Laparoscopic Splenectomy Using a Low-pressure Pneumoperitoneum for the Treatment of Immune Thrombocytopenic Purpura During Pregnancy : A Case Report

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We report the case of a 21-year-old pregnant woman who underwent a laparoscopic splenectomy for the treatment of immune thrombocytopenic purpura (ITP) because of severe thrombocytopenia refractory to medical therapy using steroids. The operation was performed during the 24th week of pregnancy using a rigid 10-mm scope with adjustable viewing angles and limiting the abdominal insufflation pressure to 8 mmHg. The operating time was 204 minutes, and the amount of intraoperative blood loss was 200 mL. Her postoperative course was uneventful, and her platelet count rapidly increased postoperatively. No additional treatments were required. *Shinshu Med J 62 : 441—446, 2014*

I Introduction

Idiopathic thrombocytopenic purpura (ITP) during pregnancy is a rare condition that occurs in 0.1 % to 0.2 % of all pregnancies[1] but can lead to hemorrhagic complications, which are potentially hazardous for both the mother and fetus[2]. Although ITP during pregnancy can usually be managed medically using corticosteroids or the intravenous injection of immunoglobulin, a splenectomy is sometimes required when thrombocytopenia is severe and fails to respond to medical treatment.

Since laparoscopic splenectomy provides a comparably safe and effective alternative to an open splenectomy for the treatment of ITP[3,4], it has become a standard operative procedure because of its low degree of invasiveness. Previous studies have shown that a laparoscopic splenectomy can be successfully applied for the treatment of ITP during pregnancy with an insufflation pressure of more than 12 mmHg[5]–[7]. The European Association for Endoscopic Surgery guidelines define normal and low laparoscopic insufflation pressure as 12-15 and 5-7 mmHg, respectively, and recommends that the intraabdominal pressure for pregnant patients should be kept as low as possible during a laparoscopy[8] because an increased intraabdominal pressure may decrease maternal respiratory compliance[9,10] and uterine blood flow[9]. Here, we report the case of a 21-year-old pregnant woman who underwent a laparoscopic splenectomy for ITP with a limited abdominal insufflation pressure of 8 mmHg of carbon dioxide (CO_2).

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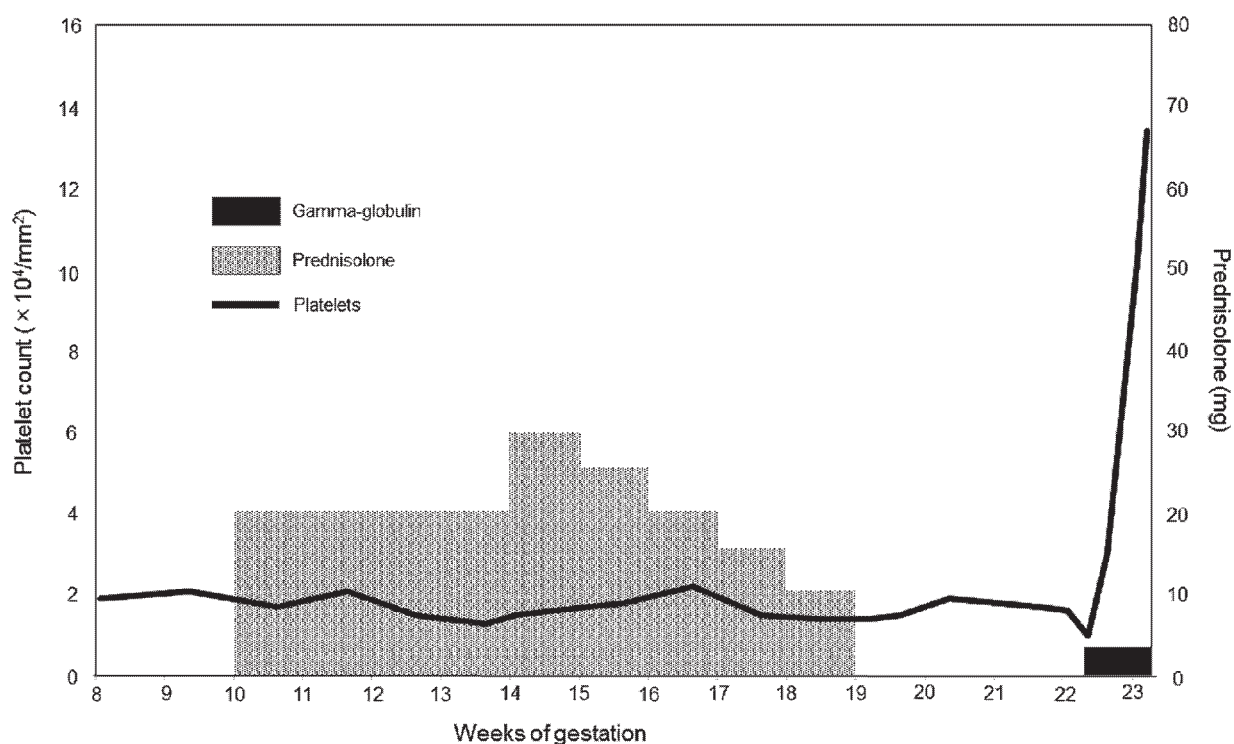E-mail : kbys@shinshu-u.ac.jp

