Triaging equivocal cytology of the cervix : identyfying women at risk for high-grade cervical lesions

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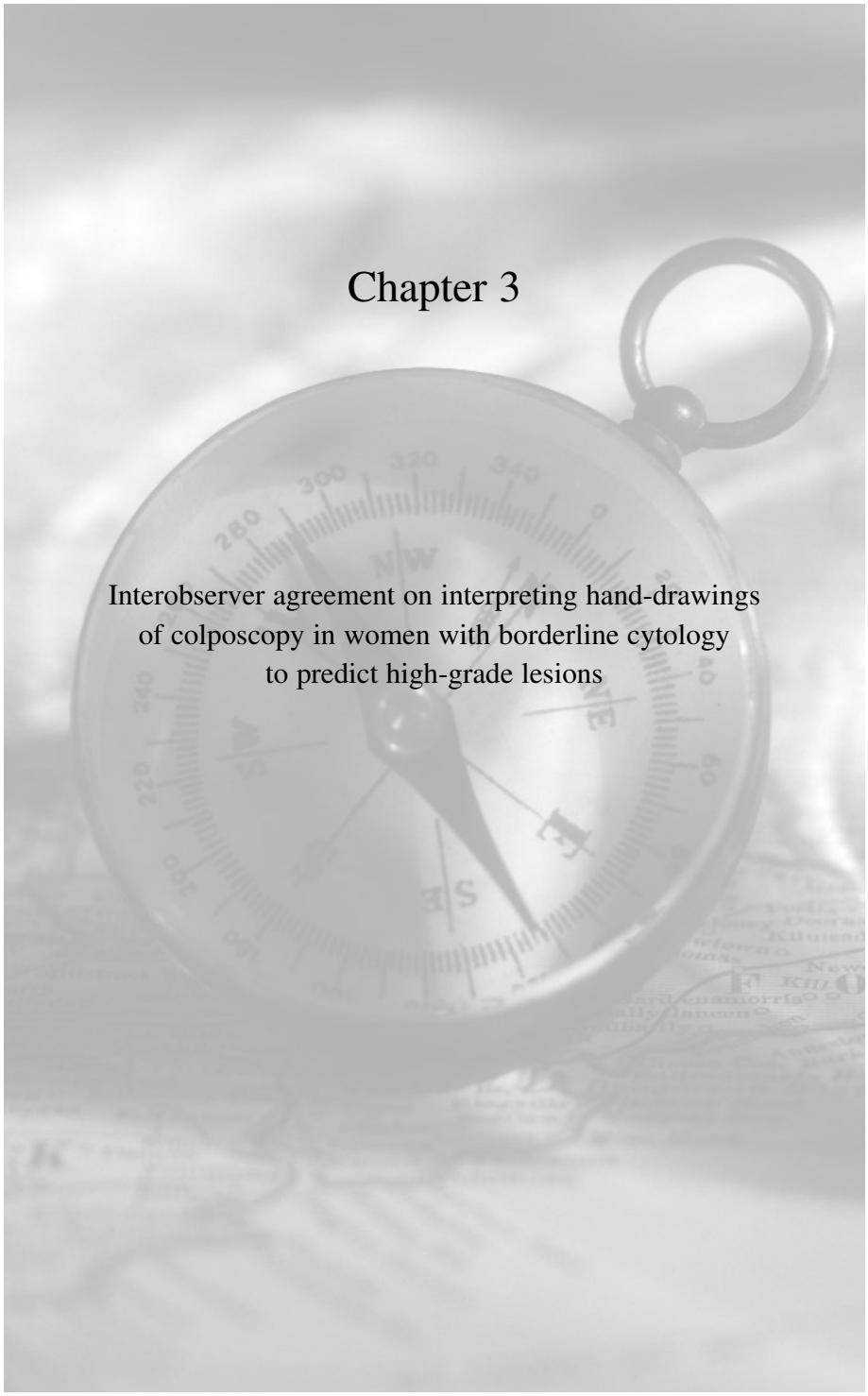

