

The first report of a single-port laparoscopic nephrectomy in a child

Kenneth KY Wong 黃格元
Patrick HY Chung 鍾浩宇
Lawrence CL Lan 藍傳亮
Ivy HY Chan 陳巧兒
Paul KH Tam 譚廣亨

There has been an exponential rise in the use of minimally invasive procedures in surgery, with obvious benefits to patients. Recently, transumbilical single-port laparoscopic surgery has been championed as the next major technical advance. In this article, we report the first case where single-port laparoscopic surgery has been used to manage a paediatric problem in the region.

Introduction

Laparoscopic surgery has come a long way since the first laparoscopic cholecystectomy was performed in 1987.¹ In comparison with open surgery, minimally invasive surgery causes less scarring and pain and leads to faster recovery.^{2,3} Surgeons have been trying various techniques to make laparoscopic wounds as small as possible. This is done not only for cosmetic reasons, but, more importantly, to cause less postoperative pain. To this end, the idea of moving from the conventional three-port technique to a single-port technique surfaced.

Recently, single-port surgery has been successfully used for laparoscopic cholecystectomy⁴ and appendectomy⁵ in adults. The introduction of flexible-tip laparoscopes, together with articulated laparoscopic instruments, has made the procedure slightly easier and has thus attracted interest from many surgeons. With access through the umbilicus, which is a natural obliterated orifice, the wound is well hidden postoperatively and is cosmetically excellent. In this article, we report recent success with performance of a single-port nephrectomy in a young child. To our knowledge, this is the first reported case of single-port laparoscopy being performed in children in Asia and Europe.

Case report

Our patient was a 6-year-old girl who had a single right kidney detected antenatally by ultrasound. After birth, she was assessed in the paediatric clinic and was followed up regularly. At 4 years of age, she presented to us with frequent wetting of her underwear. A radioisotope scan was performed and revealed a left dysgenic kidney, with a residual function of 3%. Magnetic resonance imaging showed similar features. In view of her incontinence, an ectopic insertion of the left ureter was also suspected. After discussion with her parents, a laparoscopic left nephro-ureterectomy was arranged.

The operation was carried out under general anaesthesia with the patient's left side raised by 30°. For the single-port laparoscopic technique, a 2.5-cm transumbilical incision was made down to the peritoneal cavity. Under direct vision, a Triport (ASC, Wicklow, Ireland), a specially designed single port with three inserts, was placed into the peritoneal cavity and secured (Fig 1). A 10-mm laparoscope with a flexible tip (Endoeye; Olympus Medical Systems Corp, Tokyo, Japan) was used for visualisation and two 5-mm working instruments were inserted. Due to the in-line configuration of the instruments, it was important to create more space. Thus, the grasper used during the procedure was fully articulated (Autonomy Laparo-Angle Instrumentation; CambridgeEndo, Framingham

Key words
Child; Laparoscopy; Nephrectomy;
Treatment outcome

Hong Kong Med J 2010;16:153-4

Division of Paediatric Surgery,
Department of Surgery, The University
of Hong Kong, Queen Mary Hospital,
Pokfulam Road, Hong Kong
KKY Wong, PhD, FHKAM (Surgery)
PHY Chung, MB, BS, MRCS
LCL Lan, MB, BS, FHKAM (Surgery)
IHY Chan, MB, BS, MRCS
PKH Tam, ChM, FHKAM (Surgery)

Correspondence to: Dr KKY Wong
Email: kkywong@hku.hk

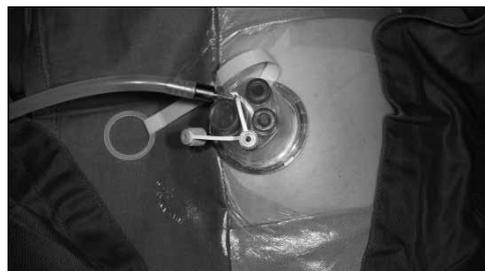


FIG 1. A photo showing the Triport with 1 x 10 mm and 2 x 5 mm channels after insertion via the umbilicus



FIG 2. The appearance of the wound in the umbilicus after closure

小童單孔腹腔鏡腎切除術的首個報告

微創術對病人有明顯的好處，所以被廣泛使用。最近，經濟單孔腹腔鏡術被譽為新世代一個主要的技術發展。本文報告首宗於小童身上進行的單孔腹腔鏡腎切除術。

[MA], US). As in a conventional laparoscopic nephrectomy, the left colon was reflected and the ureter was located. This was traced proximally back to the left kidney. The Gerota's fascia was opened up and the kidney, measuring about 3 cm x 3 cm in size, was dissected out using a diathermy hook. The ureter was then dissected, clipped distally and divided. The kidney was then retrieved via the transumbilical wound, which was then closed (Fig 2). The total operation time was 100 minutes and blood loss was minimal. Postoperatively, the patient required minimal analgesia. She was discharged on postoperative day 2 with oral analgesics. At follow-up, her symptoms had completely resolved.

