

## CASE REPORT

# A case report of malignant struma ovarii with papillary thyroid carcinoma

Yekta Rahimi<sup>1</sup>  | Soghra Rabizadeh<sup>2</sup> | Sara Seifouri<sup>3</sup> | Kiana Seifouri<sup>2</sup> | Samane Salarvand<sup>4</sup> | Manouchehr Nakhjavani<sup>2</sup> 

<sup>1</sup>University of Southern California, Los Angeles, California, USA

<sup>2</sup>Endocrinology and Metabolism Research Center (EMRC), Vali-Asr Hospital, Tehran University of Medical Sciences, Tehran, Iran

<sup>3</sup>Guy's Hospital, London, UK

<sup>4</sup>Department of pathology Cancer Institute, Tehran University of Medical Sciences, Tehran, Iran

## Correspondence

Manouchehr Nakhjavani,  
Endocrinology and Metabolism  
Research Center (EMRC), Vali-Asr  
Hospital, Tehran University of Medical  
Sciences, Tehran, Iran.  
Email: [nakhjavanim@tums.ac.ir](mailto:nakhjavanim@tums.ac.ir)

## Key clinical message

Struma ovarii (SO), is a rare and specialized ovarian teratoma. The treatment is controversial depending on the risk of recurrence and metastasis. Here a SO with papillary thyroid carcinoma is reported and the approach is thoroughly discussed.

## Abstract

Struma ovarii (SO) is a highly specialized ovarian teratoma primarily composed of thyroid tissue. Clinical features associated with SO include lower abdominal discomfort, unusual vaginal bleeding, ascites, and hyperthyroidism. While SO rarely transforms into malignancy, the optimal degree of treatment remains controversial due to the varying risks of recurrence and metastasis. In this report, we present the case of a 64-year-old woman experiencing abdominal pain and diagnosed with SO, accompanied by papillary thyroid carcinoma. We thoroughly discuss the evaluation and management of this rare condition.

## KEYWORDS

malignancy, papillary thyroid carcinoma, radioactive iodine ablation, Struma ovarii, total thyroidectomy

## 1 | INTRODUCTION

Struma ovarii (SO) is a highly specialized ovarian teratoma, mainly composed of thyroid tissue.<sup>1,2</sup> It can be characterized by clinical features such as lower abdominal discomfort, unusual vaginal bleeding, ascites, and hyperthyroidism, and may be associated with an underlying thyroid disease.<sup>3–6</sup> Based on evidence patients with SO mostly have no symptoms or may present with non-specific symptoms similar to other ovarian cancers.<sup>7,8</sup> It has been shown that 5% of SO cases are malignant, and metastases are not well-documented. The transformation of struma into malignant thyroid tissue requires

a BRAF genetic mutation, similar to the mutation that occurs in the thyroid, leading to malignancy.<sup>9</sup> The papillary type is also the most common malignancy in SO.<sup>10</sup> Nuclear features found in primary thyroid cancer, such as grooves, granular chromatin, and psammoma bodies, may also be observed in malignant ovarian masses.<sup>11</sup> Approximately 70% of follicular cell-derived thyroid carcinomas exhibit mutations in genes such as BRAF, RAS, RET, and NTRK1. Specifically, the BRAF mutation is observed in 29%–69% of primary papillary thyroid cancers.<sup>4</sup> Despite these genetic associations, papillary thyroid carcinoma has an excellent surveillance record, mirroring its favorable prognosis. The 5 and 10-year prognosis for

This is an open access article under the terms of the [Creative Commons Attribution](https://creativecommons.org/licenses/by/4.0/) License, which permits use, distribution and reproduction in any medium, provided the original work is properly cited.

© 2024 The Authors. *Clinical Case Reports* published by John Wiley & Sons Ltd.

malignant SO are 92% and 79%, respectively.<sup>12</sup> In the literature, no optimum treatment has been declared for malignant SO.<sup>13</sup> Therefore, we present a rare case of SO and discuss its management.

