International Journal of Biomedicine 15(1) (2025) 210-214
http://dx.doi.org/10.21103/Article15(1)_CR1

CASE REPORT

INTERNATIONAL JOURNAL OF BIOMEDICINE

Pregnancy-Associated Synchronous Ovarian and Gastric Cancer

E. M. Zhulina[1], D. S. Zhulin[1], D. V. Kromka[1], N. V. Bezgodova[2], S. S. Naumov[1], N. V. Krakhmal[1,2*], A. L. Chernyshova[3], M. V. Zavyalova[1,2], S. V. Vtorushin[1,2]

[1]*Siberian State Medical University, Tomsk, Russian Federation*
[2]*Cancer Research Institute, Tomsk National Research Medical Center of the Russian Academy of Sciences, Tomsk, Russian Federation*
[3]*E.N. Meshalkin National Medical Research Center, Novosibirsk, Russian Federation*

Abstract

The occurrence of malignant neoplasms during pregnancy presents an exceptionally challenging clinical scenario, encompassing complex medical decisions alongside crucial social and ethical considerations. The simultaneous development of multiple primary carcinomas is particularly rare, especially when occurring during pregnancy or within 12 months postpartum. Synchronous cancers are defined as two or more independent tumors detected simultaneously or within a six-month interval—representing an uncommon clinical phenomenon of significant scientific interest. While cases of pregnancy-associated synchronous cancers have been documented, successful treatment options remain limited. Our literature review revealed no previously reported cases of synchronous ovarian and gastric cancer developing during pregnancy. This article presents a unique clinical case that highlights both the diagnostic challenges and the severely limited therapeutic options available for patients with pregnancy-associated malignancies, particularly in such a rare combination of synchronous primary tumors. This case contributes valuable insights into the management of complex pregnancy-associated malignancies and underscores the need for improved diagnostic and therapeutic strategies.(**International Journal of Biomedicine. 2025;15(1):210-214.**)

Keywords: malignant neoplasm • pregnancy • synchronous cancer

For citation: Zhulina EM, Zhulin DS, Kromka DV, Bezgodova NV, Naumov SS, Krakhmal NV, Chernyshova AL, Zavyalova MV, Vtorushin SV. Pregnancy-Associated Synchronous Ovarian and Gastric Cancer. International Journal of Biomedicine. 2025;15(1):210-214. doi:10.21103/Article15(1)_CR1

Abbreviations

MNs, malignant neoplasms; **OHSS**, ovarian hyperstimulation syndrome; **PMTs**, primary multiple tumors.

Introduction

The development of malignant neoplasms (MNs) during pregnancy presents an extremely complex situation that encompasses not only multifaceted clinical challenges but also significant social and ethical considerations.[1] Research indicates that cancer is diagnosed in approximately 1 in 1000 pregnancies.[2] Recently, an increase in such cases has been noted, attributed to the trend of women choosing to have children at a later age.[1,3] According to a population study by Petkau et al.[3] in the Russian Federation, conducted between 2017 and 2021, 357 cases of MNs were identified among 217,428 registered pregnancies. Of these, 243 women were diagnosed during pregnancy, while cancer was verified in 114 patients within one year postpartum. Most cases were observed in the 30-34 and 35-39 age groups, accounting for 34.7% and 29.7% of cases, respectively. The leading localizations reported in the study were cervical cancer (23.5%) and breast cancer (19.6%), with lower percentages for thyroid cancer (7%) and ovarian cancer (6.7%). These findings are consistent with other studies addressing the same issue.[4-6] Betts et al.[7] also identified lymphoma, melanoma, and skin cancer as common MNs associated with pregnancy.

