# Agreement between colposcopy results using the Reid Colposcopic Index and histopathology

## Zgodność badania kolposkopowego wykonanego przy wykorzystaniu skali Reida z histopatologią

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### Abstract

***Objectives:*** *The aim of the study was to evaluate the diagnostic efficacy of colposcopy and to determine the strength of correlation between colposcopic impression using the Reid Colposcopic Index (RCI) and histopathology.*

***Material and methods:*** *This was a prospective cross-sectional study carried out at the colposcopy clinic of Bakırköy Dr Sadi Konuk Education and Research Hospital, Department of Obstetrics and Gynecology, between June 2011 and September 2011. A total of 105 women who met the selection criteria were included in the study. All women underwent colposcopy and the final diagnosis was made using RCI. Colposcopy-guided biopsy was obtained from the abnormal areas. In cases when colposcopy did not reveal any lesion, a four-quadrant biopsy from the squamocolumnar junction was taken, which served as the gold standard.*

***Results:*** *According to the Reid scoring system, there were 60% of benign cases, whereas 27.6%, 5.7%, and 6.7% of the women were diagnosed with CIN 1, CIN 2, CIN 3, respectively. As far as histologic results were concerned, 62.9% of the subjects were benign, whereas 25.7%, 3.8%, and 7.6% of the patients were diagnosed with CIN 1, CIN 2, CIN 3, respectively. The correlation between the Reid scoring system and histologic results was statistically significant (p>0.05).*

***Conclusions:*** *The correlation between colposcopic lesions graded with RCI and histology was strong, particularly in women who had HGSIL on a Pap smear. Good correlation between colposcopic imaging using RCI and histopathology makes it a reproducible technique, easy to implement in colposcopy clinics.*

Key words: **colposcopy** / **histology** / **Reid index** /

### Streszczenie

***Cel pracy:*** *Celem tej pracy jest ocena skuteczności diagnostycznej badania kolposkopowego i zbadanie zgodności obrazów kolposkopowych, uzyskanych przy użyciu skali Reida (RCI) z histopatologią.*

***Materiał i metody:*** *Badanie prospektywne, przekrojowe przeprowadzono w okresie od czerwca 2011 do września 2011 w Szpitalu Naukowo - Badawczym Bakırköy Dr Sadi Konuk w Pracowni Kolposkopii Kliniki Ginekologiczno-Położniczej. Do badania włączono 105 kobiet odpowiadających kryteriom. Wszystkie pacjentki miały wykonane badanie kolposkopowe i przy użyciu skali RCI postawiono diagnozę. Wykonano biopsję obszarów nieprawidłowych pod kontrolą kolposkopu. U kobiet, u których nie wykryto kolposkopowo patologii, wykonano biopsję na granicy nabłonków w czterech kwadrantach, które uznano jako złoty standard.*

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***Wyniki:*** *Według skali Reida wykryto 60% zmian niezłośliwych, podczas gdy u 27,6% zdiagnozowano CIN 1, u 5,7% CIN 2, i u 6,7% CIN 3. Na podstawie badania histopatologicznego znaleziono 62,9% pacjentek ze zmianami niezłośliwymi, 25,7% CIN 1, 3,8% CIN 2, i 7,6% CIN 3. Związek indeksu RCI z histopatologią jest statystycznie znaczący (p>0.05).*

***Dyskusja:*** *Istnieje wysoki stopień zgodności pomiędzy prognozą dysplazji wykonaną przy pomocy RCI, a dysplazją w wynikach ostatecznych histologii. Zgodność jest jeszcze wyraźniejsza zwłaszcza u pacjentów z nieprawidłowym wynikiem wymazu HGSIL. Wysoka zgodność obrazów uzyskanych przy użyciu RCI z histopatologią zapewnia możliwość łatwej integracji tego narzędzia w pracowniach kolposkopowych, a także pozwala na stosowanie go przez innych lekarzy ginekologów.*

Słowa kluczowe: **kolposkopia** / **Reid index** / **histopatologia** /

## Introduction

Cervical cancer is the most frequent type of gynecologic malignancy in developing countries [1]. According to the World Health Organization, in 2005 over 500 000 new cases of cervical cancer have been reported, with 90% from developing countries. Additionally, 95% of the 260 000 cervical cancer-related deaths also occurred there. Cervical cancer has a long latent phase and can be easily prevented using early screening methods, including Papanicolaou (Pap) smears, human papilloma virus (HPV) testing, cervical examination using acetic acid and Lugol's iodine, and colposcopy [2]. Colposcopy is the standard diagnostic method for cervical cancer [3] and is a visual technique that hinges upon the training and experience of colposcopists. Therefore, a colposcopist is required to obtain a certificate of convenience, and a proper rating system should be incorporated [4].

