

Effectiveness of harmonic scalpel in laparoscopic treatment of simple renal cyst

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Abstract

We retrospectively evaluated the results of Harmonic Scalpel (Ethicon, Cincinnati, Ohio) used for laparoscopic decortication of simple renal cysts (SRC).

Between May 2011 and December 2014, 28 patients with symptomatic SRC (Bosniak type 1) underwent laparoscopic decortication with Harmonic Scalpel, were reviewed. All cysts were evaluated with ultrasonography and abdominal computed tomography. Symptomatic and surgical success was defined as no recurrence on computed tomography imaging and complete pain relief, respectively.

The mean age of patients was 51.7 ± 9.6 years and there were 16 female and 12 male. While a transperitoneal approach was preferred in 18 cases, a retroperitoneal approach was chosen in 10 patients. The mean cyst size and duration of operation was 8.8 ± 2.8 (6-12) cm and 72.8 ± 28.4 (50-110) minutes, respectively. A total of three minor complications were observed postoperatively. Mean hospital stay was 1.3 ± 0.9 (1-3) days. After the mean 12.6 ± 3.2 (3-24) months follow-up the radiological and symptomatic successes were 100% and 89.2%, respectively.

Our results showed that laparoscopic decortication of SRC using Harmonic Scalpel is consistent with the literature and provides a reasonable complication but increases cost.

Keywords: Simple Cyst, Laparoscopy, Decortication, Harmonic Scalpel.

Introduction

Simple renal cysts (SRC) are most common benign lesions of the kidney that is accidentally diagnosed by radiological evaluation. SRC develop from renal tubules due to the tubular obstruction and ischaemia, but its exact cause is unknown.¹ Incidence of the SRC account for 65-70% of all renal masses, is about 10% in the general

population and 30% in people older than fifty years.²⁻⁴ Most patients are asymptomatic and do not require treatment unless cysts develop symptoms and complications.⁵ Some patients develop abdominal or flank pain, hypertension, recurrent infection, upper urinary tract obstruction, haematuria, and even renal failure that can lead to intervention.^{5,6}

Advantages of laparoscopic cyst decortication include reduced pain, minimized blood loss, less surgery time, shorter hospital stay and higher success rate.³ In laparoscopic surgery, several energy sources can be used. These sources are conventional monopolar device, PlasmaKinetic, Argon Beam coagulator, ultrasonic, LigaSure (Valleylab, Boulder, Colorado), Tunderbeat (Olympus Medical Systems Corp., Tokyo, Japan) and Harmonic Scalpel (Ethicon, Cincinnati, Ohio). There are limited studies concerning feasibility of Harmonic Scalpel (HS) system for treatment of renal cyst decortication in the literature.

We assessed the clinical outcomes and experiences of our laparoscopic decortication of simple symptomatic renal cysts using ultracision HS system and aimed to discuss different energy types by reviewing the literature.

Case Series

We retrospectively reviewed the records of 28 patients who underwent laparoscopic cyst decortication for SRC, using HS, at our institution in Turkey. Cyst operations were performed between May 2011 and December 2014. In the preoperative period, all cysts were characterized and localized by abdominal ultrasonography (US) and computed tomography (CT)

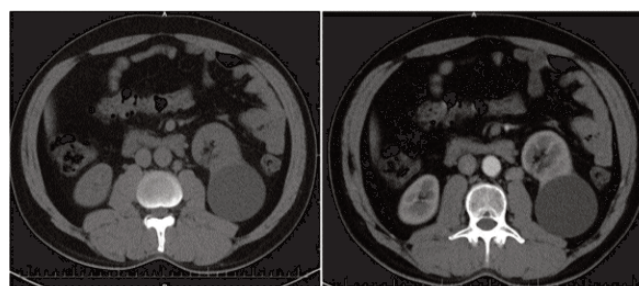


Figure-1: Preoperative CT scan depicting a simple symptomatic renal cyst.

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(Figure-1). All patients were duly informed and written consent was taken before surgery. For symptomatic success, we assessed whether the patient was symptomatic or not based on the subjective report of the patients. At the 3 month follow up, all patients were asked to evaluate their pain. Symptomatic improvement was also defined as a considerable decrease in pain. Radiological success was defined as no visible evidence of a cyst confirmed by CT at 3 months and by US at 12 months after the operation.

Operative Technique

For retroperitoneal approach, the patient was prepared as standard flank position. First optic trocar was placed in the Petit lumbar triangle. By gentle index finger dissection, a retroperitoneal cavity was created. Pneumoretroperitoneum was established, and under direct vision, another two ports were inserted. One was a 10 mm port, primarily to minimize the necessity for a peroperative port change in case intracorporeal suturing was required. Once cyst surface was identified, the dome of the cyst was opened using HS and the cyst fluid was aspirated and preserved for later cytological analyses. The exophytic wall of cyst was resected with HS. The cystic wall was sent for pathologic interpretation.

