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ORIGINAL RESEARCH

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Clinicopathological features and oncological prognosis in ovarian metastasis of the primary origin: a single-center retrospective study

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Abstract

Background: The ovary is a common site of metastasis. The frequency of metastasis and the localization of the primary cancer vary geographically. This study aims to present the clinicopathological features and oncological outcomes of patients with ovarian metastasis of the primary origin (OMPO) who underwent surgery in our clinic. **Methods**: In this retrospective study, the files of 806 patients who underwent surgery with a preliminary diagnosis of pelvic mass or ovarian cancer between 2012 and 2016 were scanned. Four hundred eighty eight patients with a definite diagnosis of ovarian cancer were included in the study. **Results**: Seventy-nine patients (16.2%) had OMPO, the second most common cancer type after primary epithelial cancer of the ovary, and 65.8% (n = 52) of OMPOs had non-gynecological primary. Twenty-seven (34.2%) patients had primary endometrial cancer, 18 (22.7%) had colorectal cancer, 16 (20.2%) had gastric cancer and 6 (7.5%) had breast cancer. The most common reasons for admission were abnormal bleeding in 27 patients (34%), abnormal imaging results in 19 patients (24%), pain in 14 patients (18%), and abdominal distension in 10 patients (12%). The mean follow-up was 13.3 $\pm$ 13.4 months, and the mortality rate was 43% (n = 34). Gynecological metastatic ovarian cancers were observed at an older age with a higher mortality rate and shorter median survival than non-gynecological metastatic ovarian cancers. Median survival of OMPOs with primary breast, colorectal, gastric and endometrial cancer was 45 months, 46.4 months, 10.1 and 10.0 months, respectively. **Conclusions**: Ovarian metastases of primary origin are frequently seen and have a very poor prognosis.

Keywords

Ovarian metastasis of the primary origin; Prognosis; Survival

1. Introduction

Ovarian cancer is the gynecological malignancy with the highest mortality rate. The American Cancer Society estimates that approximately 19,680 women will be diagnosed with ovarian cancer in 2024, and approximately 12,740 women will die from the disease [1]. Ninety percent of primary ovarian cancers are epithelial, and the remaining 10% are non-epithelial. In addition to primary cancers of the ovary, ovarian metastasis of the primary origin (OMPO) is frequently observed. The frequency of OMPO varies between 3–15% in Western countries and 21–30% in Eastern countries [2]. Both primary and OMPOs are usually diagnosed at an advanced stage, so their prognosis is poor.

The ovaries frequently serve as a site for metastases from gastrointestinal, breast, uterine, cervical neoplasms and hematologic cancers [3]. In Asia, nearly 30% of ovarian metastases originate from gastric carcinoma, whereas in Western nations, this figure hovers around 4–5% [4]. Conversely, in Western countries, breast cancer and colorectal cancer rank as the predominant primary tumors that metastasize to the ovaries [5]. Patients with ovarian metastases are typically younger than those diagnosed with primary epithelial ovarian cancer, with an average age of 45 years observed in individuals with Krukenberg tumors [6]. The diagnosis of ovarian metastases is challenging and may be inferred through comprehensive clinical history. Morphological characteristics indicative of ovarian metastases include bilateral involvement, tumor dimensions less than 10 cm, engagement of the ovarian surface and superficial cortex, as well as histological features that do not align with primary ovarian neoplasms [7]. Given that ovarian metastases indicate an advanced stage of disease, precise and definitive diagnosis is critically important. The prognosis associated with these metastases is less favorable than that of primary ovarian cancers, and both surgical and adjuvant therapeutic approaches differ [7]. Consequently, this study seeks to elucidate the clinicopathological characteristics and oncological outcomes of patients with ovarian metastases

treated at our institution.

2. Materials and methods

This retrospective study was conducted at the Department of Obstetrics and Gynecology, Hacettepe University Faculty of Medicine. The study received ethical approval from the Hacettepe University Non-Interventional Clinical Research Ethics Committee (Decision No: 2019/04-43). Data of 806 patients, who underwent surgery with a preliminary diagnosis of pelvic mass or ovarian cancer between 2012 and 2016, were retrospectively evaluated. A total of 488 patients diagnosed with ovarian cancer were included in the study. The exclusion criteria from the study were patients who had previously received surgical or medical treatment with a gynecological cancer diagnosis, patients who underwent fertility-preserving surgery, and patients diagnosed with synchronous cancer.