Fig. 1　Preoperative platelet count and medical treatment for thrombocytopenia.

II　Case Report

A　Case

A 21-year-old pregnant woman was referred to our hospital at 8 weeks of pregnancy with a 3-year history of ITP diagnosed on the basis of a bone marrow biopsy. Her baseline platelet count was around 50,000/mm³. Clinical examinations revealed no coagulation disorders. Although she tested negative for serum antibody against *Helicobacter pylori*, the serum autoantibody level against platelets was slightly elevated.

Prednisolone was administered at a daily dose of 20 mg from her 10th week of pregnancy, with a dose increase to 30 mg/day at the 14th week of pregnancy. However, her platelet count level did not respond to the steroid therapy and remained low throughout the treatment (**Fig. 1**). Because of ongoing gingival bleeding and subcutaneous hemorrhage, a laparoscopic splenectomy was planned at the 24th week of pregnancy after gamma-globulin infusion therapy (400 mg/kg/day) had been performed for 7 days. Her platelet count increased to 141,000/mm³ before surgery (**Fig. 1**)

B　Surgical Technique

Adequate perioperative hydration was ensured, and the fetal heart rate monitoring results were reassuring. While the patient was under general anesthesia, she was placed in a 45° right lateral decubitus position. A direct incision was made at the midline above the umbilicus, and a 12-mm port was secured. After the establishment of a CO_2 pneumoperitoneum with an insufflation pressure of 