

Improving ductoscopy with duct lavage and duct brushing

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Summary

Aim: To assess the combined technique of duct lavage (DL) and duct brushing (DB) performed during ductoscopy in pathological nipple discharge (PND). **Materials and Methods:** The study was conducted in two hospitals: Rea (Greece) and in Meet Ghmmr Oncology Center (Egypt), from January 2011 to April 2013. Sixty-four women were enrolled. A sample of cells was collected with the use of DB. Afterwards, DL was performed. For each case, liquid cytology was compared to the final histology. **Results:** From the 19 histological diagnosis of duct ectasia, cytology by DL plus DB (CDLDB) was correct in 17 cases (89.5%). For 28 papillomas, CDLDB was correct in 19 cases (67.9%). For breast cancer (six cases), CDLDB was correct in five cases (83.3%). Also, CDLDB found 45.5% of miscellaneous benign cases. In total, cytology performed by CDLDB was correct in 46 of 64 patients: 71.9%. Thus, the sensitivity of CDLDB ranged from 67% to 90%, depending on the histological diagnosis. **Conclusion:** This technique showed a high accuracy, in contrast to other studies that used only DL.

Key words: Duct lavage; Duct brushing; Nipple discharge; Breast ductoscopy.

Introduction

Recent interest has focused on the topic of intraductal approaches to the evaluation of breast disease, as it is shown by the literature and by medical conferences [1-3]. An important goal in the management of breast cancer is still the early detection of breast lesions and this involves the use of special techniques.

Mammary ductoscopy is a useful endoscopic technique, which allows direct visual assess to the mammary ductal epithelium, through nipple orifice cannulation. This surgical tool is able to estimate intraductal lesions with nipple discharge [4-10].

Duct lavage (DL) is a new method of cell collection used to identify precancerous and cancerous changes within the breast ducts, especially in women who are at high risk for breast cancer [5, 11]. It should be noted that there are various opinions about the utility of DL. In contrast to DL, the data about duct brushing (DB) technique are limited. This new technique may offer the detection of breast cancer, as it could help collect more breast cells with the use of one microbrush.

Several studies were published during the last decade, related to the DL technique. However, as these methods examine only a small number of 15-20 nipple's ducts, they might fail to detect focal abnormalities [12]. The aim of this study was to assess the sensitivity of the combined technique of DL and DB performed during ductoscopy in women with pathological nipple discharge. For this purpose, the authors compared cytology results with those of final histology, after surgical procedure which is known as microdochoectomy or pyramidectomy [13].

Materials and Methods

The study was conducted at Rea hospital in Athens (Greece) and at Meet Ghmmr Oncology Center in Mansoura (Egypt), from January 2011 to April 2013 (Figures 1 and 2). Sixty-four women with pathological nipple discharge were enrolled, after obtaining an informed consent. Only 53 of these women had a complete cytological and histological control. The mean age of the patients was 47 years with a range of 31 to 62 years (Figure 3).

Initially, the patient was placed in the supine position and the skin in the nipple area was cleansed with 70% alcohol. After that, a sample of cells was collected with a microbrush (diameter of 0.5 mm) (Figure 4), which was inserted in the duct through the ductoscope (DB technique) (Figure 5). The handle of the microbrush was rotated to collect the cells. Then the microbrush was pulled out and DL technique was performed (Figure 6).

The first step of DL technique included breast massage, which was performed by the physician, in order to identify the duct where the discharge originated. Then a small catheter was inserted into the breast duct in a maximum depth of one cm. The next step was the injection of saline solution (approximately two to three ml), which was then followed by aspiration. There were no reported serious side effects during the clinical trial.

The recovered sample of cells was placed in Thinprep, according to the manufacturer's guidelines and was sent for cytological examination (liquid cytology).

Furthermore, for each case, discharge characteristics and mammography, ultrasound, and galactography findings were related to ductoscopic appearance. The results of liquid cytology were compared to the final histology after pyramidectomy (Figure 7). Finally, it is noteworthy that the time required for the procedure of DL and DB was approximately 20-30 minutes.

