

Laparoscopic treatment of ovarian tumors in children: an experience of seven cases in Mansoura University Hospital

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Abstract All ovarian tumors in children are rare. Laparoscopic ovary-sparing treatment of ovarian tumor would be the preferred surgical approach for children in order to preserve future fertility. The objective of this research is to study the experience of gynecology department in Mansoura University Hospital in laparoscopic treatment of ovarian tumors in children. This study included seven patients with age range of 7 to 11 years presented with ovarian tumors. The following items were fulfilled for all studied cases: age at diagnosis, presenting complaints, blood samples for detection of tumor markers, abdominal ultrasonography, abdominal magnetic resonance imaging (MRI), treatment by laparoscopy, histopathological examination, and the outcome of the patients. All ovarian tumors were benign. Three cases were found to be cystic teratomas, two cases were benign serous cystadenoma, only one case was cystadeno-fibroma and one case was solid tumor, and its histology did not give a clear diagnosis, but no malignant cells were found. Unilateral salpingo-oophorectomy was carried out in three patients, whereas the other four patients had unilateral ovarian cystectomy. In one case, intraoperative spillage during excision of the tumor occurred. Recovery of all patients was good and without any complications. Laparoscopic conservative surgery as a treatment for benign ovarian tumor in childhood gives a good chance to preserve future fertility.

Keywords Ovarian tumor · Tumor markers · Children · Laparoscopy · Treatment

Introduction

All ovarian tumors in children are rare [1]. Malignant ovarian tumor in children and adolescents constitutes 0.9 % of all malignancies in this age group [2]. Fortunately, ovarian malignancies diagnosed in young ages tend to be low-stage and low-grade, approximately 70–75 % are benign germ cell tumors; thus, some gynecologists prefer to do the conservative surgery to preserve the future fertility of such cases [3]. Diagnosis of ovarian tumors in childhood creates much anxiety to the parents and makes a great challenge to all gynecologists, because it is difficult to take the proper decision for the optimum surgical treatment [4]. In some randomized studies [5, 6], laparoscopic surgery was considered a gold standard in the management of ovarian masses. However, a controversy was suggested by other literature [7]; thus, many cases with benign ovarian tumors are still treated by laparotomy by many gynecologists. In this present study, we aimed to review the experience of gynecology department in Mansoura University Hospital in laparoscopic treatment of ovarian tumors in children.

Methods

This prospective study included seven patients who presented with ovarian tumors and were admitted to gynecology department in Mansoura University Hospital, between January 2013 and December 2014. Laparoscopic surgery was indicated as a line of treatment for all cases. Malignancies were excluded via preoperative abdominal ultrasonography with the use of

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doppler, abdominal magnetic resonance imaging (MRI) examinations, and serum tumor markers. This study was approved by our institutional review board. A written appropriate informed consent was obtained from all studied cases and their parents. The following items were fulfilled for all cases including full history taking, especially age at diagnosis and presenting complaints; collection of blood samples for detection of tumor markers; abdominal ultrasonography and abdominal MRI examination; treatment by laparoscopy; histopathological examination of the tumor; and the outcome of the patients.

Features suggesting that ovarian tumors were benign with the use of abdominal ultrasonography and MRI examination included entirely cystic architecture, absence of intracystic papillary projections, absence of thick and/or irregular septa, wall thickness less than 3 mm, absence of ascites, and absence of peritoneal implants or lymphadenopathy [8].

The estimation of serum tumor markers was carried out by enzyme-linked immunosorbant assay (ELISA) according to the manufacturers' protocol. These tumor markers included serum alpha-fetoprotein, human chorionic gonadotropin, and CA-125 and CA-19-9 with a minimum detectable dose of 6 pg/ml, 40 pg/ml, 0.6 U/ml, 0.3 U/ml, respectively (Ray Biotech, Georgia, USA).

During preoperative imaging, tumor size and its characteristics were recorded for each patient. Also, the presence or absence of ascites or any other abnormal masses in the abdomen and pelvis were noted.

Laparoscopy was performed under general anesthesia. No uterine manipulator was used to avoid injury of the hymen.

Inspection of the pelvis and abdomen for any abnormal mass or nodule and peritoneal wash for cytological analysis were carried out for all cases at the beginning of laparoscopy. Also, intraoperative frozen sections and postoperative pathological examination of the removed mass were done for all patients.

The data were presented in the form of numbers and percentages. Data were analyzed using the statistical package for social science (SPSS v17) program under Windows using descriptive analysis to calculate the means and standard deviation.

