

Giant Testicular Tumor with Seminoma and Adenocarcinoma Component: A Case Report

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Abstract: Giant testicular tumors are uncommon and may present with extensive metastatic disease and complex histopathological findings, complicating definitive diagnosis and treatment planning.

Objective: This case report aims to describe the clinical, radiological, histopathological, and biochemical characteristics of a giant testicular tumor containing seminoma and an adenocarcinoma component of uncertain origin. **Methodology:** A descriptive case report was conducted using clinical examination, diagnostic imaging, postoperative serum tumor marker assessment, and histopathological evaluation following radical inguinal orchiectomy. **Findings:** A 35-year-old man presented with progressive right testicular enlargement and radiological evidence suggestive of pulmonary and lymphatic metastases. Orchiectomy revealed a 12 × 8.5 × 6.5 cm tumor containing seminoma and an adenocarcinoma component without identifiable teratoma. Postoperative AFP, β -hCG, and LDH levels were elevated at 371 IU/mL, 191.86 mIU/mL, and 1721 U/L, respectively. The origin of the adenocarcinoma component remained undetermined. **Implications:** Discordant histopathological and biochemical findings require comprehensive clinicopathological correlation, immunohistochemical evaluation, and appropriate metastatic assessment to guide diagnosis and management. **Originality:** This report documents an uncommon combination of seminoma, adenocarcinoma of uncertain origin, elevated AFP, and extensive suspected metastatic disease, highlighting diagnostic uncertainty when confirmatory investigations are unavailable.

Keywords: Adenocarcinoma; Case Report; Seminoma; Testicular Neoplasms; Tumor Markers.

INTRODUCTION

Testicular cancer is one of the most common malignancies among men aged 15–45 years, accounting for approximately 1% of all male malignancies and 5% of urological cancers (Burton, 2023; Gaddam, 2023). Testicular germ cell tumors (TGCTs) represent approximately 90–95% of testicular malignancies, with seminoma and nonseminomatous germ cell tumors constituting the principal histological categories (Singla, 2025). Although advances in diagnostic imaging, serum tumor markers, and multimodal treatment have substantially improved clinical outcomes, delayed diagnosis may result in extensive tumor

growth and metastatic dissemination. Giant testicular tumors remain uncommon, and a universally accepted size-based definition has not been established ([Angerer, 2026](#)). Their clinical significance extends beyond tumor dimensions because advanced presentations may involve regional and distant lymphadenopathy, pulmonary metastases, and considerable diagnostic complexity. Consequently, early recognition, accurate histopathological classification, and comprehensive staging are essential for determining appropriate treatment strategies and improving patient outcomes ([Arranz Arija, 2024](#); [Patrikidou, 2026](#)).

Previous investigations concerning testicular germ cell tumors can be categorized into three principal areas. First, epidemiological and clinical management studies have characterized the distribution, diagnosis, staging, and treatment of TGCTs, emphasizing the importance of radical inguinal orchiectomy, serum tumor markers, and risk-adapted systemic therapy ([Arranz Arija, 2024](#); [Hamilton, 2022](#); [Singla, 2025](#)). Second, histopathological and molecular investigations have examined somatic-type malignancies arising in association with germ cell tumors, including rare adenocarcinomatous components, and have highlighted their diagnostic complexity and potential resistance to conventional germ cell tumor chemotherapy ([Guo & Czerniak, 2022](#); [Rozsvai, 2025](#); [Siegmund & Acosta, 2025](#)).

Third, diagnostic studies and case reports have investigated atypical tumor marker profiles, primary adenocarcinoma of the rete testis, and metastatic carcinomas involving the testis, demonstrating the importance of distinguishing primary germ cell neoplasms from secondary or histologically divergent malignancies ([Burton, 2023](#); [Chen, 2025](#); [Hermi, 2023](#); [Ranjitha, 2022](#)).

