Two-glove-finger-balloon Dissection of Retroperitoneal Space for Laparoscopic Urology

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**Background:** We present our experience in retroperitoneal interventions with 2 catheter mounted glove fingers through 2 access points.

**Methods:** Patients were placed in the lateral decubitus position, and the retroperitoneum was accessed by blunt dissection through a 10-mm transverse skin incision on the posterior axillary line. Another incision was performed through the anterior axillary line, and the surgeon inserted his finger to dissect the muscle layers in the retroperitoneum to develop an initial space to place the glove finger balloon, which was attached to a 14-F Nelaton catheter.

**Results:** This technique was performed on 32 patients. The mean operation time was 57.4 ± 26.7 minutes. A satisfactory retroperitoneal space for the operation was provided and both balloons inflated to 500 mL. No complications were observed.

**Conclusion:** Retroperitoneal laparoscopy using 2 balloons is a safe, cheap, effective minimally invasive procedure, and we believe that the technique described above both decreases both the operation time and cost. [J Chin Med Assoc 2009;72(12):625–628]

**Key Words:** dissection, glove, laparoscopy

**Introduction**

In recent years, the retroperitoneoscopic approach has become popular among urologists for the treatment of retroperitoneal pathologies. In the retroperitoneal approach, the anatomical landmarks are less prominent compared with the transperitoneal approach, and the fatty retroperitoneal area and limited space makes the dissection more difficult. Therefore, the retroperitoneal approach is not recommended for beginners. On the other hand, complication rates are lower during retroperitoneoscopy compared with the transperitoneal approach. Appropriate dissection and insufflation creates a feasible working space, which makes the retroperitoneal approach preferable.1–3

The balloon dilatation technique was first described by Gaur in 1992 and has become popular all over the world.4 Special balloon dilators, Foley catheters, condoms, Helmstein balloons and glove fingers are being used for this purpose.5–7 In this study, we used glove fingers for dissection of the retroperitoneum through 2 different access points.

**Methods**

The retroperitoneal laparoscopic approach was used to operate on 32 patients in our institution. Operations were performed for: symptomatic renal cysts in 16 patients, non-functional kidneys in 10 patients, and renal pelvis stones in 6 patients. The patients had no history of retroperitoneal surgery. Obese patients were excluded from the study.

Patients were placed in the lateral decubitus position. To prepare balloon dissectors, we cut the middle finger of a No. 8 powder-free surgical glove from the palmar insertion side. Then a 14-F Nelaton catheter was inserted into each cut fingertip and tied with No. 1 silk sutures in a watertight and airtight fashion (Figure 1). This gives the dissector a cost of around US$5.00.
Access to the retroperitoneal space was performed blindly through a 10-mm transverse incision on the posterior axillary line 2 cm above the iliac crest. The muscular layers and the transversal fascia were dissected blindly to reach the retroperitoneal space. Another incision was made on the anterior axillary line, and blunt dissection was made in a similar way. Finger dissection of Gerota’s fascia was used as much as possible (Figure 2).

The balloon dissectors were inserted into the retroperitoneal space through the previously described incisions. The posteriorly located balloon lay between the posterior side of the posterior aspect of the kidney and the psoas muscle. The anteriorly located balloon lay between the anterior side of the anterior aspect of the kidney and the peritoneum (Figure 3). The 2 balloons were inflated with air simultaneously, each forming a 500 mL volume, and were kept inflated for 5 minutes. At the end of the dissections, 2 10-mm trocars were inserted into the incision. After a third trocar was placed on the midaxillary line, the surgical procedure was performed.

Results

The mean patient age was 42.2 years (age range, 19–66 years). The mean follow-up period was 23 months (range, 5–49 months). The mean operation times for renal cyst excision, simple nephrectomy and pyelolithotomy were 38.75 ± 10.45 minutes, 71.80 ± 23.59 minutes and 83.33 ± 27.50 minutes, respectively. The overall mean operation time was 57.43 ± 26.70 minutes (range, 25–120 minutes). The surgical indications and operation times are listed in Table 1. The 2-glove-balloon technique resulted in an effective surgical field in all patients, and no other interventions were required. None of the patients underwent conversion to open procedure. Peritoneal perforation was not observed in any of the cases. No major bleeding occurred during the surgery, and none of the patients required a blood transfusion. Furthermore, no balloons ruptured.

