

Appendectomy in the surgical treatment of benign ovarian mucinous cystadenomas — is it necessary?

Eser S. Ozyurek, Uner M. Karacaoglu, Erdal Kaya, Elif C. Gundogdu, Eylem Odacilar

*Department of Obstetrics and Gynecology, Bagcilar Research and Training Hospital
Merkez Mahallesi Mimar Sinan Caddesi 6. Sokak; Bagcilar/Istanbul, Turkey*

ABSTRACT

Objectives: To determine if appendectomy as an adjunctive procedure is necessary in the surgical treatment of benign ovarian mucinous cystadenomas.

Material and methods: Retrospective analysis of clinical data: in a research hospital, obstetrics and gynecology department setting, 63 cases of benign ovarian mucinous cystadenomas confirmed in the pathological evaluation were revised. 59 had the complete clinical, final pathological and follow-up data available and were included.

Results: 20.6% (13/59) went through an appendectomy. Basic characteristics of patients with different appendiceal pathologies did not show any significant differences. In the study group the mean age, parity, adnexial mass size were (40.1 ± 12.4); (1.3 ± 1.1) and (9.1 ± 5.3 cm), respectively. Patients were either operated laparoscopically (20), laparotomically (39) to perform a unilateral salpingoopherectomy/cystectomy. In 7 patients, oopherectomy was an additional procedure with: 2 abdominal hysterectomies, 4 cesarean sections and 1 total laparoscopic hysterectomy. 2 synchronous appendiceal pathologies (mucinous cystadenomas of the appendix) were defined in appendectomies performed. In these cases, the ovarian tumour sizes were: 7 cm and 4 cm.

Conclusions: In the presence of a benign or borderline unilateral ovarian mucinous tumour as defined during the operation and especially if it is larger than 10–12 cm and with normal peritoneal and appendiceal gross morphology, appendectomy is not a necessary adjunctive procedure.

Key words: surgical treatment, appendectomy, ovarian mucinous cystadenomas

Ginekologia Polska 2016; 87, 5: 338–341

INTRODUCTION

Ovarian mucinous cystadenomas comprise approximately 15% of benign ovarian epithelial neoplasms, mostly unilateral, and may present with sizes as large as 30 cm. Women who are diagnosed with this pathology are on average in their early 50's. The lesions are mostly benign and yet may probably contain atypical proliferative foci as these masses get larger [1]. On the other hand, appendiceal mucinous tumors comprise an interesting pathological subgroup. These tumors, especially if they are malignant, have been reported to present with synchronic or metachronic metastatic mucinous ovarian masses by various authors [2]. The rationale behind performing an appendectomy in the presence of an ovarian mucinous pathology is based on these reports. Despite the fact that these reports have

not been supported by further studies, it has mostly been considered as a prudent practice because performing an appendectomy as an additional procedure was thought to be adding a very slight risk, if any. In this study, we investigated whether appendectomy is a necessary adjunctive procedure when a benign mucinous adenoma is defined peri-operatively, with an otherwise normal-looking appendix and pelvis. The necessity of appendectomy performed in addition to the primary cytoreductive operations for treating malignant mucinous ovarian tumors equal to or higher than Stage 2 is unquestionable. However, it is not as well-defined if this is the case with benign or mucinous ovarian tumors, with low malignancy potential. We are of the opinion it would be prudent to share our clinical experience with surgical treatment of benign mucinous ovarian tumors

Corresponding author:

Eser S. Ozyurek
Şişli Küştepe Mah Tomurcuk Sok İzmen Site A1 9/43, 80310 Istanbul, Turkey
e-mail: eozyurek@yahoo.com

only in a subset of which appendectomies were performed according to the perioperative gross morphological evaluation of our attending surgeons.

MATERIAL AND METHODS

The operation records within the time frame of 2008–2015 were retrospectively reviewed for the patients operated on due to adnexal masses. Out of 347 patient pathology records, 63 were reported as pure ovarian mucinous pathologies or pathologies with mucinous components. Final pathology, surgical records and patient follow-ups were complete in 59 cases and these were included in our analysis. The 59 benign mucinous cystadenomas were defined by frozen section and confirmed by final pathology examinations and comprised our retrospective cohort. Thirteen (20.6%) patients were treated with an appendectomy because the gross morphology of the appendix observed during the operation was not normal. Operation reports revealing the operation routes, complications, locations of the pathologies, patient records including their demographic characteristics and obstetric histories, were collected. Patient informed consents to use their clinical data for medical analysis providing full confidentiality of their identities were obtained. Parametric tests were used where normal distribution and equal variances were observed. Otherwise, when not possible, non-parametric tests were applied. Data analysis was made using the Microsoft Excel 2010 and the SPSS 17.0 Statistical Package.

