Tumor-To-tumor Metastasis: Prostatic Cancer Metastasizing to Malignant Solitary Fibrous Tumor of The Lung

Yuane Lian
affiliated union hospital,Fujian medical university
Yinghong Yang (xhyyhsci@163.com)
https://orcid.org/0000-0003-4782-7905
Changyin Feng
affiliated union hospital，Fujian medical university
Deyong Kang
affiliated union hospital，Fujian medical university

Case Report

Keywords: Prostatic cancer, solitary fibrous tumor, metastasis, Case report

Posted Date: July 2nd, 2020

DOI: https://doi.org/10.21203/rs.3.rs-38622/v1

Abstract

Background: Tumor-to-tumor metastasis is an extremely rare but interesting phenomenon. Prostatic cancer metastasizing to malignant solitary fibrous tumor (SFT) of the lung has not been previously reported.

Case Presentation: In this report, we describe the case of a 60-year-old man presenting a large solitary neoplasm in the left lung on computed tomography. Pathology after left lung wedge resection indicated two different cancerous cell components: SFT cells with malignant potential and prostatic cancer cells. The heterogeneous cells of prostatic origin were confirmed by using evidence from fine needle aspiration and pathology after radical prostatectomy.

Conclusions: We report the first tumor-to-tumor metastasis of prostatic cancer to lung malignant SFT.

Background

Tumor-to-tumor metastasis is an extremely rare but interesting phenomenon. Since first described by B. M. Fried in 1930 [1], fewer than 200 cases have been reported in the literature. Solitary fibrous tumor (SFT) is an extraordinarily rare recipient for tumor-to-tumor metastasis. So far, there are only nine recipients of SFT described in the literature [2–10]. The most common metastatic donor to an SFT is breast cancer, while prostatic carcinoma acting as a donor tumor has not been previously reported. Here, we report the first case of lung malignant SFT acting as the recipient of a donor prostatic carcinoma.

Case Presentation

A 60-year-old man was admitted into our hospital presenting with symptoms of persistent dry cough and recurring chest tightness. Computed tomography (CT) revealed a large mass in the left lung measuring 9 × 8 × 8 cm^3 (Fig. 1A), highly suspicious for malignancy. The patient then underwent surgery consisting of video-assisted thoracoscopic left lower lobe wedge resection and mediastinal lymph node dissection on the basis of malignancy in intraoperative frozen sections.

Postoperative routine pathologic examination led to a diagnosis of malignant SFT. Macroscopically, the excised specimen revealed a lobulated, dense rubbery mass measuring 9 × 8 × 8 cm^3, tannish-white in color and firm in consistency. Microscopically, a cellular mesenchymal neoplasm was composed of round, ovoid to spindle cells with a patternless architecture. The lesion contained “staghorn” vessels and a hyalinized stroma, particularly in perivascular regions (Fig. 1B). A subset of tumor cells exhibited pleomorphism, hypercellularity, nuclear atypia (Fig. 1C), mitotic figures (> 4 mitoses/10 high-power fields), and areas of necrosis (Fig. 1D), which indicated the neoplasm had malignant potential. Immunohistochemical staining of the tumor cells revealed positivity for vimentin, CD34, and B-cell lymphoma 2 (Bcl-2) (Fig. 2A-B), while cytokeratin (CK), epithelial membrane antigen (EMA), smooth muscle actin (SMA), desmin, and S-100 were negative.

There were also two microscopic foci of heterogeneous cancerous cells surrounded microscopically by SFT cells, characterized by cribriform-shaped epithelioid cells (Fig. 1B). The immunohistochemical staining pattern was also strikingly different, showing strong positivity for prostatic-specific antigen (PSA) and prostate-specific membrane antigen (PSMA) (Fig. 2C-D). Bothhematoxylin and eosin and immunohistochemical staining indicated tumor-to-tumor malignancy of these heterogeneous cells with prostatic origin.