Discussion

Until the description of balloon dissection by Gaur et al, pneumoretroperitoneum was established with
in each glove without decreasing the total volume, making the gloves less likely to rupture. Some devices have also been developed to measure the pressure of the dissector during the inflation process to provide a safer dissection. In adults, dissectors are inflated from 800 mL to 1,000 mL for dissection and to create an adequate operating space. In our technique, the volume of each balloon does not exceed 500 mL. This provides for a safe dissection, and enables us to use gas instead of saline to inflate the balloon. There was no balloon rupture in our study.

The need for balloon dissection is not limited to renal or adrenal surgery. It is also necessary for extraperitoneal laparoscopic pelvic surgery. The glove finger technique could also be used here in place of a Gaur balloon. Previously, a glove finger has been used in laparoscopic inguinal hernia surgeries.

Using glove fingers for dissection is cost-effective. Using disposable instruments for laparoscopic surgery is expensive, and in developing countries cost is a barrier to the introduction of safer techniques. Using glove fingers instead of other balloons will reduce the cost of this type of surgery. Balloon dissectors cost more than US$220.00. Using this method, we are able to perform the dissection for only US$5.00.

In addition to the benefits listed above, our technique reduces operating time. During finger dissection, separation of Gerato’s fascia followed by insertion and inflation of the balloon dissectors would clear most of the adipose tissue around the kidney. Visualization of the kidney tissue immediately after the first insertion of the laparoscope through the trocar reduces dissection time and operation time.

Urology is one of the branches of medicine that has been affected by technological advances. However, these advances also increase treatment costs. Thus, researchers must find safe and affordable methods. Retroperitoneal laparoscopy with 2 independently inflated balloons is a minimally invasive procedure, which decreases the operation time significantly and is safe, efficient, and cheap.

**References**


**Table 1. Indications and mean operation times of patients**

<table>
<thead>
<tr>
<th>Patients, n (%)</th>
<th>Operation time, * (min)</th>
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<tbody>
<tr>
<td>Renal cyst 16 (50)</td>
<td>38.75 ± 10.45 (25–60)</td>
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<tr>
<td>Non-functioning kidney 10 (31.25)</td>
<td>71.80 ± 23.59 (45–110)</td>
</tr>
<tr>
<td>Renal pelvic stone 6 (18.75)</td>
<td>83.33 ± 27.50 (50–120)</td>
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<tr>
<td>Total 32 (100)</td>
<td>57.43 ± 26.70 (25–120)</td>
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*Data are presented as mean ± standard deviation (range).*

insufflations through a veress needle, but it was often unsuccessful. In this method, the working space was inadequate. Using only CO₂ insufflations to disrupt the fibroareolar septum and to create an adequate working space was very difficult and even harder in patients who had undergone previous retroperitoneal surgery.

In balloon dissection, the balloon that is inflated in the retroperitoneal space forms a working area. After formation of the working area, the balloon is kept in this space for 5 minutes. During this time, the inflated balloon compresses the capillaries and veins that are ruptured during dissection. This helps to maintain homeostasis.

In recent years, investigators have made some modifications to the balloon dissection procedure. Because they believed that inflation of the balloon in 2 different retroperitoneal spaces might help to form a larger space, they placed a balloon through the umbilicus to make a dissection inferiorly, and then repositioned the balloon towards the upper aspect providing dissection up to the diaphragm. In our series (with an access point on each side), anterior and posterior sides of the kidney could be dissected at the same time. This is important because it allows the anatomical landmarks such as the psoas muscle to be seen, and provides an effective working space.

The most common complication of the glove finger dissection is rupture of the glove caused by the high pressure of the gas during inflation. This rupture could damage the surrounding organs and there is a risk of gas emboli. Furthermore, it is difficult to find pieces of a ruptured glove in the retroperitoneal space. Two modifications were previously described to decrease these risks: the first was to use sterile saline to fill the balloon instead of air (to prevent air emboli), the second was to use 2 gloves to decrease the pressure.