Despite these contributions, the interpretation of a giant testicular tumor containing seminoma and an adenocarcinoma component of uncertain origin remains challenging, particularly when alpha-fetoprotein (AFP) is elevated, no teratomatous component is identified, and immunohistochemical confirmation is unavailable. The limited clinicopathological evidence concerning this combination creates an important diagnostic knowledge gap.

This case report aims to describe the clinical presentation, radiological findings, surgical management, histopathological characteristics, and postoperative serum tumor marker profile of a 35-year-old man presenting with a giant right testicular tumor

containing seminoma and an adenocarcinoma component of uncertain origin, accompanied by pulmonary lesions and extensive lymphadenopathy suggestive of metastatic disease. Particular attention is directed toward the discordance between the seminomatous histology and elevated postoperative AFP, the differential diagnosis of the adenocarcinoma component, and the limitations of provisional staging and prognostic classification when essential diagnostic investigations are incomplete. By integrating the available clinical and pathological findings with relevant literature, this report seeks to clarify the diagnostic uncertainties associated with this unusual presentation and identify additional investigations necessary for definitive tumor classification and treatment planning.

The central clinical argument of this report is that the coexistence of seminoma and an adenocarcinoma component within a giant testicular tumor should not automatically be interpreted as confirmed somatic-type malignant transformation. Alternative explanations, including an unsampled nonseminomatous germ cell tumor component, primary adenocarcinoma of the rete testis, or metastatic adenocarcinoma from an extratesticular primary site, require consideration ([Chen, 2025](#); [Guo & Czerniak, 2022](#); [Rozsvai, 2025](#)).

Furthermore, elevated AFP in a tumor diagnosed histologically as seminoma warrants careful reassessment because pure seminoma is not generally associated with AFP production ([Burton, 2023](#)). Therefore, definitive diagnosis and risk stratification require comprehensive histopathological review, appropriate immunohistochemical evaluation, serial serum tumor marker measurements, and clinicoradiological correlation. This case illustrates the importance of maintaining diagnostic uncertainty when pathological findings and biochemical markers are discordant, particularly in patients presenting with extensive metastatic disease.

CASE PRESENTATION

A 35-year-old man employed as a construction worker presented with a one-year history of gradually progressive enlargement of the right testis. He additionally reported intermittent abdominal pain, low back pain, mild dyspnoea on exertion, and swelling on the left side of the neck. He had three children. His medical history included cigarette smoking of approximately one pack per day since 2008. He reported no history of cryptorchidism, and there was no family history of malignancy.

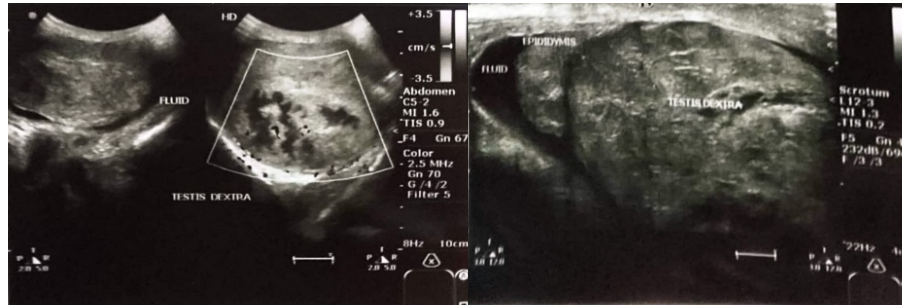


Figure 1. Scrotal ultrasonography demonstrating a heterogeneous right testicular mass.

On physical examination, the right hemiscrotum was markedly enlarged and contained a firm intratesticular mass. Scrotal ultrasonography demonstrated a heterogeneous lesion within the right testis (Figure 1).

Chest radiography revealed multiple bilateral pulmonary nodules (Figure 2). Contrast-enhanced CT of the thorax and abdomen demonstrated multiple pulmonary nodules involving both lungs, measuring up to 1.5 cm and considered consistent with metastases. Multiple hypodense lymph nodes were also identified in the cervical, left axillary, paratracheal, peribronchial, carinal, and para-aortic regions, with the largest measuring up to 2.5 cm (Figure 3).



