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BREAST SURGERY

Microductectomy under local anaesthetic for pathological nipple discharge. Is it time to change practice?

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Background: Pathological nipple discharge (PND) is a common clinical concern that requires careful evaluation to rule out malignancy. Microductectomy is the gold-standard surgical intervention for both diagnosis and symptom relief. In most centres, it is usually performed under general anaesthesia. This study aims to assess the feasibility, efficacy, and safety of performing microductectomy under local anaesthesia without sedation, a technique adapted during the COVID-19 pandemic to address resource constraints.
Methods: A retrospective review was conducted on all patients who underwent microductectomy under local anaesthesia at Groote Schuur Hospital between January 2021 and December 2022. Data were collected on demographics, imaging used, imaging findings, biopsy results, and histological diagnoses.
Results: A total of 23 patients were included, with a median age of 55 years (interquartile range, IQR, 45–60 years). All patients presented with spontaneous nipple discharge (ND), with 75% reporting bloody ND. Dual imaging (mammography and ultrasound) was performed in 78.2% of cases, while 39.1% of patients underwent preoperative biopsy. Histology revealed intraductal papilloma in 65.2%, ductal hyperplasia in 39.1%, and ductal ectasia in 21.7% of cases. One patient (4.3%) was diagnosed with papillary ductal carcinoma in situ (DCIS). No invasive malignancy was detected, and no complications were reported postoperatively.
Conclusion: Microductectomy conducted under local anaesthesia without sedation appears to be a safe, effective, and feasible method for managing PND. It benefits resource-limited settings by decreasing reliance on general anaesthesia while preserving diagnostic and therapeutic efficacy. Further prospective studies with larger sample sizes incorporating patient satisfaction, procedure duration, diagnostic yield, recurrence rates, and completeness of excision are advised to evaluate long-term outcomes and patient experiences.
Keywords: pathological nipple discharge, microductectomy, bloody nipple discharge, microductectomy under local anaesthesia

Introduction

Nipple discharge (ND) is common among females, with approximately 80% experiencing some form of discharge during their lifetime.[1] Physiological ND typically presents as white or watery fluid, is often bilateral, and arises from multiple ducts. This type of discharge is observed during the puerperal period, such as galactorrhoea, and in non-puerperal conditions, including mechanical stimulation of the nipples, stress, and exercise. Non-physiological ND occurs due to hyperprolactinaemia, resulting from pituitary tumours, hormonal conditions such as hypothyroidism, and medications like anti-psychotics. Duct ectasia, an aberration of breast involution, is usually bilateral and involves multiple ducts, with discharges ranging from green to creamy. In contrast, pathological nipple discharge (PND) arises from ductal pathology. It is usually unilateral and spontaneous, involving serosanguinous, serous, or watery fluid from a single duct, and may indicate underlying conditions such as ductal papilloma or malignancy.[1] PND, particularly if bloody in nature, raises concerns about underlying malignancy. Traditionally, surgery has been the primary treatment for PND, aimed at alleviating symptoms and serving as the gold standard for identifying the cause. Modern imaging techniques such as MRI, ultrasound, mammogram, and fibreoptic ductoscopy have shifted the paradigm towards conservative management, provided a benign cause can be confidently identified.[2]

It should be noted that while smear cytology of the ND has been proposed as a method to investigate PND, the diagnostic accuracy is low, with a sensitivity of 62% for breast cancer, as found by Jiwa et al.[3] in a recent meta-analysis. The initial diagnostic imaging consists of a diagnostic mammogram and/or ultrasound, depending on the patient's age. The diagnostic sensitivity for mammograms ranges between 15% and 70%.[4] Following a negative mammogram, an ultrasound examining the retro-areolar region is the next suggested imaging modality.[4] If both the mammogram and ultrasound are normal, ductography may be used for further imaging, with the caveat that it is an invasive and technically demanding investigation that requires specialised skills. MRI exhibits a high sensitivity of 93% to 100% but a low specificity of 37–97%. It can be helpful if all other imaging is normal.[2]

