

## Laparoscopic treatment of symptomatic diaphragmatic endometriosis: a case report

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Several theories currently exist regarding the origin of endometriosis, but none of them have proven singly conclusive and the disease continues to be poorly understood. The location of endometrial implants varies widely and has been found to include such uncommon sites as the appendix, ureter, and lungs. To our knowledge, the following is the first case report describing the laparoscopic treatment of diaphragmatic endometriosis in the vicinity of the phrenic nerve. This type of endometriosis can be successfully treated with extreme caution by experienced laparoscopic surgeons, using CO<sub>2</sub> laser vaporization and/or excision and hydrodissection.

### CASE REPORT

A 26-year-old gravida 0 white female presented with progressive incapacitating pelvic, abdominal, and rectal pain and mild bladder discomfort. Laparoscopic evaluation revealed extensive stage IV endometriosis (1) involving the bladder dome, anterior abdominal wall, right ovary, rectosigmoid colon, and pelvic side wall. Adhesiolysis, CO<sub>2</sub> laser vaporization, and/or excision of endometriosis and removal of the right ovarian endometria were performed without

complication. The diagnosis of endometriosis was pathologically confirmed.

Postoperatively, the patient was placed on hormonal suppressive therapy (danazol, 800 mg/d) for 3 months, which was discontinued because of side effects including emotional lability, weight gain, and depression. She remained almost symptom free for 16 months. After that period, she complained of pleuritic, right shoulder, right upper quadrant, and pelvic pain. Recurrent and new endometriosis was noted at diagnostic laparoscopy involving both ovaries, the left fallopian tube, and right pelvic side wall, rectosigmoid colon, and rectovaginal septum. Upon exploration of the upper abdomen, several endometrial implants were found on the right hemidiaphragm. Excluding the diaphragm, all endometriosis was thoroughly treated with CO<sub>2</sub> laser vaporization and/or excision. After the procedure, surgical versus medical treatment was discussed with the patient. After cardiothoracic surgeons reviewed this case, the potential surgical risks were explained to the patient. This discussion included possible diaphragm, phrenic nerve, pulmonary, or cardiac injury. Because of the previous side effects of hormonal therapy and failed medical therapy, the patient refused medical therapy. It was decided that she would undergo operative laparoscopy (videolaseroscopy [2]) to treat her endometriosis.

The patient was taken to the operating room and received general inhalation induction anesthesia. A double lumen endotracheal was inserted, and the patient was placed in a modified dorsolithotomy position. Pneumoperitoneum was obtained with CO<sub>2</sub> gas after the insertion of a verres needle. A 10-mm

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trocar and a 10-mm laparoscope were introduced into the abdominal cavity without difficulty. Three incisions were made in the right upper quadrant (as they would be for a laparoscopic cholecystectomy) to place the suction irrigator (Karl Storz, Culver City, CA) and two grasping forceps. The grasping forceps were introduced to push the liver down and obtain better exposure of the diaphragm. This procedure could have been performed under direct visualization rather than using videolaparoscopy. However, the addition of the video camera offers several advantages. The first is increased magnification. Second, the surgeon is able to operate in a more comfortable, upright position. In our experience, the right upper abdominal area is very difficult to adequately visualize and treat without the aid of the videocamera. Third, the entire surgical team can observe the procedure and better assist the primary surgeon. After thorough evaluation of the diaphragm, lactated Ringer's was carefully injected under the lesions using a 22-gauge needle (2). Once the lesions were elevated from the underlying structure, a biopsy was performed, and the sample taken was histologically confirmed to be endometriosis. Several endometrial implants (between 0.1 to 0.5 cm) found on the right hemidiaphragm and around the phrenic nerve were then vaporized using the 20-watt Ultrapulse laser (Coherent, Palo Alto, CA). Three of the implants, 0.1, 0.3, and 0.5 cm, respectively, were located exactly on the nerve. All apparent disease was completely eradicated without injury to either the phrenic nerve or diaphragmatic vasculature. The Ultrapulse 5000L uses a C<sub>13</sub> component rather than C<sub>12</sub>. By using a different carbon isotope, the laser beam stays focused as the power is increased. This, in turn, significantly reduces the power loss associated with other CO<sub>2</sub> lasers.

At the conclusion of the procedure, the cardiopulmonary consultant evaluated the pharynx, larynx, and trachea with a rigid bronchoscope. These areas were within normal limits. A flexible scope was then used to carefully examine the distal trachea and proximal main bronchi. Because no endometriosis or other abnormalities were present, the bronchoscopy was terminated. Approximate operative time was 1 hour. The patient tolerated the procedure well and was taken to the recovery room in stable condition. She was discharged from the hospital on the first postoperative day and 1 year later has almost complete pain relief (7).

#### DISCUSSION

Endometriosis continues to be a diverse pathological entity that is poorly understood. Many ad-

vances in the diagnosis and treatment have been made since the recognition of endometriosis over 65 years ago; however, based on the study population, the prevalence of the disease can be as high as 35% (3).

Common sites for endometriosis consist of the dependent portions of the pelvis including the ovaries, anterior and posterior cul-de-sac, broad ligaments, uterosacral ligaments, and bladder. Additionally, the disease may involve unusual locations such as the appendix, ureter, umbilicus, surgical scars, and the lungs (4). Endometriosis involving the diaphragm has also been reported and has been associated with complications such as recurring catamenial pneumothoraxes during menses (5). To our knowledge, this is the first reported case of endometriosis involving the phrenic nerve treated laparoscopically.

In treating endometriosis, medical, surgical, or combined approaches all merit consideration. The treatment should be individualized based on patient's age, fertility desires, disease extent, and location. Hormonal therapy using progestational agents, continuous oral contraceptive pills, and danazol and gonadotropin-releasing hormone agonists have been used extensively with generally good results. However, some patients do not fully respond to hormone therapy or cannot tolerate the associated side effects. Patients whose medical therapy has failed or who have extensive adhesions or severe endometriosis are best treated with surgery. Laser vaporization or excision of the endometrial lesions has been used increasingly in recent years. Hydrodissection is an older technique that is presently being used to add to the safety of surgical treatment of endometriosis with the CO<sub>2</sub> laser (6). Fluid is injected below the peritoneal surface to separate the peritoneum and lesion from underlying structures. This uses the specific properties of the CO<sub>2</sub> laser including minimal depth and spread of the beam and lack of penetration through a fluid barrier. The patient should be fully advised of available therapies along with the risks and benefits of each option so that she can make an informed decision regarding the management of her disease.

#### SUMMARY

Extreme caution and meticulous surgery are imperative when treating the surface of the diaphragm. This procedure should only be performed by an experienced laparoscopic surgeon after appropriate consultation with a cardiothoracic surgeon. Proper

care, a thorough understanding of surrounding anatomic structures, and familiarity with laparoscopic instrumentation including the CO<sub>2</sub> laser are required for the safe laser vaporization or excision of any peritoneal surface using hydrodissection (7).

**Key Words:** Operative laparoscopy, diaphragmatic endometriosis, videolaparoscopy, videolaser-  
oscopy.

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