Figure 2. Chest radiography demonstrating multiple bilateral pulmonary nodules.

Figure 3. Contrast-enhanced computed tomography demonstrating pulmonary metastases with cervical, axillary, mediastinal, and para-aortic lymphadenopathy.

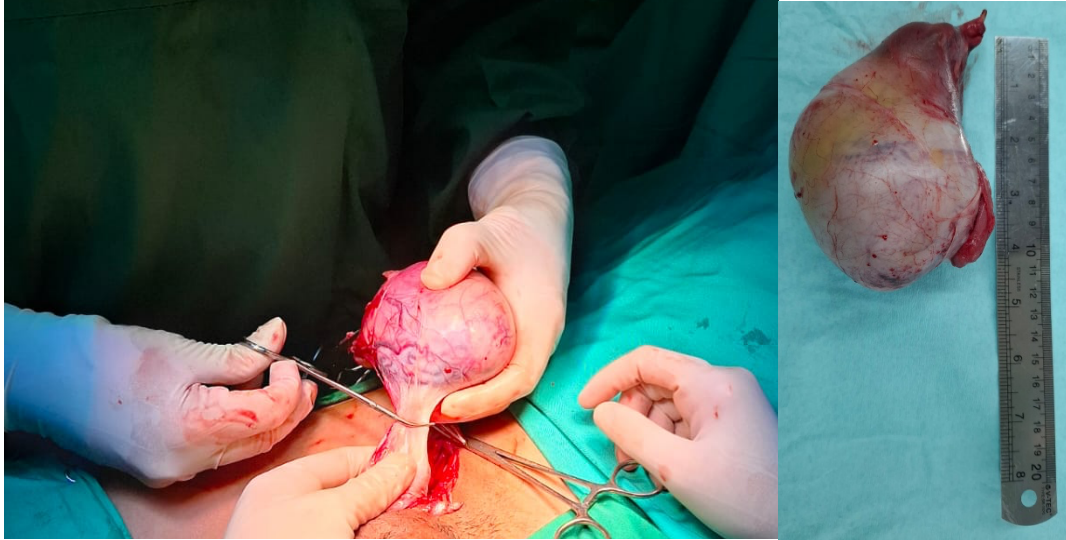


Figure 4. Right radical inguinal orchiectomy.

Figure 5. Gross examination of the right orchiectomy specimen demonstrating a giant heterogeneous tumour measuring $12 \times 8.5 \times 6.5$ cm.

The patient underwent right radical inguinal orchiectomy with high ligation of the spermatic cord. The intraoperative photograph is shown in (Figure 4).

Gross examination revealed a giant tumour measuring $12 \times 8.5 \times 6.5$ cm (Figure 5). Postoperative tumour markers were measured because preoperative values were not available. AFP was 371 IU/mL (<10 IU/mL), β -hCG was 191.86 mIU/mL (<3 mIU/mL), and LDH was 1721 U/L (50–150 U/L), whereas PSA remained normal at 0.83 ng/mL.

Persistent or increasing postoperative serum tumour marker levels may indicate metastatic germ cell tumour and provide support for systemic chemotherapy ([Nagaraj, 2022](#)).

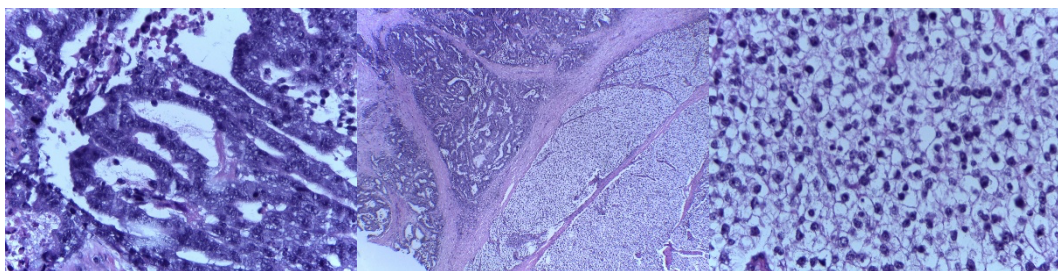


Figure 6. Histopathology demonstrating seminoma with areas containing an adenocarcinoma component of uncertain origin on hematoxylin and eosin staining.

