The Embryonal Body: Pathognomonic in Mixed Testicular Germ Cell Tumors

FAIZANAHMED MUNSHI, MD; KAMIL MALSHY, MD; MIGUEL CARABAÑO, MD; DRAGAN GOLIJANIN, MD; ALI AMIN, MD

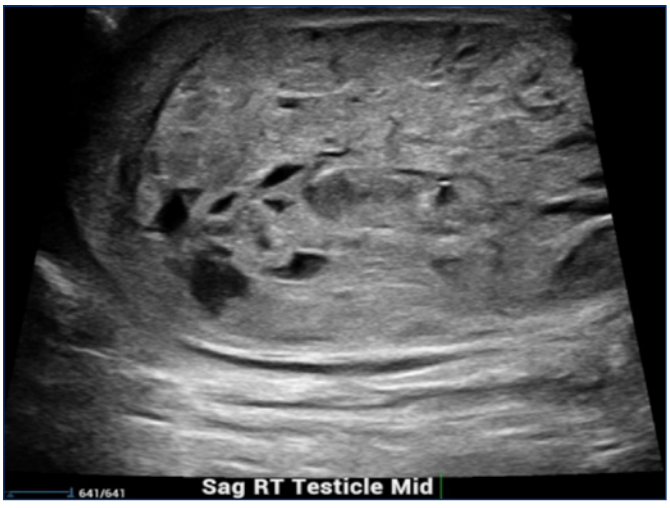
OBJECTIVES

We present the characteristics of pathognomonic images of an "embryonal body" in a patient with testicular germ cell tumor (GCT).

CASE PRESENTATION

A 26-year-old male with no family history of testicular cancer presented with right groin pain and associated firm, enlarged right testicular mass for one month. Scrotal ultrasound showed a 5.6 x 5.4 x 3.6 cm heterogeneous, mixed hypoechoic cystic and solid mass with internal vascularity replacing the entire right testicle (**Figure 1**). Serum tumor markers were elevated, and he underwent right radical orchiectomy. Pathology resulted as mixed GCT: 30% Embryonal Carcinoma (EC), 30% yolk sac tumor (YST), and 40% teratoma. Post-operatively, he was staged at Stage IA (pT1N0M0S0) with no evidence of metastatic disease in the chest, abdomen, or pelvis on imaging and normal tumor markers. He is now on surveillance.

Figure 1. 5.6 x 5.4 x 3.6 cm heterogeneous, hypoechoic cystic and solid mass with internal vascularity nearly replacing the entirety of the right testicle.



DISCUSSION

Testicular cancer is the most common tumor in men aged 20–40.[1] Diagnosis involves physical examination and testicular ultrasound, supplemented by serum tumor marker including B-HCG, AFP, and LDH. Radical inguinal orchiectomy is the gold standard. For cases confined to the testis, adjuvant treatments include single-dose chemotherapy or radiotherapy for seminomas, or several cycles of chemotherapy vs. primary retroperitoneal lymph node dissection (RPLND) for non-seminomatous germ cell tumors (NSGCT). Most patients undergo surveillance following Stage I GCT. The five-year survival rate for stage I GCT reaches 97–99%.[2]

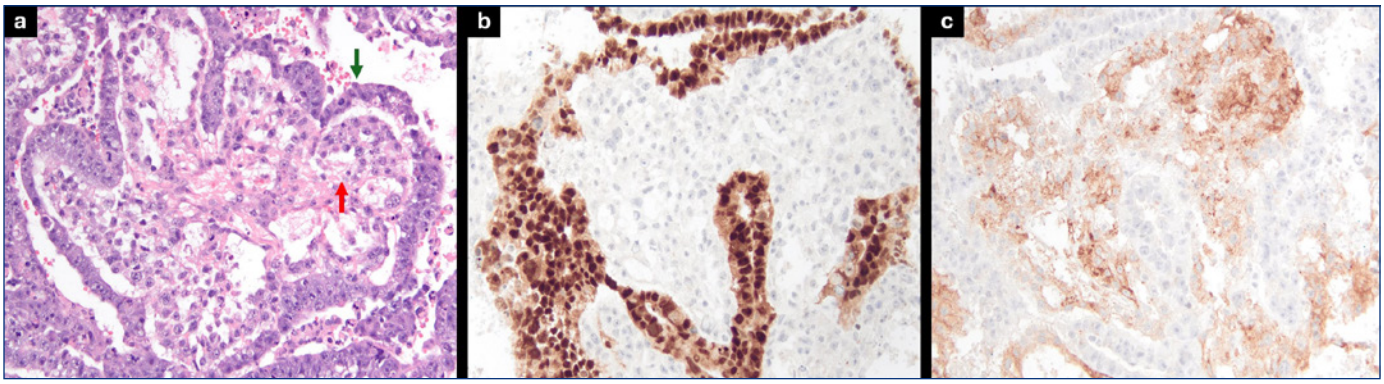
Within the NSGCT subtypes (EC; YST; Teratoma; choriocarcinoma), EC is known to be poorly differentiated and with high rates of metastasis. EC consists of undifferentiated malignant cells resembling primitive epithelial cells with crowded pleomorphic nuclei.[3] (**Figure 2A**). Grossly, EC exhibits areas of hemorrhage and necrosis. The microscopic appearance varies, and may grow in solid sheets or in papillary, glandular-alveolar, or tubular patterns. The presence and proportion of EC is associated with increased risk of occult metastases in clinical stage I NSGCT. Immunohistochemically, EC stains positive for: AE1/AE3, PLAP, and OCT3/4 and negative for c-Kit.[4] (**Figure 2A**)

