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Mastectomy—A Critical Review

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Abstract

History of breast cancer dates back to at least 1600 B.C. and treatment methods have undergone significant progress over the last hundred years. We are moving away from frighteningly radical, and towards increasingly more conservational breast cancer surgery. And while mastectomy is no longer a first-line choice for all breast cancers, it is still an important and, really, an essential procedure to discuss and research about. Different types and techniques exist and evidence regarding each is vast-with novel techniques appearing even nowadays. For example, robotic surgery is increasingly more common in many surgical specialties and procedures, and mastectomy is no exception. With several high-profile celebrities recently discussing their experiences of breast cancer and mastectomies, this article covers a multitude of essential aspects relevant to this topic, in turn, hopefully, helping patients and doctors deal with the diagnosis and plan the treatment accordingly. Current breast cancer care and mastectomy trends are also discussed here, giving the readers an up-to-date overview of how breast cancer can and should be managed.

Keywords

Mastectomy, Breast Cancer, Halsted Mastectomy, Patey Mastectomy, Total Mastectomy, Skin Sparing Mastectomy, Breast Conserving Surgery, Prophylactic Mastectomy

1. Introduction

Breast cancer has been a hot topic over the last few decades, and the public are much more aware of it now than they have been before. Celebrities have publically spoken out about having breast cancer genes (BRCA 1 or 2) and subsequently electing to have mastectomies. In particular, Angelina Jolie and her prophylactic bilateral mastectomy, were highly discussed in the press-similarly; Sharon Osbourne, Christina Applegate and Shannen Doherty also became the centre of attention after admitting to having breast cancer and proceeding with

mastectomies.

Breast cancer screening has really become ingrained in our culture, and patients, in general, tend to know more about their diagnosis and treatment planning-potentially because resources nowadays are way more readily available. Patients are more inclined to ask and enquire about their options, indications and possible complications after they are diagnosed with breast cancer, with internet being a huge source of information for them.

Mastectomy is not always the treatment of choice and will usually be used in tumours that are large, compared to the breast size, or tumours that have recurred.

Various types of mastectomy exist and these different types and techniques tie in nicely with the history of breast cancer and breast cancer surgery. From very radical to conserving-that could be the general description of trends in breast cancer surgery over the last hundred years or so. Nowadays, many patients who undergo mastectomy will expect breast reconstruction and a satisfactory cosmetic result.

Our article touches on all the above topics-from the history of breast cancer, through types and techniques, indications, complications, patient expectations and current trends, and also discusses breast reconstruction.

2. History of Breast Cancer and Mastectomies

Breast cancer is claimed to be one of the oldest cancers described in literature and its history dates back to at least 1600 B.C., when eight breast "growths" were described in "Edwin Smith Surgical Papyrus" [1].

Hippocrates also spoke about breast cancer and indeed claimed an association between menstruation and breast cancer [1]. In Roman times, Galen of Pergamum spoke about humoral theory in breast cancer and attributed the aetiology to bile excess [1]. Leonides was the first to describe nipple retraction in breast cancer, and Michael Servetus was the first to describe removal of axillary nodes and pectoralis major [1].

However, it was only in 1894-now more than 120 years ago-that Halsted wrote about radical mastectomy and this was a great leap forwards in the treatment of breast cancer [1]. For many years afterwards, this was the "gold standard" treatment of breast cancer. Halsted removed the breast with the skin, the axillary nodes, the pectoralis major muscle and at times cleared the supraclavicular area, too. Later on in early 20th century, François Baclesse and Robert McWhirter advocated for less extensive surgical approaches, combined with radiation, claiming that the results achieved were the same [1]. In mid-20th century, however, a step backwards was taken, and extended radical mastectomies were suggested, which included removal of internal mammary, supraclavicular, mediastinal lymph nodes-these extensive surgeries did not lead to better survival and, unfortunately, had high peri-operative mortality [1]. Later, Patey introduced a conservative radical ("modified radical") mastectomy, which suggested pectoralis major should only be removed if it was directly involved with cancer [1].

Later, randomized controlled trials were undertaken to investigate conserva-

tive surgery with radiotherapy versus radical mastectomy and survivals were shown to differ depending on the stage of disease-however, this is covered in more detailed later on in the article.

3. Types and Techniques

Several types of mastectomies have been described; however the most common one is simple mastectomy – where it becomes necessary due to patient choice, size of the tumour or recurrence following conservative surgery (e.g. wide local excision with axillary surgery and radiotherapy).

3.1. Halsted's Radical Mastectomy

A radical (Halsted) mastectomy is a type of mastectomy, where breast tissue, Pectoralis major and minor muscles, and all axillary tissue are removed [2]. This is extensive surgery and, not surprisingly, there is an article describing the reaction of a woman who underwent a Halsted mastectomy back in 1971, "I went to the hospital feeling perfectly healthy and came out grotesquely mutilated-a mental and physical wreck" [3]. Halsted mastectomy is now performed only in cases, where the cancer has spread to chest wall muscles or recurrent disease involving Pectoralis muscles.