Reid and Scalzi proposed a four-feature scoring system to designate the histologic diagnosis based on the margins of the lesion, color, type of vascularity, and iodine staining. Moreover, they report a high degree of correlation between the histologic results and index assessments [5]. They have developed the Reid Colposcopic Index (RCI) to make colposcopy a less subjective diagnostic tool [6]. The purpose of our study was to evaluate the diagnostic effectiveness of colposcopy and to use RCI to investigate the relationship between colposcopic observations and histopathologic results.

## Material and methods

Our prospective, cross-sectional study was conducted between June 2011 and September 2011 at the colposcopy unit of the Obstetrics and Gynecology Clinic of the Bakırköy Dr Sadi Konuk Training and Research Hospital. The Local Ethics Committee approved of the study. One hundred and twenty-one women who had post-coital bleeding, uncertain cervical lesions and had undergone Pap-smear tests, and who were diagnosed with atypical squamous cells of undetermined significance, low-grade squamous intraepithelial lesion, or high-grade squamous intraepithelial lesion, were referred to the colposcopy unit. Informed consent was obtained from of all patients involved in the research. Three of the 121 patients were excluded and RCI was not applied because their symptoms were suggestive of invasive cervical cancer. Thirteen patients were excluded from the study due to inadequate colposcopies. Overall, 105 patients were included into our research. All women underwent colposcopic imaging and were diagnosed using the RCI. Biopsies, targeted to the suspicious areas identified during the colposcopic examination, were performed. Four-quadrant biopsy was performed for patients with normal colposcopic findings, and was considered to be the gold standard. Acetowhite-negative or Lugol's iodine-negative regions, as well as lesions with atypical vascularization, punctuation, and/or mosaic appearance, were biopsied using Tischler forceps.

A four-quadrant biopsy was conducted at the transformation zone for the unmonitored lesions. Biopsy samples were sent to pathology in 10% formalin. Patients received either follow-up or treatment based on the biopsy results. All patients were diagnosed using RCI. According to this scoring system, patients with a score of 0–2 were classified as either subclinical HPV infection or cervical intraepithelial neoplasia (CIN) I (low-grade, mild lesions), whereas those with the scores of 3–4 and 5–8 were classified as CIN I–II (moderate-grade lesions) and CIN II–III (high-grade lesions), respectively. Biopsy results were categorized as benign, CIN I–III, or invasive cervical cancer. Patients who had invasive cancer and inadequate colposcopic examination were excluded from the study because RCI was not available.

## Results

One hundred and twenty-one patients were included in the study but 3 had to be excluded from the study, and RCI was not applied, because their symptoms were suggestive of invasive cervical cancer. Thirteen patients were excluded from the study due to inadequate colposcopy. Finally, 105 women were included in the study. No complications were reported at the time of the study. Based on RCI, 63 (60%) patients were classified as benign, whereas 27 (25.7%), 3 (2.9%), and 7 (6.7%) were categorized as CIN I, II and III, respectively. In these cases, RCI was compatible with the histopathologic result.

The kappa value was calculated to measure agreement between RCI and pathology findings and was 0.951 ($p=0.00 \leq 0.05$) for CIN I, 0.852 ($p=0.00 \leq 0.05$) for CIN II, and 0.928 ($p=0.00 \leq 0.05$) for CIN III. In all three cases the results indicated a strong agreement between the pathology results and RCI.

RCI, given as the result of colposcopy, demonstrates compatibility with the histopathological results. In our study, RCI was compatible with the histopathologic result for 95.2% of the subjects. The number of patients diagnosed with the disease based on the histologic results and using RCI was 39 (37.1%) and 42 (40%), respectively. Both tests diagnosed 63 (62.9) patients as non-diseased. The sensitivity, specificity, and accuracy of the RCI test were determined to be 1, 0.95, and 0.97, respectively.