Chapter 3

Interobserver agreement on interpreting hand-drawings of colposcopy in women with borderline cytology to predict high-grade lesions

Abstract

Objective: To assess the interobserver agreement on interpreting hand drawings as a colposcopic image recording technique in women with borderline dyskaryosis and to assess the correlation between colposcopic impression and histological outcome.
Methods: We used colposcopic documentation and histology from a cohort study of women with borderline dyskaryosis. Four gynecologists and four residents scored the same 30 colposcopic documentation forms.
Results: There is a good interobserver agreement on classifying colposcopic hand drawings as high-grade lesions (average Kappa 0.58). The interobserver agreement on interpreting colposcopic CIN classification was higher for the more highly experienced gynecologists than for the residents. The agreement between colposcopic impression and histological outcome is poor (Kappa 0.17) among the observers.
Conclusions: Hand drawings are a reliable recording technique of interpreting colposcopic impression documented as high-grade lesion. However, the correlation between colposcopic impression and histological outcome is still poor in women with minor cytological abnormalities.

Introduction

The purpose of a thorough and systematic colposcopic assessment is to assist the colposcopist in selecting the most abnormal lesions for biopsy and to rule out high-grade cervical intraepithelial neoplasia (CIN II/III) or cervical cancer. In the early years of colposcopy criteria were defined that were thought to be associated with abnormalities, especially high-grade lesions. These abnormal findings included leukoplakia, acetowhite epithelium, punctation, mosaic and atypical vessels. Unfortunately, none of these colposcopic characteristics are pathognomonic of (pre-) malignancy[1].
Distinction between normal and abnormal histology may create difficulties in interpretation of the colposcopic image[2]. Women with cytology diagnosed as borderline dyskaryosis often show mainly minimal colposcopic abnormalities and therefore interpreting colposcopic images can be difficult. In a meta-analysis on colposcopy to predict high-grade lesions in women with cytology diagnosed as mild/moderate dysplasia or more, Mitchell et al. (1998) estimated a mean weighted sensitivity of 85% (range 64-99%) and a specificity of 69% (range 30-93%)[3].
Colposcopic assessments, like other forms of medical assessment, require documentation (for clinical use, audit and research), for which a wide variation in techniques exists. The most widely used of these are simple hand drawings. These are usually not to scale, only record the presence or absence of a lesion and may also specify whether or not the whole transformation zone was visualised. The shortcomings

of this method are that there is difficulty in quantifying the abnormality as well as in reproducibility of this subjective method. Other methods like colpophotography and computerised digital imaging colposcopy were developed for documentation, but these methods are expensive.
As the colposcopic abnormalities in women with borderline cytology are often minimal, interpretation and documentation of their colposcopic images is more difficult and could be related to the experience of the investigator. This study was designed to assess the interobserver agreement on interpreting the hand drawings as a subjective method of documentation of colposcopic impression. Furthermore, we explored the correlation between the colposcopic characteristics and colposcopic impression and between the colposcopic characteristics and histological outcome.

Methods

In this study colposcopic documentation and histology of 30 cases were obtained from a cohort study of 148 women with borderline dyskaryosis (=atypical squamous or glandular cells of undetermined significance) who were enrolled between April 1997 and March 2000 at the gynecological outpatient clinic of the Medical Center Haaglanden, The Hague, The Netherlands[4]. A colposcopic examination with biopsy was performed on all 148 women because we were interested in the colposcopic and histological outcome in women with borderline dyskaryosis. Seven percent of these women showed a high-grade lesion. The Medical Ethics Committee of the hospital approved this prospective study and informed consent was obtained from the patients.
For this study we selected at random ten hand drawings of women with normal histology and ten with CIN I. All cases of CIN II[7], CIN III[1], and cervical cancer[2] were also included in this study. Documentation on a standard colposcopy form was made stating the location and appearance of the transformation zone. Colposcopic abnormalities such as acetowhite changes, punctation, mosaic vascular pattern, and atypical vessels were noted. Whether the squamous cell junction was visible or not was also documented. The colposcopic impression was noted on the form. The investigators did not know the colposcopic diagnosis and histological outcome. Four gynecologists with extensive colposcopic experience, all members of the Dutch Society for Cervical Pathology and Colposcopy and four less experienced residents independently scored these 30 colposcopic forms for the characteristics acetowhite changes, punctation, mosaic, atypical vessels, number of abnormal quadrants and colposcopic impression.
The objective of this study was to determine the range of interpretations of each documented colposcopic characteristic. Then, the agreement (average Kappa and range) among the observers was assessed. We also investigated the agreement (Kappa and 95% confidence interval (= CI)) between the colposcopic characteristics and colposcopic