3.2. Patey's Mastectomy

A modified radical (Patey) mastectomy is a type of mastectomy, where breast tissue and Pectoralis minor are removed, together with axillary nodes [2]. This type of procedure is performed on more invasive tumours with involved axillary nodes for the ease of and completeness of axillary clearance. The removed lymph nodes can then be examined for cancer spread.

3.3. Total or Simple Mastectomy

A total or simple mastectomy is a type of mastectomy, where breast tissue and involved skin are removed with or without axillary surgery. Pectoralis fascia is usually preserved and axillary tail is normally always removed. Patients are usually left with two drains in situ [2]. This is the most common type of mastectomy and is used in patients who cannot be managed with breast conserving treatments, e.g. patients with larger tumours (compared to breast size) or those who had radiotherapy to chest wall in the past.

3.4. Skin Sparing Mastectomy ± Nipple Sparing Mastectomy

A skin-sparing mastectomy is on the rise and it is a type of mastectomy where the breast tissue is removed, but skin envelope is preserved [2]. Similarly, a nipple-sparing mastectomy allows for preservation of the skin envelope and the nipple areola complex (NAC), and this is followed by breast reconstruction. This is only performed on patients with small tumours that are far away from the nipple or for the cases where a prophylactic mastectomy is required in patients with genetic mutations or high risk family history. Complications do happen,

and nipple ischaemia and malposition are the two main ones to be aware of. Patients need to be counselled and consented regarding this before the procedure. Moreover, all the pros and cons of the prophylactic mastectomies need to be taken into consideration. Patients should be referred to a psychologist to assess the impact of the procedure and to ensure that the patient is fully aware of the complications and also the small chances of having carcinoma of the breast despite the mastectomy (Table 1).

4. Complications

Complications do occur in mastectomies and are worth a mention. Haematoma is a serious complication and patients need to be closely monitored postoperatively for this. Patients may have to go back to the operating theatre for evacuation of the haematoma, with prompt identification and control of the source of bleeding. In addition, infection, seroma, necrosis of skin flaps and recurrence of cancer on the mastectomy skin flaps are also a potential problem. Recurrence is more likely in younger patients, multifocal or poorly differentiated tumours, lymphovascular invasion and extensive Ductal Carcinoma in Situ (DCIS) at the margins [2].

Table 1. Comparison between types of Mastectomy.

	Halsted's radical mastectomy	Patey's mastectomy	Total or simple mastectomy	Skin-sparing mastectomy
Started in…	1882	1948	Around 1977	1990s
Extent	Breast tissue, Pectoralis major and minor, all axillary tissue removed	Breast tissue, Pectoralis minorand axillary nodes removed	Breast tissue and involved skin removed; with or without axillary surgery	Breast tissue removed, but skin envelope preserved (nipple may also be preserved)
Usage	Extremely rare cases nowadays, e.g. tumour spread to chest wall	More invasive tumours	Most common type of mastectomy	Small tumours only
Essential risks and complications	Extensive scars, lymphoedema, reduced shoulder mobility	Lymphoedema, seromas, haematomas	Seromas, haematomas, flap necrosis	Recurrence, nipple ischaemia or malposition
Important patient outcomes	Life changing, with significant decrease in quality of life	Significant risk of lymphoedema which may markedly reduce quality of life	Negative effect on esteem, sexual attraction, increased rates of depression and anxiety	Generally pleasing and satisfactory cosmetic outcome for the patient

5. Bilateral Prophylactic Mastectomy

Bilateral prophylactic mastectomy, aimed at women who are at high risk of breast cancer, has been recently widely debated in the media. And although this may be an option for some, it can be a regrettable decision for others [4]. It does reduce the chances of developing breast cancer significantly, but can have a significantly negative impact on a woman's health as well. Patients need to be counselled before and after the procedure to ensure smooth transition. Stable support has to be provided [4]. This is usually available in most countries by the Breast Cancer and Mastectomy charities. Patients must be aware of the fact that if the reconstruction is done in these cases, it will never have the same feeling as normal breast because what is reconstructed is not a true breast but only the breast mound. The nipple areola complex, even if preserved, would not have the same sensations or exertion as that of a surgically untouched nipple.

A couple of articles also touch on Munchausen's and fictitious illnesses [5] [6]. Patients may assume sick role and create an elaborate family history to justify prophylactic bilateral mastectomy. In cases where history can easily be traced, this may not end up a disaster, however patients' relatives' medical history may not be available due to many reasons and as such, the physician may have to rely on the patient's account only. DNA testing is essential in these cases, and these patients will need psychological help and counseling.

6. Current Trends and Future Research

Patient satisfaction and experience of the service is at the heart of medical care nowadays. Finding ways to make patients feel better throughout the life-changing experience of having a mastectomy is therefore essential.

Robotic surgery is currently a hot topic among practitioners in many different surgical fields. A preliminary study/report looked into robotic mastectomies and noted that there are some advantages, namely the magnification, ability to see structures better, and also potentially less impact on woman's body image. However, they did admit that the first operation took 7 hours-this is potentially three times that of a conventional mastectomy theatre time [7]. A recent feasibility and safety study has concluded that further research into patient satisfaction and results is necessary, as it seems that robotic surgery has a very rapid learning curve and few complications, deeming it safe and potentially very effective [8].

