# A modified technique for a common problem after major duct excision

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**Objective**
The present study aims to describe and evaluate a modified major duct excision (MDE) technique as regards its role in minimizing postoperative complications.
**Patients and methods**
We included female patients who underwent total duct excision due to the following indications: suspicious nipple discharge, periductal mastitis, and nipple retraction with a history of periductal mastitis. The modified MDE was performed under general anesthesia. All the patients were discharged home on the same day of the procedure and they were followed up for 6 months. In the follow-up, the patients were assessed for any complications to the wound, any retraction or necrosis to the nipple, the nipple sensation compared with the other one, or the nearby skin in bilateral cases.
**Results**
In this study, a total of 29 operations were performed on the 25 patients. No seroma or hematomas were observed. On follow-up of the patients, two patients suffered from infection of the wound, three cases developed breakdown that healed by daily dressing, one case presented with nipple necrosis most probably occurred as a result of excessive dissection with diathermy, while the remaining 31 patients recovered by primary intention with no recurrent discharge. Loss of nipple sensation occurred in four patients, impaired sensation occurred in six patients, and normal sensation in the rest of the patients was observed at 6 months of follow-up.
**Conclusion**
The modified MDE technique is a safe alternative to the classic technique with low rate of postoperative complications.

**Keywords:**
breast surgery, duct excision, nipple sensation

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## Introduction

Being the third common symptom of breast complaint in women, after breast mass and mastalgia, nipple discharge represents an important complaint [1]. It causes more stress and anxiety, and is responsible for 3–10% of referrals to breast clinics [2], occurring in 10–50% of benign breast diseases [3]. In patients with breast cancer, nipple discharge is the presenting symptom in 6–21% of the cases [4].

Suspicious nipple discharge tends to be unilateral, single duct, spontaneous, and persistent [5]. While that presents with discharge from many ducts, different colors are seldom associated with any serious pathology [2]. Pathologic nipple discharge most commonly caused by intraductal papilloma (48%), periductal mastitis (15–20%), and the less common, but a significant one is cancer (15–20%) [6].

Half of the patients with nipple discharge is associated with a mass, about 20% of which are malignant [5]. These patients should be assessed using the triple assessment. The patients without palpable lesions can be evaluated by mammography to detect any abnormality that requires more investigations. Those who have not had any abnormality either clinically or radiologically and the discharge is suspicious, surgery is needed to rule out malignancy [7].

Total duct removal is the gold standard treatment in women with nipple discharge coming out of multiple mammary ducts or not limited to one duct. Pathological nipple discharge in women after the childbearing age is another indication [2]. It is also recommended in cases with repeated breast abscesses and periductal mastitis in an attempt to preventing recurrence [8].

Major duct excision (MDE) as described in Hadfield's operation is a common diagnostic and therapeutic



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procedure with little published data on its complication rates. It is associated with a number of complications like nipple necrosis that occurs due to a decrease in blood supply to the nipple–areola complex [9]. Also change in sensation of the nipple, inversion of the nipple, altered shape, size, and color are noted as possible complications [8].

In a trial to modify this technique to decrease the above-mentioned sequelae of MDE, we aim in this study to describe and evaluate this modification as regards its role in minimizing the postoperative complications.

## Patients and methods

The study was conducted in accordance with the International Conference on Harmonization Good Clinical Practice guidelines, the Declaration of Helsinki, and applicable local regulatory requirements and laws. The study was approved by the institutional review board of the Menoufia University Hospital.

Between July 2013 and August 2016, 27 women, with a mean age of 50 years with a range of 36–70 years, underwent total duct excision due to the following indications: suspicious nipple discharge, periductal mastitis, and nipple retraction with a history of periductal mastitis (Table 1). The total operations were 31 as four patients underwent bilateral procedures. Preoperatively, the patients were evaluated by history taking and clinical examination. Mammosongraphy was done. Patients with pathological discharge had to undergo histopathological examination to rule out malignancy; all were negative for malignant cells. Culture and sensitivity of the discharge were available for some of these patients.

### Operative technique

The procedures were done using general anesthesia. The patients were placed supine with the arms at right angle to the body. Following sterilization of skin and proper draping, a classic circumareolar incision was used cutting along the areola-skin line, starting with the creation of the areolar flap by dissecting deep into the venous plexus avoiding injury to the subdermal blood supply. Dissection using the scalpel separating the flap from the mammary tissue until the entry of the milk duct appears. All the ducts are dissected, trying not to miss any duct that may cause persistence of the condition. Then an artery forceps is used to clamp the ducts trying to preserve their contents, followed by cutting them just to the back of the skin of the nipple to ascertain complete cutting. With the help of the index finger, the nipple is inverted and removal of any residuals of the duct is performed using sharp scissors. Dissection is continued into the mammary tissue removing a cone of the tissue including the major ducts. According to the extent of the affected ducts, the extent of excision is done making the size of the dead space to be variable. Proper hemostasis is done, followed by washing the field with saline and betadine. Closure of the defect is done in some cases with interrupted sutures, but not done routinely in all cases. No need for purse suture under the nipple.

Starting with the modification that includes a crescent-shaped part of the skin immediately close to the incision (Fig. 1) is de-epithelized to be the bed for half of the nipple and the areola (Fig. 2), advancing the half of the areola to its new bed (Fig. 3). The two edges were sutured by 3/0 vicryl sutures in two layers with the deep layer being interrupted sutures and the superficial layer is a subcuticular continuous suture (Fig. 4). Caution is taking care while suturing the deep layer to correct dog ears at the ends of the incision. Cleaning of the skin and protection of the wound is done (Fig. 5).