Results

A comparison between the cytological and histological findings was accomplished. The histological findings were summarized in four categories, which were: duct ectasia (Figure 8 a, b), papillomas and papillomatosis (Fig-

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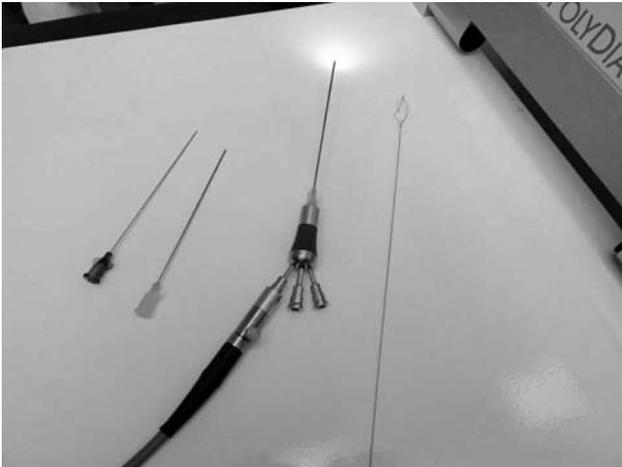


Figure 1: Tools for DL and DB.

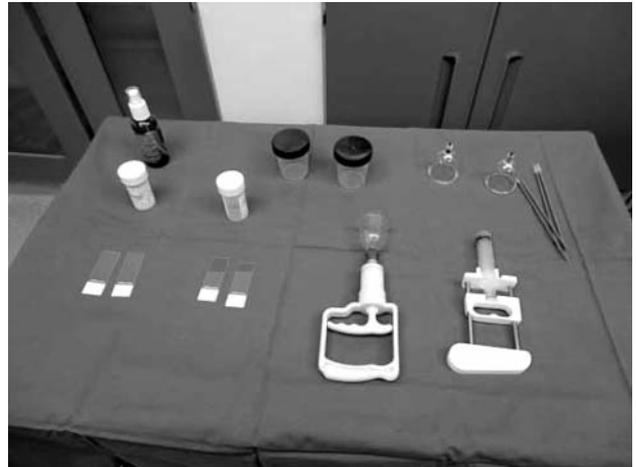


Figure 2: Tools for DL and DB.

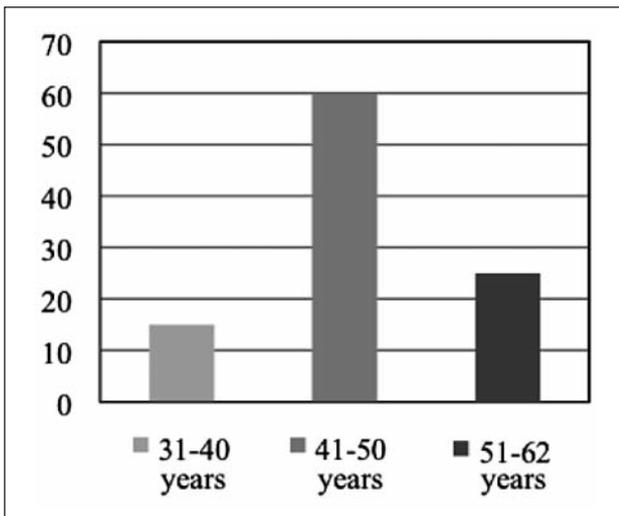


Figure 3: Age distribution.



Figure 4: Microbrush.



Figure 5: DB technique.



Figure 6: DL technique.

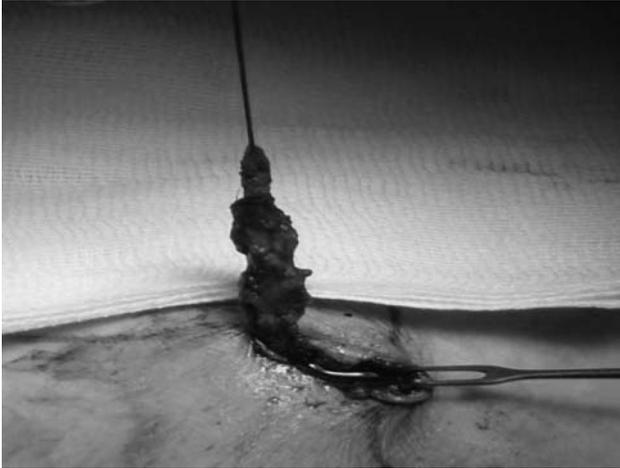


Figure 7: Pyramidectomy (microdolichectomy).

ure 9 a, b), breast cancer (Figure 10 a, b), and miscellaneous benign.

