Use of the Laparoscope Holder for Liver Retraction during Urological Laparoscopic Surgery

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Abstract
Purpose: During laparoscopy, as in open surgery, exposure is critical. Here, we describe the use of a laparoscope holder to facilitate the liver lift during urological laparoscopic surgery.

Materials and Methods: Laparoscopic right radical nephrectomy (n = 3), partial nephrectomy (n = 1), and adrenalectomy (n = 2) were performed with 4 ports. At the beginning of the operation, the small snake retractor was placed through the 5-mm port under direct vision and the liver was lifted in the appropriate direction to optimize exposure.

Results: The laparoscope holder provided quick, reproducible retraction to facilitate exposure. No complications occurred with its use. The device reduced the need for a dedicated second assistant to stand bedside.

Conclusions: We achieved significant improvements in the safety and efficiency of liver retraction during urological laparoscopic surgery using the laparoscope holder.

Introduction

During laparoscopic right adrenal and renal surgery, liver retraction is essential to enable full visualization [1]. However, once the liver is retracted and an adequate view is established, the camera lens is focused mainly on the immediate operative field, not the retracted liver. Once the field of view shifts from the retractor, the instrument may drift, compromising exposure. Thus, surgical assistants are regularly entrusted with the use of an unfamiliar instrument to retract an unseen liver for an extended period of time. As the surgical procedures increase in complexity, it is difficult to constantly maintain the proper amount of isometric force and the proper retractor position to maintain optimal exposure. As a result of muscle fatigue in the assistant surgeon, the retractors may accidentally move or excessive force may inadvertently be applied when the liver is retracted. Injury to the liver may occur out of the surgical field of vision during instrument manipulation. In fact, subcapsular hematoma and tear of the liver have been reported during laparoscopic cholecystectomy but have not been reported following open cholecystectomy [2–7]. Postoperative hemorrhage due to a hematoma or tear of the liver is a rare but life-threatening complication. To overcome these problems, we describe the use of the laparoscope holder to help facilitate the liver lift during right adrenal and renal surgery.

Patients and Methods

Beginning in April 2010, 6 cases were included in this study. Laparoscopic right radical nephrectomy (LRRN) (n = 3), laparoscopic right partial nephrectomy (LRPN) (n = 1), and laparoscopic right adrenalectomy (LRA) (n = 2) were performed with 4 ports. The laparoscope holder (Karl Storz GmbH and Co., Tuttingen, Germany) consisted of 4 components: a table holder, a base rod, a small snake retractor, and a universal joint.
an articulating arm, and a precision clamp (fig. 1). The clamp, located at the tip of the holding system, accommodates instruments of various sizes. The articulating arm has 3 joints and is operated manually to aid in positioning. At the beginning of the operation, the device is quickly clamped to the table via the base rod over a sterile drape. Through the 5-mm port, the small 5-mm snake retractor (Snowden-Pencer, McGaw Park, IL; 40 mm in diameter) is placed under direct vision and the liver is lifted in the appropriate direction to optimize exposure. Once in the proper position, the set screw on the handle is tightened, thereby precluding any inadvertent release of the surface of the retractor. The laparoscope holder is also fastened, securing the retractor in the desired position. If required, minor repositioning of the device can easily be performed by the assistant.

Results

We used the laparoscope holder to facilitate retraction of the liver. The livers were adequately retracted using the described method and the right renal pedicle and right adrenal central vein were fully exposed in all cases. The device also eliminated the need for a dedicated second scrubbed assistant to stand bedside, which limited the need to only one assistant to assist with the camera operation. The laparoscope holder provided quick, reproducible retraction to facilitate exposure during surgery. The laparoscope holder maintained the retraction of the liver in the appropriate direction. No complications related to use of the laparoscope holder were observed. The time required to set the device up was less than 5 minutes. Moreover, no internal or external instrument collisions occurred during the surgery. Preoperative aspartate aminotransferase levels were within normal limits (<40 IU/l) except in 1 patient whose level was 82 IU/l because of a fatty liver. The levels had not changed significantly on postoperative day 7 in all 6 patients.

Discussion

Exposure is critical to the efficient and safe completion of all surgical procedures. During laparoscopy, with its limited field of view, this aspect of surgery becomes even more important, since the surgeons forfeit their primary sense of touch for visually based information [8, 9]. In LRRN, LRPN, and LRA, the snake retractor is useful to retract the liver in order to keep the surgical field clear. In conventional laparoscopic liver lift by an assistant, the potential disadvantages of using the snake retractor include over-retraction of tissues, which may lead to liver tears [10]. Although the assistant should bear this in mind and use the snake retractor with an appropriate amount of force for the liver, it is difficult to constantly maintain the proper amount of isometric force and the proper retractor position to maintain optimal exposure [11].

Our method using the laparoscope holder device for liver retraction from the initial stage of surgery can be recommended for the following reasons. The device eliminates the need for a dedicated second scrubbed as-

Fig. 1. Demonstration of application of the laparoscope holder during LRRN (white arrow).
Liver Retraction during Laparoscopic Surgery

We have achieved significant improvements in the safety and efficiency of liver retraction during LRRN, LRPN, and LRA using a laparoscope holder. Furthermore, this tool eliminates assistant muscle fatigue and instrument migration, and eliminates the need for a dedicated second terminal assistant. Our preliminary clinical experience revealed that there are no complications related to this procedure and that the applied retraction force did not damage the liver during the procedure. This technique may be helpful not only in urological laparoscopic surgery, but also in gall bladder, esophageal, and gastric surgical approaches.

References