

# Novel Approach to Minimizing Trocar Sites during Challenging Hand-Assisted Laparoscopic Surgery Utilizing the Gelport: Trans-Gel Instrument Insertion and Utilization

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## ABSTRACT

**Purpose:** We present a novel technique for modified application of a hand-assist device, the Gelport (Applied Medical Resources, Rancho Santa Margarita, CA), which uses a gel for intra-abdominal access.

**Materials and Methods:** A 53-year-old woman with a history of rectal cancer treated by abdominoperineal resection, ileostomy, subsequent reanastomosis, chemotherapy, and radiation presented with a 6-cm upper-pole left renal mass. Staging was negative, and a CT scan showed no evidence of lymphadenopathy or renal vein involvement. The patient elected to undergo a hand-assisted laparoscopic radical nephrectomy. Numerous intra-abdominal adhesions were encountered during initial periumbilical hand port placement. The initial adhesions were taken down in an open fashion; however, the proposed trocar sites still could not be exposed. The Gelport was placed, and a laparoscope was passed directly through the established central opening and the gel. A working instrument was then passed through the gel itself, allowing adhesiolysis under direct laparoscopic vision.

**Results:** The nephrectomy was completed laparoscopically in 4 hours and 15 minutes with lysis of adhesion occupying 90 minutes of the operative time. The estimated blood loss was 150 mL. Despite the technical difficulty of the case, the procedure was completed laparoscopically with two standard 12-mm trocars and a 5-mm lateral retraction trocar.

**Conclusion:** The Gelport permits simultaneous insertion of the surgeon's hand and a working laparoscopic instrument. This allows for maximally efficient utilization of the incision made for hand-assist device placement and may minimize the need for additional trocars during challenging laparoscopic cases.

## INTRODUCTION

THE GELPORT (Applied Medical Resources, Rancho Santa Margarita, CA) is a new hand-assist device that maintains the pneumoperitoneum without an additional sleeve, as is required with other hand port devices. The unique sealing mechanism of the device conforms to the hand or instrument introduced into the abdomen and allows for easy exchange of instruments. Although originally designed for hand and instrument passage through an established opening in the middle of the gel, additional instruments may also be inserted directly through the gel without damaging the functional integrity of the device. Herein, we describe a case whereby trans-gel instrument passage averted open conversion despite severe intra-abdominal adhesions. Additionally, a technique for safe trans-gel instrument passage is described.

## CASE REPORT

A 53-year-old woman was referred for the incidental finding of a 6-cm left upper-pole renal mass identified on a CT scan performed as a follow-up for rectal cancer. Treatment of the rectal cancer 2 years prior to presentation involved an abdominoperineal resection with ileostomy. She subsequently underwent reanastomosis of her enteric system and adjuvant chemotherapy and radiation. No CT scan evidence of lymphadenopathy or renal vein involvement was found. Screening chest radiography and liver function tests were normal.

The patient elected to undergo a laparoscopic nephrectomy. Concern about numerous intra-abdominal adhesions from the prior operative procedures and radiation therapy prompted a hand-assisted approach. Primary access was via a 7.5-cm midline periumbilical incision. As anticipated, numerous adhesions

were encountered. Extensive adhesiolysis was performed via the limited incision. However, adequate exposure for direct or laparoscopic visual access to the left upper and lower quadrants could not be obtained for secondary trocar placement.

With the Gelport in position, the surgeon's hand was introduced through the established opening in the center of the gel. Subsequently, the harmonic scalpel (Ethicon Endo-Surgery, Cincinnati, OH) was passed directly through the gel parallel to the palmar surface of the surgeon's cupped hand. This technical point is of key importance, as the blind passage of instruments into the abdominal cavity can result in significant injury to underlying structures, whereas when the instrument is caught in the surgeon's palm, it can be carefully guided into position. Additionally, during instrument passage through the gel, special care should be taken not to damage the rubber sleeve of the Gelport, which may be torn inadvertently on instrument passage.

With the harmonic scalpel in position through the gel, the surgeon's hand was removed, and a 12-mm trocar was passed through the central opening in the Gelport. A laparoscope with a 30° lens was placed through the trocar for further adhesiolysis under direct laparoscopic vision. After the left lower-quadrant trocar site was visible laparoscopically, a secondary trocar was placed, and another working instrument was inserted to expedite the dissection. An additional left upper-quadrant trocar was placed. The remaining dissection was difficult in that the spleen and colon were densely adherent to Gerota's fascia. During difficult portions of this dissection, the suction irrigator was passed through the gel adjacent to the surgeon's hand as previously described; this allowed suctioning without removal of other instruments being used in dissection or retraction (Fig. 1).