RESULTS

Out of 59 patients with benign ovarian mucinous cystadenomas included in this retrospective clinical data analysis, 13 (20.6%) were treated with an additional appendectomy. The decision about an additional appendectomy was based on the surgeon's choice, depending on the gross morphology of the appendix. Mean patient age was 40.1 ± 12.4 ,

mean parity was 1.3 ± 1.1 , and mean adnexal mass size was 9.1 ± 5.3 cm. These parameters did not show any differences among the patients with different appendiceal pathological status. For 39 patients, the laparotomic route was used, including 34 unilateral salpingo-oophorectomies and 5 cystectomies. Twenty patients were operated on laparoscopically, including 16 undergoing a cystectomy and 4 treated with unilateral salpingo-oophorectomy. For 7 patients, unilateral salpingo-oophorectomy was an additional procedure to the abdominal hysterectomy (2 cases), a total laparoscopic hysterectomy (1 case), or a cesarean section (4 cases). Out of the appendixes positive for a synchronous pathology, the ovarian pathology involved the right ovary in each case. In cases when the appendiceal pathology accompanied the ovarian pathology, the synchronous ovarian neoplastic lesions were 7 cm and 4 cm. Patient characteristics with respect to the different reported appendectomy specimen findings are presented in Table 1.

DISCUSSION

Our findings are consistent with the theory that in the presence of mucinous ovarian neoplasia, the chances of discovering an incidental appendiceal involvement are limited, if any, unless the peritoneal or the appendiceal morphology is abnormal. The necessity of performing appendectomies in the presence of benign or benign-appearing mucinous ovarian tumors has been less often addressed in the literature, and so we carried out this retrospective cohort analysis to investigate this issue. Ovarian mucinous tumors have been reported to be synchronous to appendiceal mucinous tumors. This association has been explained in 2 ways. The first explanation is malignant invasion or metastasis. This correlation is hardly debatable. When an ovarian tumor is malignant and at stages 1 or 2, an appendiceal involvement may upstage the disease [3]. Ayhan et al., reported malignant ovarian epithelial tumors which had involvement of

Table 1. Patient characteristics with respect to the reported appendectomy pathological specimen findings

	Appendix-status/pathology (number of cases)	Mean \pm SEM (min-max)
Ovarian tumor size (cm)*	Appendectomy was not performed (46)	8.7 cm \pm 4.7 (2–25)
	Reactive inflammatory changes (10)	11.4 cm \pm 7.8 (2–30)
	Mucinous adenoma (2)	–
	Appendicitis (1)	–
	Group mean (59)	9.1 cm \pm 5.3 (2–30)
Age*	Appendectomy was not performed (46)	39.5 \pm 11.4 (16–69)
	Reactive inflammatory changes (10)	39.4 \pm 10 (24–53)
	Mucinous adenoma (2)	–
	Appendicitis (1)	–
	Group mean (59)	40.1 \pm 12.4 (16–79)

*Nonparametric tests — no significant difference was observed among the 4 groups

the appendix at a rate of about 28%; and in 50% of these the disease was upstaged accordingly. The second explanation for the involvement of the ovary due to an appendiceal pathology is through a pseudomyxoma peritonei, originating from the appendix. In this situation, the primary tumor does not show any invasive characteristics or atypia, but still has the potential to recur, spread, or metastasize [4]. Regarding the borderline mucinous tumors, the evidence is less clear. To the best of our knowledge, there have been only 8 studies regarding this issue, and 3 of these recommended the additional appendectomy [5–7]. Kleppe et al., analyzed a group of 98 mucinous borderline ovarian tumors diagnosed and operated on by gynecologists, when the appendectomy was selectively performed depending on the gross morphology of the appendix, and a group of 29 confirmed mucinous appendiceal tumors, 15 of which were operated on by gynecologists to perform an oophorectomy, when the appendectomy was deemed necessary due to abnormal macroscopy of the appendix, and 14 cases, primarily operated on by general surgeons, with normal looking ovaries reported in a retrospective cohort study. In this study, within a 5 year follow-up, none of the patients in the first group, where appendectomy was selectively omitted, recurred as an appendiceal pathology, whereas in the second group of confirmed appendiceal mucinous tumor cases with concomitant ovarian involvement, none had reported a normal looking appendix, concluding that the appendectomy was not necessary if the appendix was grossly normal in mucinous borderline tumors of the ovary [8]. None of the referred studies recommending an appendectomy in borderline or malignant mucinous ovarian tumor cases took into account the morphological findings of the appendixes [9, 3, 10, 11].