Histopathological examination demonstrated seminoma accompanied by an adenocarcinoma component of uncertain origin. The elevated postoperative AFP, however, raised concern regarding a possible occult non-seminomatous germ cell tumour component that was not identified in the available histological sections (Figure 6). No definite teratomatous component was observed. On the basis of the available pathological, radiological, and postoperative serum tumour marker findings, the tumour was provisionally classified as pT1N2M1aS3 (Stage IIIC).

Although elevated AFP is generally associated with nonseminomatous germ cell tumour components, occasional mild increases may also occur in patients with a histological diagnosis of seminoma ([Burton, 2023](#)).

miR-371a-3p has emerged as a promising diagnostic biomarker for TGCT, particularly in situations where conventional serum tumour markers provide limited diagnostic information ([Ditunno, 2023](#)). It has demonstrated approximately 90–92% sensitivity and 84–86% specificity ([Sykes, 2024](#)). Although this biomarker was unavailable for the present patient, it could potentially have provided additional information because of the discordance between the seminomatous histology and elevated postoperative tumour markers.

Considering the elevated postoperative serum tumour markers, particularly LDH at 1721 U/L ($>10\times$ the upper limit of normal), together with increased AFP despite seminomatous histology, an occult non-seminomatous germ cell tumour component was suspected. Risk stratification was therefore performed according to the International Germ Cell Cancer Collaborative Group (IGCCCG) NSGCT criteria, with LDH $>10\times$ ULN meeting the poor-risk category. Since no teratomatous component was identified and immunohistochemical studies were unavailable, somatic-type malignancy could not be definitively confirmed.

Patients with advanced germ cell tumours should undergo risk stratification according to the IGCCCG criteria, taking into account histology, primary tumour site, metastatic distribution, and post-orchietomy serum tumour marker levels. In nonseminomatous germ cell tumour (NSGCT), poor-risk disease is characterized by a mediastinal primary tumour, non-pulmonary visceral metastases, or S3 serum tumour marker levels, defined by AFP $>10,000$ ng/mL, β -hCG $>50,000$ IU/L, or LDH $>10\times$ the upper limit of normal (ULN) ([Hamilton, 2022](#)). In the present case, the postoperative LDH was 1721 U/L (ULN 150

U/L), which was more than $10\times$ ULN. Although this fulfilled the S3 criterion, histopathological examination showed seminoma with an adenocarcinoma component; therefore, an occult NSGCT component was suspected rather than established. IGCCCG NSGCT risk stratification was accordingly regarded as provisional.

According to the American Joint Committee on Cancer (AJCC) and Union Internationale Contre le Cancer (UICC) TNM staging system, testicular tumors are classified according to the extent of the primary tumour (T), regional lymph node involvement (N), distant metastasis (M), and serum tumour marker status (S) ([Arranz Arija, 2024](#)). Recommendations based on the highest available level of evidence are provided across different TC stages, histologies, and prognostic groups, covering diagnosis, primary treatment, detection and management of relapse, and survivorship care ([Patrikidou, 2026](#)).

