Breast cancer is the most common malignancy in women in South Africa as reported by the South African Cancer registry (NHLS, 2013). The standard management of patients with breast cancer is within a multi-disciplinary team which include both local and systemic control even in its earliest stages. Local control of Stage 1-3 breast cancer (and increasingly in Stage 4) normally includes some form of surgery. This will encompass both surgery to the breast and to the draining axilla.

Surgery to the breast is either by Wide Local Excision (WLE) or Mastectomy (including its various forms from nipple-sparing, skin-sparing, modified radical and radical), and may be followed by either immediate or delayed reconstruction of the breast mound and nipple areolar complex. Surgery to the axilla may either be in the form of a Sentinel Lymph Node Biopsy (SLNB) which is diagnostic procedure to determine lymphatic infiltration by tumour cells, or by Axillary Lymph Node Dissection (ALND).

Commonly, particularly in South Africa where the burden of breast cancer is locally-advanced, these surgeries may precede or be preceded by chemotherapy. Radiation may or may not be employed either for further local control due to extensive breast or axillary disease, or routinely after breast conserving surgery, to reduce recurrence to acceptable levels. Targeted therapies using hormonal blockade or small molecule therapies are the final facet of comprehensive breast cancer management in the modern era.
Over the past half-decade there have been many changes to the practice of breast cancer surgery, which continues to develop through innovation and research.

In 1971 the NSABP initiated the B04 study aiming to prove no benefit of a radical Halstedian mastectomy when compared to less invasive surgery\(^1\).

When this was indeed proven, through the B04, B06, Milan 3 and countless other studies, the gold standard of oncological surgery for breast cancer became “less is better”, with a movement to close margin excision (less than 1cm) and oncoplastic techniques of surgery\(^1,2,3\).

A more recent trend well-described in the last twenty years, has been a movement back to “big” surgery, not just to the mastectomy but to the bilateral mastectomy or contra-lateral prophylactic mastectomy (CPM)\(^4,5,6\). At the same time a revolution is being described (although slower to be accepted or practiced) in the management of the axilla following the ACOSOG Z0011 and EORTC-AMAROS trials where SLNB has been described as adequate surgical intervention for axillary disease in the presence of radiotherapy and within many caveats that are beyond the scope of this paper to describe\(^7,8\).

Within this era of change in breast cancer surgery, although the indications and types of procedure are debated and researched, the practices of actual surgical care remain surprisingly unquestioned for breast cancer surgery, benign breast disease surgery and cosmetic breast procedures. Patients are operated on under general anaesthesia; scalpel and diathermy are employed; absorbable sutures used; and drains inserted. It is this final practice of drain use, this paper seeks to examine and critically assess.

Seroma formation is a common problem post-breast and axillary surgery. It is described as an “unavoidable nuisance rather than a serious complication” in some studies\(^9,10\). It remains the most common early complication in breast surgery occurring in between 15-90% of patients\(^10,11\).
Seromas can cause discomfort or pain, delay wound healing, provide a nidus for infection and precipitate flap necrosis. The ongoing follow-up and needle aspiration, which is the standard of care for symptomatic seromas can further inconvenience patients, cause pain and have economic and resource-allocation implications in both the public and private sector. For these reasons, it is common practice for a closed-suction drain to be inserted into the wound at the end of a procedure to the breast or axilla.

Practice varies widely as to where or how many drains are used, although there is no evidence that two drains are more effective than one and whether patients should remain in hospital whilst a drain remains in situ.

It is standard practice in our unit for patients to be discharged home prior to drain removal, and be managed as outpatients.

Despite the described importance of drains in preventing seromas, preventing dead space and promoting healing, drains are not popular with patients. They cause discomfort and prevent Activities of Daily Living (ADLs). In units where patients with drains are managed as inpatients, they vastly increase inpatient stay (with its resource and economic implications), and may increase the risk of infection. Most importantly, there remains controversy as to whether they are an effective measure against seroma formation, and even if they are, whether seroma formation is such a serious complication as to necessitate a drain.

RECENT STUDIES EXAMINING THE USE OF DRAINS IN BREAST SURGERY

Breast cancer surgery
The question as to whether drains are instrumental in reducing seroma formation was addressed by a Cochrane review in 2013. In this study, seven randomised controlled trials (RCTs) involving 960 patients were analysed.
They found a poor quality of data in this field with little uniformity of study design, but found a reduced incidence of seroma formation when a drain was inserted and a significantly reduced incidence of seroma aspiration (unsurprisingly). There was, however no difference in infection rates.

As most studies were carried out in centres where patients remained in hospital until drain removal, there was a significantly reduced length of stay in un-drained patients, and this was described as a significant and potentially practice-changing factor.

This finding is reinforced in He et al.\textsuperscript{15} where a systematic review of six RCTs found that insertion of a drain reduced the rate of seroma, rate and volume of aspiration without increasing infection rates, but with an increased hospital stay.

The most recent RCT on this subject, employing modern surgical techniques and limited issections, particularly of the axillary nodal basin, records a symptomatic seroma rate in both drained and un-drained patients of over 60% (64.3\% un-drained, 65.7\% drained) in Mastectomy and ALND patients and between 26-40\% in patients having either a WLE and ALND or Mastectomy and SLNB. It is interesting to note that it is not the practice of that unit to routinely drain either isolated SLNB or isolated WLE surgeries\textsuperscript{17}. Other studies with one exception describe seroma rates in drained patients of between 20-94\%.

