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Management of pediatric and adolescent adnexal masses by gasless laparoendoscopic single-site surgery

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ABSTRACT

Objective: To evaluate the safety and feasibility of gasless transumbilical laparoendoscopic single-site (LESS) surgery for the management of adnexal masses in pediatric and adolescent girls aged 19 years or younger.

Study design: Retrospective study of 28 pediatric and adolescent girls each undergoing gasless LESS surgery and gasless multiport laparoscopic surgery for adnexal masses. In each case, laparoscopic surgery was performed by the abdominal-wall lift method under endotracheal general anesthesia. The two groups were compared for their patient demographics and surgical outcome measures.

Results: In the LESS surgery group, median age of the patients including three pre-menarcheal girls was 17.5 years. The most common symptom was abdominal pain. Median tumor diameter in the LESS surgery group was 7.4 cm. There were no statistical differences in clinical features between LESS surgery and multiport laparoscopic surgery groups. In the LESS surgery group, adnexal masses were managed by unilateral cystectomy ($n = 20$), unilateral salpingo-oophorectomy ($n = 5$), bilateral cystectomy ($n = 2$), and unilateral salpingectomy ($n = 1$). Emergency LESS surgery was performed for seven cases due to adnexal torsion and one case due to cyst rupture. Preservation of affected ovary was not achieved in three emergency cases with adnexal torsion due to severe necrosis, and in one case each of recurrent mucinous cystadenoma and huge mucinous cystadenoma. In 24 adnexal masses from 22 girls who received adnexal cystectomy by LESS surgery, LESS-assisted extracorporeal cystectomy, was possible in 14 masses while intracorporeal cystectomy was required in other 10. In a case of dermoid cyst managed by LESS-assisted extracorporeal cystectomy, additional hemostasis was required by intracorporeal suturing due to laceration of utero-ovarian ligament. Median-excised tissue weight in the LESS surgery group was 111 g. Significant differences between LESS surgery and multiport laparoscopic surgery groups were not noted in surgical outcomes and pathological diagnosis, except for significantly lower C-reactive protein value on postoperative day 3 in the LESS surgery group.

Conclusion: Gasless LESS surgery for pediatric and adolescent adnexal masses is a safe and feasible alternative to multiport laparoscopic surgery.

Introduction

With recent advances in laparoscopic surgical procedures and the development of surgical instruments, laparoscopic surgery is currently accepted as the most efficient way to treat benign adnexal masses [1]. Since this form of minimal-access surgery provides potential benefits to the patients due to improved cosmetic outcome, shorter hospital stay, reduced postoperative pain and earlier postoperative return to daily activities when compared with laparotomy [1], the application of laparoscopic procedures for management of gynecologic disorders developed in pediatric and adolescent girls during maturation is strongly required [2–5].

To achieve the further benefits of minimal invasiveness by laparoscopic surgery, laparoendoscopic single-site (LESS) surgery [6] has recently been introduced into gynecological practice [7]. Although the feasibility and efficacy of LESS surgery for the management of adnexal masses were previously shown in pneumoperitoneum laparoscopy [8,9] as well as gasless lift laparoscopy [10], reports on the management of adnexal masses in pediatric and adolescent girls by LESS surgery are still limited [11–15]. Furthermore, surgical outcomes after gasless LESS surgery

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for pediatric and adolescent adnexal masses as case series have not yet been systemically analyzed. The aim of the present study is thus to evaluate the safety and feasibility of gasless LESS surgery for the management of consecutive cases of pediatric and adolescent adnexal masses.

Materials and methods

Patient selection

The present study was performed by retrospective review of a hospital electronic database at Gifu Prefectural Tajimi Hospital (Tajimi, Gifu, Japan) between January 2005 and December 2013. Only pediatric and adolescent girls aged 19 years or younger with known precise patient characteristics and surgical outcomes were included. Patients were initially evaluated by ultrasonography and measurement of serum tumor markers [10,16]. Magnetic resonance imaging and/or computerized tomography were additionally performed for image diagnostic evaluation of tumor characteristics.

After careful exclusion of asymptomatic functional cysts, presumably benign adnexal masses were included as candidates for laparoscopic surgery. Even in cases with elevated serum tumor markers, laparoscopic surgery was performed if apparent malignant findings could not be obtained by image diagnostic modalities [10,16]. If pediatric and adolescent girls with adnexal masses presented acute abdominal symptoms, emergency laparoscopic surgery was performed [2,3,11]. Preoperatively, informed consent, including a statement that conversion to laparotomy might be required if the disorder could not be managed by laparoscopic surgery, was obtained from the patient and her family. If the patient was thought to be unable to understand the pathological condition due to either younger age or symptoms such as severe pain, an explanation was given only to her family [2,3].

Surgical procedures

In each case, gasless LESS surgery [10,11,17] or gasless multiport laparoscopic surgery [2,3,16] was performed by the abdominal-wall lift method under endotracheal general anesthesia. In the present study, Drs. Takeda, Imoto, and Nakamura, with laparoscopic experiences for 20, 8, and 15 years, respectively, performed all surgeries with assistants as a team. In LESS surgery, an Alexis wound retractor (small size, Applied Medical, Rancho Santa Margarita, CA) was utilized as a single-access working port with placement through a 2.5-cm midline umbilical skin incision. Surgical procedures were performed with conventional laparoscopic instruments under vision with a rigid 5-mm EndoEYE laparoscope (Olympus, Tokyo, Japan) [10,11,17].

