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The Modified Semi-lateral Transmesocolic Approach for Laparoscopic Left Adrenalectomy

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Abstract

Background As the most appropriate laparoscopic approach for adrenalectomy is still a matter of debate, we present a modified technique of laparoscopic transmesocolic approach for left adrenalectomy.

Methods All demographics, intraoperative and postoperative data of patients who underwent laparoscopic transmesocolic left adrenalectomy from 2009 to 2015 in Avicenne Hospital were recorded.

Results Thirty-three consecutive patients underwent laparoscopic transmesocolic left adrenalectomy. We observed no conversion, negligible blood loss, no red cell transfusion or intraoperative complication. Mean operative time reached 96 min (range: 40–200 min). Postoperatively, the median length of hospital stay was 5 days (range: 3–8 days), mortality was nil, and six (19%) patients suffered from complication, including one major complication (Clavien–Dindo III–IV, an abdominal collection treated with radiologic drainage). R0 resection was achieved in all patients.

Conclusion Laparoscopic left adrenalectomy using semi-lateral transperitoneal transmesocolic approach is feasible and safe with acceptable intraoperative and perioperative outcomes. This technique could be considered as a routine approach and should be compared in further studies.

Introduction

Since 1992 and the first case by Gagner et al. [1], benefits of the laparoscopic approach for adrenalectomy have been extensively reported in terms of morbi-mortality and length of hospital stay [2], resulting in the laparoscopy as the gold standard for adrenalectomy [2].

Yet, several laparoscopic techniques have been proposed, including transperitoneal anterior or lateral approaches, retroperitoneal posterior approach and transdiaphragmatic approach; however, the best technique is still a matter of debate as differences are marginal [3]. In left adrenalectomy, all techniques lead to the risk of kidney, spleen, pancreatic, diaphragmatic and colon injury, respectively [3], and related outcomes.

Among admitted techniques for left adrenalectomy, laparoscopic transmesocolic approach [4, 5] has some theoretical but compelling advantages; among others, eased intraoperative exposure of the left adrenal gland, limited dissection and decreased risk of intraoperative complications are expected. The comparison has shown that when morbi-mortality is unchanged, transmesocolic approach leads to shorter operative time and hospital stay [5].

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As we aimed to combine the advantages of anterior (direct visualization of adjacent organs) and lateral (improved exposition) approaches, we modified and standardized the technique of laparoscopic transmesocolic left adrenalectomy [4, 5] during the last few years. Herein, we describe this procedure and our experience.

Operative technique

The patient was placed in left semi-lateral position with the right back on a cushion and with the surgeon and two assistants standing in front of him. Under general anesthesia, nasogastric tube and urinary catheter were inserted. In case of suspected pheochromocytoma, intra-arterial blood pressure and central venous pressure were monitored.

Four operative ports were used: Under visual control, a first 10-mm port was inserted in the left paraumbilical region, then one 10-mm port was inserted on the midline, one 10-mm port was inserted on the left midclavicular line, and one 5-mm exposure port was located more laterally (Fig. 1). A 12 mmHg pneumoperitoneum was maintained during the procedure.

Due to the left semi-lateral position, exposition was eased as small bowel was positioned in right quadrants of the abdominal cavity. Left part of transverse mesocolon was lifted to expose duodenojejunal flexure, inferior mesenteric vein and inferior aspect of the pancreas (Fig. 2). Using harmonic scalpel (Ultracision©, Ethicon, Cincinnati, Ohio, USA), peritoneum between duodenojejunal flexure and mesocolon was opened laterally to the inferior mesenteric vein. Inferior aspect of the pancreas was then identified, and body of the pancreas was gently lifted after blunt dissection between the posterior aspect of the pancreas and the Gerota's fascia. The left renal vein was then individualized, enabling to reach the adrenal gland. At the superior side of the renal vein, the left middle adrenal vein was thereafter individualized, electively clipped and severed (Fig. 3). The tumor was gently mobilized from medial to lateral until full dissection: Adrenal arteries were coagulated or clipped and the left renal artery (or superior branch) was identified and resected at the inferior aspect of the adrenal gland. The specimen was removed using a retrieval bag through the optical port incision. No abdominal drainage was left in place.

