Analysis of the Clinical Application Value of Colposcopy Biopsy in the Screening of Cervical Precancerous Lesions

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Abstract: *Objective:* To analyze the value of colposcopy biopsy in the screening of cervical precancerous lesions. *Methods:* 5,000 patients with suspected cervical precancerous lesions were used as samples. From January 2020 to December 2022, pathological examination and colposcopy biopsy were carried out, and the value of colposcopy biopsy was analyzed. *Results:* 1,503 cases were positive and 3,497 cases were negative by pathology, whereas 1,432 cases were positive and 3,568 cases were negative by colposcopy biopsy. The diagnostic sensitivity, specificity, and accuracy of colposcopy biopsy were 99.69%, 94.54%, and 97.78%, respectively. Cervicitis, CIN I grade, CIN II grade, CIN III grade, and cervical cancer had no statistical difference with the pathological examination ($P > 0.05$). *Conclusion:* The colposcopy biopsy scheme is used in the screening of cervical precancerous lesions, the detection accuracy is high in consistency with the pathological results, the risk of missed diagnosis and misdiagnosis is low, and it is efficient and feasible.

Keywords: Cervical cancer; Precancerous lesions; Colposcopy biopsy; Clinical value

1. Introduction

Cervical cancer is a general term for malignant lesions in the cervical region, which is related to pathological tumors induced by uterine cavity cell lesions, and accounts for a relatively high proportion of gynecological reproductive tract malignancies [1]. The analysis of cervical cancer etiology showed that the human papillomavirus (HPV) infection is the main risk factor. At present, there is no definitive cure for cervical cancer, but vaccination and regular testing can be used to prevent and control cervical cancer, so as to diagnose and treat cervical precancerous lesions as early as possible and reduce the risk of cervical cancer [2]. Currently, clinical diagnosis is mostly based on the "three-step program", such as cervical thin-layer liquid-based cytology screening, HPV screening, and colposcopy biopsy [3]. Among many detection schemes, colposcopy biopsy is safe and accurate and can be promoted as a screening scheme for cervical precancerous lesions. In this paper, 5000 patients with suspected cervical precancerous lesions were used as the study sample to explore the value of colposcopy biopsy.

2. Materials and methods

2.1. Information

Five thousand patients with suspected cervical precancerous lesions were recruited from January 2020 to December 2022. The patients aged between 28–72 years old, with an average of 50.17 ± 2.84 years old, had pregnancies of 1–4 times, with an average of 2.91 ± 0.41 times, had parities of 1–3 times, with an average of 1.67 ± 0.34 times.

2.2. Inclusion and exclusion criteria

The inclusion and exclusion criteria are as follows:

(1) Inclusion criteria: (i) all patients underwent colposcopy cervical biopsy in our hospital due to abnormal cervical liquid-based cytology (TCT) and/or high-risk positive human papillomavirus (HPV), or symptoms of irregular vaginal bleeding or contact bleeding; (ii) informed consent; and (iii) with sex life history.

(2) Exclusion criteria: (i) history of total hysterectomy; (ii) during pregnancy period; and (iii) having an acute inflammatory period of the reproductive system.

2.3. Methods

2.3.1. Inspection method

Before colposcopy biopsy, abnormalities were detected through routine gynecological examination in patients with suspected cervical precancerous lesions. Patients were instructed to empty their bladder and adjusted the lithotomy position of the bladder. The speculum was prepared with an appropriate amount of lubricant on its surface before being placed in the vaginal vault area of patients with cervical precancerous lesions, followed by the cervical discharge being completely removed, and the angle of the objective lens being adjusted to obtain a clear image. The shape, color, and blood vessels of the cervix were observed and recorded with a low-magnification lens, and a cotton ball dipped with 3% glacial acetic acid was applied evenly on the cervical area to record the color changes of the cervical blood vessels, epithelium, and other areas. For severe cases, the acetic acid was wiped every 3 minutes, and then the iodine tincture was prepared and applied evenly on the cervix according to the actual situation of the patient, followed by carrying out the iodine experiment. Changes such as punctate blood vessels, abnormal blood vessels, mosaic areas, and white epithelium were recorded, and pathological tissues were obtained for inspection.

2.3.2. Diagnostic criteria

The diagnostic criteria of this study are as follows:

(1) Cervical intraepithelial neoplasia (CIN): Mild cervical symptoms, no typical hyperplasia, abnormal cells accounted for 1/3, and enlarged nuclei, classified into CIN I grade; cervical symptoms are slightly severe, no typical hyperplasia, abnormal cells can be seen. The cells accounted for 2/3, and the nuclei were severely enlarged, the divisions were more, and the nature was disordered, which was included in CIN II; the cervical symptoms were severe, carcinoma in situ appeared, and the entire layer was abnormal cells, and it was included in CIN III.