## 2 | CASE REPORT

### 2.1 | Case history and physical examination

A 64-year-old woman presented with abdominal pain in 2014. She had experienced dull abdominal pain for some time, with no other specific symptoms. Physical examination revealed no palpable mass, and tenderness was negative. The patient had no significant medical or drug history.

### 2.2 | Methods

Abdominopelvic ultrasonography revealed a large, heterogeneous mass with an irregular border (43 × 45 mm) in the left ovary. Hematological and biochemical investigations were normal: LDH (309 IU/mL, reference range <480), CEA (0.2 µg/mL, reference range 0–5.5), and Alpha-fetoprotein (2.1 IU/mL, reference range <5).

Magnetic resonance imaging of the abdomen and pelvis suggested a large multicystic lesion with a solid component in the left ovary, strongly indicating left ovarian cancer. Subsequently, a hysterectomy with bilateral salpingo-oophorectomy was performed.

Pathological examination revealed a 1.5 cm endometrial polyp and a normal right ovary. The left ovarian mass was identified as a teratoma consisting of papillary thyroid carcinoma (Figure 2). The tumor comprised cartilage, bone, ciliated columnar epithelium, foci of normal thyroid follicles, and a papillary neoplasm with loose connective tissue and a vascular core lined with atypical cells demonstrating nuclear crowding, overlapping, and clearing.

Immunohistochemical (IHC) study yielded positive results for CK7, TTF1, and thyroglobulin, and negative for CA125. BRAF was positive in our patient. These IHC findings suggested that the ovarian teratoma was composed of thyroid tissue (Figures 1–3).

Laboratory results are summarized in Table 1: TSH: 4.4 mIU/L (0.5–5), T4:7.9 mcg/dL(4.7–12.5), T3: 1.3 ng/mL (0.8–2.3), thyroglobulin: 24.5 ng/mL, anti-thyroglobulin:6.2 IU/mL. WBC: 4600 (4500–10,500), Hemoglobin: 14 g/dL (13.8–17.2), platelet: 337000/mL of blood (150,000–450,000), FBS: 115 mg/dL (<100), BUN: 21 mg/dL (6–24), Creatinine: 1.1 mg/dL (0.7–1.3),

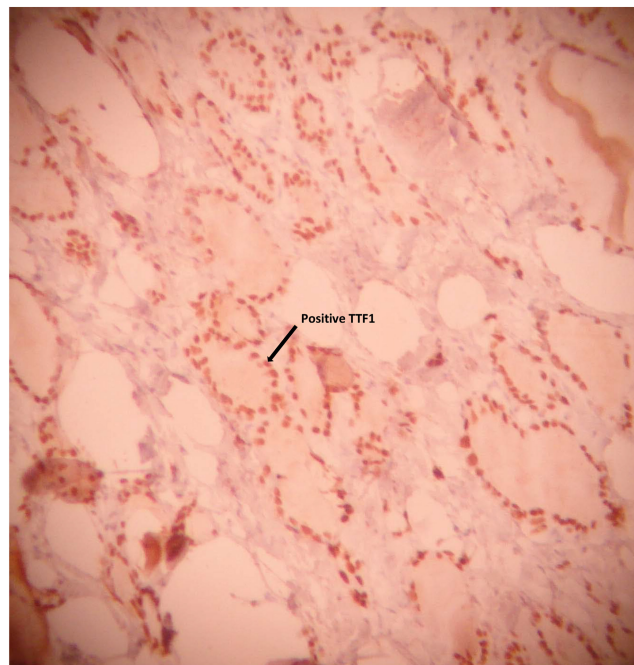


FIGURE 1 Immunohistochemical staining for TTF1 highlights thyroidal origin of neoplastic cells in struma ovarii (×100).