YST often occurs in pediatric tumors and primary mediastinal cases[5] but is less common in primary adult testicular GCT than other subtypes.[6] Pure YSTs produce AFP but not HCG. Mixed GCTs include elements of YST, consisting of a reticular network of cuboidal cells with cytoplasmic and extracytoplasmic eosinophilic, hyaline-like globules, (**Figures 2A,C**). YSTs grow in glandular, papillary, or micro-cystic patterns, with the classic pathologic "Schiller-Duval bodies" in roughly 50% of cases.[7]

Embryonal bodies (**Figures 2A–C**) present as a minor component of mixed GCTs. Microscopically they appear as a hyperchromatic disc of EC with YST admixed. The EC cells have amphophilic cytoplasm and high-grade nuclei while the surrounding YST cells have variable pattern-dependent cytological atypia.[8]

Teratoma contains elements of two or more of intermixed three germ cell layers: endoderm, mesoderm, and ectoderm, often intermixed. Most tumors have solid and cystic areas. Approximately 50% of adult mixed GCTs contain a component of teratoma.[3]

Figures 2A–C. [**A**] Pathognomonic architecture of the Embryonal Body, highlighting the uniquely organized arrangement of YST (red arrow) and EC (green arrow) in the periphery, forming an embryonal body. [**B**] Octamer binding transcription factor 3/4 (OCT3/4) highlights embryonal cells with strong nuclear and diffuse cytoplasmic reactivity. Positive embryonal cells in the periphery contrast with negative yolk sac cells centrally. [**C**] Yolk sac cells present diffuse cytoplasmic Glypican 3 reactivity, contrasting with peripheral negative embryonal cells. Positive foci within embryonal bodies or EC reflect differentiation into yolk sac tumor.



In conclusion, our case demonstrates a distinctive pathognomonic histologic finding of the "embryonal body" in a testicular mixed germ cell tumor.

References

1. Hayes-Lattin B, Nichols CR. Testicular cancer: a prototypic tumor of young adults. *Semin Oncol*. Oct 2009;36(5):432-8. doi:10.1053/j.seminoncol.2009.07.006
2. Gilligan T, Lin DW, Aggarwal R, et al. Testicular Cancer, Version 2.2020, NCCN Clinical Practice Guidelines in Oncology. *J Natl Compr Canc Netw*. Dec 2019;17(12):1529-1554. doi:10.6004/jnccn.2019.0058
3. Williamson SR, Delahunt B, Magi-Galluzzi C, et al. The World Health Organization 2016 classification of testicular germ cell tumours: a review and update from the International Society of Urological Pathology Testis Consultation Panel. *Histopathology*. Feb 2017;70(3):335-346. doi:10.1111/his.13102
4. Looijenga LHJ, Van der Kwast TH, Grignon D, et al. Report From the International Society of Urological Pathology (ISUP) Consultation Conference on Molecular Pathology of Urogenital Cancers: IV: Current and Future Utilization of Molecular-Genetic Tests for Testicular Germ Cell Tumors. *Am J Surg Pathol*. Jul 2020;44(7):e66-e79. doi:10.1097/PAS.0000000000001465
5. Zhu F, Wang L, Zhai X. Primary mediastinal yolk sac tumor: a case report and literature review. *Int J Clin Exp Pathol*. 2020;13(11):2772-2777.
6. Lew CZ, Liu HC, Hou JY, Huang TH, Yeh TC. Pediatric Extracranial Germ Cell Tumors: Review of Clinics and Perspectives in Application of Autologous Stem Cell Transplantation. *Cancers (Basel)*. Mar 27 2023;15(7). doi:10.3390/cancers15071998
7. Nogales FF. Embryologic clues to human yolk sac tumors: a review. *Int J Gynecol Pathol*. Apr 1993;12(2):101-7. doi:10.1097/00004347-199304000-00003
8. Nakashima N, Murakami S, Fukatsu T, et al. Characteristics of "embryoid body" in human gonadal germ cell tumors. *Hum Pathol*. Oct 1988;19(10):1144-54. doi:10.1016/s0046-8177(88)80145-x

Authors

Faizanahmed Munshi, MD, Minimally Invasive Urology Institute, The Miriam Hospital, The Warren Alpert Medical School of Brown University, Providence, RI.

Kamil Malshy, MD, Minimally Invasive Urology Institute, The Miriam Hospital, The Warren Alpert Medical School of Brown University, Providence, RI.

Miguel Carabaño, MD, Pathology Department, The Miriam Hospital, The Warren Alpert Medical School of Brown University, Providence, RI.

Dragan Golijanin, MD, Minimally Invasive Urology Institute, The Miriam Hospital, The Warren Alpert Medical School of Brown University, Providence, RI.

Ali Amin, MD, Pathology Department, The Miriam Hospital, The Warren Alpert Medical School of Brown University, Providence, RI.

Disclosures

The authors have no conflicts of interest to disclose.

Correspondence

Faizanahmed Munshi, MD
164 Summit Ave.
Providence, Rhode Island 02906
401-793-5400
fmunshi@brownhealth.org