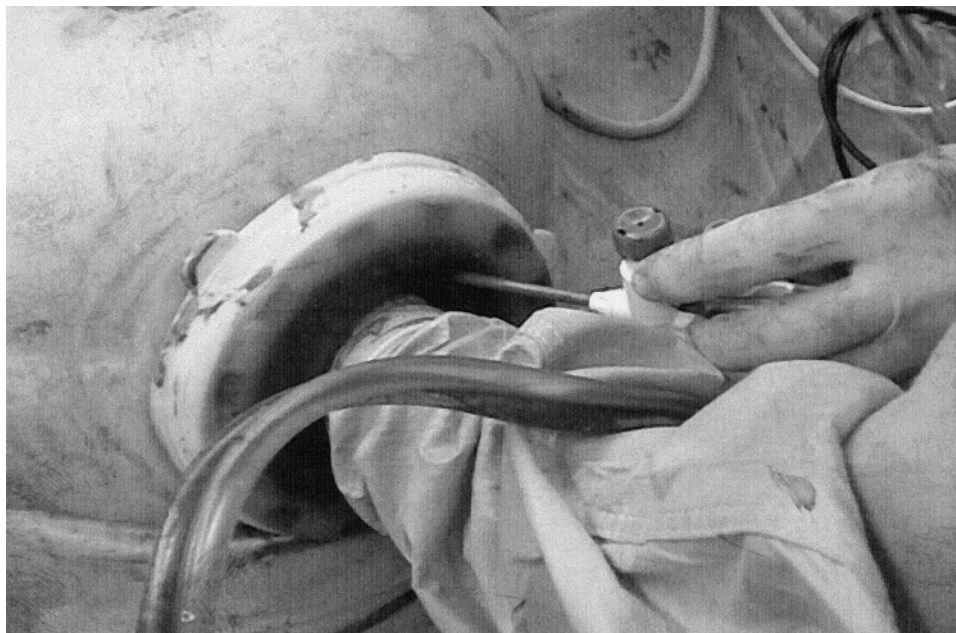
The nephrectomy was completed laparoscopically in 4 hours and 15 minutes. Ninety minutes of the procedure were dedi-

cated to lysis of adhesions. The estimated blood loss was 150 mL. The patient was tolerating a liquid diet on postoperative Day 1. She was discharged to home on postoperative Day 3, tolerating a regular diet, ambulating, and comfortable without analgesics. Final pathology examination revealed a 5.7-cm renal-cell carcinoma with clear-cell histology. All margins were negative, and a single lymph node within the specimen was negative for tumor (pT<sub>1</sub>N<sub>0</sub>M<sub>x</sub>).

## DISCUSSION

Hand-assisted laparoscopic nephrectomy results in an expedited convalescence compared with open nephrectomy.<sup>1,2</sup> The hand-assisted technique also appears to shorten the learning curve associated with laparoscopic nephrectomy and as such may encourage surgeons to pursue minimally invasive renal surgery.<sup>2</sup> Hand-assisted techniques are particularly popular in cases where the specimen must be removed intact, as in donor nephrectomy<sup>3,4</sup> and nephroureterectomy.<sup>5-7</sup>

The Gelport is a hand-assist device that allows the easy removal and introduction of working devices while maintaining pneumoperitoneum. It consists of a rubber sleeve that passes through the abdominal wall. The sleeve anchors to a plastic ring that lies on the skin surface. An outer gel dome with a central opening can then be snapped onto the plastic ring to complete the seal. The gel seal mechanism allows easy passage of the surgeon's wet hand. Although not part of the original manufacture design, the unique gel sealing mechanism of the device also permits passage of 5-mm instruments (e.g., harmonic scalpel, suction device, etc.) directly through the gel. These instruments can be inserted and removed without damaging the sealing mechanism. In fact, there is no obvious alteration in the



**FIG. 1.** Simultaneous passage of surgeon's left hand through established gel opening and 5-mm suction device directly through gel for hilar dissection.

gel after instrument removal. Other hand-assist devices are fitted with a cap that allows one instrument into the field. However, the passage of two instruments or an instrument and a surgeon's hand is impossible. During challenging cases, the Gelport provides technical advantages and may prevent the need for conversion to open surgery or placement of additional trocars.

The key technical point is careful introduction of the instruments through the gel. In all cases, the authors feel that the initial cupping of the instrument in the palm of the hand will allow its safe introduction under tactile guidance, thus minimizing the risk of injury to underlying structures or to the rubber ring of the Gelport.

### CONCLUSION

The Gelport allows passage of 5-mm instruments directly through the gel in parallel with the surgeon's hand without compromising the integrity of the seal. This allows for maximal utilization of the small hand-assist site incision and many avoid the need for additional trocars during technically challenging hand-assisted laparoscopic cases. In the case described here, the use of both the laparoscope and the harmonic scalpel at the outset of the case avoided open conversion and allowed satisfactory adhesiolysis. A technique for safe trans-gel placement of 5-mm instruments is described.

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