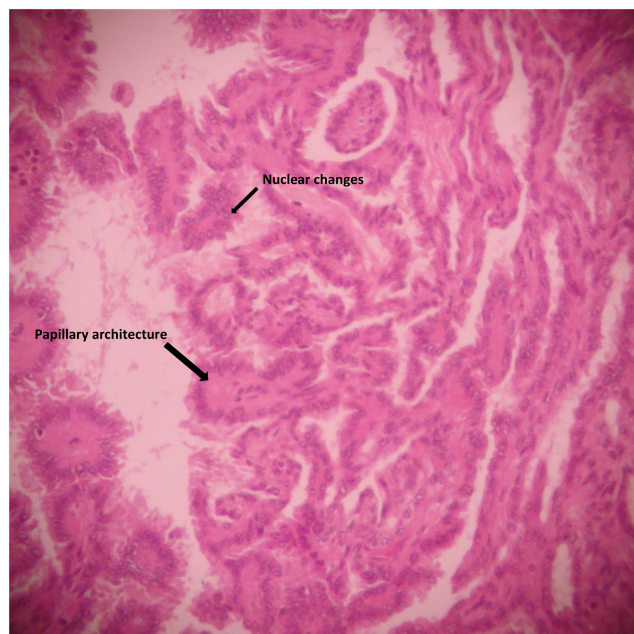
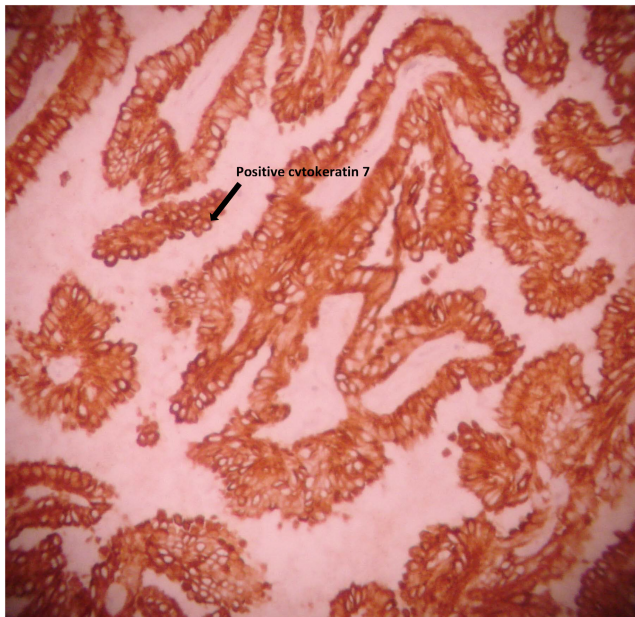


FIGURE 2 Focus of papillary thyroid carcinoma arising on struma ovarii. Note true papillae with multiple branching and nuclear changes of neoplastic cells including nuclear enlargement, crowding, overlapping, clearing, and inclusions (×100).

AST: 24 U/L (8–33), ALT: 50 U/L (7–55), Alk P: 335 U/L (44–147).

The whole-body scan conducted 3 h after the intravenous administration of 740 MBq of T99-MIBI showed no evidence of abnormal MIBI-avid lesions. Thyroid



**FIGURE 3** Immunohistochemical staining for cytokeratin seven shows a positive reaction in neoplastic cells in struma ovarii ( $\times 400$ ).

ultrasonography revealed an 8 mm nodule in the right lobe and a  $28 \times 16$  mm lymph node in the right cervical region.

### 2.3 | Conclusion and results

Following a total thyroidectomy, pathology results were negative for malignancy. Two months post-thyroidectomy, laboratory tests indicated TSH  $>100$  mIU/L, Tg: 2.05 ng/mL, and anti-Tg: 3 IU/mL. Subsequently, the patient underwent ablation with 150 mCi of radioactive iodine (RAI). The post-therapeutic I-131 whole-body scan revealed no uptake in the pelvic area or distant metastasis. The patient was prescribed a daily dose of levothyroxine at 150  $\mu$ g.

Suppressive therapy. In the follow-up, in 2017, laboratory test results were as follows: Tg  $<0.2$  ng/mL, anti-Tg  $<20$  IU/mL, TSH: 0.05 mIU/mL. Ultrasonography, of the neck showed three suspicious lymph nodes up to  $14 \times 8$  mm on the left side. A biopsy of the lymph node was done and it was negative for malignancy. The patient had a good condition with no evidence of metastasis at other sites.

