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Original research

Efficacy of harmonic focus scalpel in seroma prevention after axillary clearance

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HIGHLIGHTS

- Despite ardent touting, Harmonic Focus is not necessarily superior to Conventional Diathermy in preventing seroma formation after Axillary Lymph Node Dissection.
- Mastectomy and Axillary Lymph Node Dissection increased seroma formation; when compared to Wide Local Excision and Axillary Lymph Node Dissection.
- More the surgical perturbation of tissue (as in mastectomy), the more the incidence and magnitude of seroma after Axillary Lymph Node Dissection.

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ABSTRACT

Introduction: Seroma formation in breast cancer patients who have undergone axillary lymph node dissection (ALND) is a source of significant discomfort and morbidity. We aimed to ascertain seroma incidence after ALND, when Harmonic Focus (HF) scalpel is used for dissection instead of conventional diathermy (CD).

Methods(and patients): This retrospective study was carried out in a single hospital over 6 years. Patients were allocated into HF group (HFG) or CD group (CDG). Seroma volume, hospital stay, and complications were evaluated.

Results: Of 94 patients, 42 were in the HFG and 52 in the CDG. Two day median seroma volume was 205 ml (IQR 95-265) for HF, and 227.5 ml (IQR 149-385) for CD. The total median seroma output was 270 ml (IQR 160-478) for HF, and 385 ml (IQR 220-558) for CD. No statistically significant differences between HFG and CDG were identified in these data, as well as patient demographics, operative time, and complication rates. Duration of surgery >2.5 h increased seroma formation ($p < 0.001$). Mastectomy and ALND increased seroma formation compared to wide local excision (WLE) and ALND ($p < 0.05$). Nodal involvement, number of lymph nodes resected, and extra nodal spread did not influence seroma formation.

Discussion(and conclusion): In our hands, HF use was not superior to CD in limiting seroma formation in ALND for breast cancer. Increased seroma formation in surgeries >2.5 h in duration is commensurate with surgeries involving mastectomy and ALND (>2.5 h in our study), which entails greater and sustained tissue and lymphovascular trauma.

Abbreviations: ALND, Axillary lymph node dissection; CD, Conventional diathermy; CDG, Conventional diathermy group; HF, Harmonic focus; HFG, Harmonic focus group; IQR, Interquartile range; LN, lymph node; n, number of patients in the group referred to; SLNB, Sentinel lymph node biopsy; SLND, Sentinel lymph node dissection; WLE, Wide local excision.

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1. Introduction

Postoperative seroma formation is the commonest early cause of significant discomfort and morbidity in breast cancer patients [18]. Seroma accumulation in the axillary space is associated with increased rates of wound infection, delayed healing, skin necrosis, and delayed initiation of adjuvant therapy [18]. Furthermore, this complication increases the burden on the health system with limited resources, owing to the occurrence of increased hospital admissions, prolonged hospital-stay, and recurrent specialist intervention [14].

The reported incidence of seroma formation after axillary lymph node dissection (ALND) varies between 15 and 90% [3,20]. In extant literature, there are several factors implicated in the formation of seroma in breast surgery. These include the size of the primary cancer, number of lymph nodes involved, axillary clearance level, intraoperative techniques (eg: lymphangio-ligation, drain-use), co-morbidities and adjuvant radiotherapy [3,18–20]. Other associated factors are increased patient age, weight and initial 24–72-h wound drainage [1,21].

Concrete ways to circumvent seroma formation have not been elucidated yet. However, there are several potential surgical preventative measures that may reduce seroma formation in ALND [3], including type of instruments [13] that would limit the thermal injury and associated disruption to lymphatic channels. Dissection using the Harmonic Focus (HF) compared to the use of conventional diathermy (CD) provides this exact environment whereby there is less spread of lateral thermal injury whilst maintaining the ability to cut and coagulate vascular and lymphatic channels. Its precise and more controlled coagulation results in sealing of vessels and small lymphatic channels and is thought to result in less seroma accumulation [13,15].