From 19 histological diagnosis of duct ectasia, cytology by DL plus DB (CDLDB) technique was correct in 17 cases (89.5%) and was non conclusive in two cases (10.5%).

In 28 cases of papillomas and papillomatosis, CDLDB was correct in 19 cases (67.9%). In contrast, in five cases, cytology found duct ectasia, one probable breast cancer, and was non-conclusive in three cases. Therefore, cytology was not successful in nine of 28 cases (32.1%).

Moreover, in six cases of breast cancer, cytology of DL and DB detected five cases (83.3%) and was non-conclusive in one case (16.7%).

Furthermore, from 11 miscellaneous benign cases, cytology was correct in five cases (45.5%), non-conclusive in five cases, and also revealed one duct ectasia. Thereafter, from these 11 cases, cytology was unsuccessful in six cases (54.5%). Interestingly, from these benign cases, thorough

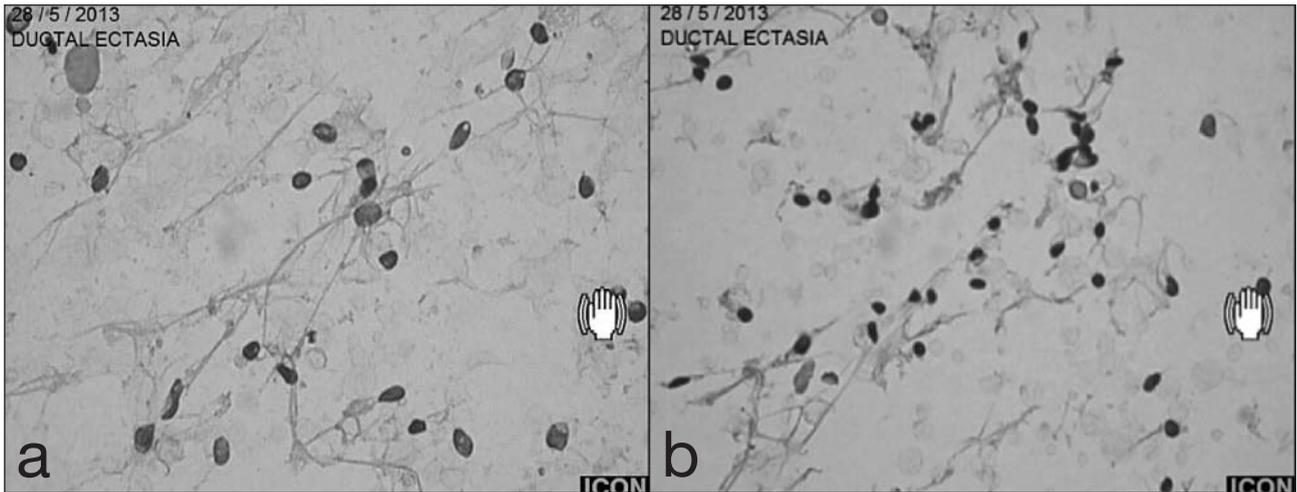


Figure 8 a, b: Duct ectasia.