***Correspondence:** Nadezhda V. Krakhmal. Siberian State Medical University, Tomsk, Russia. E-mail: krakhmal@mail.ru*

Rare cases of hepatocellular carcinoma during pregnancy have been reported, with an invariably poor prognosis. According to Maeda et al., as of 2020, only 62 such cases had been described in the literature,[8,9] with overall survival rates of 50%, 29.5%, and 13.6% at 6 months, 12 months, and 3 years, respectively.[10] Literature indicates that ovarian tumors are detected in 0.2%-2% of pregnant women, often during routine ultrasound examinations in the first trimester. Most of these tumors are benign and may undergo spontaneous regression; however, 1%-6% are malignant.[11,12] A detailed review of studies from 1991 to 2020 revealed 23 cases where malignant ovarian tumors were diagnosed during pregnancy.[13] The development of MNs in the gastrointestinal system during pregnancy is significantly rarer than in the localizations mentioned above. Clinical symptoms in these patients are often minimal or mimic physiological pregnancy symptoms, leading to late-stage diagnoses and a correspondingly poor prognosis. Colorectal cancer occurs in 0.002% pregnancies, while gastric carcinoma is reported in 0.0025%-0.1%.[14-17]

Cases involving the independent emergence and development of two or more neoplasms in a single patient are categorized as primary multiple tumors (PMTs).[18] Synchronous cancer, defined as the presence of two or more independent tumors simultaneously or within six months, is uncommon and sparks interest among oncology researchers.

In Russia, as of the end of 2022, 258,349 patients with PMTs were registered, comprising 6.4% of all patients under medical observation. The highest rates were observed in Irkutsk (9.0%), Tver (8.7%), Tomsk (8.7%), and Orel regions (8.6%), as well as Altai Krai (8.5%) and Moscow (8.5%).[19]

There are limited reports in the literature of synchronous cancer involving different localizations during pregnancy or within 12 months postpartum. However, data demonstrate favorable treatment outcomes for synchronous endometrial and ovarian cancers associated with pregnancy.[13] Daley et al.[20] reported a case of spontaneous remission of synchronous cancer of the same localization diagnosed within one month postpartum.

Our analysis did not reveal prior descriptions of clinical cases involving the development and progression of synchronous ovarian and gastric cancers associated with pregnancy. From this perspective, our article presents a unique clinical case illustrating the diagnostic challenges and the near impossibility of treating MNs associated with pregnancy.

Case Presentation

A 29-year-old woman was presented to a women's health clinic in September 2021 at 4 weeks of gestation. Her medical history included an ovarian cyst rupture in 2017, which was successfully treated surgically. There was no family history of cancer, no prior pregnancies, abortions, or miscarriages; this was her first planned pregnancy. Before conception, the patient led an active lifestyle, worked as a pediatrician, and regularly underwent preventive medical check-ups, including gynecological examinations. The last pelvic ultrasound in April 2021 revealed no abnormalities.

At 5 weeks of pregnancy, the patient experienced dull, pulling abdominal pain and independently sought care at a private clinic. A pelvic ultrasound revealed a multicystic mass in the pelvis measuring 128×119×145 mm, along with a gestational sac in the uterus measuring 5×3 mm, corresponding to the gestational age. The patient was hospitalized at the gynecology department of OGAUZ «Maternity Hospital №1» in Tomsk with suspected pseudomyxoma. During her stay, a relatively immobile pelvic mass (15×10×10 cm) with elastic consistency and tenderness on palpation was confirmed, but a definitive diagnosis could not be established. At 6 weeks, she was transferred to the multidisciplinary gynecological department of the Tomsk Regional Clinical Hospital (TRCH) for comprehensive evaluation.

Initial findings included a firm, painful hypogastric abdominal mass on palpation. Investigations included pelvic US (multicystic masses right - 99×97×98 mm, left - 117×75×116 mm with free fluid); CA-125 tumor marker elevated to 177.6 U/mL; esophagogastroscopy: erythematous gastropathy.

Pelvic MRI with contrast: Enlarged uterus in retroflection (7×5.4×5.5 cm, cervix 2.6×2.2×3.1 cm), gestational sac (0.9×0.8×1 cm). Large multicystic masses with irregular septations containing hyperintense T1 FS areas, likely proteinaceous (6×11.3×12 cm, 7.4×8.7×7.6 cm). Minimal pelvic free fluid. Conclusion of pelvic MRI: Likely cystadenomas. Pregnancy at 5 weeks.

