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# Stapleless Laparoscopic Splenectomy Using Harmonic Scalpel by 2-Step Sealing

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**Laparoscopic splenectomy (LS) has been accepted as a safe and effective procedure as compared with open splenectomy. Recently, there have been a few reports on the LigaSure vessel sealing system as an alternative hemostasis to clip ligation. Here we report the experience of LS using an alternative energy device, Harmonic Scalpel laparoscopic coagulating shears (LCS). Preliminary experience of LS with LCS for a patient with idiopathic thrombocytopenic purpura (ITP) is reported. Generally, two-step sealing with LCS was used for vessels of the splenic pedicle approximately 5 mm in diameter without using the Endo-GIA stapler. Operative time was 93 minutes, and blood loss was 40 mL. The patient was discharged on the third postoperative day with no intraoperative or postoperative complications. The LS with LCS was performed safely using two-step sealing. Further experience is necessary to verify the safety of this procedure.**

*Key words:* Harmonic scalpel – Laparoscopic splenectomy – Stapleless – Sutureless – Vessel sealing

Laparoscopic splenectomy (LS) was first reported in 1991–1992 by several groups[1–3] and to date has been established as the standard surgical treatment for hematologic disorders of the normal-sized spleen. LS is now routine for most cases of elective splenectomy, also in cases of malignant diseases and in the treatment of select trauma cases. The spread of LS is associated with the development of electrosurgical devices such as the LigaSure Vessel Sealing System (Valleylab, Boulder, Colorado) and the Harmonic Scalpel (Ethion Endo-Surgery Inc, Cincinnati, Ohio) laparoscopic coagulating shears (LCS), which provide safe and secure hemostasis especially in advanced laparoscopic surgery.

Here we report the surgical technique of LS using LCS as the only means of achieving hemostasis in a patient with ITP.

## Case Presentation and Surgical Technique

A 46-year-old woman diagnosed with idiopathic thrombocytopenic purpura (ITP) was referred to us

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for splenectomy. The patient was offered a laparoscopic splenectomy (LS); she gave her informed consent for this surgical approach.

The technique used is a modification of those reported previously.[4] After the administration of general anesthesia, the patient was placed in a modified lateral decubitus position with the left side elevated approximately 70°. Four trocars were used. A 30° laparoscope was introduced through a 12-mm port at the umbilicus. Two additional 5-mm working ports were placed in the upper midline, and a 5-mm port was placed in the left lower quadrant. The operating table was then rotated to a right lateral recumbent position to effectively hang the spleen from its lateral side-wall attachment. The splenic artery and vein were exposed near the hilus with LCS. In principle, large vessels up to 5 mm in diameter are divided in 2 steps. The first step is "pre-seal," in which the vessel is half-clamped by LCS followed by 3 to 4 seconds coagulation with the power of level 3 (75% amplitude of swing of level 5). By this maneuver, the size of the vessel is reduced to less than 5 mm in diameter; achieved by LCS-mediated heat-denature of the vessel wall (Fig. 1). Next, an intermediate part between 2 pre-sealed vessel points is divided by LCS with the power of level 3. The maximum diameter of divided splenic veins was approximately 6 mm. The capsule of the spleen was then partially divided with a clamp within a plastic bag, after which the bag containing the fractured spleen was removed through a 12-mm port at the umbilicus. The operative times were 90 minutes, and blood loss was 40 mL. There were no postoperative complications.

**Fig. 1** The diameter of the splenic vein near the splenic hilum is reduced by pre-seal processing with Harmonic Scalpel laparoscopic coagulating shears (arrow).

## Discussion

In a report in early 1990s, the dissection of the hilum of the spleen was generally achieved by surgical clips or endo-gastrointestinal staplers. Subsequently, new surgical tools such as ultrasonic devices or bipolar electrosurgical devices such as LCS or LigaSure have been employed as supporting devices that can seal blood vessels with supraphysiologic burst pressures equal to those obtained with surgical clips or ligatures.[5,6] Several reports indicate that LCS and LigaSure have been shown to withstand a minimum of 3 times the normal systolic pressure, and they have been approved by the Food and Drug Administration for sealing vessels up to a vessel diameter of 5 mm for LCS and 7 mm for LigaSure.[6,7] The LCS uses a piezoelectric ceramic to convert electrical impulses to mechanical energy at the activate blade, which vibrates 55,000 cycles per second and can be set at various excursion distances (power) for modification of cutting and coagulation. Several reports support sutureless and stapleless LS using LigaSure as a safe and time-sparing procedure.[8,9] Yet, regarding LS using LCS, there is only one report by Rothenberg in 1996, which includes 3 cases of LS with LCS as the only means of achieving hemostasis for dissection of splenic pedicle.[9] The major reason for the dominance of stapleless LS using LigaSure may be that the approved vessel diameter for sealing is greater than that of LCS. However, Newcomb *et al* reported that there was no significant difference in mean burst pressure for large-diameter vessels (6–7 mm) between LCS and LigaSure.[7] Here we reported sutureless and stapleless LS with the use of LCS for the dissection of splenic pedicle. We used 2-step sealing technique for dividing vessels up to 5 mm in diameter for achieving a precise hemostasis. However, further experience is necessary to determine the usefulness of this procedure.

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