The complete surgical technique is shown in the attached video.

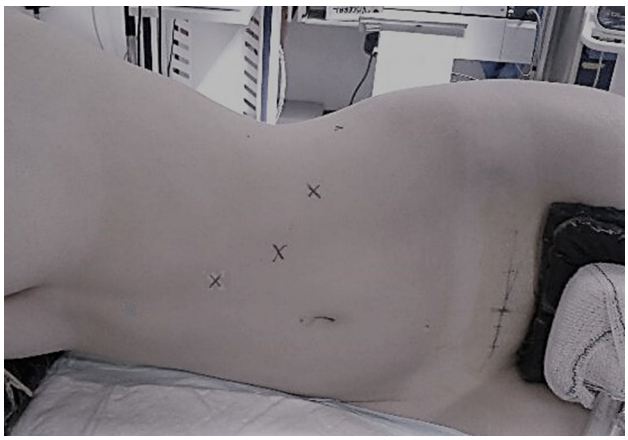

Fig. 1 Trocarts position

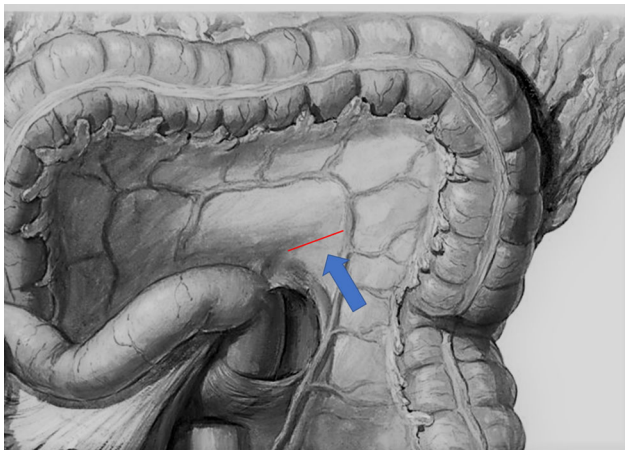

Fig. 2 Transmesocolic approach; the red line shows the incision and the blue arrow shows the dissection direction

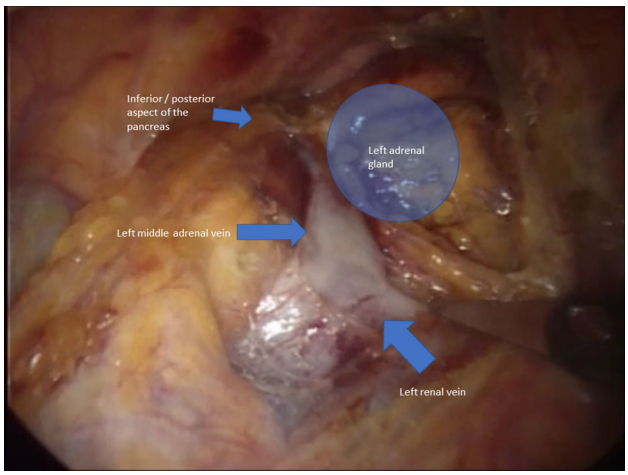

Fig. 3 Division of the left middle adrenal vein

Results

From 2009 to 2015, 86 adrenalectomies (41 right and 45 left adrenalectomies) were performed in our department. Among them, 33 patients, including 18 (54.5%) women, with a median age of 48 years (range 18–67) underwent laparoscopic transmesocolic left adrenalectomy (for Conn's adenoma, pheochromocytoma, unilateral hyperplasia and metastasis from lung cancer in 18 (54.5%), 6 (18.2%), 5 (15.2%) and 4 (12.1%) patients, respectively). Median body mass index (BMI) was 23 kg/m^2 (range 17.2–29.6), and previous abdominal surgery was recorded in 16 (48.5%) patients.

Neither intraoperative complication nor conversion to laparotomy was reported. Mean operative time was 96 min (range 40–200). There was negligible blood loss in all cases, and no red blood cell transfusion was required intraoperatively. There was no colon, pancreatic or splenic injury.

