



Pediatric laparoscopic cholecystectomy with 2.3 mm Percutaneous Surgical System (MiniLap[®]): A new frontier for pediatric mini laparoscopy?



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ARTICLE INFO

Article history:

Received 9 December 2015

Received in revised form

29 January 2016

Accepted 1 February 2016

Key words:

Minimally invasive surgery

Percutaneous instruments

Laparoscopic cholecystectomy

ABSTRACT

Mini-laparoscopy represents an evolving and attractive field both in general and in pediatric surgery, with a pressing and increasing technical demand. Although the advantages of the mini-laparoscopic approach (reduced morbidity, less incisional pain and discomfort, better cosmetic results) are well recognized, its technical difficulties due to the lack of suitable and comfortable instruments brought to a limited use. Moreover, in the pediatric population, the need of ergonomic mini-invasive but efficient devices is the key of a widespread use of mini-laparoscopic surgery performed with an effective and safe technique. We aim to highlight the first case of pediatric laparoscopic cholecystectomy performed with 2.3 mm percutaneous instruments (MiniLap[®] Percutaneous Surgical System, Teleflex Incorporated, USA) that represents a significant advance in minimally invasive surgery.

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Laparoscopic technique has become a safe and effective alternative to conventional surgery also in children [1]. It is associated with shorter LOS and improved quality of life with less pain and better aesthetic results; it has become the preferred surgical treatment option also by parents. Nowadays, the widespread use of the mini-invasive technique is still debated in many pediatric fields as the oncologic and the neonatal one, due to the characteristics of the pathologies, the technical difficulties and the absence of dedicated devices. In the last 20 years, many attempts have been made to further improve the established laparoscopic technique with the aim of minimize tissue trauma and the invasiveness of the procedure by reducing the size of trocars and instruments or the number of ports. Thus the “ultra”-minimally invasive surgical technique has been started, and significant technological advantages have been achieved as in the mini-laparoscopy, needlescopic surgery, Natural Orifice Transluminal Endoscopic Surgery (NOTES[™]) and single-site laparoscopy (SSL) [2,3]; some of these new technologies have been tested even in the pediatric population [4]. The use of minimally laparoscopic techniques is not widespread, particularly in the adult population, due to some limitations related to the instruments

themselves [5,6]; the same applies to NOTES[™] and SSL [7,8], which, due to some technical difficulties, are considered not suitable for all surgical procedures. A further evolution of mini-laparoscopy is represented by the development of the trocar-less percutaneous instruments [9] and the 3 mm trocar-less percutaneous instruments with interchangeable end-effectors designed to be assembled and disassembled in or outside the abdominal cavity [10–12]. The use of mini-laparoscopic technique is mandatory in the pediatric population, particularly in toddlers and in neonates, because of the limited size of the working space and viscera, even though the evolving research of dedicated devices is still necessary to achieve a true minimally invasive surgery. We report the first case of pediatric cholecystectomy performed with 2.3 mm percutaneous instruments (MiniLap[®] Percutaneous Surgical System, Teleflex Incorporated, USA) that represents a significant advance in minimally invasive surgery.

1. Case report

A 12-year-old female (BMI = 20) was referred to our center for recurrent abdominal pain; an US diagnosis of non-complicated gallstone was made and elective laparoscopic cholecystectomy was planned. Informed consent was obtained from the legal parents in accordance with the local legislation. Moreover, parents signed an informed consent to use images and videos of the procedure. The

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patient was placed supine in the 30° reverse Trendelenburg position. The monitor was set on the right side of the patient, with the surgeon and the assistant standing on the left side. A 10-mm incision was made at the umbilicus and the pneumoperitoneum (13 mm Hg, 2 L/min) was achieved with the open technique. A 5-mm, 30° endoscope was used. Under visual control two 2.3-mm MiniLap® atraumatic graspers with integrated needle tip were percutaneously inserted into the abdomen through a small skin incision: one in the right flank and the other in the right mid-clavicular line, 20 mm below the costal margin. A 5-mm port was placed 20 mm inferior to the xiphoid for the 5-mm devices. The first atraumatic grasper was used by the assistant to stabilize the gallbladder and to lift it up in order to expose the operative field (Fig. 1). The second atraumatic MiniLap® grasper, in the left hand of the surgeon, was used to distend and expose the Calot triangle in order

to facilitate the dissection, that was carried out using the 5 mm hook cautery and Maryland dissector. After dissection both the cystic duct and artery were clipped with Weck® Hem-o-lok® system and cut (Fig. 2). The gallbladder was freed from its bed, put in a retrieval bag and extracted through the umbilical port hole. A drain was placed in the gallbladder lodge through the 5 mm access. Peritoneal desufflation through the ports was followed by closure of the fascia only in the umbilical port site by 0-0 Vycril (Ethicon). The umbilical skin was closed with absorbable intradermal suture; steri-strips were applied on the mini-laparoscopic instruments' access sites. The procedure was performed successfully with no intraoperative or postoperative complications. Operative time was 75 min overall. Postoperative analgesia was achieved with Paracetamol administered intravenously at the dose of 1 gr t.i.d. The drain was removed on day 1 and the patient was discharged on day