Abdominal MRI with contrast: Liver normal in size and structure, with a small cyst (7×6 mm, S7) and a hemangioma (10×6 mm, S8). Based on these findings, an onco-gynecologist at the Tomsk Regional Oncology Center concluded that the presentation suggested OHSS with ascites secondary to pregnancy. The elevated CA-125 level was attributed to pregnancy, ovarian masses, and ascites rather than definitive ovarian cancer. The patient was discharged for outpatient follow-up with a Diagnosis: Pregnancy, 6 weeks. OHSS. Bilateral ovarian cysts. Ascites.

At 11 weeks, the patient presented again to TRCH with recurrent complaints. The pain was managed during hospitalization, and prophylactic thromboembolism measures, spasmolytics, iron, folic acid, and iodine supplements were administered. Pelvic US findings showed a gestational sac (diameter 54 mm), crown-rump length (29.4 mm), fetal heartbeat (158 bpm), yolk sac (5mm), and no retrochorial hematoma. Bilateral multicystic ovaries (right - 137×83×114 mm; left - 147×94×122 mm), with detectable vascularization on Doppler imaging. There was no free fluid in the retrouterine space. The patient was discharged with a Diagnosis: Pregnancy, 11 weeks. OHSS. Bilateral ovarian cysts. Pain syndrome.

At 15 weeks, the patient was urgently admitted to the hospital with severe right abdominal pain. Symptoms worsened with signs of peritoneal irritation. Next, emergency surgery was performed—diagnostic laparoscopy, conversion to lower midline laparotomy, partial resection of a hyperstimulated giant right ovary, and pelvic drainage.

Postoperatively, her condition deteriorated despite conservative treatment. Histology examination revealed ovarian cystadenocarcinoma with necrosis and micro-invasion against a background of cystadenofibroma. Subsequent MRI findings indicated a large multicystic-solid pelvic mass with irregular septations (9.9×16×24 cm), signs of mesenteric

involvement, and compression of adjacent organs. No significant lymphadenopathy was noted. Liver MRI findings showed small benign lesions (cysts/ hemangiomas).

A teleconsultation with leading oncopathologists at the National Medical Research Center for Obstetrics, Gynecology, and Perinatology (Moscow) confirmed the diagnosis. An urgent multidisciplinary oncology team recommended further surgery due to rapid tumor progression and degeneration. A second operation was performed: Midline relaparotomy, adhesiolysis, hysterectomy with bilateral adnexectomy, omentectomy, small bowel decompression, and peritoneal drainage. Postoperative recovery was uneventful. Further diagnostic procedures (EGD, colonoscopy) were deferred due to risk of mechanical erosion from nasogastric tube placement. The patient was discharged in stable condition for continued treatment, with the final Diagnosis: Pregnancy, 15 weeks. Ovarian cancer, Stage IIIA2 (T3aN0M0). OHSS. Chronic moderate iron deficiency anemia. Autoimmune thyroiditis. Erythematous gastropathy.

After discharge, the patient was under observation at Tomsk Regional Oncology Center and received the first course of adjuvant chemotherapy following the Paclitaxel 287mg+Carboplatin 350mg regimen. Within a month, an EGD was performed, yielding the following results: Insufficiency of the lower esophageal sphincter. Epithelial lesion at the esophagogastric junction (0-Is), measuring up to 0.7 cm (Biopsy 1). A tumor in the middle third of the stomach along the greater curvature presented as a flat, irregularly rounded ulcerative defect with converging folds measuring up to 1.5cm in diameter and a surrounding infiltration zone (Biopsy 2).

Pathology Description: Biopsy 1: The sample reveals a polypoid lesion composed of hyperplastic gastric-type glands with moderate stromal inflammation. Biopsy 2: Gastric mucosal fragments containing numerous discrete tumor cells and small tubular structures. Tumor cells exhibit significant pleomorphism and atypical mitotic figures. The stroma is well-developed and consists of fibromuscular tissue. Pathology Diagnosis: Hyperplastic polyp of the esophagogastric junction (Biopsy 1). High-grade adenocarcinoma (ICD 8140/3; Biopsy 2).