**Table 1 Demographics**

| Demographics | *n*=29 |
|---|---|
| Age | |
| Mean | 50 |
| Range | 36–70 |
| Presentation | |
| Pathological nipple discharge | 22 (75.8%) |
| Periductal mastitis | 5 (17.3%) |
| Nipple retraction | 2 (6.9%) |
| Laterality | |
| Unilateral | 21 |
| Bilateral | 4 |

**Figure 1**

Skin incision.

**Figure 2**

De-epithelization.

**Figure 3**

Advancement of the areola.

**Figure 4**

Immediate intraoperative.

**Figure 5**

Two weeks later.

All the patients were discharged home on the same day of the procedure, on an antibiotic (amoxicillin–clavulanic acid 1 g twice daily), simple analgesia (paracetamol 1 g twice daily), and on an antiedematous agent three times daily. The patients were followed up in the outpatient at 1 week, 2 weeks, 1 month, and 6 months. In the follow-up, the patients were assessed for any complications to the wound, any retraction or necrosis to the nipple, the nipple sensation compared with the other one or the nearby skin in bilateral cases.

The statistical analysis was carried with SPSS software (Statistical Package for the Social Sciences, version 24; SSPS Inc., Chicago, Illinois, USA). Frequency tables with percentages were used for categorical variables and descriptive statistics (mean and SD) were used for numerical variables.

## Results

This study included 27 patients who underwent duct excision; two patients were excluded as proved to have malignancy and they underwent radical surgery. Four patients underwent bilateral operations due to bilateral presence of the disease. Then the total number of operations done is 29 for the 25 patients.

The postoperative hospital stay was 1 day. No seroma or hematomas were observed. Stitches were removed after 10–15 days of surgery after complete healing of the wound. On follow-up of the patients, two patients suffered from infection of the wound that was cured by antibiotic and dressing; three cases developed breakdown that healed by daily dressing; one case presented with nipple necrosis most probably occurred as a result of excessive dissection with diathermy healed by secondary intention after 35

**Table 2 Complications**

| Complications | *n*=29 [*n* (%)] |
|---|---|
| Infection | 2 (6.9) |
| Breakdown | 2 (6.9) |
| Necrosis | 1 (3.45) |
| Retraction | 1 (3.45) |

**Table 3 Postoperative nipple sensation**

| Nipple sensation | 1 month (*n*=29) [*n* (%)] | 6 months (*n*=29) [*n* (%)] |
|---|---|---|
| Normal | 15 (51.7) | 22 (75.9) |
| Impaired | 9 (31) | 4 (13.8) |
| Loss | 5 (17.3) | 3 (10.3) |

days of dressing while the remaining 31 patients recovered by primary intention (Table 2). No recurrent discharge was present.

Assessment of nipple sensation in 45 operations made in 37 patients showed loss of sensation in four patients, impaired in six patients, and normal sensation in the rest of the patients occurring at 6 months of follow-up (Table 3).

## Discussion

The Hadfield's operation is described by making circumaerolar incision, the areolar flap is elevated and complete excision of the duct system just under the nipple together with the mammary tissue surrounding the ducts to a depth of 5 cm is done. Despite being an this effective procedure has some drawbacks like nipple and areola necrosis and nipple retraction, associated with nipple anesthesia [9,10].

Trying to avoid these drawbacks of the classic Hadfield's operation, studying the pattern of vascular and neurologic supply of the nipple–areola complex is of great importance to preserve them. A trial to study the blood supply to the nipple by injecting lead oxide systemically and examined radiologically revealed there are branches of the external and internal mammary vessels that supply the nipple–areola complex, with other vessels passing through the subcutaneous tissue supplying the complex particularly the upper and middle thirds of the nipple [11].

With the application of the oncoplastic concepts in breast surgery by using the volume displacement procedure and the use of the available surrounding skin, we applied the modification described above involving de-epithelization of the skin, so it provides a new bed for the elevated flap with reduction of the possibility of ischemia and necrosis of the nipple. There is also decreasing in the dead space and preventing the retraction of the nipple by the supporting effect of the newly vascularized bed.

On studying the breast nerve supply done on 12 cadaveric female breasts, it was found that the lateral and anterior cutaneous branches of the second to the sixth intercostal nerves and the supraclavicular nerves provide the breast nerve supply and progressed to a plexus under the areola. The nerves to the nipple are located in the superficial fascia and are passed through the subdermal tissue of the areola to form a plexus underneath it [12]. So, with the described technique preservation of the nipple, sensation was acceptable by both preserving the neurologic supply from the preserved skin attachment in contrast to the round block technique and providing a newly vascularized bed allowing regeneration of the nerves with restoring the nipple sensation as observed in the majority of advancement flaps where return of sensation reported to occur 1–2 years afterwards. In this study, the sensation reaches the normal in 22 (75.9%) patients, impaired sensation in four (13.8%) patients, and complete loss of sensation in three (10.3%) patients within 6 months postoperatively. In contrast to that reported by Hadfield where all cases had loss of nipple sensation.

One drawback had been faced in our cases represented indifference at the nipple level. It did not present a great deal for most patients and accepted simply due to the gained benefit of preserved nipple sensation and no retraction. In patients with bilateral procedures, it was accepted easily especially if ptosis was noted.

In conclusion, the present study shows that the modified MDE technique is a safe alternative to the classic technique with low rate of postoperative complications. In addition, the majority of the patients showed normal nipple sensation at the end of follow-up.

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#### Conflicts of interest

There are no conflicts of interest.

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