All surgical procedures were performed by gynecologic oncologists. All operations were performed with open laparotomy. In cases where there was suspicion of malignant tumor, the ovarian mass was sent for frozen examination by cystectomy, oophorectomy or salpingo-oophorectomy. Similarly, patients with a previously existing non-gynecological primary cancer diagnosis who developed an ovarian mass during their follow-up were subjected to frozen examination. This was in order to distinguish the mass from primary and metastasis. In those with metastasis reported as a result of frozen section, full surgical staging was not applied. In these patients, only limited surgeries such as total abdominal hysterectomy + bilateral salpingo-oophorectomy (TAH + BSO) or only unilateral-bilateral salpingo-oophorectomy were performed. Omentectomy was added to the surgical procedure in those with ascites or suspected involvement, and appendectomy was added in the presence of abnormal appearance. In cases where frozen section examination could not distinguish primary from metastasis, complete surgical staging including TAH + BSO + omentectomy + appendectomy and bilateral pelvic-paraaortic lymphadenectomy was performed. In patients diagnosed with primary endometrial cancer, complete surgical staging including TAH + BSO + omentectomy and bilateral pelvic-paraaortic lymphadenectomy was performed. In patients diagnosed with cervical cancer, standard surgery was performed as type 3 hysterectomy, bilateral salpingo-oophorectomy and bilateral pelvic-paraaortic lymphadenectomy. The demographic, clinical, pathological and oncological characteristics of the patients included in the study were evaluated.

The statistical evaluation for this research study was conducted utilizing the SPSS software, specifically the Statistical Package for Social Sciences for Windows, Version 22.0, which is produced by IBM Corp. and is located in Armonk, NY, USA, thereby providing a comprehensive platform for data analysis. To assess the normality of the data distribution, the Kolmogorov-Smirnov test was employed, which serves as a robust statistical method for evaluating whether a given sample comes from a population with a specific distribution. In order to facilitate the comparison of numerical variables across different groups, either the *T*-test or the Mann-Whitney U test was applied, depending on the distribution characteristics of the data being analyzed. For the investigation of categorical variables, the Chi-square test or, when appropriate, the Fisher's exact test was utilized to determine whether there are significant associations between the categorical variables under consideration. The survival outcomes were meticulously examined through the Kaplan-Meier survival analysis, and the resulting survival curves were subjected to comparison using the log-rank test to ascertain differences between groups. Additionally, life tables were employed as a methodological tool for the determination of median survival times, thereby providing essential insights into the survival patterns observed in the study population. In accordance with widely accepted statistical standards, a *p*-value threshold of less than 0.05 was established, which indicates the level of significance for all statistical analyses conducted throughout the research. This rigorous approach to statistical evaluation ensures that the findings of the study are both reliable and valid, contributing valuable knowledge to the field. The careful selection of appropriate statistical tests further enhances the interpretability of the results, allowing for meaningful conclusions to be drawn about the research questions posed. By adhering to these statistical principles, the study aims to advance the understanding of the phenomena under investigation and provide a strong foundation for future research endeavors. Ultimately, the meticulous application of these statistical methodologies underscores the importance of rigor in data analysis within the broader context of scientific inquiry.

3. Results

Clinicopathological data of the patients are given in Table 1. Of the 488 ovarian cancers, 409 (83.8%) were primary ovarian cancers and 79 (16.2%) were OMPOs. Three hundred and seventy-four (76.6%) of the patients with primary ovarian cancer had epithelial ovarian cancers. Fifteen (3.1%) were germ cell tumors and 20 (4.1%) were sex-cord stromal tumors. Of the OMPOs, 34.2% (n = 27) were of gynecological origin, while 65.8% (n = 52) were non-gynecological. Seventy seven percent (n = 40) of the non-gynecological metastatic cancers had gastrointestinal cancers as primary and 11.5% (n = 6) had breast cancer as primary. All of the gynecological OMPOs had endometrial cancer as primary. The reason for admission to the hospital was abnormal bleeding in 27 patients (34%), abnormal imaging results in 19 patients (24%), pain in 14 patients (18%) and abdominal distension in 10 patients (12%). Staging surgery was performed in 50.6% of the patients, TAH + BSO in 20.3% and TAH + BSO + omentectomy + appendectomy in 8.9%. Seventy-six (96.2%) patients received adjuvant therapy, except for three patients who died early after surgery. The mean follow-up period after surgery was 13.3 ± 13.4 months (range, 1.0 to 53.0 months), and 34 of 79 patients (43.0%) died of disease during the follow-up period.

The mean ages of 409 patients with primary ovarian cancer and 79 patients with OMPO were similar (55.5 ± 14.2 and 56.3 ± 14.5, respectively, $p = 0.68$). Similarly, both primary and OMPO were mostly observed after menopause. Interestingly, 73.6% of primary cancers and 74.7% of OMPO were detected in postmenopausal patients ($p = 0.84$) (Table 2).