Regarding postoperative course, the median length of hospital stay reached 5 days (range 3–8). Overall, six (18.2%) patients presented with complication: Five (15.2%) had a minor complication (Clavien–Dindo I–II) and one (3.0%) suffered from a major complication (Clavien–Dindo III–IV): an intraabdominal collection diagnosed 3 weeks after the surgery and successfully treated with radiologic drainage. No mortality, postoperative hemorrhage, red cell transfusion or pancreatic fistula was observed.

At histopathological examination, complete resection (R0) was achieved in all cases (100%) and the mean size of the adrenal tumor was 26 mm (range 5–80); a median tumor size of 20 mm (range 8–70) was measured using preoperative imaging.

Discussion

When compared, no technique of laparoscopic adrenalectomy has shown obvious superiority [3]. In left adrenalectomy, risks associated with these different techniques are known: Spleen, colon, diaphragm, kidney and pancreas injuries have been reported indifferently during transperitoneal and retroperitoneal approaches [1, 3]; yet, these might go unnoticed during retroperitoneal approach as they result from transfixing trauma, a compelling argument in favor of transperitoneal approach. Among transperitoneal approaches, the best choice is still debatable. In our opinion, two prerequisites are mandatory to the best surgical approach: an easy and reproducible exposition (as the left adrenal gland is a deep organ) and the reduced dissection and mobilization in order to avoid intraoperative organ injury. Considering the exposition, Gagner et al. [1] have shown a dramatic improvement using the lateral position in their former experience. And among various benefits of the transmesocolic approach, dissection and mobilization of the colon and the spleen are not necessary.

Current technique stems from Peretta et al. [4]. Lezoche et al. [5] compared this inframesocolic approach (that we call transmesocolic approach herein) to the classic lateral transperitoneal approach and showed the superiority of submesocolic approach in terms of operating time and length of hospital stay, as suggested by decreased dissection in submesocolic approach. From a technical standpoint, we made some refinements as we tried to keep advantages from anterior and lateral approaches; differently from Peretta et al., patients were placed in semi-lateral (45° left-rotated) right flank decubitus and held with cushions. In this position, small bowel loops are positioned in right abdominal quadrants, enabling to reach easily the duodenojejunal flexure, the mesenteric vein and inferior aspect of the pancreas. Differently from the technique described by Gagner et al., colon and spleen are not dissected nor mobilized: The left part of the transverse colon is lifted up and the horizontal incision of the mesocolon is completed, enabling to complete the dissection of the left adrenal gland without any mobilization, theoretically reducing the risk of injury. Also, in case of conversion, cushions are removed enabling to turn the patient in decubitus without lengthy full repositioning.

These hypotheses were seemingly confirmed in our experience: No intraoperative conversion or complication was recorded, operative time was acceptable, and no significant blood loss was recorded. Regarding short-term outcomes, with only one major complication (a collection requiring radiologic drainage), morbi-mortality was in accordance with most series [3]. And finally, complete resection of the lesion was obtained in all patients.

However, we reported mainly small lesions and patients low BMI, as we selected indications: For left adrenalectomy, transmesocolic approach was the only laparoscopic technique we used and open approach was preferred because of the size of the lesion (mainly Conn's adenoma, as we work), several abdominal surgeries in previous medical history and in case of associated procedure as pancreatectomy or nephrectomy. Yet, when no comparison was performed, these results are encouraging from a low-volume team (12 adrenalectomies/year and long length of hospital stay).

In conclusion, this modified technique of laparoscopic transmesocolic approach for left adrenalectomy is feasible and safe and enables to avoid injury of adjacent organs. Further study should be designed for comparison to other laparoscopic techniques.

Authors' contribution PW, LG and AZLB conceived the work; acquired, analyzed and interpreted the data; drafted the manuscript and critically revised it for important intellectual content; and finally approved the manuscript.

Compliance with ethical standards

Conflict of interest PW, LG and AZLB have no conflict of interest regarding this manuscript.

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