Microductectomy is the gold standard surgical procedure for the treatment of PND for both diagnostic and symptom control purposes and is primarily performed under general anaesthesia.[4,5] However, during the COVID-19 pandemic, the breast unit at Groote Schuur Hospital adapted to performing microductectomies under local anaesthesia without sedation due to the limited access to theatre for procedures requiring general anaesthesia. Performing microductectomies under local anaesthesia may be particularly valuable in resource-constrained settings with limited access to general anaesthesia or for patients deemed high-risk general anaesthetic candidates and those who prefer an alternative to a general anaesthetic.

This study aimed primarily to investigate the efficacy and safety of performing a microductectomy under local anaesthesia without sedation. Secondary aims examined the diagnostic modalities used to investigate patients with ND and the cause of the ND at final histology.

Methods

Design and participants

A retrospective review of all patients who underwent microductectomy surgery for ND under local anaesthetic at Groote Schuur Hospital between 1 January 2021 and 31 December 2022 was performed. Patients were identified using an operation schedule database. The study included all patients presenting with PND who underwent microductectomy under local anaesthesia. Eligibility required the availability of complete clinical records, including imaging, histology (pre- and postoperative), and operative notes. Only patients with spontaneous, unilateral discharge from a single duct were considered for inclusion. Patients were excluded if they had bilateral or multi-duct discharge, underwent procedures under general anaesthesia or sedation, or had incomplete medical records, such as missing imaging or histopathology reports. Data was collected from hospital folders, National Health Laboratory Service (NHLS) histology reports and the hospital picture archiving and communication system (PACS). Variables collected were age, gender, histology, type of preoperative imaging, and results according to the Breast Imaging-Reporting and Data System (BIRADS) system. Additional clinical parameters included the colour of the discharge of the breast and laterality.

Imaging

All patients were investigated using either ultrasound, mammogram, or both. The BIRADS score was recorded. The ultrasound findings were grouped as dilated duct, lump, cyst, papilloma or a combination of these findings and then subdivided in our analysis. The BIRADS scoring system was analysed and correlated to the pathological diagnosis.

Operative technique

Prior to surgery, patients were instructed to avoid nipple expression for two days. During the procedure, the affected duct was identified by applying gentle pressure near the nipple-areola complex to elicit discharge. Once localised, the duct was cannulated using a size 1 nylon suture as a guidewire, over which a 22-G IV cannula was inserted using the Seldinger technique. Proper cannulation was confirmed by observing discharge in the cannula hub. A small amount of methylene blue dye was then injected to stain the duct for visualisation. After expressing excess dye, local anaesthesia (2% lignocaine) was administered around the incision site. A 1.5 cm curvilinear incision was made 1 cm from the nipple base on the areola. The blue-stained duct was carefully dissected from its origin behind the nipple and traced distally to the point where the main duct began to branch, which is usually approximately 2 cm distally from the undersurface of the nipple skin. Notably, deeper dissection beyond approximately 2 cm was not required for any patients. The specimen was sent for histopathological evaluation without ligating the duct proximally after flush excision with the posterior nipple surface. Finally, the wound was closed in layers to optimise cosmetic results. The technique is illustrated in Figure 1.

Statistical analysis

Anonymised data was entered and analysed from an Excel spreadsheet using simple descriptive statistics. Non-parametric data were described as median and interquartile range.

Results

Patient demographics

During the study period (January 2021 – December 2022), 29 patients underwent microductectomy surgery under local anaesthesia without sedation at Groote Schuur Hospital.