In attempting to prevent seroma formation without drain use, methods such as fibrin glue (no decrease), octreotide infiltration (useful but expensive), dead space obliteration (increase in operative time), tailoring of drainage to procedure (less dissection results in less drainage) and patient risk factor assessment (BMI, hypertension and early physiotherapy) have been attempted but with little agreement as to effectiveness\textsuperscript{10}. Therefore, whilst studies may conclude that drain use is not effective in preventing seroma formation, the unacceptably high levels in both study groups (with and without drains) render the results meaningless in our practice.
And in our modern practice of outpatient drain care, the advantage of saving of inpatient bed-days is also redundant.

Only one study describes seroma formation following SLNB without drainage, and finds an incidence of 11% versus 24% in ALND patients\textsuperscript{18}. This decrease of seroma incidence by more than 50% following the more limited SLNB dissection may provide evidence that a drain is not routinely required following this procedure.

**Gynaecomastia**

Benign breast procedures do not necessitate axillary or other lymphatic dissection and therefore the need for a drain can be questioned.

There is little data as to whether surgery to the breast alone for benign disease requires a drain and in clinical practice this is normally dependant on level of dissection and concern over seroma or haematoma formation. Should a haematoma be precipitated, it is unlikely that the calibre of drain normally used will prevent formation and there will be a need for subsequent open drainage. This is confirmed by isolated cases recorded within the literature on seromas and drains\textsuperscript{11,17}.

In gynaecomastia surgery performed with liposuction or open excision techniques, there is no evidence to support the use of closed-suction drains either for the prevention of haematoma or seroma. Although the quality of literature is poor with little homogeneity of technique or use of drains, most studies with drain use had a less than 10% haematoma or seroma formation\textsuperscript{19}.

**Breast plastic and reconstructive surgery**

Breast plastic surgery can include reconstructive work, augmentation and reduction surgery. In each case extensive dissection can be carried out with the destruction of tissue planes. Most plastic surgeons routinely place drains for the prevention of haematoma, seroma and post-operative infections.
There is little literature on this subject and a recent Cochrane review found only three randomised studies involving 306 patients. All three studies were of breast reduction surgery. Results indicated that apart from a reduction in length of hospital stay, there was no evident benefit for the use of drains. Given such low numbers it is understandably not practice-changing data, but does indicate that, if drains are not required for such extensive dissection, as in a breast reduction, it is unlikely that they would change outcome in smaller benign tissue excisions.

Whilst breast reduction surgery may not require drains, small studies of patients post-reconstruction for breast cancer surgery indicate that there is definitely a place in implant surgery.

In examining implant-based reconstruction post-mastectomy, an acellular dermal matrix was found to significantly increase wound drainage and in patients with expander-prostheses reconstructions, the impact of a seroma formation is more serious when implants are in place: despite percutaneous drainage, up to 20% of patients with fluid collections may require explanation. Therefore caution should be used in not employing drains in these patients.

**Current drain use in breast surgery**

With such divergence in the literature as to whether drains hinder or aid healing, it is important to look within the studies as to their applicability locally. Current practice in our units is for drainage of all breast procedures beyond simple benign excisions. Standard closed-suction drains are used.

Patients routinely have short admissions (<24 hours in private, <48 hours in the state facility) with discharge after drain-training but with drains in-situ. Patients will then record drain output and when below a specified amount for specified period of time (surgeon dependant), will re-present for drain removal. We do not routinely experience seromas requiring drainage but have not studied their incidence. This practice is in accordance with other local units.
Looking at studies concerning the economic benefits of a no-drain policy, locally there is no bed-stay benefit of no-drain (as patients are managed at home) but rather an additional cost associated with multiple aspirations due to seroma. This would appear to weigh the evidence towards routine drainage. None of the studies or reviews indicated a true increase of infection secondary to drain insertion, although all mentioned it as a theoretical risk. Therefore the current policy of drain use appears to be appropriate.

However, in the most notable recent randomised study on drain use, patients excluded were those with either isolated SLNB or WLE with SLNB where it was never the unit policy to use drains. This is also the case in other high-volume breast units internationally. This raises the question as to whether we are too cautious locally in employing drains for these minor procedures.

Despite an extensive review of the literature, there is little evidence to guide this and this is an area of potential local research currently being reviewed in our unit.

**CONCLUSION**

The place for drains in breast surgery is still undecided in practice. It is clear that drains are for the removal of lymphatic and serous material. They should not be employed to reduce the risk of haematoma as evidence clearly shows they are ineffectual for this purpose. The literature suggests most breast procedures can be managed without drains, but at a cost of increased aspirations of the subsequent seromas.

At present the use of drains can be supported as best for patient care if used sparingly, for the drainage of lymph or serous fluid after major procedures, and as an outpatient measure to limit their impact financially and on healthcare resources.
SUMMARY

• Seroma formation is a common cause of post-operative morbidity in breast surgery.
• Suction drains may reduce seroma formation but at a cost of increased risk of infection and discomfort.
• Suction drains do not reduce the risk of haematoma formation.
• A no-drain policy is possible but at an increased risk of multiple aspirations of subsequent seromas.
• Local policies must dictate the decision to institute a no-drain policy.

RECOMMENDED READING

1. Thomson DR, Sadideen H, Furniss D Wound drainage after axillary dissection for carcinoma of the breast Cochrane Database of Systemic Reviews 2013 (10).
3. He XD, Guo ZH, Tian JH, Yang KH, Xie XD Whether drainage should be used after surgery for breast cancer? A systematic review of randomised controlled trials Medical Oncology 2011 Dec; Suppl 1: S22-30.

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8. Rutgers E et al. Radiotherapy or surgery of the axilla after a positive sentinel node in breast cancer patients: Final analysis of the EORTC AMAROS trial (10981/22023). *Journal of Clinical Oncology* 2013; 31 (suppl; abstr LBA1001).