(2) Colposcopy standard: during colposcopy biopsy, the diagnosis is usually made from the lesion distribution area (such as inside the transformation zone, inside the endocervical canal, outside the transformation zone, etc.), color, configuration (such as boundary, outline, etc.), and vascular structure. Different types included normal, low-grade squamous intraepithelial lesions (LSIL), high-grade

squamous intraepithelial lesions (HSIL), suspected or confirmed cancer, unsatisfactory colposcopy, and others. For patients with early-stage cervical cancer, colposcopic strong light irradiation showed the local tissue being lard-like or cloud-like color, surface collapse, capillary lumen dilation, abnormal proliferation of blood vessels, widening of vascular intervals, and capillary loss of normal branching leading to hairpin-like, club-like, or tadpole-like branching. A 3% acetic acid solution was prepared and applied to the surface, which gave rise to a surface appearing like cooked meat with glassy edema. The iodine staining test appeared negative.

2.4. Observation indicators

The pathological results of the control group were used to calculate the coincidence rate of colposcopy biopsy.

2.5. Statistical research

The data of patients with suspected cervical precancerous lesions were processed with SPSS 21.0 recorded the count data of cervical precancerous lesions and the x^2 test was used; mean ± standard deviation (SD) was shown as the measurement data of cervical precancerous lesions and the t-test was used. There is a statistical difference when $P < 0.05$.

3. Results

3.1. Analysis of colposcopy results

Table 1 showed that there are a total of 1,503 cases were positive and 3,497 cases were negative by pathology, whereas 1,432 cases were positive and 3,568 cases were negative by colposcopy biopsy.

Table 1. Comparison of colposcopy results and pathological results

Group	Pathologically positive	Pathological negative	Total
Positive colposcopy	1,421	11	1,432
Negative colposcopy	82	3,486	3,568
Total	1,503	3,497	5,000

3.2. Analysis of diagnostic efficacy

Compared with the pathological results, the diagnostic sensitivity, specificity, and accuracy of colposcopy biopsy were 99.69%., 94.54%, and 97.78%, respectively. The results were shown in **Table 2**.

Table 2. Diagnostic efficacy analysis

Inspection Method	Sensitivity	Specificity	Accuracy
Colposcopy	99.69% (3,486/3,497)	94.54% (1,421/1,503)	97.78% (4,889/5,000)

3.3. Detection situation analysis

Cervicitis, CIN I, CIN II, CIN III, and cervical cancer detected by colposcopy biopsy had no statistical difference with pathological examination ($P > 0.05$), as shown in **Table 3**.

Table 3. Detection analysis

Inspection Method	Cervicitis	LSIL (CIN I)	HSIL (CIN II, CIN III)	Cervical cancer
Pathological examination	3,497 (69.94%)	242 (4.84%)	1,136 (22.72%)	125 (2.50%)
Colposcopy biopsy	3,568 (71.36%)	233 (4.66%)	1,072 (21.44%)	127 (2.54%)
x^2	2.4311	0.1790	2.3807	0.0163
P	0.1190	0.6722	0.1228	0.8985

4. Discussion

Cervical cancer refers to cancerous lesions in the epithelium and glands of the cervix. It can be divided into different types such as cervical adenocarcinoma and squamous cell carcinoma, among which the risk of squamous cell carcinoma is higher [4]. Combined with the analysis of clinical practice, the common cause of cervical cancer is HPV infection, which is closely related to inflammatory stimulation in the cervical region, premature sex life, frequent sex life, poor eating habits, multiple pregnancies, and other factors [5]. There are no specific signs in the early stage of cervical cancer. Most patients are detected by screening. As cervical cancer progresses, patients may experience symptoms such as postmenopausal bleeding, irregular vaginal bleeding, and contact bleeding. Therefore, early detection of cervical precancerous lesions and timely treatment are extremely important [6]. Precancerous lesions of the cervix refer to cervical cells that have not broken through the basement membrane, and there is no problem of cancer infiltration, also known as intraepithelial neoplasia. Based on the analysis of the physiological and anatomical structure of the cervical epithelium, it belongs to the stratified squamous epithelial structure, mostly with 20–25 layers, and can be divided into CIN grades I–III according to the degree of cervical lesions [7]. Due to the close relationship between cervical precancerous lesions and HPV infection, if the patient is infected with HPV, cervical smear screening is required. If precancerous lesions are found, further colposcopy biopsy is required to make a clear diagnosis and treatment. Generally, doctors recommend conservative treatment for patients with CIN I with periodic reexamination; CIN II may regress or may progress to III, hence conservative treatment or cervical conization can be selected according to the patient's reproductive needs, age, and treatment willingness; CIN III is recommended for cervical conization treatment [8].