The pT1 classification was reported in the pathological assessment and is defined as a tumour confined to the testis, including invasion of the rete testis, without lymphovascular invasion. N2 was assigned according to the radiological findings of lymph node involvement, with the largest node measuring 2.5 cm, corresponding to lymph node metastasis >2 cm but ≤ 5 cm in greatest dimension. M1a was assigned because of pulmonary metastases and distant nonregional lymph-node involvement ([Arranz Arija, 2024](#)).

cN2 refers to metastasis involving a lymph node mass measuring more than 2 cm but not more than 5 cm in greatest dimension, including multiple lymph nodes in which any mass exceeds 2 cm but does not exceed 5 cm ([Passarelli, 2024](#)). In this patient, the radiological lymph-node findings were compatible with cN2. Although some references describe this simply as N2, the designation cN2 is used here to reflect clinical nodal assessment.

The postoperative LDH level was 1721 U/L ($>10\times$ the upper limit of normal), thereby meeting the S3 threshold. Nevertheless, because preoperative and serial postoperative tumour marker measurements were unavailable, the S3 classification remained provisional. Based on the available findings, the combination of M1a disease and S3 marker elevation was provisionally consistent with Stage IIIC disease ([Arranz Arija, 2024](#)).

DISCUSSION

The 2016 WHO classification divides testicular tumors into five major groups: (1) germ cell neoplasia in situ (GCNIS); (2) tumors derived from GCNIS, including seminoma,

embryonal carcinoma, yolk sac tumor, teratoma, and mixed germ cell tumors; (3) germ cell tumors unrelated to GCNIS, such as spermatocytic tumor; (4) sex cord/stromal tumors, including Leydig and Sertoli cell tumors; and (5) miscellaneous non-specific stromal tumors, including tumours of the rete testis, epididymis, and paratesticular structures ([Gaddam, 2023](#)).

Tumors resembling conventional somatic-type malignancies occur infrequently (<10%) in association with malignant postpubertal-type testicular germ cell tumors. They are encountered predominantly at metastatic sites, less commonly within the primary tumour, and often after treatment ([Desar, 2026](#)). Although TGCTs are generally responsive to therapy, they may rarely develop STM, a transformation associated with poor prognosis and resistance to chemotherapy. A recent study described two cases of postpubertal-type teratoma with intestinal-type adenocarcinoma as STM, providing further insight into their clinical, histopathological, immunophenotypic, and molecular characteristics ([Rozsvai, 2025](#)).

Most somatic-type malignancies develop from teratoma, whereas adenocarcinoma has been more commonly described in metastatic than in primary testicular tumours. Somatic-type malignancy at metastatic sites is associated with poor prognosis, and somatic-type carcinomas may have less favourable outcomes than sarcomas. These tumours frequently respond poorly to cisplatin-based chemotherapy, emphasizing the importance of timely surgical resection ([Guo & Czerniak, 2022](#)).

Although TGCTs typically respond well to cisplatin-based treatment, the emergence of somatic-type malignancy is a rare adverse transformation that is often associated with treatment resistance and poorer clinical outcomes ([Rozsvai, 2025](#)).

Although testicular metastasis from lung cancer is uncommon, this possibility should not be overlooked ([He, 2023](#)). Microscopic examination established secondary testicular involvement by prostatic adenocarcinoma, with the testicular parenchyma almost completely occupied by multiple sheets of tumour proliferation ([Hermi, 2023](#)). In the present case, the adenocarcinoma component led to consideration of somatic-type malignancy, metastatic adenocarcinoma, and primary adenocarcinoma of the rete testis. A prostatic origin was considered less likely because of the patient's age and normal PSA level, although PSA alone cannot definitively exclude this possibility. A definitive classification requires morphology-directed immunohistochemical assessment.

Testicular metastasis is rare, and determining the primary site of origin can represent a major diagnostic challenge ([Alsayed-Ahmad, 2023](#)). Cervical presentations of metastatic GCTs are uncommon but have been increasingly described in the literature among patients with advanced metastatic disease, most often involving cervical or supraclavicular lymph nodes and, in some cases, the parotid glands ([Crawford, 2025](#)). Similarly, our patient presented with left cervical swelling, corresponding to this unusual metastatic pattern.