Results

This study included seven patients who were admitted to gynecology department in Mansoura University Hospital. The age of the patients ranged from 7 to 11 years (median 10.00). The presenting complaint was abdominal pain in all patients (Table 1).

All ovarian tumors were unilateral. Abdominal ultrasonography and abdominal MRI examinations revealed that five patients (71.4 %) had entirely cystic architecture, one case

(14.3 %) had solid mass and one case (14.3 %) showed cystic mass, with small solid component its maximum diameter measuring 6 mm.

Three cases had features suggesting cystic teratomas with layered lines and dots, fat–fluid level, and isolated bright echogenic foci with acoustic shadowing [9]. The maximum diameters of the largest and smallest tumor were 10 and 6 cm, respectively (mean 8.14 ± 1.77) (Table 1). Doppler ultrasound revealed neither increase in vascular flow nor septations. All tumors after imaging were suggested to be benign with no evidence of ascites [8]. No other abnormal abdominal or pelvic masses were detected. Tumor marker CA19-9 was elevated in three patients (42.9 %) (Table 1).

Two cases (28.6 %) were found to be complicated by torsions. One case with severe torsion of the ovarian mass resulted in ischemia of the ovary, and salpingo oophrectomy was done without detorsion of the torsed ovary, and the histology did not give a clear diagnosis, but no malignant cells were found. The other case with mild torsion was managed by laparoscopic detorsion of the torsed ovary, and ovarian cystectomy was done and healthy residual ovarian tissue was preserved. The histopathology for this case was benign cystic teratoma (Table 1).

The results of cytological analysis of peritoneal wash in all cases proved to be free from malignancy. Both intraoperative frozen sections and postoperative pathological examination in all patients were proved to be benign. Three cases (42.9 %) were mature cystic teratomas, two cases (28.6 %) were serous cystadenoma, one case (14.3 %) was cystadeno-fibroma that contains both epithelial and fibrous stromal components, and one case (14.3 %) was solid tumor with necrotic tissue, and the histology did not give a clear diagnosis, but no malignant cells were found. Unilateral salpingo-oophorectomy was done in three patients (42.9 %) because there were no identifiable healthy ovarian tissues to be preserved in such cases. Moreover, one of these three cases had a severe torsion of the ovarian mass as mentioned before (Table 1).

Laparoscopic unilateral ovarian cystectomy was carried out in four patients (57.1 %), three patients (42.9 %) with benign cystic teratomas and one patient (14.3 %) with cystic adenofibroma of the ovary (Table 1). In one case, intraoperative spillage during excision of the tumor occurred but no complications happened in this case after the operation. The operation time ranged from 80 to 130 min (mean 105.7 ± 20.7).

All patients had good recovery without any intraoperative or postoperative complications. All patients were discharged from hospital after 48 h from the operative interference. Three months later, follow-up of the patients using abdominal ultrasonography revealed normal findings in all patients.

Table 1 Age of patients, tumor characteristics, type of surgery, and results of histopathology and tumor markers estimation

Case	Age (year)	Site	Torsion	Features and maximum diameter of the mass (cm)	Surgery	Pathology (all benign)	Tumor markers ^c
1	10	Right ovary	No	Cystic 10	Unilateral salpingo-oophorectomy	Serous cystadenoma	Normal
2	11	Right ovary	Yes	Solid 6	Unilateral salpingo-oophorectomy	Necrotic unidentified	Normal
3	11	Right ovary	No	Cystic 10	Unilateral salpingo-oophorectomy	Serous cystadenoma	Normal
4	10	Left ovary	No	Cystic with ^a features of dermoid 7	Unilateral ovarian cystectomy	Mature cystic teratoma	High CA19.9 (117 U/ml)
5	10	Right ovary	Yes	Cystic with ^a features of dermoid 6	Unilateral ovarian cystectomy	Mature cystic teratoma	High CA19.9 (88 U/ml)
6	7	Left ovary	No	^b Cystic mass with small solid component 10	Unilateral ovarian cystectomy	^b Cystadeno-fibroma	Normal
7	9	Left ovary	No	Cystic with ^a features of dermoid 7	Unilateral ovarian cystectomy	Mature cystic teratoma	High CA19.9 (97 U/ml)

^a Features of dermoid in US and in MRI: cystic mass with layered lines and dots, fat–fluid level, and acoustic shadowing

^b Cystadeno-fibroma that contains both epithelial and fibrous stromal components. The diameter of small solid component is 6 mm

^c Tumor markers: CA19.9, CA125, alpha-fetoprotein, and HCG. Normal values: CA19.9 < 39 U/ml, CA125 < 35 U/ml, alpha-fetoprotein < 9.5 ng/ml, and HCG < 5 mu/ml

Discussion

The aim of laparoscopic conservative surgery in children with ovarian tumor is to achieve a normal puberty and to preserve the future fertility. Management of pediatric cases suffering from ovarian tumors with such preservative laparoscopic techniques is not commonly followed in Egypt, that is why we tried to show our efforts in management of such cases admitted to Mansoura University Hospital in order to encourage providing facilities and skills for using laparoscopy as a method of choice for the management of benign ovarian tumor in children.