8 mmHg, three additional ports were placed under direct visualization as follows : two 10-mm ports at 3 cm below the xiphoid process and on the left anterior axillary line 3 cm below the costal margin (**Fig. 2**), and a 5-mm port on the left midclavicular line 3 cm below the costal margin. A rigid 10-mm scope (EndoCAMeleon ; KARL STORZ Gmbh & Co. KG, Tuttlingen Germany) that allows adjustable viewing angles was used. The splenocolic, gastrosplenic, and splenophrenic ligaments were sequentially divided (**Fig. 3**), followed by transection of the splenic hilar vessels using an Echeron flex 60 (white) (ETHICHON, Tokyo, Japan). The spleen was then placed into a large EZ purse (HAKKO, Nagano, Japan) and retrieved through the incision above the
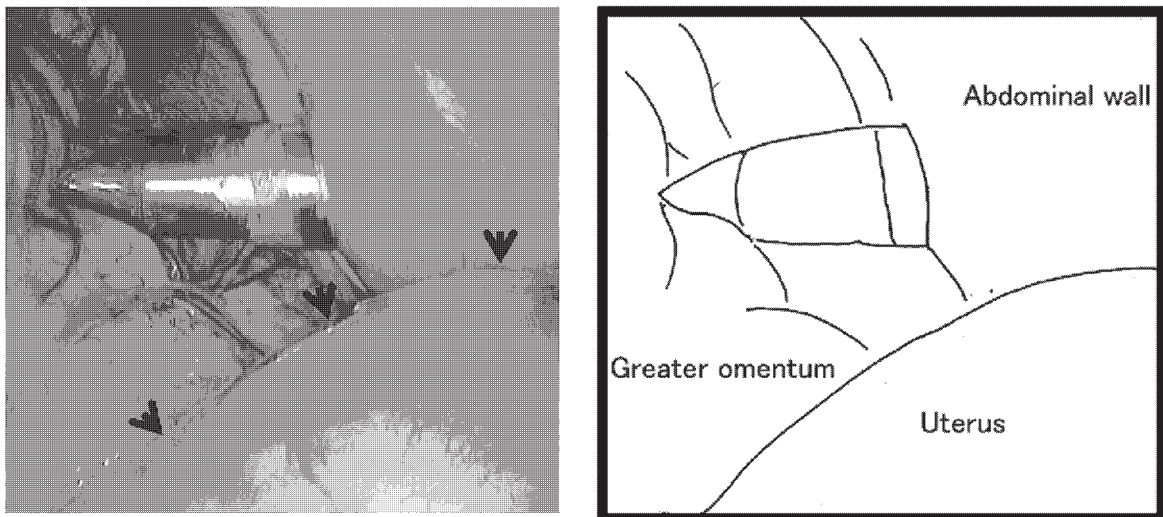
Fig. 2　Laparoscopic view of the uterus (arrows) and a 10-mm port on the left anterior axillary line 3 cm below the costal margin.
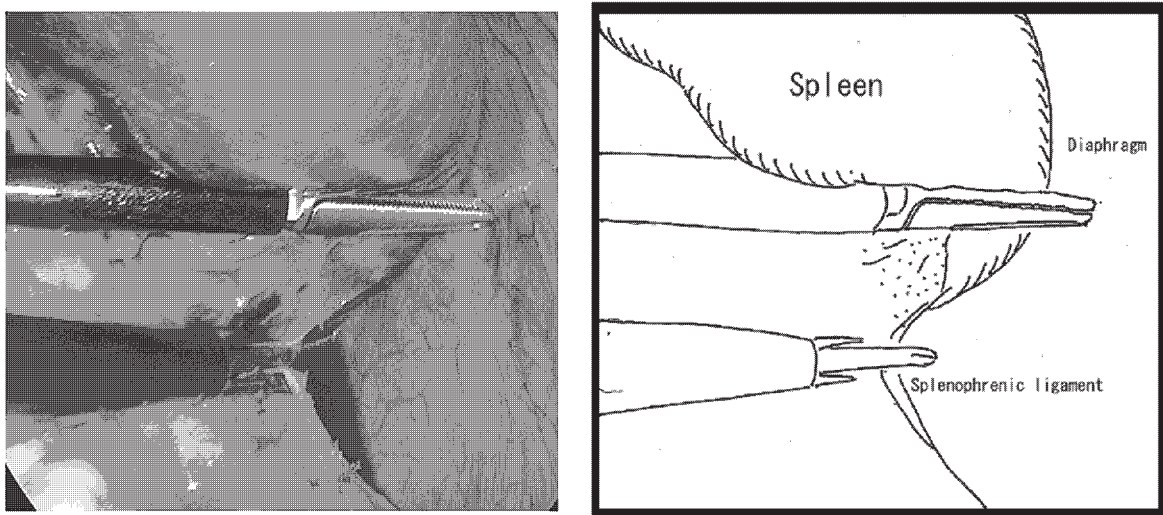

Fig. 3　The splenophrenic ligament was divided using ultrasonic laparoscopic coagulation shears.

umbilicus after morcellation of the specimen using ring forceps. The operating time was 204 minutes, urinary output was 110 mL, and intraoperative blood loss was 200 mL. During anesthesia, the maternal oxygen saturation, end-tidal CO_2, heart rate, and mean arterial blood pressure were well maintained within the ranges of 99-100 %, 32-36 mmHg, 70-80 beats per minute, and 80-90 mmHg, respectively. There was no need for platelet transfusion.