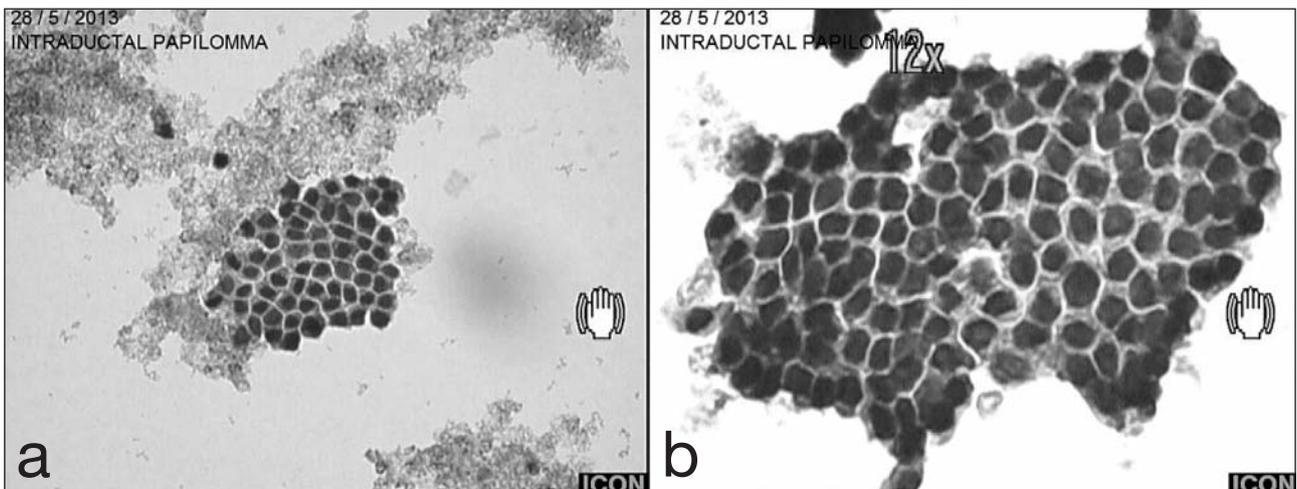


Figure 9 a, b: Ductal papilloma.

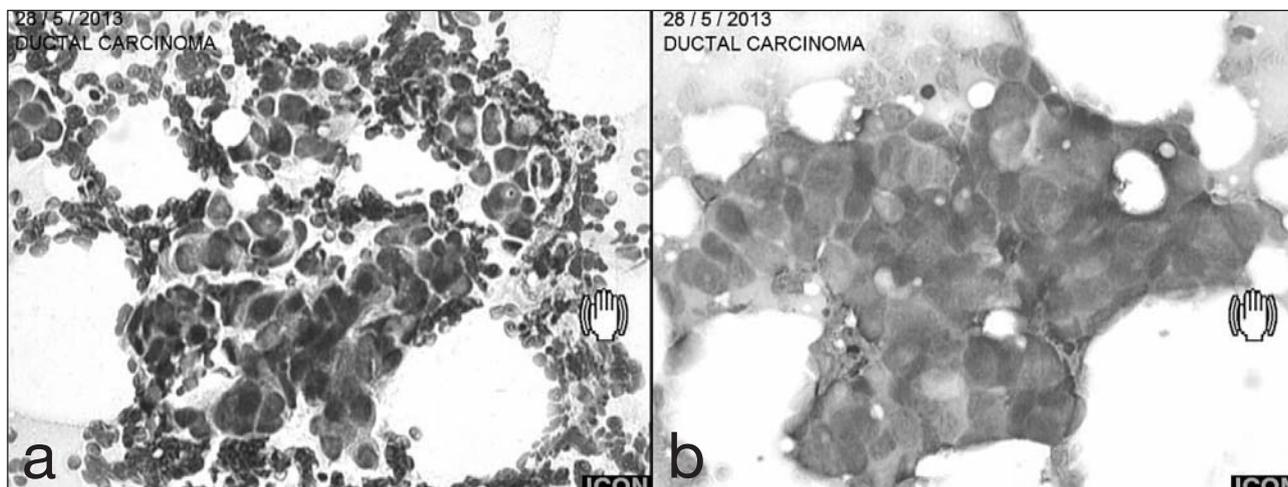


Figure 10 a, b: Ductal carcinoma.

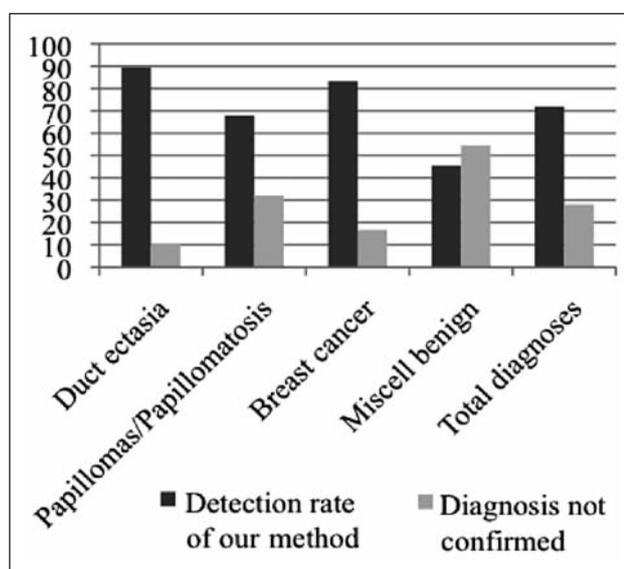


Figure 11: Sensitivity.

diagnosis was: fibrocystic disease, chronic mastitis or hormonal discharge.