Clinical features of OMPOs according to their primary cancers are given in Table 3. Among these patients, those with

TABLE 1. Clinicopathological characteristics of participants.

Ovarian cancer (n = 488)	n (%)
Primary ovarian cancer	409 (83.8%)
Ovarian metastasis of the primary origin	79 (16.2%)
Primary ovarian cancer (n = 409)	
Epithelial ovarian cancer	374 (91.5%)
Germ cell tumors	15 (3.7%)
Sex-cord stromal tumors	20 (4.8%)
Ovarian metastasis of the primary origin (n = 79)	
Gynecologic	27 (34.2%)
Nongynecologic	52 (65.8%)
Nongynecologic ovarian cancer (n = 52)	
Gastrointestinal system	40 (77.0%)
Breast	6 (11.5%)
Other	4 (7.7%)
Unknown	2 (3.8%)
Reason for admission	
Abnormal bleeding	27 (34%)
Abnormal imaging result	19 (24%)
Pain	14 (18%)
Abdominal distension	10 (12%)
Other	9 (12%)
Gastrointestinal system cancers	
Colorectal	18 (45.0%)
Stomach	16 (40.0%)
Pancreatobiliary	5 (12.5%)
Appendix	1 (2.5%)
Surgical procedures performed	
Staging surgery	40 (50.6%)
TAH + BSO	16 (20.3%)
TAH + BSO + omentectomy + appendectomy	7 (8.9%)
TAH + BSO + omentectomy	4 (5.1%)
TAH + USO + unilateral salpingo-ooforektomi	2 (2.5%)
Unilateral salpingo-ooforektomi	2 (2.5%)
TAH + BSO + appendectomy	1 (1.2%)
Other	7 (8.9%)
Adjuvant therapy	
Chemotherapy	50 (63.3%)
Chemotherapy + radiotherapy	26 (32.9%)
Survival	
Alive	42 (57%)
Dead	34 (43%)
Median follow-up, mon	13.3 ± 13.4 (1.0–53.0)

TAH + BSO: Total abdominal hysterectomy + bilateral salpingo-oophorectomy.

TABLE 2. Age and menopausal status of primary cancer and ovarian metastasis of the primary origin.

	Primary ovarian cancer (n = 409)	Ovarian metastasis of the primary origin (n = 79)	*p*
Age, yr	55.5 ± 14.2	56.3 ± 14.5	0.68
Menopausal status			
Premenopause	108 (26.4%)	20 (25.3%)	0.84
Postmenopause	301 (73.6%)	59 (74.7%)	

TABLE 3. Clinical characteristics of patients diagnosed with metastatic tumors of the ovary according to their primary focus.

	Gynecological (n = 27)	Nongynecological (n = 52)	*p*
Age, yr	62.3 ± 11.1	52.8 ± 8.4	0.007
CA 125 (U/mL)	178.8 ± 18.6	329.5 ± 25.8	0.494
CA 19-9 (U/mL)	389.2 ± 35.6	629.0 ± 57.4	0.712
CA 15-3 (U/mL)	60.1 ± 8.9	42.8 ± 6.7	0.597
Median survival	10.0 ± 3.5	32.6 ± 7.4	0.050
Menopausal status			
Premenopause	1 (3.7%)	18 (34.6%)	0.002
Postmenopause	26 (96.3%)	34 (65.4%)	
Ovarian involvement			
Right ovary	5 (18.5%)	9 (17.3%)	
Left ovary	9 (33.4%)	7 (13.4%)	0.067
Bilateral involvement	13 (48.1%)	36 (69.23%)	
Mortality			
No	11 (40.7%)	34 (65.4%)	0.036
Yes	16 (59.3%)	18 (34.6%)	

CA: Cancer antigen.

gynecological primary cancers were significantly older than those with non-gynecological primary cancers (mean ages 62.3 and 52.8 years, respectively, $p = 0.007$). In addition, the rate of postmenopausal patients was significantly higher in those with gynecological primary cancers, consistent with age (96.3% and 65.4%, respectively, $p = 0.002$). Mean serum tumor markers were above the threshold level in all patients, and the mean values of CA (cancer antigen) 125, CA 19-9 and CA 125-3 were 280.6 U/mL, 557.8 U/mL and 48.0 U/mL, respectively. However, the mean levels of these markers were similar in gynecological and non-gynecological primary cancers. In 30 patients (38.0%), only one ovary was affected by metastasis. In the remaining 49 patients (62.0%), bilateral ovarian tumoral infiltration was observed. In patients with one ovary, the rates of right and left ovary involvement were similar (17.7% and 20.3%, respectively). Although bilateral ovarian involvement was less common in patients with gynecological primary cancers compared to non-gynecological primary cancers, the difference was not statistically significant (48.1% and 69.23%, respectively, $p = 0.067$). The mortality rate in patients with metastatic ovarian cancer with gynecological primary cancers was 59.3%, and it was significantly higher than the mortality rate of non-gynecological primary cancers, which was 34.6% ($p = 0.036$).