## 3 | DISCUSSION

SO accounts for about 1% of all ovarian tumors and 2.7% of dermoid tumors.<sup>1,2</sup> Malignant SO is exceptionally rare and lacks distinctive signs and symptoms. Patients with

struma ovarii typically present with symptoms unrelated to the thyroid, such as abdominal mass, vague pain, or swelling; however, some may exhibit symptoms of hyperthyroidism.<sup>14</sup> In a study conducted from 1940 to 2008, 60 out of 88 patients with malignant SO exhibited benign histological features, while 28 patients showed malignant histological features. Among the latter, 20 were diagnosed with papillary carcinoma. The majority of these individuals, typically between 40 and 50 years old, presented with chief complaints of abdominal pain, mass, or vomiting. In most cases, the mass was unilateral, with an average size of 13 cm. Similarly, we present the case of a 64-year-old woman who complained of abdominal pain, and upon examination, a tumor with a size of  $4 \times 4$  cm was identified. The presence of thyroid follicles with colloid, resembling normal thyroid tissue, and the reaction to thyroglobulin antibodies and thyroid transcription factor-1 in ovaries suggest normal SO. However, diagnosing malignant SO can be challenging. In Schmidt's study, four out of every six malignant struma cases exhibited BRAF mutation, while none of the nine benign struma cases were BRAF positive.<sup>15</sup> Our patient's IHC results were positive for CK7, TTF1, and Thyroglobulin, and negative for CA125. As there are no specific guidelines for the treatment of malignant SO, decisions should be individualized based on the histological and pathological findings of the mass. According to Kabukcuoglu et al., pelvic surgery is deemed sufficient in these patients, and prophylactic thyroidectomy is considered unnecessary.<sup>16</sup>

In the studies conducted by Devaney et al. and Terayama et al., none of the patients with malignant SO received adjuvant therapy, and there was no clinical evidence of recurrence.<sup>17,18</sup> Some studies suggested that the RAI didn't improve mortality rate and overall survival rate.<sup>19,20</sup> However, it should be considered that the incidence of papillary carcinoma and malignant SO is increasing. To mitigate the chance of recurrence, it is recommended to perform thyroidectomy followed by RAI for tumors larger than 2 cm with distant metastasis, the presence of BRAF mutation, or synchronized thyroid cancer.<sup>1,9,21-23</sup> Given the large size and BRAF-positive tumor, despite the absence of synchronized thyroid cancer or metastasis, the following treatment was applied: total thyroidectomy, bilateral oophorectomy, and radioiodine ablation. In the follow-up series, there were no specific signs of recurrence. In support of our management, no recurrence was observed in patients after total thyroidectomy and RAI ablation, even after 36 years.<sup>24</sup> Other studies also recommend near-total thyroidectomy followed by RAI ablation for the treatment of malignant SO.<sup>3,9,25</sup> Wu et al. presented a case with massive peritoneal metastasis 14 years after chemotherapy for malignant SO.<sup>26</sup> The measurement of thyroglobulin and Tg antibodies, coupled with pelvic and thyroid imaging, can

Laboratory tests	Conventional units	Reference range values	Patient results (2020)
LDH	IU/mL	<480	309
CEA	µg/mL	0–5.5	0.2
Alfa fetoprotein	IU/mL	<5	2.1
White blood cell Count	×1/µL	4500–10,500	4600
FBS	mg/dl	<100	115
Hemoglobin	g/dL	13.8–17.2	14
BUN	mg/dl	6–24	21
Platelet count	×1/µL	150,000–450,000	337,000
Creatinine	mg/dl	0.7–1.3	1.1
ALT	U/L	7–55	50
AST	U/L	8–33	24
ALK P	U/L	44–147	335
TSH	µIU/mL	0.5–5	4.4
T4	mcg/dl	4.7–12.5	7.9
T3	ng/mL	0.8–2.3	1.3

Abbreviations: ALK P, alkaline phosphatase; ALT, alanine transaminase; AST, aspartate aminotransferase; BUN, blood urea nitrogen; CEA, carcinoembryonic antigen; FBS, fasting blood sugar; LDH, lactate dehydrogenase; T3, triiodothyronine; T4, thyroxine; TSH, thyroid stimulating hormone.