Discussion

Single-port laparoscopic surgery was first introduced by a group of gynaecologists who used this approach to perform tubal ligation in the 1960s.⁶ Its application in general surgery can be traced back to 1992 when a series of single-port appendectomies was reported.⁵ Despite its advantages, this approach has not been universally adopted due to the limited range of motion and triangulation, and the clashing of instruments inserted through the single port. Interest in single-port surgery was rekindled in 2007; there has been a rise in reported cases since then.⁷⁻⁹

The first report of the use of single-port laparoscopy in paediatric patients was a 'formal' single-port appendectomy, published in 2001 by D'Alessio et al.¹⁰ Single-port surgery has mostly been used for paediatric urological procedures.^{9,11} The few published reports have all been from centres in the United States. We believe that our patient is the first

child reported to have undergone single-port surgery in Asia. Although the operative technique deviates from standard laparoscopic surgery, we showed that the procedure can be relatively straightforward when performed by advanced laparoscopic surgeons. This is reflected by the fact that the operation finished within 100 minutes. The introduction of flexible-tip laparoscopes and instruments has provided superior manoeuvrability, especially when instruments are introduced parallel through a single port. Despite this, clashing of instruments and the laparoscope can still occur. Being a novel technique with inherent limitations, single-port surgery should be used selectively and does not share traditional laparoscopy's broad applicability for complex procedures. This may of course change with maturation of the technique.

As seen in Figure 2, the cosmetic outcome is excellent, with the wound hidden in the umbilicus. This renders the surgery virtually scarless. This is important in paediatric patients, as a scar will be a stigma that stays for life.

Nonetheless, there are several disadvantages to single-port surgery. The port size is significantly larger than the usual 5-mm port, thereby increasing the risk of operative site herniation after surgery. Also, as mentioned previously, the frequent clashing of instruments and the laparoscope means that the single-port technique is challenging and may be reserved for use by experienced laparoscopists only.

Conclusion

A single-port nephrectomy is feasible in paediatric patients. With more experience, it is expected that even better outcomes can be achieved. Furthermore, we hope to extend the use of this operative approach to other commonly performed paediatric procedures, including hernia repair, varicocelectomy, and cholecystectomy. Studies comparing single-port laparoscopic procedures with standard laparoscopic surgery should be performed in the future.

References

- Dubois F, Berthelot G, Levard H. Cholecystectomy by coelioscopy [in French]. *Presse Med* 1989;18:980-2.
- Trondsen E, Reiertsen O, Andersen OK, Kjaersgaard P. Laparoscopic and open cholecystectomy. A prospective, randomized study. *Eur J Surg* 1993;159:217-21.
- Ackroyd R, Watson DI, Majeed AW, Troy G, Treacy PJ, Stoddard CJ. Randomized clinical trial of laparoscopic versus open fundoplication for gastro-oesophageal reflux disease. *Br J Surg* 2004;91:975-82.
- Piskun G, Rajpal S. Transumbilical laparoscopic cholecystectomy utilizes no incisions outside the umbilicus. *J Laparoendosc Adv Surg Tech A* 1999;9:361-4.
- Pelosi MA, Pelosi MA 3rd. Laparoscopic appendicectomy using a single umbilical puncture (minilaparoscopy). *J Reprod Med* 1992;37:588-94.
- Wheless CR. A rapid, inexpensive and effective method of surgical sterilization by laparoscopy. *J Reprod Med* 1969;3:65-9.
- Rane A, Ahmed S, Kommu SS, Anderson CJ, Rimington PD. Single-port 'scarless' laparoscopic nephrectomies: the United Kingdom experience. *BJU Int* 2009;104:230-3.
- Desai MM, Rao PP, Aron MM, et al. Scarless single port transumbilical nephrectomy and pyeloplasty: first clinical report. *BJU Int* 2008;101:83-8.
- Kaouk JH, Palmer JS. Single-port laparoscopic surgery: initial experience in children for varicocelectomy. *BJU Int* 2008;102:97-9.
- D'Alessio A, Piro E, Tadini B, Beretta F. One-trocar transumbilical laparoscopic-assisted appendectomy in children: our experience. *Eur J Pediatr Surg* 2002;12:24-7.
- Garg S, Gundeti M, Mushtaq I. The single instrument port laparoscopic (SIMPL) nephrectomy. *J Pediatr Urol* 2006;2:194-6.