Evolution of Operative Technique for Mastectomy

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KEYWORDS

• Mastectomy • Technique • Nipple-sparing mastectomy • Breast cancer

KEY POINTS

- For the majority of the twentieth century, radical or modified radical mastectomy was the recommended mastectomy for surgical treatment of breast cancer.
- However, research has shown that extensive surgical resection does not improve survival breast cancer patients and therefore the surgical mastectomy has evolved.
- Today, the majority of patients can undergo nipple or skin sparing mastectomies, offering patients improved cosmetic results without oncologic compromise.

INTRODUCTION

Approximately 252,710 women and 2470 men in the United States were diagnosed in 2017 with invasive breast cancer. The mainstay of the treatment of breast cancer continues to be surgical: breast-conserving surgery, typically with adjuvant radiation, or mastectomy. Increasing numbers of patients eligible for breast-conserving therapy (BCT) are choosing to undergo mastectomy and breast reconstruction.[1] Today, nearly 40% of all women undergo mastectomy for breast cancer.[2] Recently, there has also been a trend of BCT-eligible patients choosing mastectomy and prophylactic mastectomy.[3] Also, as more genetic mutations have been identified that increase a woman's risk of breast cancer, mastectomy provides an opportunity for breast cancer prevention for mutation carriers.

Today, survival rates are the highest ever with more than 6 million people worldwide alive 5 years after their diagnosis.[3] Ever-increasing in number, survivors of breast cancer appropriately desire to return to a sense of normalcy as soon as possible; minimization of surgical scars and maximization of cosmetic results facilitates this return. Disfiguring surgeries are a daily reminder to patients of their struggle with breast

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cancer. As a consequence, surgeons have increasingly sought to maximize cosmetic results without compromising oncologic outcomes; as a result, the mastectomy has evolved over time.

HISTORICAL BACKGROUND

The Edwin Smith Papyrus, dating back to 3000 BC, contains the first known reference to breast cancer. Among 48 accounts of injuries, wounds, and tumors, it describes a case of "swellings on breast, large, spreading and hard: touching them is like touching a ball of bandages."[4] When addressing possible treatment, the investigator notes, "there is nothing."[3] In 400 BC, Hippocrates began to conjecture the causes of many medical ailments and hypothesized that breast cancer was due to having an excess of black bile. Galen of Rome promoted ridding the body of this black bile by allowing surgical wounds to bleed freely. Leonides of Alexandria, a physician of ancient Greece, performed the first operation for breast cancer using the escharotomy method, which involved alternating incision and cautery. During the Renaissance, John Hunter, the Scottish father of investigative surgery, replaced Hippocrates' black bile theory with the theory that lymph was the cause of breast cancer.[5] In the 1800s, the causes of breast cancer remained poorly understood. Surgeries were often fatal, largely because of sepsis; debate raged on whether breast cancer was an infectious disease whose spread was only quickened by surgery or whether surgery was the best hope for cure.[6] Early theories, investigations, and surgeries laid the framework for the modern era of surgical treatment of breast cancer, which was led by Dr William Halsted.

RADICAL MASTECTOMY

History

In 1882 at the Roosevelt Hospital in New York City, Dr William Stewart Halsted introduced the radical mastectomy (RM) using new techniques of anesthesia, aseptic, and antiseptic.[7] Halsted[8] went on to publish his experiences at Johns Hopkins Hospital in November 1894. Willie Meyer of the New York Graduate School of Medicine independently performed the RM in 1884 and published his technique merely 10 days after Halsted's article.[9] The Halsted mastectomy, as it became known, was an aggressive surgery aimed at achieving local control under the premise that cancer spreads centrifugally from the breast to the pectoralis muscles and regional lymph nodes first, followed by more distant sites.[10] Morbidities included large wounds that were left to heal by granulation, nearly universal lymphedema, and severely restricted arm movement, all of which led to chronic pain syndrome. However, because surgeons more than a century ago were faced with large cancers that seemed to require extreme treatment for a chance of cure, postoperative complications were of little consideration.[10] Despite this aggressive approach, survival rates improved but remained poor, ranging from 13% to 40% at 5 years.[11] RM remained the gold standard for breast cancer through much of the twentieth century and was performed on more than 90% of patients with breast cancer in the United States until the 1970s, with local and regional recurrence rates of 6% and 22%, respectively.[12,13]

Extended Radical Mastectomies

Some furthered the Halsted-Meyer theory that breast cancer disseminated through the lymphatic system by advocating for extended RMs. From 1920 Samson Handley performed an extended RM that included removing the internal mammary chain lymph