For transperitoneal approach, patients were placed in flank position. Firstly, pneumoperitoneum was obtained by using a Veress needle (Figure-2). Once the first port was placed, the abdomen was inspected for any injury due to Veress needle and/or port placements. Usually two additional ports were used and other two ports were inserted under direct vision. When necessary on the right side, an additional fourth port was used for liver retraction. After the Told line was incised, colon was mobilized medially. Firstly, blue dome of the cyst was

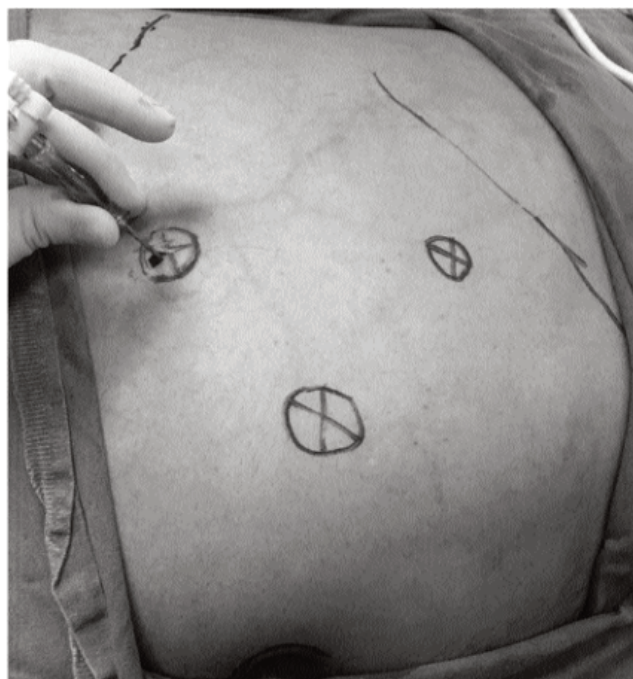


Figure-2: Patient positioning and port locations are shown for transperitoneal approach.

opened by the tip of the HS, and the fluid was aspirated using the suction device and preserved for cytological analysis. Secondly, the cyst wall circumferentially excised with HS devices (Figure-3). At the end of the procedure operative area was controlled visually and a small 20 F drain was routinely placed.

Patients were discharged after the removal of the drain and passing flatus. Postoperative routine radiologic follow up was performed at 3 and 6 months by CT and US,

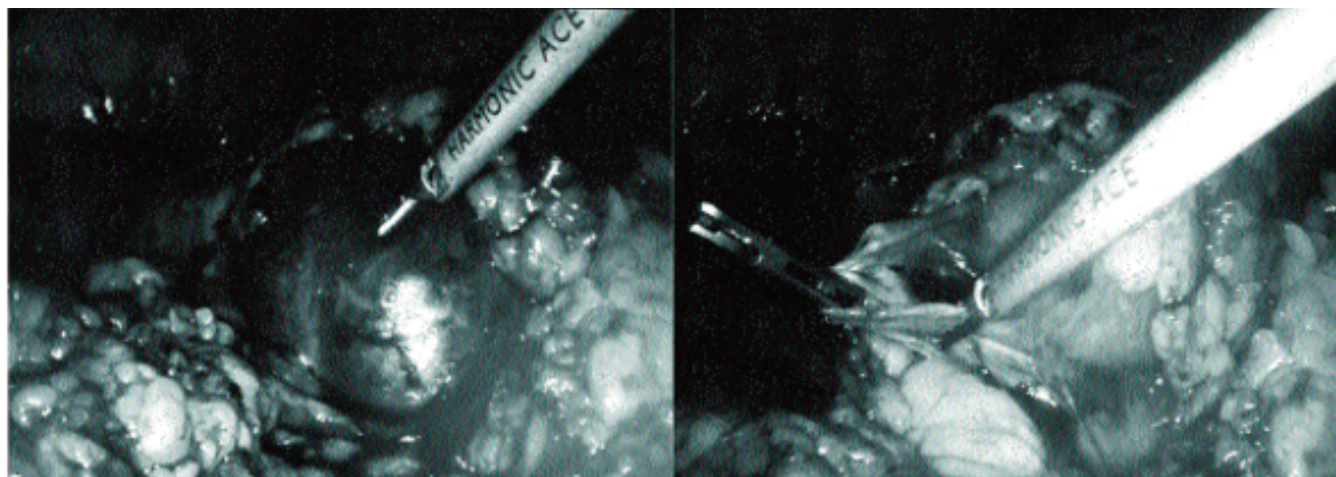


Figure-3: The cyst wall was exposed through the transperitoneal approach and circumferentially excised with Harmonic within a distance of 5mm from the renal parenchyma.