The patient's postoperative course was uneventful, and her platelet count was maintained at around 100,000/mm³ during pregnancy. She delivered a 2,850 g healthy baby during her 40th week of pregnancy via a low transverse caesarean section because of a rotational anomaly and obstructed labor.

Ⅲ　Discussion

The major consideration during laparoscopic surgery for pregnant women is the possible adverse effects of an increased intraabdominal pressure, which has been reported to compromise maternal pulmonary and circulatory conditions, such as a decreased venous return, culminating in hypoten-

sion and hypoxia[11] ; decreased respiratory compliance[12] ; decreased uterine blood flow[9] ; and reduced renal blood flow, resulting in a decreased urinary output[13]. Although most of these concerns are based on experimental studies, a low insufflation pressure is likely to be beneficial. However, previous randomized clinical trials comparing the use of low-pressure and high-pressure pneumoperitoneum for laparoscopic cholecystectomy have yielded conflicting results. Wallace and colleagues revealed that a low‐pressure group (7.5 mmHg) had significantly less postoperative pain, compared with a high‐pressure group (15 mmHg), while no significant difference was observed in cardiopulmonary parameters between the two groups[14]. In contrast, Dexter et al. showed that a high-pressure pneumoperitoneum (15 mmHg) reduced the stroke volume as well as the cardiac output to a greater extent than a low-pressure pneumoperitoneum[15]. Other previous prospective randomized studies have shown no significant differences between a low‐pressure (7-9 mmHg) and a standard-pressure (12-15 mmHg) pneumoperitoneum in terms of the short-term outcomes, such as operation time, the length of the hospital stay, or the morbidity rate, except for a lower incidence of shoulder tip pain in the low-pressure pneumoperitoneum group[16]−[21]. The cardiopulmonary parameters in the present case were well maintained during surgery. The low urine output could have raised concerns regarding possible impairment of renal function, but the postoperative blood urea nitrogen and serum creatinine levels did not increase beyond the preoperative values.

Since the purpose of a pneumoperitoneum is to obtain enough space between the abdominal wall and the viscera to perform surgical procedures, a lower intraabdominal pressure, which might be associated with a smaller space, seems to make it difficult to obtain a good surgical view and hence to perform surgical procedures[22]. Indeed, previous studies have argued that an insufflation pressure of less than 12 mmHg may not provide adequate visualization of the intraabdominal cavity[23][24]. Considering the above mentioned comparable short-term outcomes between the use of a low-pressure and a standard pressure pneumoperitoneum, the application of a standard pressure pneumoperitoneum in the present case might have allowed a wider surgical view, leading to a shorter operation time. However, we believe that the well-maintained cardiopulmonary condition observed in the present case was achieved, at least in part, as a result of the lower-pressure pneumoperitoneum.

We performed a laparoscopic splenectomy in the present patient without any difficulties in visualizing the intraabdominal cavity or performing the surgical procedures. In line with a previous study[25], the patient was placed in a right lateral decubitus position according to the results of a previous study, which showed that no significant hemodynamic change was observed between the left and right positions[26]. A rigid 10-mm scope with adjustable viewing angles was used in the present case. Because this scope can provide a viewing angle that can be adjusted between 0° and 110°, it might be useful for obtaining an adequate view of the intraabdominal cavity even under conditions of spatial restriction. Its usefulness in gastrointestinal surgery has been previously reported[27].

In conclusion, we successfully performed a laparoscopic splenectomy for ITP in a pregnant patient while limiting the abdominal insufflation pressure to 8 mmHg of CO_2.

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