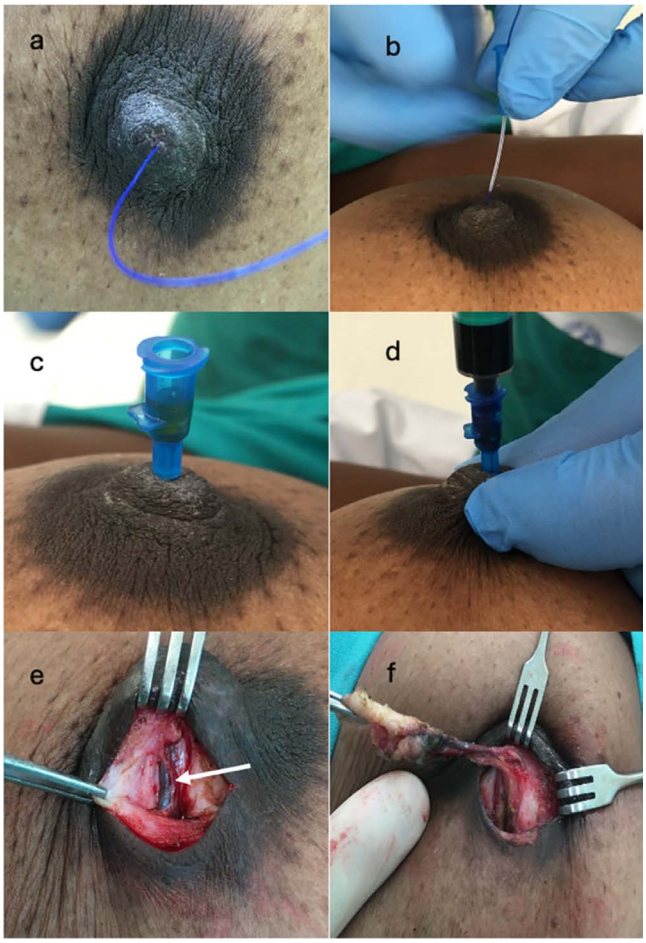

Figure 1: a) Duct cannulated with a nylon 1 suture; b) IV cannula being introduced in a duct; c) cannulated duct with fluid in cannula hub; d) methylene blue injected in duct; e) blue duct visible at surgery as indicated by the white arrow; f) blue duct dissected free distally but still attached to the posterior nipple surface

After excluding six patients due to incomplete data, 23 patients were eligible for analysis. The median age of the cohort was 55 years (interquartile range [IQR] 45–60 years), with 9/23 (39.1%) patients classified as premenopausal and 15/23 (60.9%) as post-menopausal.

Presenting symptoms

Solitary ND was the primary presenting symptom in 20/23 (86.9%), with 2/20 patients (10.0%) reporting serous discharge, 15/20 (75.0%) reporting bloody discharge, and 3/20 (15.0%) reporting another colour. The remaining 3/23 (13.1%) of patients had a lump and a ND.

Imaging analysis

Imaging was performed in all 23 patients. Dual imaging (mammogram and ultrasound) was conducted in 18/23 (78.2%) of cases, while 2/23 (8.7%) received ultrasound only, and 3/23 (13.0%) received a mammogram only. The imaging results are presented in Tables I and II.

Table I: Imaging findings in patients with PND (*n* = 23)

Category	Subcategory	*n* (%)
Normal imaging	-	5 (21.7%)
Duct abnormalities	Dilated duct only	9 (39.1%)
	Dilated duct + lump	1 (4.3%)
	Dilated duct + cyst	1 (4.3%)
	Dilated duct + papilloma	2 (8.7%)
Cystic lesions	Cyst only	1 (4.3%)
	Cyst + lump	1 (4.3%)
Solid lesions	Lump only	1 (4.3%)
	Lump + papilloma	1 (4.3%)
Papilloma only	-	1 (4.3%)

Table II: Distribution of BIRADS classifications among 21 patients

BIRADS Category	Description	*n* (%)
1	Negative	2 (9.5%)
2	Benign findings	6 (28.6%)
3	Probably benign	6 (28.6%)
4	Suspicious abnormality	5 (23.8%)
5	Highly suggestive of malignancy	2 (9.5%)

Table III: Histological findings post-surgery (*n* = 23)