Table: Summary of studies showing outcomes of laparoscopic cyst excision using different energy sources.

	Monopolar	PlasmaKinetic	LigaSure	Argon Beam Coagulator and Monopolar	Harmonic Scalpel
Author	Tuncel et al.[13]	Tefekli et al.[16]	Erdem et al.[8]	Atug et al.[14]	Present study
No of patients	15	19	17	45	28
Mean patient age(y)	49,7 (23-76)	38,5±11,9 (28-62)	56,4 (41-72)	53,9 (14-78)	51,7±9,6 (39-74)
Access route	Transperitoneal	Retroperitoneal	Transperitoneal n:9 Retroperitoneal n:8	Transperitoneal	Transperitoneal n:18 Retroperitoneal n:10
Mean cyst size (cm)	7,9 (5,2-12)	NA	9,02 (7-14)	9,7 (6-19)	8,8±2,8(6 - 12)
Mean duration of operation (min)	64,6± 34,9	82,5±16,7	55,4 (32-95)	89(48-170)	72,8±28,4(50-110)
Estimated blood loss (mL)	20	50	50 (20-100)	85 (20-400)	60±10,6(30-100)
Mean hospital stay (d)	2,2 ±1,2 (1-5)	2,3 ±0,9 (1-4)	1,2 (1-3)	1,1 (1-3)	1,3±0,9 (1-3)
Mean Follow up (mo)	12,1±6,3 (8-21)	14,3 ±5,9	12,5 (2-26)	58 (3-132)	12,6±3,2(3-24)
Success rate (%)					
Symptomatic	86,6	89,5	94,2	91,1	89,2
Radiologic	100	88,2	100	95,5	100

NA: Not available.

respectively.

The series included twenty-eight patients (16 female and 12 men), with mean age of 51,7±9,6 years (range, 39-74 years). The presenting symptoms were intractable flank pain (n=28) in all patients, microscopic haematuria in one, recurrent urinary tract infection in one, obstruction and related hypertension in one secondary to large renal cysts. One patient with hypertension referred by a cardiologists had three separate cysts on left kidney. Percutaneous cyst aspiration with sclerotherapy had been previously tried in 5 patients and none of the patients had a previous history of open and laparoscopic renal surgery. Preoperative CT revealed only single cyst in 25(89,2 %) patients, two separate cysts in 2 (7,1 %) cases and three separate cysts in 1 (3,5 %)case on the same kidney.

All cysts were classified as Bosniak type 1 SRC and did not communicate with the pelvicalyceal system, as confirmed by contrast-enhanced CT. Laparoscopic decortications was transperitoneal in 18 patients and retroperitoneal in 10 patients. The characteristics of patients and postoperative findings are summarized in Table.

We have not experienced any major complications. Postoperatively three patients (10,7%) had minor complications. One patient who underwent retroperitoneal surgery developed a perirenalhaematoma. He did not need any blood transfusion, and the haematoma resolved with conservative follow-up in three months. One of the other two patients had paralytic ileus and the other had subcutaneous gas leakage that they regressed within 4 days with conservative follow-up. All patients were mobilized and drains were removed on the first postoperative day except one with perirenalhaematoma.

In all patients oral intake was started the day after surgery except one case with paralytic ileus.

As listed in Table, symptomatic and radiological success rates of 89,2 % (25 of 28 patients) and 100 %, respectively. Of three cases that we could not provide symptomatic success was thought to have vertebral discopathies. Patient with obstruction related hypertension, had slight reduction in blood pressure at three months follow up then became normotensive during 24 months follow up. All patients had negative cytological and pathological findings for malignancy.

Discussion

SRC is the most frequently diagnosed disease of kidney with widespread use of improved radiological techniques. Though the SRC can be seen at every age, its incidence tends to increase in number, and size with aging. SRC are seen each of every 5 individuals after age of 40, and each of every 3 individuals after age of 60.⁷ Most of SRC are peripheral in location without any symptoms. However, up to 5-10% of patients develop flank pain, haematuria, hypertension, recurrent infection, stone formation, and urinary tract obstruction.^{5,6} In our series indication of surgery included persistent pain, hypertension related obstruction, microscopic haematuria and recurrent urinary tract infection.