In this study, the results of preoperative imaging and serum tumor markers were suggesting benign ovarian masses. Thus, laparoscopic surgery was indicated in all cases. Selection of the patients is important to avoid complications, but still being aware of the possibility of the presence of unexpected malignancy is essential. Nezhath et al. reported that 0.4 % of cysts are malignant postoperatively [10].

Large ovarian cystic mass can be perforated during trocar insertion, and the content may spread into peritoneal cavity that carries a risk of chemical peritonitis in patient with cystic teratoma or spreading of malignancy if the cystic mass was found to be malignant.

Intraoperative spill during excision of the tumor occurred in one case having cystic teratoma and was managed by repeated saline irrigation until the lavage was clear in anti

Trendelenburg position, and this case was not complicated by chemical peritonitis or any other complications.

There are some difficulties in conducting laparoscopic surgery for ovarian tumor in childhood. Such difficulties include tumor size [11, 12] and small abdominal space of children, and both interfere with visualization and manipulation of the masses. However, we used the classical sites during insertion of the four 5-mm trocars. Other alternative sites for trocars insertion were reported in previous study [12].

Although some gynecologists believe that a large ovarian tumor is more likely to be malignant, many previous studies reported that large ovarian tumors are benign [12]. So, large-sized mass was not excluded in our study.

In this study, all patients had benign criteria depending on preoperative imaging and serum tumor markers. Also, postoperative pathological examinations in all patients were proved to be benign. Helmrath et al. [13] reported that most ovarian tumors in children are benign, and the epithelial cysts and teratomas are the most common benign lesions, and germ cell tumors are the most common malignancy. Also, Tajiri et al. [14] reported in their study that the majority of pediatric ovarian tumors are benign disease, and even patients with malignant tumor had a good prognosis.

CA19-9 was the only serum tumor marker which was elevated in some case in this study, whereas all other tested markers gave negative results. Those three cases with elevated CA19-9 were proved to be cystic teratomas in the

postoperative pathological examination (Table 1). This positive correlation agrees with that reported by Cho HY et al. [15] and Emin et al. [16]. However, CA19-9 could be also elevated with malignant ovarian tumors, and this was reported by Cho HY et al. [15] in their study as it was high in 40 % of ovary carcinoma patients and in 44 % of patients with mature cystic teratomas.

All cases recovered well and were discharged from hospital after 48 h postoperatively. Although, laparoscopy needs much skills and care especially in young-aged patients with large ovarian masses, but still the laparoscopic conservative surgery is the best line of treatment for benign ovarian tumors in children. Our results agree with Ozcan et al. [17] who reported that ovary-sparing surgery can be done in the presence of a perfect plane of dissection between tumor margins and healthy ovarian tissue. Also, Jalencas et al. [18] in their study, strongly recommend the choice of laparoscopic ovarian cystectomy in cases with mature cystic teratoma to preserve future fertility.

Conclusions

Laparoscopic conservative surgery as a treatment for benign ovarian tumor in childhood gives a good chance to preserve future fertility. Also, rapid recovery, minimal postoperative pain, less scarring, and short hospital stay are the advantages of laparoscopic surgery over the conventional laparotomy surgery for ovarian tumors.

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Contribution to authorship Dr. Alaa Mosbah was responsible for obtaining full history taking, clinical assessment and examination, surgical laparoscopic interference for tumor excision in all cases, writing of the manuscript, and analysis of the results.

Dr. Yasmin Nabel was responsible for the estimation of tumor markers in blood samples obtained from the included cases and shared in writing of the manuscript and analysis of the results.

Dr. Nermin Megahed was responsible for cytological analysis of the peritoneal wash, evaluation of the frozen sections, and pathological analysis for the excised tumors from included cases.

Compliance with ethical standards

Conflict of interest The authors declare that they have no competing interests.

Details of ethics approval This study was approved by our institutional review board on January 20, 2013. A written appropriate informed consent was obtained from all studied cases and their parents.

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