Lin et al., in a group of 309 patients with ovarian mucinous neoplasms (197 benign; 68 low malignancy potential; and 44 malignant) with 155 appendectomies (45% of the benign group, 22% of the low malignancy potential group, and 59% of the malignant group), reported 3 synchronic appendiceal pathologies. Interestingly, there was 1 appendiceal pathology detected in each group and all of the operated appendixes looked grossly abnormal [12]. Hence, the risk of appendiceal involvement cannot be ruled out, depending on the perioperative pathological evaluation. On the other hand, the former study concluded that an appendectomy should be performed in all ovarian mucinous pathologies only if the appendix is grossly abnormal. Questioning whether it would be possible to know if the ovary was secondarily involved by a neoplasia by inspecting the ovary, Yemelyanova et al., by analyzing 194 cases, suggested that it could be determined that the ovarian mucinous tumor was primary by taking 12 cm as threshold being able to discriminate primary and metastatic tumors at the ac-

curacy of 100% and 80%, respectively [13]. Macroscopically, secondary involvement was found to be more probable if the ovarian mucinous involvement was bilateral, < 12 cm, nodular on the ovarian surface, or with stromal invasion instead of being expansile. That study also stated that colorectal metastasis and endocervical tumors are exceptions to algorithmic classifications. Also in our study, in the 2 cases where synchronous appendiceal pathologies were defined, the ovarian mucinous tumors were 7 cm and 4 cm smaller than the threshold size defined in the former study.

Certain histopathological features, as well as immunohistochemistry studies, were reported as essential adjuncts to differentiate primary and secondary tumors of the ovary [4]. Perioperative evaluation of ovarian mucinous tumors by frozen section and gross morphology deem more contradictory findings in contrast to other histological types of ovarian tumors. Hence, it may be challenging to make a decision during the operation about the character of an ovarian mucinous tumor at the early stages [14]. It is commonly concluded by many authors that 2 situations are very improbable to be encountered: a primary ovarian malignant 'pure' mucinous tumor metastasizing to the appendix, or a generalized pseudomyxoma peritonei picture originating from the ovary [15–17].

Our study had a few arguable points: the indications for appendectomy were given by 5 different attending surgeons with possible minor variations of the visual criteria; the percentage of patients operated on with an appendectomy was 20.6%, which may seem to be providing weak evidence to support our conclusions. The previously reported appendectomy rates are within a very wide range (6–100%). Also, 100% (59/59) of our study cases were benign mucinous cystadenomas. The group of patients we analyzed were operated on in the last 7 years and the long-term biannual follow-ups of at least half of these cases are available, and as of now, no recurrences have been observed. It can still be considered prudent to add an appendectomy in benign or low malignancy potential mucinous tumors, at least because mucinous tumors may not be pure and that performing an additional appendectomy only slightly elevates the risk to the patient status, if at all. Operation-related complications can and do occur, and appendectomy adds cost to the surgery [18]. The American College of Obstetrics and Gynecology has published an opinion that it is not certain whether the advantages of elective appendectomy would outweigh its risks [19].

CONCLUSIONS

We conclude that appendectomy is not a necessary additional procedure in the presence of benign or borderline unilateral ovarian mucinous tumors, with normal peritoneal and appendiceal morphology and probably larger

than 10–12 cm. Larger cohort studies in tertiary centers may be even more conclusive to clarify whether to decide upon an additional appendectomy according to the gross morphological findings. It still remains to be further studied if the mucinous tumors originating from the ovary and the appendix have different prognosis or genetic lineages.

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