases, blood cultures (aerobic and anaerobic) from two distinct venipuncture sites and from all indwelling vascular access devices, cultures from easily accessible sites (Example; sputum, urine), and imaging of suspected sources should all be obtained simultaneously (within 45 minutes) and it should not delay the administration of fluids and antibiotics.

The cornerstone of initial resuscitation is the rapid restoration of perfusion and the early administration of antibiotics.

- Tissue perfusion is predominantly achieved by the aggressive administration of intravenous fluids (IVF), usually crystalloids (balanced crystalloids or normal saline) given at 30 mL/kg (actual body weight), started by one hour and completed within the first three hours following presentation.
- Empiric antibiotic therapy is targeted at the suspected organism(s) and site(s) of infection and preferably administered within the first hour.

Following the administration of fluids and empiric antibiotics, the treatment response should be monitored on a regular basis. Most patients respond to basic fluid therapy within the first 6 to 24 hours, but resolution can take days or weeks. The response has the largest impact on fluid management, but it can also have an impact on antimicrobial therapy and source control. The most valuable strategy for source detection is a focused history and inspection. Following early investigations and empiric antibiotic therapy, all patients with sepsis should undergo additional efforts aimed at identifying and controlling the source(s) of infection.

## Conclusion

In our case the mortality of the patient can be attributed to post chemoradiation immunosuppression making the patient susceptible to infection (SSI and osteomyelitis); Unchanged ICD in-situ for almost a month; removing the ICD despite empyema in-situ; unwillingness of the attenders for intubation and mechanical ventilation.

Intercostal chest drains (ICD) are widely used throughout the medical, surgical and critical care specialties. Incorrect placement or management of intercostal chest drains can lead to significant morbidity and even mortality. Increasing duration of tube or catheter placement and retained hemothorax increases the risk of infection; hence, ICD tubes that are kept in-situ for a long duration must be changed at regular advised intervals.

### *National Patient Safety Association Advice 2009*

Following the evidence of harm, the NPSA issued a rapid response report.[8]

This encourages acute hospital trusts to develop local policies to ensure that:

Chest drains are only inserted by staff with relevant competencies and adequate supervision.

Ultrasound guidance is strongly advised when inserting a drain for fluid.

Clinical guidelines are followed and staff made aware of the risks.

Identify a lead for training of all staff involved in chest drain insertion.

Written evidence of consent is obtained from patients before the procedure, wherever possible.

Local incident data relating to chest drains is reviewed and staff encouraged to report further incidents.

Sepsis exists on a continuum of severity ranging

from infection and bacteremia to sepsis and septic shock, which can lead to multiple organ dysfunction syndrome (MODS) and death. For patients with sepsis and septic shock, therapeutic priorities include securing the airway (endotracheal intubation and mechanical ventilation), correcting hypoxemia, and establishing vascular access for the early administration of fluids and antibiotics.

When ever a morbidly sick patient is being transferred to a higher-level care center there should be a checklist of standard precautions that are associated with patient safety. UK National Patient Safety Agency (NPSA) has proposed a set of guidelines and rapid response report in 2008 to improve clinical care to minimise the associated with ICDs insertion (Figure 5).[17]

**Conflicts of Interest:** Nil

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