impression (i.e. ≥ CIN II) and between the colposcopic characteristics and histological outcome (i.e. ≥ CIN II) using SPSS crosstabs. The value of Kappa (k) assesses the strength of interobserver agreement in excess of chance. A k-value of > 0.60 or > 0.80 has been suggested as good or excellent interobserver agreement, while a k-value of less than 0.20 would indicate poor agreement[5]. For table 1, we calculated the average (over all pairs of observers) Kappa, and it's range. For table 2, we calculated an agreement (Kappa and it's 95% CI) over all 8 investigators together to correlate the colposcopic characteristics with colposcopic impression/ histological outcome ≥ CIN II.

Results

The interobserver agreement for the colposcopic items acetowhite, punctation, mosaic, atypical vessels and visibility of the transformation zone among the observers was excellent (Table1). For the number of abnormal quadrants (i.e. size of abnormalities) the agreement was still good (Table1). The average k-value for the CIN classification among the investigators was 0.37. However, this increased to 0.58 when the CIN classification was reclassified into two categories, namely ≤ CIN I and ≥ CIN II. The interobserver agreement on the number of abnormal quadrants, CIN classification and colposcopic diagnosis of ≥ CIN II was better among the experienced gynecologists than among the residents (Table1).

Table 1. Interobserver agreement for interpretation of hand drawings of colposcopic images in women with borderline cytology.

	All observers	Among the investigators 4 gynecologists Average Kappa (range)	4 residents
acetowhite	0.90 (0.80-1.00)	0.90 (0.80-1.00)	0.88 (0.80-1.00)
punctation	0.94 (0.80-1.00)	0.90 (0.80-1.00)	0.97 (0.93-1.00)
mosaic	0.96 (0.81-1.00)	0.96 (0.91-1.00)	0.96 (0.91-1.00)
atypical vessels	0.83 (0.61-1.00)	0.79 (0.71-0.87)	0.83 (0.67-1.00)
SCJ*	0.92 (0.68-1.00)	0.92 (0.83-1.00)	0.92 (0.83-1.00)
number of abnormal quadrants	0.70 (0.42-0.92)	0.75 (0.66-0.92)	0.64 (0.42-0.74)
CIN classification	0.37 (0.12-0.67)	0.38 (0.22-0.53)	0.31 (0.10-0.61)
colposcopic image ≥ CIN# II	0.58 (0.24-0.86)	0.63 (0.59-0.73)	0.51 (0.24-0.72)

*SJC=squamo-columnar junction #CIN= cervical intraepithelial neoplasia

To assess which colposcopic characteristics on hand drawings were more pathognomonic of colposcopic and histological high-grade lesions (i.e. ≥ CIN II) the interobserver agreement (k-value) of each characteristic was estimated among the investigators (Table 2). The Kappa of the colposcopic characteristics punctation, mosaic and ≥ 2 abnormal quadrants for colposcopic impression of ≥ CIN II were moderate (0.47, 0.40, and 0.56 respectively). The Kappa of the colposcopic characteristic acetowhite was poor (0.11), whereas that of atypical vessels was fair (0.37). These k-values were similar for experienced gynecologists and residents. None of the colposcopic characteristics were pathognomonic for histological outcome (Table 2). The agreement on colposcopic impression ≥ CIN II and histological outcome ≥ CIN II was poor (k-value 0.17) among the investigators (data not shown).

