Original Study

The Recurrence Rate of Ovarian Dermoid Cysts in Pediatric and Adolescent Girls

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A B S T R A C T

Study Objective: To assess the rate of recurrence of ovarian dermoid cysts in pediatric and adolescent girls at the Hospital for Sick Children.
Design: A retrospective chart review of all dermoid cysts surgically managed at the hospital for Sick Children from January 2003 to June 2012.
Setting: The Hospital for Sick Children, Toronto, Canada.
Participants: 66 adolescent and pediatric patients <18 years old treated with ovarian cystectomy of their dermoid cysts by either laparoscopy (n = 40) or laparotomy (n = 26).
Main Outcome Measures: Total dermoid cyst recurrence, recurrence after laparoscopy versus laparotomy, follow-up imaging completed and ultrasonographic identification of other ovarian cysts in follow-up. Data was assessed with Fisher exact test where appropriate ($P < .05$).
Results: The mean age of patients at time of surgery was 12.9 years (range 2.5-18.1). 25/66 (38%) of patients received no follow-up, 6/66 (9%) were followed by a single ultrasonography and 35/66 (53%) were followed with annual ultrasonography for up to 5 years. 35 patients completed their initial ultrasonography where 19/35 (54%) patients had new ovarian cysts diagnosed including: 6 functional/hemorrhagic, 3 dermoid, and 10 unspecified cysts. All new dermoids were suspected at first follow-up ultrasonography (6/35), but 3 required a second follow-up ultrasonography for confirmation. Overall, 7/66 (11%) patients had recurrent or persistent dermoid cysts of which 2 (3%) required repeat surgery. There was no significant impact on the type of surgery and dermoid recurrence.
Conclusion: The incidence of recurrent dermoid cysts in a pediatric and adolescent population following ovarian cystectomy is 10.6% where only 3% will recur and require further surgical management.
Key Words: Dermoid, Recurrence, Adolescent, Children, Ovarian, Teratoma, Follow-up

Introduction

Benign mature teratomas of the ovary, also known as ovarian dermoid cysts, represent the most common germ cell tumor of the ovaries and are reported to comprise anywhere from 20% to 40% of all ovarian neoplasms.[1,2] We have previously demonstrated that ovarian dermoid cyst is the most commonly diagnosed neoplastic lesion in children and adolescents, and represent 29.9% of masses referred to pediatric gynecology.[3] The majority of dermoid cysts are diagnosed by ultrasonography.[4] On ultrasonography, these cysts have very characteristic findings that include a Rokitansky nodule, fluid-fluid levels, regional bright echoes, hyperechoic lines and dots, cysts with nodular and shadowing echodensity. The presence of >2 of these signs in the adult imaging literature has >92% sensitivity for diagnosis of a dermoid cyst.[5,6]

Dermoid cysts are benign, and have a slow growth rate of 1.67-1.8 mm/year.[7,8] Therefore, asymptomatic cases are generally treated with an expectant approach. Over 30% of patients diagnosed with ovarian dermoid cysts have symptoms including abdominal pain, nausea and vomiting, palpable mass and abdominal tenderness.[9] Generally, dermoid cysts will be surgically resected if symptomatic or if the size is >5 cm or the growth rate is >2 cm/year as these latter features may indicate an increased risk for torsion or rupture.[7,10]

Currently, the preferred method of management in children and adolescents is ovarian cystectomy to ensure ovarian salvage and maintain fertility. The procedure is performed either minimally invasively by laparoscopy or by laparotomy depending on the size of the lesion and the patient comorbidities.[11] However, following surgical management dermoid cysts can recur. In adults, the rate of recurrence has been reported to vary with the surgical approach. Laparoscopic surgery has a reported 4% recurrence rate, while laparotomy has a 0% recurrence rate after 2 years of follow-up in adults.[12] It is difficult to determine if disease demonstrated on postoperative imaging represents persistent disease due to lack of complete resection or recurrent mature cystic teratoma tissue. The presence of a documented disease-free interval post-surgery on imaging could provide evidence that a subsequently diagnosed ipsilateral teratoma is a true recurrence. Rate of subsequent growth of a lesion may also provide a clue, for true recurrent disease may demonstrate a more aggressive growth pattern.

In children and adolescents, the rate of recurrence remains largely unknown. In a retrospective study by Templeman et al,[9] of 21 patients receiving a follow-up ultrasonography postoperatively none exhibited recurrent disease. However, the duration of follow-up and the number

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Table 1
Demographics of Patients with an Ovarian Cystectomy for Ovarian Dermoid Cysts

	Mean or %
Age (y)	12.9 (2.5-18.1)
Initial cyst size (cm)	8.0 (3.2-16)
Unilateral	89% (n = 59)
Bilateral	11% (n = 7)
Laparoscopy	61% (n = 40)
Laparotomy	40% (n = 26)

Pediatric patients surgically treated for an ovarian dermoid cyst by cystectomy (n = 66).

of patients enrolled in this previous study is not sufficient for determining recurrent disease overtime. Therefore, we conducted a retrospective review of 66 dermoid cyst patients surgically managed with an ovarian cystectomy over 9.5 years at the Hospital for Sick Children in Toronto to determine the rate of recurrence in children and adolescents.