There are many treatment options used for symptomatic cysts. Before the development of laparoscopic surgery, SRC were treated by percutaneous aspiration with or without instillation of sclerosing agents, percutaneous marsupialization or open decortication. Initially, in the treatment of simple cysts, percutaneous aspiration and sclerosing therapy was used for several years. However, a high recurrence rate of aspiration and loss of renal

function due to the inadvertent leakage of sclerosing material into the pelvicalyceal system are major deleterious effects of this technique.⁸ Another disadvantage of this technique is that there is no histopathological evaluation, missing in rare cases, a cystic tumour. A previous study by Okeke and colleagues compared the percutaneous management with the laparoscopic cyst decortication and found that laparoscopic treatment was the better option.⁹ On the other hand, open cyst decortication is thought to have higher success but has a higher morbidity rate and requires longer convalescence in comparison with other treatment options.^{8,10} Laparoscopic ablation of symptomatic renal cysts was first reported by Hulbertin in 1992.¹¹ Then, several studies indicating laparoscopic surgery as the first-line minimal invasive treatment with lower recurrence rates in the management of SRC have been published.^{8,9,12} Currently, laparoscopic cyst excision allowing all the benefits of a minimal invasive approach is in use.

Different energy sources have been used during cyst wall excision and fulguration. Initially, conventional monopolar energy device was used for laparoscopic decortication because of its cost-effectiveness, success rates and availability. However, monopolar devices have some disadvantages such as high lateral thermal damage and separate functions of cutting and coagulation. In a study by Tuncel 15 cases underwent laparoscopic cyst decortications using conventional monopolar energy.¹³ They did not have any major complications or return for open surgery. In addition, no recurrence was detected during follow up. In another study by Atug laparoscopic decortication was performed in 45 patients using monopolar electrocautery scissors and fulguration of the cyst epithelium with an argon beam coagulator.¹⁴ Their symptomatic and radiological success were 91,1% and 95,5%, respectively. Millar and co-workers have also used electrocautery and the argon-beam coagulator to obtain haemostasis in patients with autosomal dominant polycystic kidney disease.¹⁵ They concluded that cyst decortication is highly effective in the management of disease-related chronic pain for the majority of patients. Even though the cost-effectiveness and easy availability remain major advantages, the inadequacy of bleeding control and lateral thermal injury are the weak points of monopolar energy sources.

Another energy source, the Plasma Kinetic system has two functions (simultaneously cutting and coagulation) in a single device. Tefekli et al. reported their experience performed cyst decortication with bipolar Plasma Kinetic scissors in 19 patients.¹⁶ They reported six minor

complications and asymptomatic cyst recurrence in two patients. In addition, their radiologic and symptomatic success rate which was evaluated by the patients' self-assessment at the end of the mean 14,3 months follow up were 88,2% and 89,5%, respectively. Plasma Kinetic has simultaneous cutting and coagulation effect so it can decrease the operative time and bipolarity of the device significantly decreases injuries to non-targeted organs.

In a current study by Erdem and colleagues, 17 cases with symptomatic hilar renal cysts underwent laparoscopic decortication using the bipolar LigaSure sealing system.⁸ They reported a radiological success rate of 100% and symptomatic success rate of 94,2 % at the end of 12,5 months. They concluded that bipolar LigaSure sealing system was feasible, safe and effective in decreasing operation time. In the literature, HS was used during laparoscopic treatment of symptomatic autosomal dominant polycystic kidney disease in 2001.¹⁷ The authors reported 7 patients with end-stage renal disease. They had a significant reduction in the pain scores but they experienced delayed bleeding necessitating blood transfusion in two patients and laparotomy was required in one patient. According to this study HS system seems to be inadequate about prevention of delayed bleeding but in our series we did not encounter any postoperative haemorrhage and open conversion was not indicated in any case. We experienced that HS can provide high comfort to the surgeon, effective haemostasis of large vessels up to 5 mm and thus provide a good view. We think that it can be a useful and fast alternative for other energy sources. Therefore, we concluded that further comparative studies are obviously needed to clarify this issue.

The development of energy sources in laparoscopic surgery is linked to advances in ancillary surgical instrumentation so this new developments bring in mind the questions of cost-effectiveness and accessibility. LigaSure and HS increase the cost of laparoscopic procedures, however, and the amount of evidence-based information on this topic is surprisingly limited. Even though LigaSure and HS are thought to be high-priced devices, these energy sources may provide cost-effective option in high volume centers where reducing complications and operative time may balance the number of daily procedures. In addition, these new energy sources are easy to use, the possibility of dissection with blunt tip, effective bleeding control and can be used after sterile again, thus the operation cost can be reduced.

Conclusion

Based on the present experience, our results indicate that

HS system in laparoscopic decortications of SRC is efficient, safe, and practicable but also leads to increased costs. Though ultracision HS energy source is not superior to other energy sources we consider it can be used as a good alternative method to other energy sources. Although our experience is still limited, with increasing studies we think that this energy type will be used more in the coming years. Large prospective randomized controlled studies with long term follow up are required to better define the optimal energy source for the management of SRC.

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Conflict of Interest: None.

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