Increased diagnostic accuracy of laparoscopy in endometriosis using indigo carmine: a new technique

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Objective: To report the technique and outcome of laparoscopy in endometriosis using indigo carmine.
Design: Case report.
Setting: Tertiary care center.
Patient(s): Twenty-nine-year-old nulligravid woman with a history of endometriosis and left unicornuate uterus with an absent right horn with a present right ovary and distal fallopian tube with recurrence of disease.
Intervention(s): Operative laparoscopy for destruction of endometriosis and chromopertubation, given the patient's history of infertility.
Main Outcome Measure(s): Identification of endometriosis.
Result(s): Lesions of endometriosis were stained with indigo carmine and were easily identified.
Conclusion(s): Tissue staining demonstrated lesions of endometriosis that were more easily identified; therefore, this technique could provide a special and unique approach to a more accurate diagnosis of endometriosis. (Fertil Steril® 2011;95:1113–4. ©2011 by American Society for Reproductive Medicine.)

Key Words: Endometriosis, indigo carmine, diagnosis of endometriosis

Endometriosis is an estrogen-dependent inflammatory disease that affects 5%–10% of women of reproductive age in the United States (1). The defining feature of endometriosis is the presence of endometrium-like tissue in sites outside the uterine cavity, primarily on the pelvic peritoneum and ovaries. The main clinical features are chronic pelvic pain, pain during intercourse, and infertility (1).

Detection of endometriosis currently depends on the visualization and identification of peritoneal lesions at the time of pelvic laparoscopy. At laparoscopy, endometriosis may be visualized as peritoneal implants, peritoneal windows, endometriomas, and deep infiltrating nodules of endometriosis, which may each be associated with adhesions. The color, size, and morphology of endometriotic lesions are highly variable, and it is difficult to detect all the lesions of endometriosis that may be present. As a result, our ability to detect occult lesions limits our ability to eradicate the disease (2).

Chromoendoscopy is a technique in which different dyes are topically applied to the gastrointestinal mucosa during endoscopy to better characterize and highlight specific changes in the mucosa. This staining method allows visualization of certain mucosal features that would otherwise not be evident, thus improving the accuracy of the endoscopic examination. Endoscopists have mainly used indigo carmine and methylene blue for enhancing visualization of the mucosa in the colon (3). In the following case report, we describe an increased diagnostic accuracy of laparoscopy in endometriosis using indigo carmine.

CASE REPORT

A 29-year-old nulligravid woman with a history of endometriosis and left unicornuate uterus with an absent right horn and a present right ovary and distal fallopian tube presented with recurrence of disease. Twelve years earlier, she underwent a diagnostic laparoscopic examination that identified a left unicornuate uterus with an absent right horn and a present right ovary and distal fallopian tube. She had lesions within her pelvis that were biopsied and showed endometriosis. In addition, she had a history of continuous oral contraceptive use, followed by the exacerbation of her pain and the use of Depo-Lupron. Despite medical management of endometriosis, she had continued pelvic pain and the decision was made to proceed with an operative laparoscopy for the destruction of endometriosis and chromopertubation, given her history of infertility.

During surgery a Redi catheter was placed into the endocervical canal, and a balloon was used to insufflate the catheter. Indigo carmine was injected transcervically to confirm patency of the fallopian tubes. We obtained access to the abdominal cavity in the usual fashion for gynecologic laparoscopic procedures. Pelvic inspection revealed a left unicornuate. There was an associated round ligament, fallopian tube, and ovary. There was no right hemiuterus. There was a band of Müllerian tissue from the round ligament to the ovary, which was high in the right middle abdomen. The ovary was markedly elongated, so that the distal end of the fallopian tube was about 4 cm from the liver edge. There were clear and red-and-white lesions of endometriosis on the right pelvic sidewall and in the posterior cul-de-sac. There were no pelvic adhesions. A hook with electrocautery was then introduced, and the visible lesions of endometriosis were destroyed.