For further consultation and review of surgical specimens (uterus with adnexa, omentum, peritoneum, and ovarian tumors) and esophageal/gastric biopsy material, as well as immunohistochemistry studies, the patient was admitted to the Department of General and Molecular Pathology at the Oncology Research Institute of Tomsk National Research Medical Center. The findings are summarized as follows:

1. Uterine Specimens: Fragments of the uterine wall containing structures of an immature placenta. Placental tissue predominantly exhibits longitudinal and transverse sections of intermediate mature villi with visible vessels. Intervillous spaces contain acellular fibrinoid deposits. The basal plate includes Rohrer's layer with cytotrophoblast foci. Cytotrophoblast cells are present within the lumen of spiral arteries and veins, causing obstruction. Necrosis with focal leukocyte infiltration is observed in some areas. The fallopian tubes appear structurally intact.

2. Omental Specimens: Uneven vascular congestion, minor diapedesis hemorrhages, focal lymphatic and leukostasis. Tumor cells are absent.

3. Peritoneal Specimens: Signs of subacute inflammation, dilated vessels, erythrostasis, and diapedesis hemorrhages. Fibrin threads are visible on the peritoneal surface, while diffuse moderate infiltration of macrophages, fibroblasts, lymphocytes, and occasional neutrophils is noted in the stroma.

4. Ovarian Tumor Specimens: Identical histological features in both ovaries. The stroma contains numerous cystic cavities with invasive mucinous tumor foci, characterized by gland-like structures of varying shapes and sizes, lined with stratified epithelium. Tumor cells exhibit moderate pleomorphism, normochromic round nuclei, and moderately eosinophilic cytoplasm. Desmoplastic stroma features small tumor cell complexes and discretely located tumor cells. IHC analysis using the Leica Bond Max system revealed:

Diffuse bright expression of Cytokeratin 7 (clone OV-TL, Dako), CDX2 (clone DAK-CDX2, Dako) and PAX8 (Polyclonal, Cell Marque).

No expression of CA125, Wilms' Tumor, Calretinin, Inhibin, CD56, Progesterone receptor or Napsin A.

Diagnosis: Invasive mucinous carcinoma (ICD-O code 8480/3) of the ovaries arising in a background of borderline tumors.

5. Gastric Specimens: A hyperplastic polyp was identified in the gastric mucosa's epithelial lesion. Fragments labeled "tumor" revealed numerous discrete tumor cells and small tubular structures. Tumor cells demonstrated pronounced pleomorphism and atypical mitotic figures. The tumor stroma was well-developed, consisting of fibrous and muscular layers. IHC analysis using the Leica Bond Max system revealed:

•Strong expression of Cytokeratin 7 (clone OV-TL, Dako) in tumor cells.

•Absence of c-erB-2 (Her2/neu) (Polyclonal Rabbit, Dako) expression in tumor cells.

•PD-L1 status was assessed using the SP263 clone (Ventana), indicating PD-L1 negativity (CPS<1).

Diagnosis: High-grade gastric adenocarcinoma (ICD-O code 8140/3), Her2-negative (score 0) and PD-L1-negative (CPS<1).

The patient underwent further treatment at the Oncology Research Institute of Tomsk NRMC, receiving a palliative chemotherapy course with docetaxel (75 mg), oxaliplatin (130 mg, leucovorin (300 mg), and a 48-hour infusion of fluorouracil (3500 mg). The patient was discharged in satisfactory condition after a treatment break. On April 4, 2022, the patient was admitted to the Medical G.K. Zherlov's Center, where on April 7, 2022, she underwent surgery including an upper midline laparotomy, extended combined gastrectomy with D2 lymphadenectomy, splenectomy, and drainage of the abdominal cavity. The postoperative period was uneventful, and the patient was discharged under the care of an oncologist at her local clinic. One month later, during another course of palliative chemotherapy, the patient developed an acute intestinal obstruction. She was urgently hospitalized in the surgical department of Siberian State Medical University Clinics, where an emergency laparotomy, abdominal revision, adhesiolysis, and bypass entero-colonic

anastomosis were performed. After discharge, the patient was followed up by the local oncologist. She reported persistent, diffuse abdominal pain, loss of appetite, and a weight loss of 15 kg. The pain was managed with narcotic analgesics. The patient passed away nine months after her initial visit to the antenatal clinic for pregnancy registration.