The pathological characteristics associated with individuals diagnosed with primary endometrial carcinoma, particularly those exhibiting ovarian metastasis, are comprehensively delineated in the detailed presentation found in Table 4. A significant proportion, specifically sixty-three percent, of these patients were identified as having non-endometrioid histological types coupled with a classification of grade 3 malignancy, indicating a more aggressive form of the disease. Additionally, a noteworthy prevalence of deep myometrial invasion was observed, affecting 77.8% of the patient cohort studied, which suggests a concerning extent of tumor penetration into the myometrial layer. Concurrently, lymphovascular space invasion, a critical prognostic factor, was documented in 74.1% of the cases, highlighting the potential for metastatic spread through the lymphatic and vascular systems. In terms of cytological analysis, more than half of the patients displayed positive results, which is indicative of malignant cells in the peritoneal cavity, and approximately half of the cohort was categorized as having reached stage 4 of the disease, reflecting advanced progression. The dimensions of the primary neoplasm located

in the endometrial tissue averaged 7.0 centimeters; however, there was considerable variability in size, with measurements ranging from a minimum of 1.5 centimeters to a maximum of 18.0 centimeters, underscoring the heterogeneity of tumor presentations among the affected individuals. Collectively, these findings paint a comprehensive picture of the clinical landscape and the aggressive nature of primary endometrial cancer with ovarian involvement, warranting further investigation and targeted therapeutic strategies.

TABLE 4. Pathological features of patients with endometrial cancer.

	n (%)
Histological subtype	
Endometrioid	10 (37.0%)
Non-endometrioid	17 (63.0%)
Grade	
1–2	7 (25.9%)
3	17 (63.0%)
Unknown	3 (11.1%)
Myometrial invasion	
None or superficial	6 (22.2%)
Deep	21 (77.8%)
Lymphovascular space invasion	
No	2 (7.4%)
Yes	20 (74.1%)
Unknown	5 (18.5%)
Cytology	
Negative	12 (44.4%)
Positive	15 (55.6%)
Stage	
IIIA	7 (25.9%)
IIIC1	3 (11.1%)
IIIC2	4 (14.9%)
IVA	2 (7.4%)
IVB	11 (40.7%)
	Mean ± Standard deviation (Minimum–Maximum)
Tumor size (cm)	7.0 ± 4.1 (1.5–18)

Median survival was 19.7 months in the entire group, 10.0 months in those with primary gynecological cancer and 32.6 months in those with primary non-gynecological cancer (p = 0.05) (Fig. 1). Median survival was 39.2 months in those with primary gastrointestinal system, while this period was 32.4 months in those with primary non-gynecological and non-GIS (gastrointestinal system) (p = 0.14). The longest median survival among gastrointestinal primaries was found in colorectal cancer with 46.4 months, followed by pancreatobiliary system, appendix and stomach cancers (median survivals were 19.5 months, 16.5 months and 10.1 months, respectively). The median survival time of those with primary breast cancer was relatively long, 45.0 months. When all primary cancer sites were evaluated separately, significant median survival differences were only present between colorectal cancers and gynecologic cancers, colorectal cancers and stomach cancers, and colorectal cancers and appendix cancers (p = 0.002, p = 0.010 and p = 0.029, respectively). Krukenberg tumors were present in 10 patients (12.7%), and their primary was stomach in 8 patients, colorectal cancer in one patient, and the primary was unknown in one patient. Although median survival was shorter in the presence of Krukenberg tumors than in those without Krukenberg, the difference was not statistically significant (9.9 months and 20.5 months, respectively, p = 0.26). Median survival was 18.1 months in those who underwent complete surgical staging and 39.7 months in those who did not (p = 0.62). The type of adjuvant therapy given following surgery did not have a significant effect on survival. While the median survival was 31.7 months for those who received only chemotherapy, this period was calculated as 11.6 months for those who received both chemotherapy and radiotherapy (p = 0.105).

4. Discussion

This retrospective study focused on the clinicopathological features of ovarian metastasis of primary origin. Seventy-nine patients (16.2%) had ovarian metastasis of primary origin, 27 (34.2%) of which were of gynecological origin and 52 (65.8%) of which were of non-gynecological origin. Of the non-gynecological metastatic cancers, 77% (n = 40) had gastrointestinal cancers as primary and 11.5% (n = 6) had breast cancer as primary. Gynecological metastatic ovarian cancers were observed at an older age and had a higher mortality rate and shorter median survival than non-gynecological metastatic ovarian cancers. The longest median survival in non-gynecological metastatic ovarian cancers was in patients with primary colorectal and breast cancer.