Table 2. The agreement between colposcopic characteristics and colposcopic impression ≥ CIN II and between colposcopic characteristics and histological outcome ≥ CIN II

	Agreement between colposcopic characteristics and Colposcopic impression ≥ CIN II	Agreement between colposcopic characteristics and Histological outcome ≥ CIN II
colposcopic characteristics	Kappa (95% CI)*	Kappa (95% CI)*
acetowhite	0.11 (0.03-019)	0.10 (0.03-0.18)
punctation	0.47 (0.36-0.58)	0.13 (0.00-0.25)
mosaic	0.40 (0.27-0.52)	0.07 (-0.06-0.19)
atypical vessels	0.37 (0.26-0.49)	0.05 (-0.05-0.7)
≥ 2 abnormal quadrants	0.56 (0.46-0.65)	0.25 (0.14-0.36)

* CI = confidence interval

Discussion

In this study the interobserver agreement for the colposcopic criteria acetowhite, punctation, mosaic, atypical vessels, visibility of the transformation zone and number of abnormal quadrants was good to excellent among the investigators. The interobserver agreement on interpreting the number of abnormal quadrants and CIN classification was higher for the well-experienced gynecologist than for the residents. Like the (weighted) interobserver agreement shown by Etherington et al. and Hopman et al., we found a fair to moderate observer agreement (k-value 0.37) for CIN classification among the investigators[2,6]. Thus, the observers performed fairly in interpreting the CIN classification from the hand drawing and even good (0.58) when the CIN classification was dichotomised ($\leq$ CIN I and $\geq$ CIN II). Data on computerised digital imaging colposcopy are insufficient to compare the validity of this technique of documentation with hand drawing.

The highest sensitivity (92-97%) and lowest specificity (25-26%) was found for colposcopic acetowhite epithelium to predict histological CIN[4,7]. Punctation was less sensitive (38-40%), but more specific (80-85%)[4,7]. We found in a previous study very high specificity rates for mosaic and atypical vessels (90% and 97%, respectively) to predict CIN compared to Edeberi et al (89% and 68%, respectively)[4,7]. Thus abnormal vascular patterns, mosaic and punctation are more specific for CIN lesions than acetowhite abnormalities.

We showed in this study that the colposcopic characteristic acetowhite epithelium was not pathognomonic for scoring the hand drawings as high-grade lesions. To interpret when the acetowhite epithelium documented on a hand drawing was suggestive of normal histology or a certain grade of CIN was difficult.

Similar to Edebiri et al. we concluded that the observer needs more information about the density of acetowhite lesion and the sharpness of the margins separating the lesion from the normal epithelium for predicting the grade of a CIN lesion[7]. To improve the interpretation of acetowhite lesions on the hand-drawings the four experienced gynecologists suggested documenting on the form whether the acetowhite epithelium is faint, bright or dense white and to describe the margins of the lesion in more detail.

The interobserver agreement of the characteristic atypical vessels noted on the hand drawings was very good among the investigators. However, the interobserver agreement among the investigators on atypical vessels to predict colposcopic or histological high-grade lesions is less satisfactory. The four experienced gynecologists concluded that determining whether the vascular pattern is normal, abnormal or even atypical during colposcopy appeared to be difficult and atypical vessels as colposcopic impression is still overinterpreted.

In our study the correlation between colposcopic impression and histological outcome was poor (k-value 0.17). Cristoforoni et al. compared computerised colposcopy with

traditional colposcopy. They showed a higher correlation (0.40) between the traditional colposcopy and histological outcome compared with the present study. The correlation between colposcopic impression and histological outcome was even better for computerised colposcopy (0.77). However, this documentation technique is very expensive and therefore not widely used[8].

In conclusion, there is a good agreement among the investigators on interpreting hand drawings and this method appears to be reliable for documenting colposcopic impression for adjudicating whether colposcopic impression is suggestive of high-grade lesion. However, the correlation between colposcopic impression and histological outcome is still poor in women with minor cytological abnormalities.

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