Methods

A retrospective chart review of 66 patients <18 years old undergoing both ovarian dermoid cystectomy and postoperative care by adolescent gynecology at the Hospital for Sick Children in Toronto from January 2003 to June 2012 was completed. Research ethics approval was from the Sick Kids Research Ethics Board (REB #1000033304). Preoperative data was collected on: demographics, clinical presentation, radiologic and surgical findings, and final pathology. A recurrence of dermoid cysts was defined as a lesion on any postoperative ultrasonography diagnosed as a dermoid by the reading radiologist either unilaterally or bilaterally. Information was also collected on the follow-up protocol undertaken after surgery, length of time between visits, and presence of other ovarian cysts (non-dermoid) on imaging. Post operative imaging and follow up was at the discretion of the most responsible physician. The data was statistically assessed by a Fisher exact test where appropriate. Statistical significance was at $P < .05$.

Results

A total of 66 patients with dermoid ovarian cystectomies were reviewed. All patients had dermoid cysts as confirmed by final surgical pathology. The patient's characteristics are shown in Table 1. Forty patients were treated with laparoscopy and 26 with laparotomy. The mean age of these patients at the time of surgery was 12.9 years old (range 2.5-18.1). The initial preoperative dermoid cyst size averaged 8 cm (range 3.2-16) in size, and the majority of patients presented with unilateral dermoid cysts (89%, n = 59).

Patients in the clinic received 1 of 3 follow-up regimes which was surgeon dependent and not formally defined (Fig. 1). The first group of patients was discharged after a single post-surgical follow-up without an ultrasonography (25/66, 38%). The second group was discharged after a single post-surgical follow-up that included an ultrasonography (6/66, 9%). The last group of patients was followed with a post-surgical ultrasonography and an annual ultrasonography for up to 5 years (35/66, 53%). Therefore, a total of 41 patients received at least 1 postoperative imaging

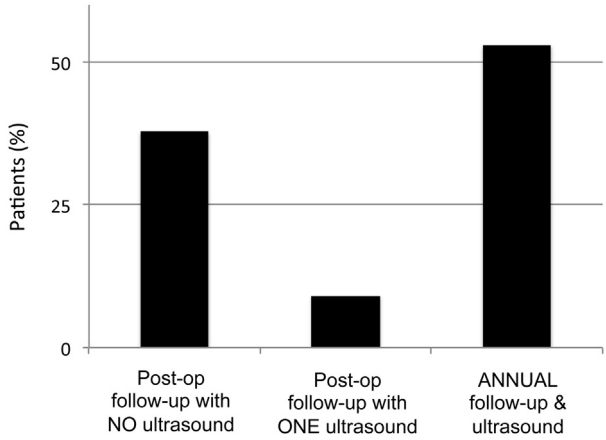

Fig. 1. Post-surgical follow-up of patients after dermoid cystectomy. Follow-up received by patients postoperatively at the Hospital for Sick Children was assessed retrospectively. Patients either received one of the following 3 follow-up protocols: a single visit with no ultrasonography, a single visit with 1 ultrasonography, or annual follow-up with ultrasonography.

(62%) of which 25 were initially treated by laparoscopy (61%) and 16 were treated by laparotomy (39%). Patients that did not receive follow-up imaging were instructed to return to clinic if they became symptomatic.

The rate of dermoid cyst recurrence was calculated and is presented in Fig. 2. Overall, 7/66 (11%) patients initially undergoing cystectomy had evidence of a recurrent dermoid cyst seen on ultrasonography postoperatively A total of 2/66 patients (3%) had evidence of a recurrent dermoid cyst that required a second cystectomy, while 5/66 patients (6%) were managed expectantly (Fig. 2, A). Stratifying by surgical approach, recurrence occurred in 6/40 (15%) patients treated with laparoscopy and 1/26 (4%) patients treated with laparotomy (Fig. 2, B). Although more patients receiving laparoscopy had evidence of recurrent disease, there was no statistically significant difference in recurrence between the surgical methods ($P = .23$). There was also no statistically significant difference in the rate of recurrence that required surgical management between those treated by laparoscopy (2/40, 5%) or laparotomy (0/26), $P = .51$.

Details of the patients with recurrence can be found in Table 2. Patients 2-7 were followed with annual ultrasonography scheduled postoperatively, although patient 1 had her first and only follow-up ultrasonography for symptoms years after her initial surgical management. Patients 6 and 7 exhibited bilateral dermoid cysts that grew in size over time and required further surgical excision by cystectomy. Both of these patients have ongoing issues with recurrent dermoid cysts to date. Patients 1-5 had evidence of a dermoid at their first ultrasonography, but showed no change in size overtime and were managed expectantly.

A total of 35 patients were followed postoperatively with annual ultrasonography. Of these patients 20 were treated with laparoscopy (57%) and 15 with laparotomy (43%). At each follow-up visit an ultrasonography was performed and the presence of a cyst was recorded (Fig. 3). The average interval between surgery and the first post-surgical ultrasonography was 209.7 ± 135.5 days. At this ultrasonography 19 new ovarian cysts were detected including: 6