After radical orchiectomy, the patient was referred to the oncology service and was provisionally scheduled for bleomycin, etoposide, and cisplatin (BEP) chemotherapy based on presumed poor-risk metastatic germ-cell tumour with a suspected occult nonseminomatous component. Additional immunohistochemical studies and biopsy of a metastatic lesion were planned to establish the origin of the adenocarcinoma component and determine subsequent management.

Treatment is determined by disease risk and the clinical setting. Metastatic disease is managed with cisplatin-based chemotherapy according to the IGCCCG risk classification, with three cycles of BEP generally recommended for good-risk disease and four cycles for intermediate- or poor-risk disease ([Shu, 2025](#)). The patient did not undergo RPLND and was provisionally regarded as having advanced metastatic germ-cell tumour on the basis of postoperative tumour markers and imaging findings.

The 5-year survival rate for testicular cancer is 96%, including 99.2% for localized tumors, 96% for regional lymph node disease, and 73.4% among patients with distant metastases ([Arranz Arija, 2024](#)).

The relationship between cigarette smoking and testicular cancer remains incompletely established, with a recent meta-analysis demonstrating only a modest association (OR 1.18) ([Yazici, 2023](#)). Congenital cryptorchidism is a recognized risk factor for testicular cancer, and an updated meta-analysis confirmed an increased risk of testicular cancer during adulthood ([Florou, 2023](#)). This risk factor was absent in our patient, who reported no history of cryptorchidism.

Radical inguinal orchiectomy with spermatic cord ligation is mandatory for histopathological evaluation and oncologic control ([Arranz Arija, 2024](#)). Testis-sparing surgery (TSS) is reserved for highly selected patients with a solitary testicle and tumour <2 cm, among other criteria ([Grogg, 2022](#)). Given the 12-cm tumour, TSS was not appropriate.

Partial or trans-scrotal biopsy or orchiectomy is not recommended because of the potential for disruption of normal lymphatic drainage, referred to as ‘scrotal violation’ ([Arranz Arija, 2024](#)). Giant testicular tumours are uncommon, and their definition remains poorly established; delayed presentation may contribute to substantial tumour enlargement ([Angerer, 2026](#)) CEA positivity has been described in adenocarcinoma of the rete testis ([Noguchi, 2022](#)) In our patient, CEA staining was not performed because immunohistochemical testing was unavailable owing to financial and resource limitations.

Because adenocarcinoma can represent metastasis from another primary site, immunohistochemistry, clinicopathological correlation, and biopsy of a metastatic lesion when indicated may assist in determining its origin ([Guo & Czerniak, 2022](#)). Pluripotency-associated markers, including OCT3/4, SOX2, and SOX17, may be useful in evaluating diagnostically challenging germ cell tumours ([Fichtner, 2024](#)) A concise immunohistochemical panel consisting of OCT3/4, CD117, GPC3, and CD30 may help differentiate seminomatous from non-seminomatous components ([Ranjitha, 2022](#)).

Based on our literature review, a giant testicular tumour containing seminoma and an adenocarcinoma component of uncertain origin, without an identifiable teratomatous component, remains exceptionally uncommon. This case emphasizes the need to integrate clinical findings, serum tumour markers, imaging, and immunohistochemistry when routine histopathological examination is unable to determine the tumour origin.

The principal limitations of this case were the absence of preoperative and serial tumour marker data, the unavailability of immunohistochemical evaluation because of financial and resource constraints, and the lack of long-term treatment and outcome data.

The clinical take-home message for urologists is that atypical testicular tumors with unusual histological components require comprehensive assessment, including complete staging, serial monitoring of tumour markers, and immunohistochemical analysis to establish the diagnosis and direct appropriate management. Early identification and timely treatment of testicular masses remain essential to reduce the risk of advanced metastatic presentation.