Currently, colposcopy biopsy is mostly used in clinical examinations for cervical cancer. A 6–20 magnification lens is used to observe the cervix and vaginal epithelial lesions. At the same time, a low-magnification magnifying glass is used to reflect the patient's vaginal condition on the fluorescent screen and subtle changes in the vagina are observed by rotating the vaginal speculum, which all have been widely used in gynecological examinations [9]. However, colposcopy cervical biopsy is an invasive examination, and it is also an important detection method to determine the location of cervical cancer and the cause of infection. It does not require anesthesia and can be completed in an outpatient clinic. For the actual colposcopy, it is essential to perform on the patient during the non-menstruation period, instruct the patient in the position of bladder lithotomy, guide and encourage the patient to relax, and then open the vagina to fully expose the cervix. If mucus is found in the cervical area, wipe the mucus clean to avoid mucus affecting the diagnosis [10]. After the doctor handles the cervical mucus, observe whether there is any abnormality in the cervical area, and then apply 5% acetic acid. If any abnormality is found, take a photo as evidence. Physicians comprehensively evaluate the most serious lesion area based on the test results, obtain pathological tissue for biopsy, and the pathologist interprets the test results [11]. If the examination results suggest that there are cervical precancerous lesions, it is essential to actively carry out diagnosis and treatment. In summary, colposcopy biopsy has the advantages

of less trauma and a high detection rate, which can alleviate female patients' taboo to seek medical treatment, and has a high application value. However, during the actual screening of cervical precancerous lesions, it is necessary to carefully observe the conditions of cervical lesions, avoid misdiagnosis and missed diagnosis as much as possible, and at the same time do a good job in the psychological construction of patients. Timely counseling of patients to appease their emotions is required to avoid medical disputes [12].

Combined with the data analysis in this paper, 1,503 cases were positive and 3,497 cases were negative in the pathological examination, whereas 1,432 cases were positive and 3,568 cases were negative in colposcopy biopsy. The diagnostic sensitivity, specificity, and accuracy of colposcopy biopsy were 99.69%, 94.54%, and 97.78%, respectively. There was no statistical difference in the coincidence rate of cervicitis, CIN I, CIN II, CIN III, and cervical cancer detected by colposcopy biopsy and pathological examination ($P > 0.05$). It is suggested that the consistency between colposcopy biopsy and pathological results is high, and it has high diagnostic efficiency in the screening of cervical precancerous lesions. Colposcopy biopsy is used in the screening of cervical precancerous lesions and has the following application values: (1) compared with routine re-examination, colposcopy biopsy is safer, with less pain for patients and a low rate of missed diagnosis; (2) colposcopy biopsy is an important method for screening cervical cancer, and the accuracy of biopsy is high; (3) colposcopy biopsy can detect subtle lesions in the cervical region and detect new lesions in time; (4) colposcopy biopsy can dynamically observe the lesions of reproductive organs, and at the same time keep accurate records, and can dynamically display the inspection process and inspection results; (5) colposcopy biopsy can accurately assess the condition of cervical lesions, and can be used as a basis for physicians to analyze the causes of cervical lesions; (6) colposcopy biopsy is suitable for early screening of cervical diseases, and can also be used for prognosis assessment of cervical cancer [13]. However, during the actual colposcopy biopsy, the following items should be focused on: (1) during the period before inserting the vaginal speculum, it should be expanded and inserted under direct vision to avoid cervical abrasion; (2) for suspected cervical precancerous lesions, pathological tissue should be taken for biopsy under the guidance of colposcopy; (3) during the examination, the cervical canal should be fully exposed to observe whether there is an inward shift in the transformation zone in order to avoid missed diagnosis as much as possible; (4) scientifically select the time of colposcopy biopsy to screen suspected CIN or cervical cancer lesions without special time requirements, for example, checks should be carried out during or near ovulation to screen cervical canal lesions, whereas it is recommended to have a clean menstrual period for 2 weeks completed within to screen other cervical lesions; (5) for patients with complicated conditions, colposcopy biopsy can be combined with cytology examination to reduce missed diagnosis [14].

To sum up, the colposcopy cervical biopsy program is used in the screening of cervical precancerous lesions, which can accurately assess the risk of precancerous lesions, and at the same time can assist physicians in clarifying the stage of precancerous lesions and guiding later symptomatic treatment, thereby reducing cervical cancer and other malignant events, with promotional value.

Disclosure statement

The authors declare no conflicts of interest.

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