Discussion

This case report highlights a rare and complex clinical scenario involving synchronous ovarian and gastric cancers in a young pregnant woman. The authors obtained written consent from the patient's family (mother and sister) to share this clinical information for publication. The uniqueness of this case lies in the simultaneous development of two primary malignancies during pregnancy, a situation that poses significant diagnostic and therapeutic challenges. Advances in diagnostic techniques and cancer therapies have increased the detection of such malignancies at earlier stages. However, survival rates among pregnant patients remain low. This is often attributed to delayed clinical manifestations, difficulties in diagnosis due to overlapping symptoms like pregnancy-associated nausea or toxicosis, and atypical anatomical shifts during pregnancy. These factors can lead to diagnostic errors and delayed treatment, resulting in a poor prognosis.[10] It is widely recognized that oncogenesis likely precedes pregnancy, with hormonal changes—such as elevated estrogen and progesterone levels—acting as triggers for accelerated tumor progression.[11] Notably, the prognosis for both the mother and the fetus is closely tied to the gestational age at which malignancy is identified. Early detection during the first trimester tends to favor maternal outcomes, while fetal prognosis improves when cancers are diagnosed during the third trimester.[12]

A thorough review of the existing literature revealed no previously documented cases of synchronous ovarian and gastric cancers during pregnancy. Despite comprehensive treatment efforts in this case, the outcome remained unfavorable, underscoring the complexity of managing such conditions. The case highlights the necessity of an individualized treatment approach and emphasizes the importance of referring patients to specialized oncology centers with experience managing rare and aggressive malignancies during pregnancy.

Competing Interests

The authors declare that they have no competing interests.

References

1. Javitt MC. Cancer in pregnancy: overview and epidemiology. Abdom Radiol (NY). 2023 May;48(5):1559-1563. doi: 10.1007/s00261-022-03633-y. Epub 2022 Aug 12. PMID: 35960309.

2. Dalmartello M, Negri E, La Vecchia C, Scarfone G, Buonomo B, Peccatori FA, Parazzini F. Frequency of Pregnancy-Associated Cancer: A Systematic Review of Population-Based Studies. Cancers (Basel). 2020 May 26;12(6):1356. doi: 10.3390/cancers12061356. PMID: 32466494; PMCID: PMC7352408.

3. Petkau VV, Kiseleva KE, Kiselev EA, Efremov SA, Ankudinov NO, Karimova AA. [Malignant neoplasms associated with pregnancy: a population study]. Malignant Tumors. 2023;(1). doi.org/10.18027/2224-5057-2023-13-1-5-10. (In Russian)

4. Teran-Porcayo MA, Gomez-Del Castillo-Rangel AC, Barrera-Lopez N, Zeichner-Gancz I. Cancer during pregnancy: 10-year experience at a regional cancer reference center in Mexico. Med Oncol. 2008;25(1):50-3. doi: 10.1007/s12032-007-0020-1. Epub 2007 May 15. PMID: 18188714.

5. Sekine M, Kobayashi Y, Tabata T, Sudo T, Nishimura R, Matsuo K, Grubbs BH, Enomoto T, Ikeda T. Malignancy during pregnancy in Japan: an exceptional opportunity for early diagnosis. BMC Pregnancy Childbirth. 2018 Feb 8;18(1):50. doi: 10.1186/s12884-018-1678-4. PMID: 29422016; PMCID: PMC5806462.

6. Li Q, Xu XZ, Shi JH. Synchronous parathyroid adenoma, papillary thyroid carcinoma and thyroid adenoma in pregnancy: A case report. World J Clin Cases. 2020 Nov 6;8(21):5426-5431. doi: 10.12998/wjcc.v8.i21.5426. PMID: 33269280; PMCID: PMC7674750.

7. Betts AC, Shay LA, Lupo PJ, Pruitt SL, Roth ME, Allicock MA, Cohn BA, Murphy CC. Adverse birth outcomes of adolescent and young adult women diagnosed with cancer during pregnancy. J Natl Cancer Inst. 2023 Jun 8;115(6):619-627. doi: 10.1093/jnci/djad044. PMID: 36912709; PMCID: PMC10248853.