Immediate reconstruction is on the rise as well, as patients expect to go back to normal as soon as possible, rather than having a delayed procedure. They hope that this will have less impact on self-confidence and body image, as reconstruction takes place immediately after the mastectomy. A study by Al-Ghazal *et al.* found that 94% of patients who had an immediate reconstruction felt very or moderately satisfied-compared to 73% in the delayed reconstruction group. In addition, only 8% of patients with immediate reconstruction felt an obvious impairment in their sexual attractiveness-compared to 32% in the delayed group. Rates of anxiety and depression were also both significantly lower in the immediate reconstruction group-37% of patients with immediate recon-

struction had anxiety, compared to 63% in the delayed group; and 0% versus 4% for depression [9].

Wide local excision, however, may not always be an option and then more conservative mastectomy techniques need to be employed. Nipple preservation is popular among patients, but can have adverse effects, with the two main ones being nipple ischaemia and nipple-areolar complex malposition [10]. These potential complications need to be clearly laid out to the patient in order to ensure their expectations are realistic and major disappointments are avoided. Careful planning and precise techniques are also essential and are highlighted by the authors [10]. Wide local excision has higher patient satisfaction and patients have better psychosocial outcomes compared to mastectomies [11].

Magazines are full of stories of patients who have, or had breast cancer and the treatments they unfortunately had to endure. This brings on to an important issue of false perceptions-some lay people still consider a more extensive surgery, in this case mastectomy, to be more effective than a smaller procedure. A paper by Dr McCormick picks up very nicely on this. She describes an article she read in one magazine, where a woman self discovered a small breast lump. "I have no history in my family and no reason to believe it was breast cancer, but I just knew. Almost as quickly, I made the decision to have a double mastectomy. If I was going to fight, I wanted to face things head on—to be aggressive and get this done" [12]. She highlights the important issue wherein the invasive and extensive surgical procedure, that is less effective than conservation surgery with radiotherapy, is still perceived as more effective by patients.

Extensive studies have compared mastectomy with other methods of breast cancer management. For example, a well known 20-year follow-up study by Fisher *et al.* showed no significant difference in survival in patients who underwent mastectomy versus those who had a "lumpectomy" with or without radiotherapy in early stage breast cancer [13]. There are many other studies that have shown similar results [14] [15] [16]. These findings would correspond to a seemingly decreasing rate of mastectomies, with a study from the United States showing a decrease of at least 2% from 2000 to 2006 [17]. However, despite this, some patients still choose mastectomy over WLE when given the choice-mainly due to fear of recurrence and a perceived benefit in survival-yet again, an "untrue and harmful belief", as highlighted by Dr McCormick [12].

Research into making patient experience of mastectomy better is active, and various methods have been utilised. For example, acupuncture has been suggested as a potential concurrent treatment method to reduce anxiety, pain levels and increase ability to cope with mastectomy [18]. It seemed to work in the quoted study, and may be worth a try in patients who are anxious and who are open to less conventional or traditional medical methods.

Interesting research has also been done into what influences the choice between mastectomy and wide local excision. A United States based study by Hershman *et al.* showed some surprising findings. Patients who had breast conserving surgery were more likely to have female, US-trained surgeons, who

completed training after 1975 and had a larger patient panel [19]. This poses some interesting questions: is a female surgeon more likely to convey a message of breast conserving surgery better? Are newer surgeons more likely to be up-to-speed with current research? In addition, it seems that social media influence plays a key role here, too. Patients tend to seek advice not only from their family members, but also from their social media contacts. A study by Venetis *et al.* showed that women are more likely to choose contralateral prophylactic mastectomy when influenced by their social networks [20].

Finally, with a dramatic increase in breast conserving surgery rates, most future research is likely to focus on skin and nipple sparing mastectomies rather than simple mastectomies. Research into what type of patients breast conserving surgery is safe enough in; also into postoperative complications and how they can best be prevented-potentially by devising risk assessment tools to identify high risk patients early on and to ensure the patient is consented for such risks when going for an operation. More research into flap and nipple necrosis is also needed, especially to identify high risk patients [21]. In addition, with heavy attention towards prophylactic mastectomies from the media, more research will be needed into rates, consequences and risk assessment tools for bilateral (and contralateral) prophylactic mastectomies [22]. Novel imaging techniques, such as MRI, might also be investigated for various potential uses, e.g. detecting nipple invasion preoperatively for patients who will be undergoing nipple sparing mastectomy [23]. More tailored and individualised systemic therapies after mastectomies for high risk patients with extensive tumours will probably be another intense research area.

7. Conclusion

Mastectomy is a topical issue nowadays, especially with heavy media coverage and with wide accessibility to online and written resources. Patients want to know more about what they are getting, and practitioners will be asked questions about novel or more conservational techniques. Skin- and nipple-sparing mastectomies are fairly common nowadays, and there is also a chance of robotic surgery becoming more widely used in breast cancer surgery. Although the latter is not a certainty, one thing is for sure-mastectomies are nothing what they used to be in Halsted's days.

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