serve as biomarkers for detecting metastasis and relapse. Therefore, any detectable thyroglobulin in serum indicates the need for further assessment for recurrence.<sup>27,28</sup> In our case, thyroglobulin (Tg) and anti-thyroglobulin (anti-Tg) were measured, and the results were normal. There was no sign of recurrence after 3 years. The choice of an effective therapeutic approach may be influenced by factors such as the type of carcinoma, the age of the patient, and evidence of metastasis.<sup>20</sup>

In conclusion, we reported a rare case of malignant SO. The treatment procedure for malignant SO may vary depending on the stage of the disease. In the presented case, primary thyroid carcinoma treatment was applied, and no metastasis was detected after 3 years.

#### AUTHOR CONTRIBUTIONS

**Yekta Rahimi:** Writing – original draft. **Soghra Rabizadeh:** Supervision; validation. **Sara Seifouri:** Writing – review and editing. **Kiana Seifouri:** Writing – review and editing. **Samane Salarvand:** Visualization. **Manouchehr Nakhjavani:** Conceptualization; project administration; supervision; validation.

#### FUNDING INFORMATION

None.

#### CONFLICT OF INTEREST STATEMENT

The authors confirm that there is no conflict of interest.

TABLE 1 Laboratory case results.

#### DATA AVAILABILITY STATEMENT

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

#### ETHICS STATEMENT


Written informed consent was obtained from the patient to publish this report in accordance with the journal's patient consent policy.

#### CONSENT

Written informed consent was obtained from the patient to publish this report in accordance with the journal's patient consent policy.

#### ORCID

Yekta Rahimi  <https://orcid.org/0000-0002-6156-3136>

Manouchehr Nakhjavani  <https://orcid.org/0000-0002-9744-2328>

#### REFERENCES

1. Yoo SC, Chang KH, Lyu MO, Chang SJ, Ryu HS, Kim HS. Clinical characteristics of struma ovarii. *J Gynecol Oncol.* 2008;19(2):135-138.
2. Marti JL, Clark VE, Harper H, Chhieng DC, Sosa JA, Roman SA. Optimal surgical management of well-differentiated thyroid cancer arising in struma ovarii: a series of 4 patients and a review of 53 reported cases. *Thyroid.* 2012;22(4):400-406.
3. Zhang R, Tian X, Luo Y, et al. Case report: recurrent malignant struma ovarii with hyperthyroidism and metastases, a