8. Russell P, Sanjay P, Dirkzwager I, Chau K, Johnston P. Hepatocellular carcinoma during pregnancy: case report and review of the literature. N Z Med J. 2012 Apr 20;125(1353):141-5. PMID: 22522274.

9. Maeda T, Imai D, Wang H, Yugawa K, Kinjo N, Kawata K, Ikeda S, Edahiro K, Takeishi K, Iguchi T, Kayashima H, Harada N, Ninomiya M, Yamaguchi S, Konishi K, Tsutsui S, Matsuda H. Hepatic resection for recurrent hepatocellular carcinoma during pregnancy: a case report. Surg Case Rep. 2020 Sep 29;6(1):229. doi: 10.1186/s40792-020-00985-9. PMID: 32990785; PMCID: PMC7524929.

10. Choi KK, Hong YJ, Choi SB, Park YN, Choi JS, Lee WJ, Kim KS. Hepatocellular carcinoma during pregnancy: is hepatocellular carcinoma more aggressive in pregnant patients? J Hepatobiliary Pancreat Sci. 2011 May;18(3):422-31. doi: 10.1007/s00534-010-0345-6. PMID: 21116657.

11. Fruscio R, de Haan J, Van Calsteren K, Verheecke M, Mhallem M, Amant F. Ovarian cancer in pregnancy. Best Pract Res Clin Obstet Gynaecol. 2017 May;41:108-117. doi: 10.1016/j.bpobgyn.2016.09.013. Epub 2016 Oct 1. PMID: 28029502.

12. Causa Andrieu PI, Wahab SA, Nougaret S, Petkovska I. Ovarian cancer during pregnancy. Abdom Radiol (NY). 2023 May;48(5):1694-1708. doi: 10.1007/s00261-022-03768-y. Epub 2022 Dec 20. PMID: 36538079; PMCID: PMC10627077.

13. Chernyshova AL, Kolomiets LA, Trushchuk YuM, et al. [A clinical case of synchronous endometrial and ovarian cancer associated with pregnancy]. Tumors of Female Reproductive System. 2023;19(2):133-37. doi: 10.17650/1994-4098-2023-19-2-133-137. (In Russian).

14. Pectasides M, Sekhar A, Dighe MK, Schwartz G, Shah SN, Mulcahy MF, Horowitz JM. Gastrointestinal malignancies in pregnancy. Abdom Radiol (NY). 2023 May;48(5):1709-1723. doi: 10.1007/s00261-022-03788-8. Epub 2023 Jan 6. PMID: 36607401.
15. Yang H, Han X. Colorectal cancer in pregnancy: a case report and literature review. J Gastrointest Oncol. 2021 Apr;12(2):885-891. doi: 10.21037/jgo-21-31. PMID: 34012676; PMCID: PMC8107627.
16. Shemer O, Stanleigh J, Pansky M, Barel O. [GASTRIC CANCER IN PREGNANCY]. Harefuah. 2022 Dec;161(12):747-750. Hebrew. PMID: 36916113.
17. Hussain N, Selvakumari N, Afadapa F, Amu O. Pregnancy and gastric cancer: diagnostic and treatment dilemma. BMJ Case Rep. 2018 Jun 23;2018:bcr2017222963. doi: 10.1136/bcr-2017-222963. PMID: 29936442; PMCID: PMC6021030.
18. Stepanova YuA, Kalinin DV, Vishnevsky VA. [Multiple Primary Neoplasms (Literature Review)]. Medical Visualization. 2015;(6):93-102. (In Russian)
19. The State of oncological care for the population of Russia in 2022. Ed. by Kaprin AD, Starinsky VV, Shakhzadova AO. Moscow: P. Hertzen Moscow Oncology Research Institute - branch of the National Medical Research Radiology Center, Ministry of Health of Russia, 2022. 239 p. (In Russian)
20. Daley D, Padwick M, Mistry S, Malhotra V, Vikram RS, Stanciu P. Case report: Spontaneous remission of synchronous endometrial and ovarian cancers following pregnancy. Front Oncol. 2022 Nov 29;12:1001677. doi: 10.3389/fonc.2022.1001677. PMID: 36523967; PMCID: PMC9745153.