**Table I.** Compatibility between histopathologic results and RCI.

| Reid Index | Pathology Result | | | | Total |
|---|---|---|---|---|---|
| | Benign | CIN-1 | CIN-2 | CIN-3 | |
| Benign | 63 (60%) | - | - | - | 63 (60%) |
| CIN-1 | - | 27 (25.7%) | 1 (1%) | 1 (1%) | 29 (27.6%) |
| CIN-2 | 3 (2.9%) | - | 3 (2.9%) | - | 6 (5.7%) |
| CIN-3 | - | - | - | 7 (6.7%) | 7 (6.7%) |
| **Total** | 66 (62.9%) | 27 (25.7%) | 4 (3.8%) | 8 (7.6%) | 105 (100%) |

**Table II.** Relation between histopathologic results and RCI.

| Colposcopy Results Reid Index | Overestimatio | Underestimation | Accurate estimation | Total |
|---|---|---|---|---|
| Benign | - | - | 63 (60) | 63 (60 |
| CIN-1 | 2 (1.9) | - | 27 (25.7) | 29 (27.6) |
| CIN-2 | - | 3 (2.9) | 3 (2.9) | 6 (5.7) |
| CIN-3 | - | - | 7 (6.7) | 7 (6.7) |
| **Total** | 2 (1.9) | 3 (2.9) | 100 (95.2) | 105 |

## Discussion

Colposcopy is not a definitive diagnostic test. There can be variability in different inspections performed by the same colposcopist and in the same inspection performed by different colposcopists. Inadequate colposcopic examination may require histopathological assessment as well, even in cases of normal findings on colposcopic examination or mild cases of HPV infection [7]. Colposcopists seek to distinguish between normal and abnormal tissue to determine whether a biopsy is needed.

A few colposcopic rating systems were developed in relation to the measurements on various colposcopic findings in order to increase accuracy. RCI, which has a 97% histologic compatibility, remains the most popular system. The system is based on four characteristics: peripheral edge, color, vascular pattern, and Lugol's iodine staining. Each category is scored between zero and two. The sum provides a numerical index that indicates compatibility with histologic findings. There is still no consensus in the literature as to which criteria should be used for colposcopic inspections to estimate the degree of pre-invasive cervical disease. Therefore, as is frequently highlighted in the literature, the accuracy of the colposcopic inspection depends on the severity of the lesion, as well as the experience and ability of the gynecologist who performs the colposcopy [8–11]. It should be noted that there could be significant histologic findings even if colposcopy indicates minor alterations [8].

A large number of studies have demonstrated a relationship between detection sensitivity and cervical pre-invasive and invasive diseases diagnosed by colposcopy. It was observed that RCI impression generates more specific results of colposcopic findings as compared to the scoring systems. In a meta-analysis performed by Mitchell et al., it was determined that the sensitivity, specificity, and positive and negative predictive values of invasive or pre-invasive lesions diagnosed by colposcopy were 95%, 45%, 82%, and 79%, respectively. They reported that colposcopy was not a good tool to discriminate between low-and high-grade squamous intraepithelial lesions in terms of sensitivity, specificity, and positive and negative predictive values, with the rates of 79%, 67%, 57%, and 85%, respectively [12].

In an extensive study conducted in Iran, 344 patients were assessed using RCI, and 353 patients were evaluated based upon a general colposcopic evaluation. Patients with abnormal cytology, visible abnormal cervical lesions, persistent vaginal discharge, post-coital bleeding, and abnormal uterine bleeding were evaluated by colposcopy. A biopsy was performed if a lesion was identified and was randomly performed using a four-quadrant approach if a lesion was not identified. The sensitivity and specificity of the group, which were evaluated with respect to general colposcopic findings, were 63.8% and 88.8%, respectively. On the other hand, according to the RCI system, the sensitivity, specificity, and positive and negative predictive values were 74%, 90.7%, 92%, and 70.5%, respectively. The indications described above were included in addition to abnormal smear results, similarly to our study. However, their study failed to mention which criteria to use for the general colposcopic evaluation. In addition, considering the results from the colposcopy examinations, a good correlation between RCI assessment and histology was only obtained using RCI, which is consistent with our findings [13].