The aim of this study was to compare the extent of seroma formation in patients who underwent ALND using HF and CD.

2. Patients and methods

2.1. Study design

This monocentric retrospective study was carried out at Bankstown Hospital, Sydney, Australia. Ethics approval was granted by the South Western Sydney Local Health District Human Research Ethics Committee. Female patients undergoing treatment for early breast cancer by ALND, with or without mastectomy or WLE, over a 6-year period (2007–2012) were included in this study. Patients who had a history of previous ipsilateral axillary surgery (except SLNB) or radiotherapy were excluded. Patient demographics, pathological data, and postoperative outcomes (duration of surgery, 2-day drain output, total drain output, complications, and duration of drainage) were collected.

2.2. Surgical techniques

Patients had undergone 1 of the following 3 surgical interventions (Table 1). The 1st entailed mastectomy and ALND; the 2nd encompassed WLE and ALND; and the 3rd involved ALND only if they had positive SLNB. Our surgical approach included a standard ALND with either HF or CD. All patients who fell under these management approaches were automatically included without exclusion.

All breast cancer surgeries with axillary clearance were included in this study, and all were carried out by the only 2 breast surgeons at Bankstown Hospital during the study period (2007–2012). Both surgeons began to use HF from 2009-end. Fifty patients had CD before and during 2009. However, after this period, only 2 patients had CD (both in 2012), and that too only because of a temporary unavailability of HF.

All patients who underwent ALND were given prophylactic antibiotic. Patients who had mastectomy had their ALND incorporated under the mastectomy incision and those who had WLE had separate axillary incision. All patients with positive sentinel lymph node from their SLNB or radiologically identified and cytologically confirmed lymph node metastasis underwent a level II clearance. The long thoracic and thoracodorsal nerves, and associated vessels, were identified and preserved routinely while the intercostobrachial nerves were sacrificed.

In the HFG, the ultrasonic dissector HF by Ethicon Endo Surgery® (Johnson and Johnson, North Ryde, Sydney) was used for dissection and haemostatic ligation of vessels and lymphatics. However, in this group, large vessels (>5 mm) and those deemed necessary by the surgeon were ligated with 3.0 Vicryl. In the CDG, after the initial scalpel incision, the ALND was performed using monopolar diathermy (25 W) and all vessels were sought out and ligated.

If the patient had mastectomy and ALND, two Bellovac closed suction drains size 15 French (68391 Wellspect HealthCare, Pymble, Australia) were placed in the axilla and chest wall respectively. If the patient had WLE and ALND, only one 15 French Bellovac drain was secured in the axilla.

2.3. Postoperative management

The chest wall drain was removed after 24 h. The axillary drain was usually retained for 3–4 days or more if the output was more than 30–50 ml/day. The operative time for the breast and axillary surgery was recorded. The amount of drainage output for both drains was recorded daily. Patients were discharged once they felt comfortable. If they were discharged with an axillary drain, a community nurse reviewed the patient, and recorded the drainage volume.

All recorded complications for the 94 patients were thoroughly reviewed. None of the drain collections had visually observable traces of blood. Haematocrit quantitation was not performed on drain fluid samples.

The patients were seen 1 week after the surgery by the operating surgeon when the drain was removed. The patients were subsequently followed up weekly for seroma aspirations as necessary and the volumes aspirated recorded.

Table 1
Surgical interventions.

Surgical instrument	ALND (%)	WLE + ALND (%)	Mastectomy + ALND (%)	Total (%)
CD	30 (58%)	8 (15%)	14 (27%)	52 (100%)
HF	16 (38%)	2 (5%)	24 (57%)	42 (100%)

The 3 surgical interventions that patients underwent are: (1) Mastectomy and ALND, (2) WLE and ALND, and (3) ALND contingent on positive SLNB. The number of patients who underwent these 3 interventions utilising either CD or HF are depicted in this table.
ALND = Axillary lymph node dissection; CD = Conventional diathermy; HF = Harmonic focus; SLNB = Sentinel lymph node biopsy; WLE = Wide local excision.