



Operative procedures of single-incision laparoscopic repair of pediatric epigastric hernia have become simple and feasible with the use of a novel suture-assisting needle



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ABSTRACT

We describe a simple and feasible procedure for single-incision laparoscopic repair of a pediatric epigastric hernia using a novel suture-assisting needle. A multichannel port was inserted through the umbilical vertical incision. After the orifice of the hernia was identified, a suture-assisting needle, which can hold a suture at its tip, with a 2-0 thread was pierced through the skin into one side of the rectus muscle sheath into the abdominal cavity. Next, after releasing the thread, the needle was pulled out to the subcutis and pierced through another side of the rectus muscle sheath. The needle, grasping the thread again, was subsequently pulled out through the abdominal wall outside, and the thread was tied extracorporeally. This knot was buried subcutaneously. Operative procedures of single-incision laparoscopic repair of an epigastric hernia have become simple and feasible with the use of a novel suture-assisting needle with an excellent cosmetic result.

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An epigastric hernia, occurring at a defect along the linea alba anywhere from the xiphoid process to the umbilicus, is a state in which preperitoneal fat is wrapped in the peritoneum and protrudes subcutaneously. This hernia in children is a comparatively rare congenital disease. It is difficult for an epigastric hernia to heal by itself after the age of 4–6 years. Therefore, for epigastric hernias accompanied by symptoms and for those that do not heal spontaneously, surgery would be performed. Conventional repair of an epigastric hernia involves a visible transverse or midline incision over the site of the defect, removal of the incarcerated fat, and suture of the linea alba. It is difficult to recognize the weak section of the linea alba from the abdominal wall during the operation, whereas the dehiscence of the linea alba can easily be confirmed by a laparoscope from the intraabdominal side.

Single-incision laparoscopic surgery in children has gradually become increasingly performed in the past several years. As this surgery is superior to conventional laparoscopic surgery and open surgery in terms of cosmetic results, many reduced-port surgeries have been performed as a radical operation for common diseases such as inguinal hernia and appendicitis [1,2]. However, this operation has a possible disadvantage of technical difficulty including limited manipulation of the forceps.

To overcome this problem, we use a LAPA-HER-CLOSURE™ (Hakko Medical, Nagano, Japan) as a suture-assisting device, which is a special 19G needle with a wire that can hold a suture at its tip (Fig. 1a). The LAPA-HER-CLOSURE™ was originally developed to bring the suture thread to the desired location during laparoscopic percutaneous extraperitoneal closure (LPEC) for the treatment of pediatric inguinal hernia and femoral hernia [1,3]. This needle can grasp and release the thread freely, by retracting or extending the wire stored away in the needle (Fig. 1b and c). Recently, it has been used for gastrostomy and closing the wound of a laparoscopic port [4]. In addition, this device was used for traction of the esophagus in a neonate with long-gap type A esophageal atresia [5].

Abbreviation: LPEC, laparoscopic percutaneous extraperitoneal closure.