In Germany, Schungraber et al., investigated the relationship between high-degree dysplasia and specific colposcopic findings on serious lesions. The sensitivity and specificity of colposcopy for determining the internal demarcation lines in moderate or severe dysplasia were obtained. The transformation zone was monitored in the colposcopy examination for all 695 patients. The internal demarcation line on the lesion was monitored in 7.6% of the cases. The histologic findings revealed metaplastic alterations or inflammation in 6 of 53 patients, CIN I in 10 patients, and CIN II or III in 37 patients. The sensitivity and specificity of colposcopy for determining the internal demarcation line of CIN II or III lesions were 20% and 97%, respectively. Additionally, the positive and negative predictive values were 70% and 77%,

  

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respectively [14]. In their study, sensitivity of the internal demarcation line for determining CIN II or III was low. Nevertheless, the positive predictive value was high for determining moderate or severe dysplasia. Therefore, Schungraber et al., emphasized that internal demarcation, a colposcopic finding, is a rare but significant and specific sign of CIN [14]. These authors only investigated sensitivity of determining high-grade CIN by the internal demarcation line. Their unique study investigated the sensitivity of pre-invasive disease, which was estimated by evaluating all features of the lesion. The internal demarcation line was also used in the index scale and is primarily observed by dark stained acetic acid, properly monitored lines, and thick lesions that are also related to severe dysplasia.

In a study that examined the cervical pre-invasive disease with colposcopy, and evaluated its severity, the sensitivity, specificity, and positive and negative predictive values were estimated by comparing the modified RCI and histologic results. Sensitivity, specificity, and positive and negative predictive values in terms of lesion severity estimated by colposcopic examination and RCI were 95.45%, 65.79%, 76.36%, and 92.59%, respectively. These authors concluded that RCI correlates well with the histologic results in case of cervical disease and evaluation of its severity [15]. In our study, RCI was in line with the histopathological results for patients who were diagnosed as benign, CIN-I, CIN-II, and CIN-III corresponding to 63 (60%), 27 (25.7%), 3 (2.9%), and 7 (6.7%) of the cases, respectively.

The kappa value was calculated to measure the agreement between RCI and pathology findings (CIN I, II, III) and indicated a strong agreement in all three cases, as presented in the Results section above, whereas the number of subjects who were diagnosed with pathologic findings by histology was 39 (37.1%), as compared to the 42 (40%) based on RCI. On the other hand, the number of women who were diagnosed as non-pathologic in either test was 63 (62.9%). The sensitivity, specificity, and accuracy of the tests were confirmed as 1, 0.95, and 0.97, respectively. RCI was compatible with the histopathologic results in 95.2% of the patients.

Colposcopy is an essential tool for identifying precancerous lesions. High compliance between histopathology and screening using RCI enables every gynecologist to use this method, which can easily be integrated into colposcopy clinics. At present, colposcopy is widely used as a secondary diagnostic tool to identify pre-invasive and invasive cervical diseases in women with positive Pap smear results, but not as the primary screening tool. Colposcopy is important for estimating suspicious areas of the cervix in order to provide histologic evidence. However, it has no diagnostic value to replace histologic evaluation [16]. Although colposcopy is a proven secondary diagnostic modality, it has many limitations, and its value depends upon the experience and the skill of the colposcopist [17]. Even though there is substantial compliance with histologic results, the accuracy and necessity of the RCI scoring system are still under evaluation [18].

The use of a scoring system may improve the quality of colposcopy, yet fast and reliable criteria are needed to make biopsies a daily practice in the most critical areas [14]. Larger prospective studies are needed to establish the relationship between severity of dysplasia, more specific colposcopic findings, and correlation between RCI and histology.

**Authors' contribution:**

1. Işık Kaban – concept, assumptions, study design, acquisition of data, analysis and interpretation of data, article draft, revised article critically, corresponding author.
2. Hüseyin Cengiz – concept, assumptions, study design, article draft, revised article critically.
3. Alpaslan Kaban – concept, assumptions, study design, article draft, revised article critically.
4. Şükrü Yıldız –acquisition of data.
5. Murat Ekin – concept, assumptions, study design, article draft, revised article critically.
6. Esin Avcı – analysis and interpretation of data.

**Authors' statement**

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