Ovaries are exposed to metastasis via hematological, lymphatic and peritoneal routes. The incidence rate of OMPO and the localization of the primary cancer vary according to geographical regions and this rate varies between 5% and 30% [8]. Lobo *et al.* [9] determined the OMPO rate as 26% in their study and documented that the most common primary cancer sites were the gastrointestinal system, breast and female reproductive organs. In a study conducted in China, Zhang *et al.* [10] determined the two most common non-gynecological causes of OMPO as colorectal cancer (38.4%) and stomach (34.5%). Kim *et al.* [11] showed that the primary sites of OMPO were mainly stomach (46.2%) and colon (61/158, 38.6%). Yada-Hashimoto *et al.* [12] reported that the primaries for OMPO were stomach (39.5%), breast (23.7%) and colon (18.4%). In another study conducted in Japan, Kajiyama *et al.* [5] found that when they excluded OMPOs of uterine origin (4.1%), the primary site of OMPO was colorectal in 62 patients (43%), stomach in 42 patients (29%), appendix in 12 patients (8%), breast in 8 patients (N = 89) and pancreas in 5 patients (4%). As can be seen, the most common causes of OMPO in East Asian populations are of gastrointestinal origin. In studies conducted in the United States, it was shown that the breast is the primary site

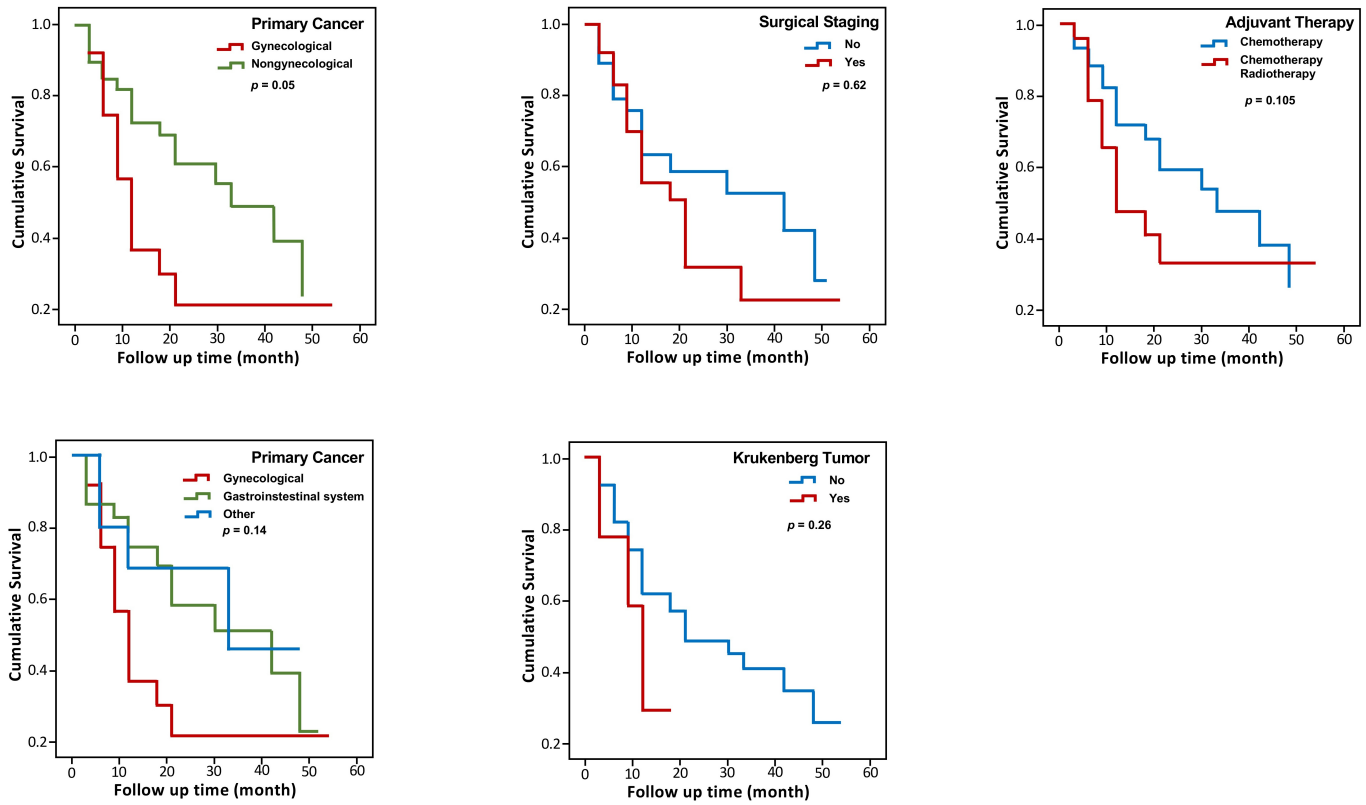

FIGURE 1. Survival curves of clinicopathological data.