In total, CDLDB was reliable in 46 of 64 patients (71.9%) (Figure 11) and was non-conclusive in 11 cases (17.2%), because the specimen was insufficient for the diagnosis by cytology. Consequently, the failure detection in non-conclusive cases, was not related to DL and DB technique. Also, cytology actually failed in seven cases (10.9%).

Thus, the sensitivity of CDLDB ranged from 67% to 90%, depending on the histological diagnosis.

Discussion

Previous studies have attempted to determine the value of DL technique during ductoscopy in the detection of breast

Table 1. — Results of duct cytology sensitivity and specificity in the present study and in other studies.

Authors	Sensitivity	Specificity	DL & DB
Lee (2003) [14]	58%	100%	
Baitchev <i>et al.</i> (2003) [15]	75%	97%	
Pritt <i>et al.</i> (2004) [16]	85%	97%	
Khan <i>et al.</i> (2004) [17]	17%	100%	
Beechey-Newman <i>et al.</i> (2005) [18]	87.5%		✓
Lang <i>et al.</i> (2007) [19]	26.7%	81.1%	
Liu <i>et al.</i> (2008) [20]	94.2%		
Kooistra <i>et al.</i> (2009) [21]	16.7%	66.1%	
Zervoudis <i>et al.</i> (2013)	71.9%		✓

cancer. Also, there are many studies which estimated the rate of duct cytology's sensitivity and specificity (Table 1) [14-21].

Badve *et al.* assessed the utility of mammary ductoscopy and DL and reported that a considerable number of patients (15-30%) undergoing mastectomy for breast cancer did not have an intraductal component. Furthermore, they concluded that mammary ductoscopy and DL were not effective methods for detecting most forms of breast cancer [12].

Khan *et al.* in 2004 investigated the relevance between DL cytologic findings and histologic findings in women with known breast cancer, who had undergone mastectomy. They demonstrated that only 37% of fluid-yielding ducts were related with the cancer. They deduced that DL should not be recommended to high risk women. Therefore, imaging modalities in early detection of breast cancer was considered as a more useful procedure [17]. Similar recommendation was documented by Fabian *et al.* They concluded that further developments are necessary for the evaluation of DL as a risk assessment tool [22]. Also, Khan *et al.* in 2009 mentioned that the utility of DL was questionable [23].

Conversely, some studies summarized that atypia identified by DL was not related to a higher risk of developing breast cancer [24, 25]. Moreover, another study indicated that the ducts, which were found on DL had atypia, however repeat lavage in some cases failed to demonstrate atypia a second time [26].

In contrast to the studies, which showed that the usefulness of DL is limited, latest studies pointed out that the combination of visualization and DL is the most accurate predictor of diagnosis. Specifically, Vaughan *et al.* reviewed their experience of 89 cases of patients with pathological nipple discharge, who had undergone ductoscopy and collection of ductal washings specimens. They showed that the highest predictive value for the diagnosis of papilloma provided by visualization and cytology examination of washings [27].

In addition, other investigators demonstrated that DL is a well-tolerated procedure for repeated evaluation to obtain material for cytology and to create a biobank for future studies [28, 29].

Although, there are restricted data about DB technique, Beechey-Newman *et al.* significantly improved the sensitivity of cytologic examination by using a microbrush. In this study, 50 patients participated and the results of microbrush cytology compared to those of DL. Interestingly, the sensitivity of brushing's cytology for the diagnosis of papilloma was 87.5%, while the sensitivity of DL was 18% [18]. According to our aforementioned data, with a relative small number of cases, the sensitivity of DL plus DBs ranges, roughly from 67% to 90%, depending on the histological diagnosis.

Conclusion

Ductoscopy plays a very important role as a useful tool for the detection of breast lesions, especially in women who have pathological nipple discharge. During ductoscopy, cytology provides objective assessment of the lesions. In this study, the combination of DL and DB during breast ductoscopy for pathological nipple discharge showed increased accuracy and sensitivity. Summarizing, this technique is an enough reliable procedure and should be recommended.

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