Histological diagnosis	*n* (%)
Intraductal papilloma	9 (39.1%)
Papilloma with ductal hyperplasia	6 (26.1%)
Ductal hyperplasia (isolated)	2 (8.7%)
Ductal ectasia (isolated)	3 (13%)
Ductal ectasia with ductal hyperplasia	1 (4.3%)
Papillary DCIS	1 (4.3%)
No definitive diagnosis	1 (4.3%)
Total patients with papilloma	15 (65.2%)
Total patients with ductal ectasia	5 (21.7%)
Total patients with ductal hyperplasia	9 (39.1%)
Invasive breast cancer	0 (0%)

Biopsy

Preoperatively, 9/23 (39.1%) patients underwent core biopsy, 1/23 (4.3%) underwent fine needle aspiration biopsy, and 13/23 (56.5%) had no biopsy performed. No complications were reported post-biopsy. The biopsy was reported as intraductal papilloma in 4/10 (40.0%) patients and non-specific benign changes with no malignancy in 6/10 (60%) patients.

Diagnostic results

Histological analysis following surgery revealed a range of diagnoses presented in Table III.

Complications

All patients underwent one month of postoperative follow-up histology and wound check, during which complete resolution of symptoms was achieved in every case (100%), and histological results were reviewed and communicated to the patient. There were no reported complications, including nipple retraction, after the short-term follow-up. Patients reported satisfaction with being done under local instead of general anaesthesia and also reported no pain during the procedure.

Discussion

This study is the first published study specifically describing a technique for routine microductectomy performed under local anaesthetic without sedation. Traditionally, microductectomy to address ND is conducted under general anaesthesia. In our setting, microductectomy performed under local anaesthesia is a relatively safe and effective method for both diagnostic and therapeutic purposes, with all our patients undergoing the procedure under local anaesthesia without the use of conscious sedation.

The use of local anaesthesia in major breast surgeries has primarily been reserved for patients with increased anaesthetic risks. It has been described in breast surgery in a few studies describing the use of local anaesthetics with conscious sedation, such as midazolam for simple mastectomy.[6-8]

Local anaesthesia offers several advantages, including the possibility of conducting the procedure as a day case, eliminating the need for an anaesthetist, reducing procedure time, and providing economic benefits.[9] Other benefits of local anaesthetics include reduced postoperative pain and bleeding.[10] In resource-limited regions with restricted access to operating theatres and general anaesthesia, local anaesthesia should be considered a viable alternative for managing conditions like PND.

In our study, all participants aged 40 and above underwent a combination of ultrasound and mammography. Locally, mammography is used as the first-line investigation for PND, followed by ultrasound, due to considerations of cost and accessibility. Cytology is not utilised, given its low sensitivity of 62%.[3] While recommended in some studies, MRI is not widely accessible in resource-constrained settings and is, therefore, not routinely performed at our hospital for PND. Our use of investigative modalities aligns with the recommendations according to an algorithm for treating PND by Lee et al.[2]

Our imaging modalities identified only 16.6% of papillomas, whereas histological analysis revealed a much

Table IV: Histological comparison across studies

Author	Year	No. of patients	Ductal papilloma (%)	Ductal ectasia (%)	Ductal hyperplasia (%)	DCIS (%)	Invasive malignancy (%)
Current Study	2025	23	65.2	21.7	39.7	4.3	0.0
Lesetedi[14]	2017	153	56.9	18.3	Not stated	4.6	3.3
Çetin[5]	2017	78	52.6	29.5	5.1	7.7	5.1
Seltzer[14]	1970	Not stated	35.0	Not stated	Not stated	Not stated	Not stated
Liu[16]	2008	1048	19.4	8.2	1.1	3.3	1.6
Murad[17]	1982	267	34.6	42.1	Not stated	Not stated	20.6
Morrogh[18]	2010	287	42.0	15.0	Not stated	9	14.0
Bahl[19]	2015	273	21	Not stated	Not stated	5.6	5.6