[13]. In another study conducted in our country, it was shown that breast (22.7%) and stomach (22.7%) share the first place for OMPO [14]. In our study, we determined that OMPO most frequently originates from non-gynecological cancers (65.8%). The first three of these were colorectal (22.7%), stomach (20.25%) and breast (7.5%) cancer. The primary of all gynecological OMPOs was endometrial cancer and its frequency among all OMPOs was 34.17%. Endometrial cancer was the most common cancer among all primary cancer sites. The possible reason for this may be that endometrial cancer is the most common gynecological cancer, which is surgically removed in our country and hospital. In our study, the most common cause of OMPO was gastrointestinal cancers, and colorectal and breast cancers were frequently observed among these, which is consistent with previous study results.

OMPO, analogous to primary ovarian cancers, is predominantly identified at advanced stages due to its asymptomatic nature in the initial phases, resulting in a relatively unfavorable prognosis [7]. The prevailing manifestations of OMPO are typically nonspecific; common symptoms, often reported by most patients post-diagnosis, include abdominal discomfort, postmenopausal hemorrhage, weight loss and ascites [8]. Sal *et al.* [15] established in their research that the median age of individuals with nongynecological OMPO is 50 years, with colorectal and gastric cancer being the predominant primary cancer sites. They also noted that abdominal distension and pain, associated with the most prevalent primary cancer localizations, represent the two most frequently observed clinical features. Zhang *et al.* [10] indicated in their investigations that the average age at which OMPO is diagnosed is 48 years, with the leading symptoms being abdominal distension (39.0%), abdominal pain (37.9%), ascites (27.7%) and abnormal bleeding (18.1%). Likewise, it was documented that distension/pressure sensations, palpable/abdominopelvic masses, and abdominal discomfort were the most prevalent OMPO symptoms [11, 14]. In our research, the mean age of individuals with OMPO was 56.3 ± 14.5 years, which did not significantly differ from those diagnosed with primary ovarian cancer. The principal reasons for patient presentations included abnormal bleeding, atypical imaging findings, abdominal pain and abdominal distension. All patients with gynecological OMPO reported abnormal bleeding as a complaint. The primary reasons for hospitalization in cases of gastrointestinal OMPO included abnormal imaging findings (35%), abdominal pain (27.5%) and abdominal distension (20%). In the context of breast cancer-associated OMPO, the referral reasons were abnormal imaging findings (83.3%) and pain (16.7%). The symptoms identified for OMPO in our study were congruent with those documented in existing literature and were nonspecific in nature. Consequently, OMPO should be considered in patients exhibiting these symptoms.

In addition to these clinical presentations, laterality of ovarian metastases is another important consideration in disease progression and prognosis. There are notable clinical and pathological differences between bilateral and unilateral ovarian metastases. The literature suggests that metastatic ovarian tumors are often bilateral due to their hematogenous and lymphatic dissemination pathways [7, 10]. Bilateral ovarian involvement is particularly common in gastrointestinal-origin metastases, with Krukenberg tumors being a hallmark example of this pattern [6].

Conversely, some primary cancers, particularly endometrial

cancer, may more frequently present with unilateral ovarian metastasis. In our study, we observed bilateral ovarian metastases in 62% of cases, a rate consistent with previously published data. While some studies have suggested that bilateral ovarian involvement may be associated with poorer prognosis [16], our findings did not demonstrate a statistically significant impact of laterality on survival. Given these observations, we believe that further large-scale studies are needed to clarify the prognostic implications of unilateral versus bilateral ovarian metastases.