CONCLUSION

This case report highlights the diagnostic complexity of a giant testicular tumor measuring $12 \times 8.5 \times 6.5$ cm in a 35-year-old man, characterized by the coexistence of

seminoma and an adenocarcinoma component of uncertain origin, elevated postoperative serum tumor markers, and radiological findings suggestive of extensive metastatic disease. The discordance between seminomatous histology and elevated alpha-fetoprotein underscores the importance of considering an occult nonseminomatous germ cell tumor component and alternative origins of adenocarcinoma rather than assuming somatic-type malignant transformation. The principal scientific contribution of this report is its documentation of an uncommon clinicopathological presentation and its emphasis on integrating histopathological findings, serum tumor markers, radiological assessment, and differential diagnosis to support accurate tumor classification and multidisciplinary management.

Nevertheless, the absence of preoperative and serial postoperative tumor marker measurements, the unavailability of immunohistochemical analysis due to financial and resource constraints, and the lack of long-term treatment and follow-up data limited definitive histological classification, prognostic assessment, and evaluation of therapeutic outcomes.

Further investigations incorporating comprehensive immunohistochemical profiling, biopsy of metastatic lesions when clinically indicated, serial tumor marker monitoring, and longitudinal follow-up are recommended to clarify the origin of the adenocarcinoma component, refine risk stratification, and guide individualized treatment decisions.

AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. The authors confirmed that the paper was free of plagiarism.

REFERENCES

- Alsayed-Ahmad, Z. A. (2023). Metastatic signet-ring cell carcinoma of the testis: An unusual case report in Syria. *Clinical Case Reports*, 11(10). <https://doi.org/10.1002/ccr3.8068>
- Angerer, M. (2026). Giant testicular germ-cell tumours-An analysis of relative incidence and clinical features based on a clinical case series and a survey of the literature. *BJUI Compass*, 7(1), e70118. <https://doi.org/10.1002/bco2.70118>
- Arranz Arijia, J. A. (2024). SEOM-GG clinical guidelines for the management of germ-cell testicular cancer (2023). *Clinical & Translational Oncology*, 26(11), 2783-2799. <https://doi.org/10.1007/s12094-024-03532-2>

- Burton, K. A. (2023). A Case of a Testicular Tumor Histologically Described as a Seminoma in a Patient With an Elevated Serum Alpha-Fetoprotein. *Cureus*, 15(6), e40698. <https://doi.org/10.7759/cureus.40698>
- Chen, Y. (2025). Adenocarcinoma of the rete testis: clinicopathological study of 18 cases with emphasis on MET amplification and a review of the literature. *Histopathology*, 86(5), 762-771. <https://doi.org/10.1111/his.15383>
- Crawford, C. K. (2025). Nodular expression of seminoma in the neck: An unusual case presentation. *Radiology Case Reports*, 20(2), 1124-1129. <https://doi.org/10.1016/j.radcr.2024.11.020>
- Desar, S. (2026). Somatic Tumor-Like Neoplasms Arising With Testicular Germ Cell Tumors: Distilling Evolving Understanding, Terminology, and Implications for the Practicing Surgical Pathologist. *Advances in Anatomic Pathology*, 33(2), 68-80. <https://doi.org/10.1097/PAP.0000000000000524>
- Ditonno, F. (2023). The Role of miRNA in Testicular Cancer: Current Insights and Future Perspectives. *Medicina*, 59(11). <https://doi.org/10.3390/medicina59112033>
- Fichtner, A. (2024). Pathogenesis and pathobiology of testicular germ cell tumours: a view from a developmental biological perspective with guidelines for pathological diagnostics. *Histopathology*, 85(5), 701-715. <https://doi.org/10.1111/his.15249>
- Florou, M. (2023). Orchidopexy for congenital cryptorchidism in childhood and adolescence and testicular cancer in adults: an updated systematic review and meta-analysis of observational studies. *European Journal of Pediatrics*, 182(6), 2499-2507. <https://doi.org/10.1007/s00431-023-04947-9>
- Gaddam, S. J. (2023). Testicular Cancer. In *StatPearls*. StatPearls Publishing LLC.
- Grogg, J. B. (2022). Oncological and functional outcomes after testis-sparing surgery in patients with germ cell tumors: a systematic review of 285 cases. *World Journal of Urology*, 40(9), 2293-2303. <https://doi.org/10.1007/s00345-022-04048-6>
- Guo, C. C., & Czerniak, B. (2022). Somatic-type malignancies in testicular germ cell tumors. *Human Pathology*, 127, 123-135. <https://doi.org/10.1016/j.humpath.2022.06.024>
- Hamilton, R. J. (2022). Canadian Urological Association consensus guideline: Management of testicular germ cell cancer. *Canadian Urological Association Journal*, 16(6), 155-173. <https://doi.org/10.5489/cuaj.7945>
- He, C. (2023). Testicular Pain is the First Symptom of Lung Squamous Cell Carcinoma Metastasizing to the Testis. *Balkan Medical Journal*, 40(6), 451-453. <https://doi.org/10.4274/balkanmedj.galenos.2023.2022-6-86>
- Hermi, A. (2023). Prostate adenocarcinoma metastasis to the testis: A new case report. *Urology Case Reports*, 48, 102392. <https://doi.org/10.1016/j.eucr.2023.102392>
- Nagaraj, R. V. (2022). Post-treatment Residual Clinicopathological Outcomes in Testicular Germ Cell Tumours. *Indian Journal of Surgical Oncology*, 13(3), 505-510. <https://doi.org/10.1007/s13193-021-01491-6>