higher incidence of 65.2%, indicating that our imaging techniques lacked sensitivity in detecting these lesions. The American College of Radiology suggests that for individuals aged 40 and above, mammograms and ultrasounds can complement each other in detecting abnormalities.[2] A recent meta-analysis by Filipe et al.[11] showed a decreasing specificity for mammography (93%), followed by fibreoptic ductoscopy (92%), cytology (90%), MRI (76%), and ultrasound (69%) in detecting malignancy. However, MRI demonstrated the highest average sensitivity (83%), followed by fibreoptic ductoscopy (58%), ultrasound (50%), cytology (38%), and mammography (22%). Gupta et al.[12] found that MRI is not superior to fibreoptic ductoscopy in malignancy evaluation and that fibreoptic ductoscopy, when available, can be highly sensitive, potentially obviating the need for surgery. This was further confirmed in another meta-analysis by Filipe et al.,[13] which showed that fibreoptic ductoscopy could reduce the incidence of unnecessary surgery while offering therapeutic benefits through the use of lasers to treat lesions that were identified. Unfortunately, fibreoptic ductoscopy is unavailable in our hospital, as in many developing countries, due to cost and lack of expertise, so we could not evaluate the diagnostic accuracy of this modality in our population.

Histologically, our study revealed a predominance of ductal papilloma (65.2%), followed by ductal ectasia (21.7%). These findings align with the regional results of another study conducted in South Africa.[14] In the local study involving 153 patients, Lesetedi et al.[14] found a papilloma incidence of 56.9%, ductal ectasia at 18.3%, and a cancer rate of 7.8%. Our incidence of papilloma also aligns with the findings of Çetin et al.,[5] who reported a rate of 65.4% (51/78) but contrasts with those of Seltzer et al[15] with a documented papilloma incidence of 35%. Of note, Liu et al.[16] reported an incidence of 52.3% for papilloma and 8.2% for ductal ectasia in their study of 1 048 patients. Similarly, Murad et al.'s[17] study in France, which included 267 patients, found that ductal ectasia accounted for 42.1% of presentations, while 34.6% of patients presented with papillary adenoma, and 20.6% had invasive carcinoma. Morrogh et al.[18] reported ductal ectasia in 15% of patients, papilloma in 42%, and invasive carcinoma in 14% of patients with pathological ND.

The incidence of ductal carcinoma in situ (DCIS) in our study was 4.3%, almost consistent with other studies, such as Bahl et al.[19] at 7.1% and Çetin et al.[5] at 7%. We reported a higher incidence of ductal hyperplasia of 21.7% than Çetin et al.'s[5] study of 5.3%. This difference in ductal hyperplasia might be explained by our small sample size or a regional difference, which should be investigated in future studies. Notably, none of our patients were found to have any invasive malignancy on histopathological diagnosis, which can probably be attributed to our small sample size.

This study has multiple limitations. The small sample size may hinder the generalisability of the findings. Due to the retrospective nature, there was minimal reporting on patient experience and satisfaction measures, both of which are critical for assessing the overall acceptability of the procedure. Furthermore, the absence of long-term follow-up limits the evaluation of outcomes, such as nipple retraction, recurrence and the enduring effect of symptom relief over time.

Conclusion

Microductectomy is a simple, minimally invasive procedure that is both diagnostic and therapeutic. This study shows that microductectomy performed under local anaesthesia without sedation is safe and complication-free, making it a valuable alternative for breast units with limited access to general anaesthesia. The cause of a PND in our population was consistent with the literature. A more comprehensive study incorporating patient experiences would be valuable in further evaluating the feasibility of performing microductectomies under local anaesthesia without sedation. In addition to assessing clinical outcomes, such a study should also examine patient satisfaction, procedure duration, diagnostic yield, recurrence rates, and completeness of excision. This broader evaluation would provide more robust evidence to support the recommendation of microductectomy under local anaesthesia as a standard of care.

Conflict of interest

The authors declare no conflict of interest.

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Ethical approval

This study was approved by the Human Research Ethics Committee of the University of Cape Town (HREC 631/2023). The study was performed according to the Helsinki Declaration and institutional review board approval was obtained.

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