- rare case report and review of the literature. *Pathol Oncol Res.* 2022;28:1610221.
4. Zhang X, Axiotis C. Thyroid-type carcinoma of struma ovarii. *Arch Pathol Lab Med.* 2010;134(5):786-791.
  5. Hatami M, Breining D, Owers RL, Del Priore G, Goldberg GL. Malignant struma ovarii—a case report and review of the literature. *Gynecol Obstet Investig.* 2008;65(2):104-107.
  6. Reyhan SK, Shirzad R, Shirzad N, Azmoudeh-Ardalan F, Hemmatabadi M. Toxic multi nodular goiter and struma ovarii coexistence: report of a rare case. *Turk J Endocrinol Metab.* 2021;25(2):243-248.
  7. March DE, Desai AG, Park CH, Hendricks PJ, Davis PS. Struma ovarii: hyperthyroidism in a postmenopausal woman. *J Nucl Med.* 1988;29(2):263-265.
  8. Kim S-J, Pak K, Lim H-J, et al. Clinical diversity of struma ovarii. *Korean J Obstet Gynecol.* 2002;45(5):748-752.
  9. DeSimone CP, Lele SM, Modesitt SC. Malignant struma ovarii: a case report and analysis of cases reported in the literature with focus on survival and I131 therapy. *Gynecol Oncol.* 2003;89(3):543-548.
  10. Boucek J, Kastner J, Skrivan J, et al. Occult thyroid carcinoma. *Acta Otorhinolaryngol Ital.* 2009;29(6):296-304.
  11. Shaco-Levy R, Bean SM, Bentley RC, Robboy SJ. Natural history of biologically malignant struma ovarii: analysis of 27 cases with extraovarian spread. *Int J Gynecol Pathol.* 2010;29(3):212-227.
  12. Bennani Guebessi N, Karkouri M. Papillary thyroid carcinoma in struma ovarii: a case report and literature review. *African Journal of Cancer.* 2015;7(2):140-142.
  13. Zhu Y, Wang C, Zhang G-N, et al. Papillary thyroid cancer located in malignant struma ovarii with omentum metastasis: a case report and review of the literature. *World J Surg Oncol.* 2016;14(1):17.
  14. Matsuda K, Maehama T, Kanazawa K. Malignant struma ovarii with thyrotoxicosis. *Gynecol Oncol.* 2001;82(3):575-577.
  15. Schmidt J, Derr V, Heinrich MC, et al. BRAF in papillary thyroid carcinoma of ovary (struma ovarii). *Am J Surg Pathol.* 2007;31(9):1337-1343.
  16. Kabukcuoglu F, Baksu A, Yilmaz B, Aktumen A, Evren I. Malignant struma ovarii. *Pathol Oncol Res.* 2002;8(2):145-147.
  17. Devaney K, Snyder R, Norris HJ, Tavassoli FA. Proliferative and histologically malignant struma ovarii: a clinicopathologic study of 54 cases. *Int J Gynecol Pathol.* 1993;12(4):333-343.
  18. Terayama N, Fujiwara S, Ueda S, Yamada T, Ohmichi M. Malignant struma ovarii with thyroid-type papillary and poorly differentiated carcinoma: a case report. *J Med Case Rep.* 2022;16(1):348.
  19. Zuo J, Lan Y, Hu H, et al. Metabolomics-based multidimensional network biomarkers for diabetic retinopathy identification in patients with type 2 diabetes mellitus. *BMJ Open Diabetes Res Care.* 2021;9(1):e001443.
  20. Cui Y, Yao J, Wang S, Zhao J, Dong J, Liao L. The clinical and pathological characteristics of malignant struma ovarii: an analysis of 144 published patients. *Frontiers. Oncology.* 2021;11:11.
  21. Yassa L, Sadow P, Marqusee E. Malignant struma ovarii. *Nat Clin Pract Endocrinol Metab.* 2008;4(8):469-472.
  22. Oudoux A, Leblanc E, Beaujot J, Gauthier-Kolesnikov H. Treatment and follow-up of malignant struma ovarii: regarding two cases. *Gynecol Oncol Rep.* 2016;17:56-59.
  23. Salman WD, Singh M, Twajiz Z. A case of papillary thyroid carcinoma in struma ovarii and review of the literature. *Pathol Res Int.* 2010;2010:352476.
  24. McGill JF, Sturgeon C, Angelos P. Metastatic struma ovarii treated with total thyroidectomy and radioiodine ablation. *Endocr Pract.* 2009;15(2):167-173.
  25. Khatchapuridze K, Kekelidze N, Tsitsishvili Z, McHedlishvili M, Kordzaia D. Papillary thyroid carcinoma in struma ovarii. *Gynecol Endocrinol.* 2020;36(8):749-752.
  26. Wu M, Hu F, Huang X, Tan Z, Lei C, Duan D. Extensive peritoneal implant metastases of malignant struma ovarii treated by thyroidectomy and <sup>131</sup>I therapy: a case report. *Medicine (Baltimore).* 2018;97(51):e13867.
  27. Leuştean L, Ungureanu MC, Preda C, et al. Management of malignant struma ovarii: is aggressive therapy justified? Case report and literature review. *Thyroid Res.* 2022;15(1):14.
  28. Janszen EW, van Doorn HC, Ewing PC, et al. Malignant struma ovarii. *Ned Tijdschr Geneesk.* 2008;152:1647.

**How to cite this article:** Rahimi Y, Rabizadeh S, Seifouri S, Seifouri K, Salarvand S, Nakhjavani M. A case report of malignant struma ovarii with papillary thyroid carcinoma. *Clin Case Rep.* 2024;12:e8610. doi:[10.1002/ccr3.8610](https://doi.org/10.1002/ccr3.8610)