- Noguchi, T. (2022). ADENOCARCINOMA OF THE RETE TESTIS WITH METASTASIS OF THE PENILE AND LUNG: A CASE REPORT. *Nihon Hinyokika Gakkai Zasshi*, 113(2), 78-81. <https://doi.org/10.5980/jpnjurol.113.78>
- Passarelli, R. (2024). Contemporary surgical management of testicular seminoma. *Translational Cancer Research*, 13(11), 6463-6472. <https://doi.org/10.21037/tcr-24-241>
- Patrikidou, A. (2026). European Association of Urology Guidelines on Testicular Cancer: Summary of the 2026 Guidelines. *European Urology*, 90(2), 163-174. <https://doi.org/10.1016/j.eururo.2026.03.021>
- Ranjitha, V. N. (2022). The core four - A panel of immunohistochemistry markers to diagnose and subtype testicular germ cell tumors. *Urology Annals*, 14(1), 21-26. https://doi.org/10.4103/ua.ua_69_21
- Rozsvai, T. (2025). Case Report: From teratoma to adenocarcinoma: molecular insights into somatic-type malignancy in testicular germ cell tumors - two case reports and review of the literature. *Pathology Oncology Research*, 31, 1612227. <https://doi.org/10.3389/pore.2025.1612227>
- Shu, D. (2025). Efficacy and safety of modified bleomycin administration with EP chemotherapy in adult male patients with germ cell tumors: a retrospective study. *Cancer Cell International*, 25(1), 151. <https://doi.org/10.1186/s12935-025-03774-2>
- Siegmund, S. E., & Acosta, A. M. (2025). Somatic-type Malignancies of Germ Cell Origin: Molecular, Pathologic, and Clinical Features. *Surgical Pathology Clinics*, 18(1), 101-117. <https://doi.org/10.1016/j.path.2024.08.010>
- Singla, N. (2025). Testicular Germ Cell Tumors: A Review. *JAMA*, 333(9), 793-803. <https://doi.org/10.1001/jama.2024.27122>
- Sykes, J. (2024). Current and Evolving Biomarkers in the Diagnosis and Management of Testicular Germ Cell Tumors. *Journal of Clinical Medicine*, 13(23). <https://doi.org/10.3390/jcm13237448>
- Yazici, S. (2023). Risk Factors for Testicular Cancer: Environment, Genes and Infections- Is It All? *Medicina*, 59(4). <https://doi.org/10.3390/medicina59040724>