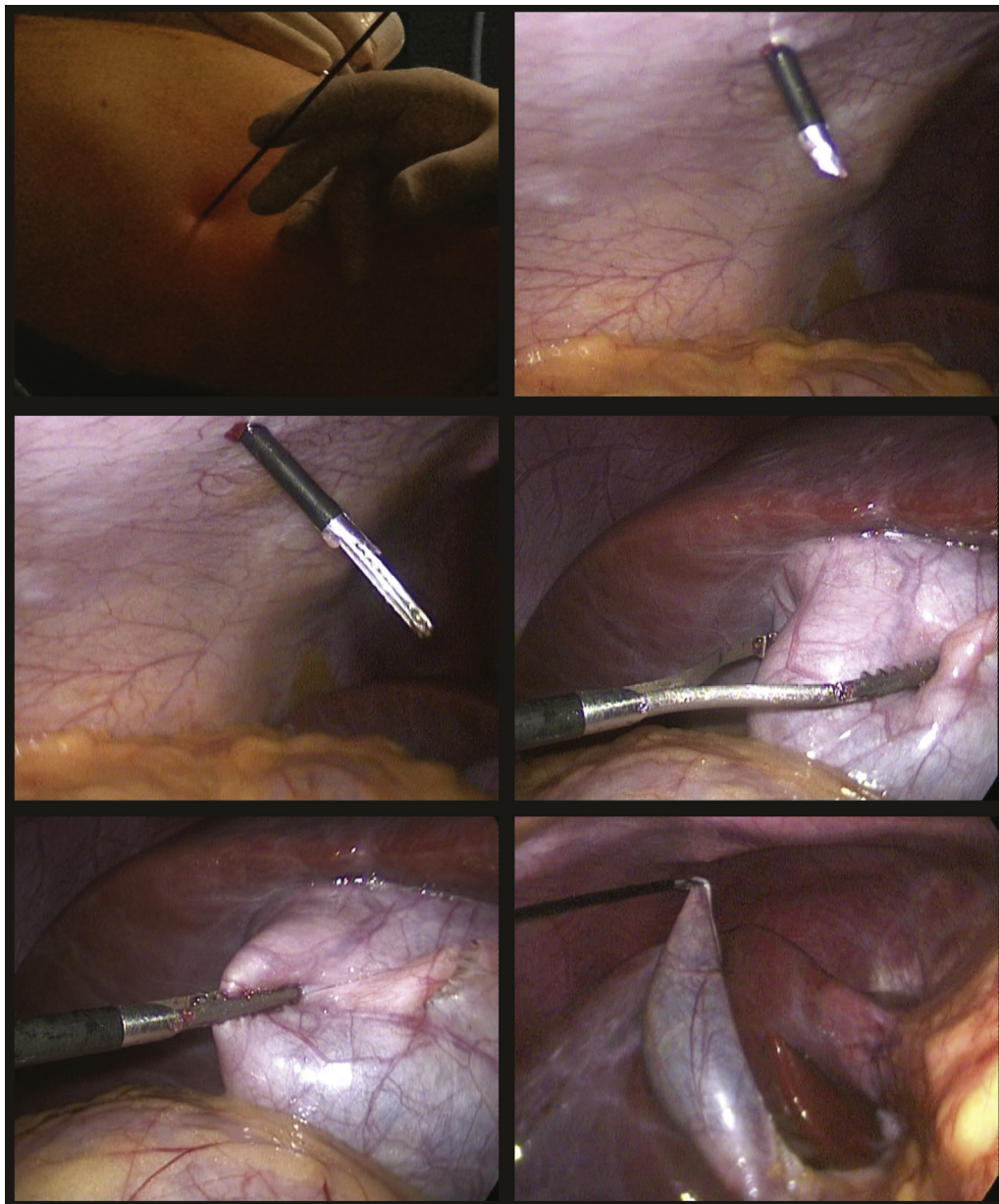


Fig. 1. A 2.3-mm shaft with a sharp retractable tip is inserted directly through the abdominal wall through a small skin incision; the device can then be deployed to grasp the gallbladder.

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