OMPOs generally have a poor prognosis, and median survival rates have been shown to range from 9 to 30 months [17–19]. Median survival in OMPOs also varies depending on the primary cancer focus. A study of 158 patients found that the median survival time for OMPOs of nongynecologic origin was 15 months and the five-year survival rate was 7.2% [11]. Ramesan *et al.* [2] determined the median overall survival in patients with OMPO to be 21 months after diagnosis and found that survival between different primary cancers was not statistically different. Zhang *et al.* [10] observed in their studies that the median survival times of breast cancer, colorectal cancer and stomach cancer were 25 months, 21 months and 18 months, respectively. However, it has been reported in many studies that the survival of patients with OMPO exhibited significant differences according to the primary cancer [20–22]. In our study, the median survival of patients with OMPO was 19.7 months. The median survival of patients with primary gynecological cancer was significantly lower than that of primary non-gynecological cancers (10.0 *vs.* 32.6 months). In contrast to our study, it has been reported that in the presence of gynecological primary, the disease is usually limited to the abdomen or even the pelvis. There is no distant metastasis, and the prognosis is better [23, 24]. However, in our study, the endometrial cancers, which constitute all gynecological primaries, had high rates of non-endometrioid histology, grade 3 disease, deep myometrial invasion and lymphovascular space invasion, which are the characteristics responsible for the aggressive course. The primary tumor diameter was quite large. In our study, the mean age of OMPO with gynecological primary was also significantly higher than that of OMPO with non-gynecological primary. Therefore, the median survival of OMPOs with gynecological primary in our study was lower. The median survival of non-gynecological primary cancers of breast, colorectal, appendix and stomach were 45 months, 46.4 months, 16.5 months and 10.1 months, respectively. When all primary cancer sites were evaluated separately, the median survival of breast and colorectal cancers was observed to be significantly better than the median survival of endometrial, appendix and stomach cancers. The better median survival of OMPOs, especially those with primary breast and colorectal cancers, is consistent with previous studies [5, 14]. In our study, it was also determined that the type of surgery and the type of adjuvant treatment given did not significantly affect the survival time.

Our study has several limitations. Due to the retrospective nature of the study, it is prone to selection bias and confounding factors that may affect the validity of the findings. The modest sample size and single-center design of the study constitute a second disadvantage. One of the limitations of this study is the age of the samples, as the data were collected retrospectively. While this may introduce some constraints in reflecting the most current clinical trends, the findings remain relevant due to the robustness of the methodology and the clinical significance of the results. Therefore, larger sample sizes and multicenter randomized controlled trials should confirm the findings of this study.

5. Conclusions

In our investigation, the occurrence of OMPO was identified in 79 individuals, ranking as the second most prevalent type following epithelial ovarian cancer. Approximately two-thirds of the OMPO cases presented with non-gynecological origins. The predominant primary sites included endometrial, colorectal, gastric and breast carcinomas. The most frequently reported symptoms encompassed abnormal bleeding, atypical imaging findings, abdominal discomfort, and abdominal swelling. OMPOs originating from gynecological sources tended to be in older patients, exhibited a greater mortality rate, and demonstrated a reduced median survival duration. The highest median survival rates were recorded in patients with colorectal and breast cancers, while the type of surgical staging and adjuvant treatment did not significantly influence median survival outcomes. It is our assertion that the findings of this study will enhance the assessment of patients diagnosed with OMPO.

ABBREVIATIONS

OMPO, ovarian metastasis of the primary origin; TAH + BSO, total abdominal hysterectomy + bilateral salpingo-oophorectomy; CA, cancer antigen; GIS, gastrointestinal system.

AVAILABILITY OF DATA AND MATERIALS

The data that support the findings of this study are available from the corresponding author upon reasonable request.

AUTHOR CONTRIBUTIONS

AI—Designed research/study; wrote the paper. AI and GZ—performed research/study. GZ—collected data. MCS—analyzed data.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The study received ethical approval from the Hacettepe University Non-Interventional Clinical Research Ethics Committee (Decision No: 2019/04-43). As this was a retrospective study, individual consent for participation was waived by the ethics committee, in accordance with institutional and ethical guidelines.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

REFERENCES

[1] American Cancer Society. Survival rates for ovarian cancer. 2022. Available at: https://www.cancer.org/cancer/ovarian-cancer/detection-diagnosis-staging/survival-rates.html (Accessed: 02 August 2022).

[2] Ramesan CK, Thomas V, Thomas DS, Daniel S, Sebastian A, Thomas A, *et al*. Metastatic tumors to the ovary-a surgeon's dilemma. Indian Journal of Surgical Oncology. 2021; 12: 152–157.

[3] Li O, Hamadeh A, Pourvaziri A, Mercaldo S, Clark J, McLay K, *et al.* Differentiating primary from metastatic ovarian tumors of gastrointestinal origin by CT. Current Problems in Diagnostic Radiology. 2025; 54: 349–354.

[4] Li X, Zhang W, Ding P, Guo R, Hong Z, Liu P, *et al*. Clinical characteristics and prognostic factors of colorectal cancer patients with ovarian metastasis: a multicenter retrospective study. International Journal of Colorectal Disease. 2021; 36: 1201–1208.

[5] Kajiyama H, Suzuki S, Utsumi F, Nishino K, Niimi K, Mizuno M, *et al*. Epidemiological overview of metastatic ovarian carcinoma: long-term experience of TOTSG database. Nagoya Journal of Medical Science. 2019; 81: 193–198.