A chromopertubation was performed, and blue dye was seen to spill from the left fallopian tube. Lesions of endometriosis were stained with indigo carmine and were easily identified. Of note, the lesions that stained were in close proximity to the already appreciated lesions of endometriosis, suggesting a benefit of the stain for diagnosing endometriosis. Figure 1 shows such a nonpigmented peritoneal area under white illumination. Figure 2 shows the same area displaying strong blue coloration in the same light mode. Notice the visible lesion manifests itself as a dark blue lesion.

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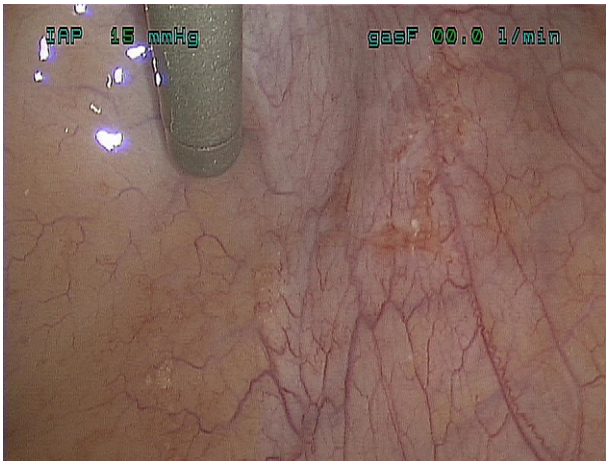
FIGURE 1

Nonpigmented area with suspected endometriosis under white illumination.



Rauh-Hain. Diagnosis of endometriosis using indigo carmine. Fertil Steril 2011.

FIGURE 2

The same area shown in Figure 1 displaying strong blue coloration in the same light mode. Notice the visible, dark blue lesion.

Rauh-Hain. Diagnosis of endometriosis using indigo carmine. Fertil Steril 2011.

DISCUSSION

Endometriosis is a frequent clinical problem for women of reproductive age that can markedly influence both reproductive prognosis and quality of life. This disorder causes various aggravating symptoms such as dysmenorrhea and infertility, and these disturb the quality of life of premenopausal women profoundly. Currently, laparoscopy is the most sensitive technique for diagnosing endometriosis. Endometriosis has a large variety of manifestations. Usually, it is nonpigmented in the form of small vesicles, nodular lesions, or plaque-type implants (1, 2).

Laparoscopic diagnostic accuracy is influenced by several variables, including the quality of the endoscopic equipment and the operator's experience and skill (4). In addition, intraoperative diagnosis by conventional laparoscopic visualization is frequently difficult. As a result, some lesions can be easily missed, which can lead to recurrent endometriosis and its clinical consequences. The hypothesis that tissue-staining diagnosis could serve as a diagnostic tool for endometriosis represents an attractive approach.

Tissue staining, or chromoscopy, is an adjunctive endoscopic technique using chemical agents applied to the gastrointestinal mucosal surface to identify specific epithelia or to enhance the mucosal surface characteristics of the gastrointestinal epithelium. Chromoscopy is performed to aid in the recognition of subtle lesions, or to allow directed targeting biopsies to increase the yield of endoscopic diagnostic accuracy. Indigo carmine is derived from a blue plant dye (indigo) and a red coloring agent (carmine). This deep blue stain is not absorbed by the epithelium in the gastrointestinal tract; it pools in crevices between epithelial cells and highlights small or flat lesions and defines irregularities in mucosal architecture, particularly when used with high-magnification or high-resolution endoscopy (5).

We report the increased diagnostic accuracy of laparoscopy in endometriosis using indigo carmine. A contrast stain such as indigo carmine is not absorbed by epithelial cells, but accumulates in pits and valleys between cells highlighting the peritoneal architecture, revealing occult areas of endometriosis that would have escaped the surgeon's eye under normal circumstances.

New techniques are regularly emerging in the field of endometriosis. These advances are extremely important for the detection of disease and improving diagnostic and therapeutic accuracy. Currently, it is difficult to detect all areas of endometriosis; as a result, our inability to detect occult disease limits our capability to eradicate the disease. In this initial case report, tissue staining demonstrated lesions of endometriosis that were more easily identified; therefore, this technique could provide a special and unique approach to a more accurate diagnosis of endometriosis. Further clinical and basic analyses will clarify its true significance.

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