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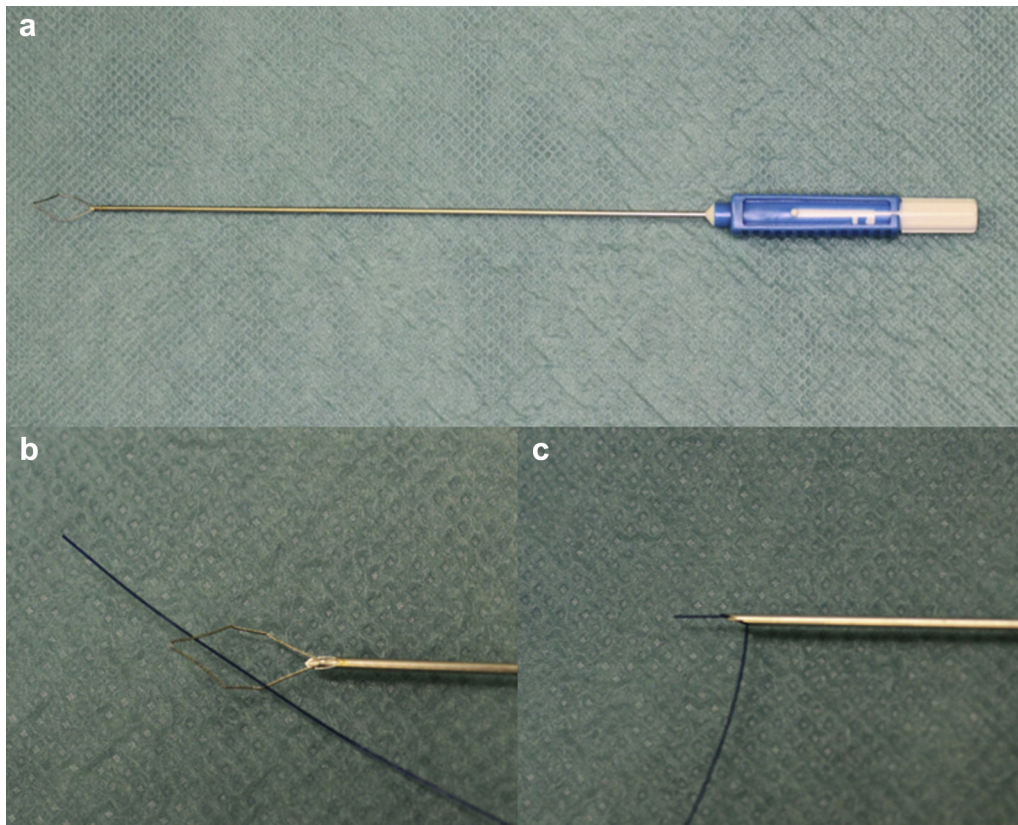


Fig. 1. The suture-assisting device. (a) This device is a special 19G needle with a wire to hold a suture at its tip. (b & c) This device can grasp and release a strand of thread freely, by extending or retracting the wire stored away in the needle.

The suture-assisting needle is a novel instrument and is associated with easy handling.

By using a LAPA-HER-CLOSURE™, we were able to perform safe, simple, and feasible single-incision laparoscopic repair of pediatric epigastric hernia.

1. Case description

1.1. Case reports and preoperative preparation

1.1.1. Case 1

A 7-year-old boy was seen at our hospital with a swelling on the midline of the upper abdomen that had been present for one year. An epigastric hernia was diagnosed. Due to the increased abdominal pressure, an abdominal protrusion measuring 10×5 mm between the xiphoid process and the umbilicus in the linea alba was observed by physical examination. There was an epigastric defect on the cranial side that was situated more than 3 cm from the umbilicus as observed. After follow-up at our hospital for approximately one year without spontaneous cure of the hernia, he underwent single-incision laparoscopic surgery.

1.1.2. Case 2

A female was diagnosed as having an epigastric hernia at three months of age at our hospital, after swelling of the skin of the upper umbilicus and an umbilical hernia were observed by physical examination. Due to the increased abdominal pressure,

an abdominal protrusion measuring 15×10 mm on the cranial side 2 cm from the umbilicus between the xiphoid process and the umbilicus in the linea alba was observed. After two-year follow-up without spontaneous cure of the hernia, she underwent single-incision laparoscopic surgery at the age of 3 years.

1.1.3. Preoperative preparation

Before the operation, the location of the hernia orifice was determined by palpation and ultrasonography, and the patient's skin was marked.

1.2. Surgical procedures

1.2.1. Positioning of patient and ports

Under general anesthesia, the patient was placed in the supine position. The surgeon stood at the patient's feet side, and a monitor was placed over the patient's head. A vertical midline laparotomy was performed through a single vertical umbilical incision (20 mm). A wound retractor (Lap Protector 504; Hakko Medical, Nagano, Japan) was inserted through the incision, and a silicon cap (EZ access 504; Hakko Medical) was mounted on the wound retractor. Two reusable 5 mm ports (Mini-Mini Trocar Sleeves; Hope Denshi, Chiba, Japan) which consisted of a 5 mm camera port and a 5 mm working port, were placed in the silicon cap (Fig. 2). Carbon dioxide pneumoperitoneum was set at 8–10 mm Hg after port insertion. To reduce the interference between forceps, the 3 mm forceps, of which the tip is bent

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