If mobility of the adnexal tissue was secured with sufficient extensibility of the utero-ovarian and infundibulo-pelvic ligaments, LESS-assisted extracorporeal cystectomy was performed [11]. Ovarian cyst (Fig. 1A) was carefully punctured utilizing a SAND balloon catheter (Hakko Medical, Tokyo, Japan) (Fig. 1B), which has two balloons at the tip of the needle and can hold a cyst wall between these two balloons [16,17] to minimize the spillage during aspiration. After maximal removal of the cystic contents, the entire adnexal tissue was extracorporeally brought through the umbilical port with gradual termination of abdominal-wall lifting [11]. Then, the ovarian cyst (Fig. 1C, arrow) was extracorporeally enucleated from the ovarian parenchyma (Fig. 1C, arrowhead). After the ovarian parenchyma was reconstructed using 3-0 polyglactin 910 suture (Vicryl; Ethicon Japan, Tokyo, Japan) (Fig. 1D), the adnexal tissue (Fig. 1E, arrow) was returned to the abdominal cavity for final inspection. If the mobility of the adnexal tissue was limited, adnexal cyst was bluntly enucleated from the ovarian parenchyma intracorporeally [10]. Then, the ovarian parenchyma was reapproximated by suturing with an Endo Stitch suturing device (Covidien Japan, Tokyo, Japan) followed by extracorporeal knot tying.

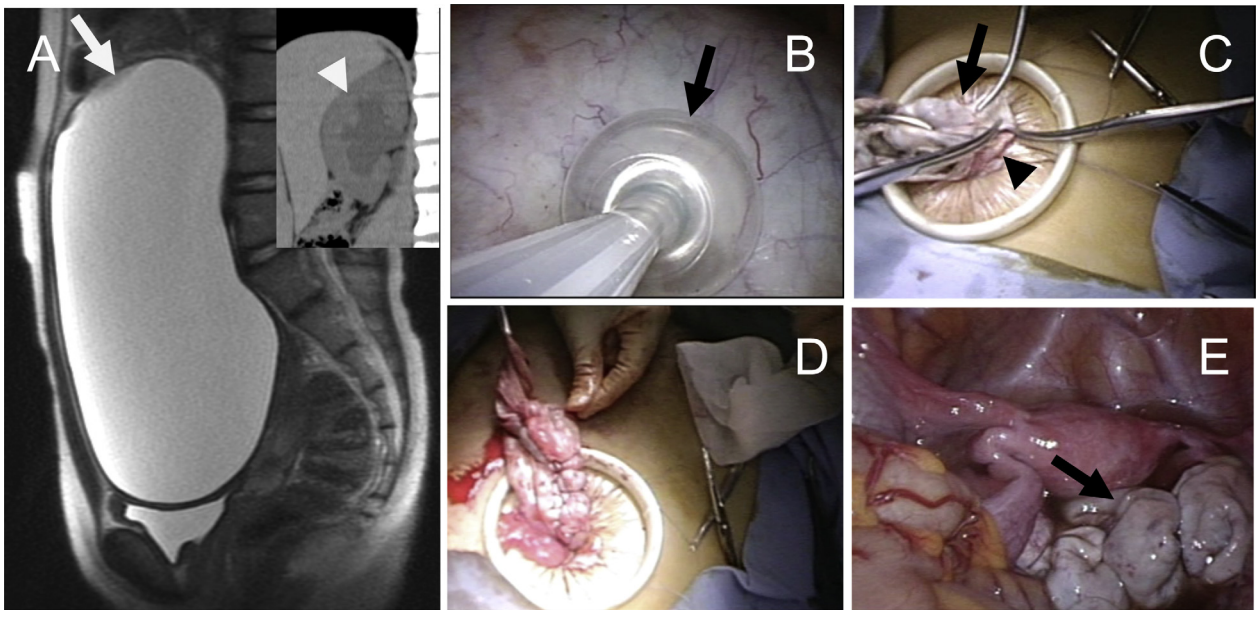

Fig. 1. A 13-year-old girl received gasless laparoendoscopic single-site-assisted extracorporeal ovarian cystectomy for left dermoid cyst with left hydronephrosis after consultation due to abdominal distension. (A) Sagittal-view T2-weighted magnetic resonance image showing 22-cm left dermoid cyst with sagittal-view reconstituted computerized tomographic image showing left hydronephrosis (inset, arrow). (B) Under laparoscopic guidance, the cyst wall was punctured utilizing a SAND balloon catheter (Hakko Medical, Tokyo, Japan), which has two balloons at the tip of the needle to minimize spillage of cystic contents during aspiration. (C) After maximal removal of the cystic contents, left adnexal tissue was completely exteriorized through the umbilical port with gradual termination of abdominal-wall lifting and the ovarian cyst (arrow) was enucleated from ovarian parenchyma (arrowhead). (D) The ovarian parenchyma was extracorporeally reconstructed with surgical instruments for abdominal procedures. (E) The left adnexal tissue (arrow) was returned to the abdominal cavity for final inspection of hemostasis. Excised tissue weight including the cystic contents was 2062 g and the surgical duration was 97 min. Intraoperative blood loss was 50 mL. Postoperative course was uneventful and she was discharged on postoperative day 3.