[6] Zhu L, Liu Y, Chen S, Yang G, Wang C. Extremely rare mucinous adenocarcinoma of the small bowel causing bilateral metastatic Kukenberg tumors of the ovaries: a case report. Medicine. 2024; 103: e40397.

[7] O'Cearbhaill RE, Miller A, Soslow RA, Lankes HA, DeLair D, Segura S, *et al*. A phase 2 study of dasatinib in recurrent clear cell carcinoma of the ovary, fallopian tube, peritoneum or endometrium: NRG oncology/gynecologic oncology group study 0283. Gynecologic Oncology. 2023; 176: 16–24.

[8] Salkeni MA, Shin S, Takebe N, Stevens S, Chen A. Advanced granulosa cell tumors of the ovary: a review with a focus on current and novel therapeutic approaches. Journal of Immunotherapy and Precision Oncology. 2024; 7: 263–271.

[9] Lobo J, Machado B, Vieira R, Bartosch C. The challenge of diagnosing a malignancy metastatic to the ovary: clinicopathological characteristics vary and morphology can be different from that of the corresponding primary tumor. Virchows Arch. 2017; 470: 69–80.

[10] Zhang JJ, Cao DY, Yang JX, Shen K. Ovarian metastasis from nongynecologic primary sites: a retrospective analysis of 177 cases and 13-year experience. Journal of Ovarian Research. 2020; 13: 128.

[11] Kim WY, Kim TJ, Kim SE, Lee JW, Lee JH, Kim BG, *et al*. The role of cytoreductive surgery for non-genital tract metastatic tumors to the ovaries. European Journal of Obstetrics and Gynecology and Reproductive Biology. 2010; 149: 97–101.

[12] Yada-Hashimoto N, Yamamoto T, Kamiura S, Seino H, Ohira H, Sawai K, *et al*. Metastatic ovarian tumors: a review of 64 cases. Gynecologic Oncology. 2003; 89: 314–317.

[13] Thull T, Kempton D. Ovarian cancer: a review for primary care providers. JAAPA. 2024; 37: 32–36.

[14] Ayhan A, Guvenal T, Salman MC, Ozyuncu O, Sakinci M, Basaran M. The role of cytoreductive surgery in nongenital cancers metastatic to the ovaries. Gynecologic Oncology. 2005; 98: 235–241.

[15] Sal V, Demirkiran F, Topuz S, Kahramanoglu I, Yalcin I, Bese T, *et al*. Surgical treatment of metastatic ovarian tumors from extragenital primary sites. International Journal of Gynecological Cancer. 2016; 26: 688–696.

[16] Liu W, Cui YM, Wang XJ, Lin XD, Zhang LB, Liu JC, *et al*. Lung adenocarcinoma metastatic to the ovary: a retrospective clinicopathological analysis of 17 cases and literature review. Pathology. 2024; 56: 942–950.

[17] Dueno S, Stein R, Jamal M, Lewis G, Hew K. Metastasis of serous ovarian carcinoma to the breast: a case report and review of the literature. Journal of Medical Case Reports. 2024; 18: 127.

[18] Olmes GL, Breitbach GP, Tepikin A, Nistor A, Solomayer EF, Hamoud BH. A metastasis of ovarian cancer in the Bartholin gland: a case report with systematic literature review. Reproductive Sciences. 2024; 31: 550–554.

[19] Preetam S, Mondal S, Priya S, Bora J, Ramniwas S, Rustagi S, *et al*. Targeting tumour markers in ovarian cancer treatment. Clinica Chimica Acta. 2024; 559: 119687.

[20] Ramos C, Gerakopoulos V, Oehler R. Metastasis-associated fibroblasts in peritoneal surface malignancies. British Journal of Cancer. 2024; 131: 407–419.

[21] Shah AS, Menias CO, Schmitt A, Chen L, Magtibay PM, Nguyen B, *et al.* An unusual presentation: high-grade serous carcinoma of the fallopian tube manifesting with altered mental status secondary to a single brain metastasis—a case report and review of the literature. Journal of Minimally Invasive Gynecology. 2024; 31: 155–160.

[22] Wang W, Ji X, Yang H, Wang X. Ovarian carcinosarcoma with lung metastasis characterized by persistent fever: a case report and literature review. Medicine. 2024; 103: e40202.

[23] Dong SY, Ding S, Meng Z, Zou B. The clinicopathological and prognostic significance of PSMD14 in cancers based on bioinformatics and meta-analysis. Future Science OA. 2024; 10: 2409054.

[24] Patel D, Thankachan S, Sreeram S, Kavitha KP, Suresh PS. The role of tumor-educated platelets in ovarian cancer: a comprehensive review and update. Pathology Research and Practice. 2023; 241: 154267.

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