This situation led us to investigate the possibility of lesions in the prostate gland. First, blood tests revealed that the patient had slightly elevated PSA levels (7.72 ng/ml). Magnetic resonance imaging then revealed two irregular nodules of isointensity on T2-weighted images, with significant enhancement in the peripheral zone of the prostate and the region of the prostate-bladder seminal vesicle angle, which was highly suspicious for prostate malignancy involving the left seminal vesicle. Finally, ultrasound-guided fine needle aspiration of the prostate revealed direct evidence of primary prostatic carcinoma, and radical prostatectomy was performed. The patient was admitted twice for these separate surgeries. The patient's recovery was uneventful, and he was discharged 3 days postoperatively.

Routine postoperative pathologic examination after radical prostatectomy revealed scattered gray nodules in the prostate measuring 0.8–1.5 cm in diameter. Microscopically, an epithelial neoplasm was apparent, with papillary, cribriform, and glandular architecture; glandular epithelium with columnar-shape morphology; and cell nuclei containing large nucleoli arranged in a monolayer or pseudostratified (Fig. 3A). Immunohistochemical staining of PSA (Fig. 3B) and PSMA was strongly positive, similar to that of the heterogeneous cells in the lung malignant SFT.

Discussion

In this report, we present a case of tumor-to-tumor metastasis characterized by malignant SFT harboring metastatic prostatic cancer. This case is consistent with the previously proposed diagnostic criteria for tumor-to-tumor metastasis [11], namely, (□) the existence of more than one primary tumor; (□) the recipient tumor representing a true benign or malignant neoplasm; (□) the donor neoplasm representing a true metastasis with established growth in the host tumor, not the result of contiguous growth or embolization of tumor cells; and excluding (□) tumors that have metastasized to the lymphatic system, where lymphoreticular malignant tumors are already present.

Generally, SFT is a rare mesenchymal neoplasm, which frequently arises in intrathoracic sites including the pleura and lung. Macroscopically, SFT appears as a smooth, firm, and lobulated mass. Microscopically, the neoplasm displays an erratic organization of round, ovoid to spindle-shaped cells with a patternless architecture. They possess "staghorn" vessels and a hyalinized stroma, especially in perivascular regions. Immunohistochemically, the immunostaining of tumor cells is typically positive for vimentin, CD34, STAT6 and Bcl-2 and negative for keratin [12].

While SFT has been acknowledged as a suitable niche for harboring metastases because of its rich vascularity to filter microemboli from other tumors, SFT is an extraordinarily rare recipient for tumor-to-

tumor metastasis. To date, only nine SFT recipients of tumor-to-tumor metastasis have been described in the literature (Table 1), including five intrathoracic lesions, one intraabdominal, one spinal intradural, and two in the soft tissues (thigh and back) [2–10]. The most common metastatic donor to SFT in previous reports was breast cancer.

Table 1
Cases of tumor-to-tumor metastasis to a solitary fibrous tumor recipient

Publication	Donor	Recipient	Relationship
Petraki et al., 2003(2)	Bladder carcinoma	SFT-pleura	Synchronous
Chen et al., 2004(3)	Lung carcinoma	SFT-thigh	Synchronous
Gonullu et al., 2010(4)	Breast carcinoma	SFT-pleura	Synchronous
Sen et al., 2010(5)	Breast carcinoma	SFT-mesentery	Metachronous
Kragel et al., 2011(6)	Renal cell carcinoma	SFT-pleura	Synchronous
Scheipl et al., 2014(7)	Male breast carcinoma	SFT-back	Synchronous
Frank et al.,2016(8)	Breast carcinoma	SFT-pleura	Metachronous
Tosic et al.,2018(9)	Lung carcinoma	SFT- intradural	Synchronous
Shishido et al.,2019(10)	Pulmonary typical carcinoid	SFT-lung	Synchronous
Our case report	Prostatic carcinoma	Malignant SFT-lung	Synchronous

The lung SFT in this report was diagnosed as a malignant neoplasm with histological characteristics of pleomorphism, hypercellularity, nuclear atypia, more than 4 mitoses per 10 high-power fields, and tumor necrosis. To our knowledge, this report is the first to describe a case of lung malignant SFT as recipient of tumor-to-tumor metastasis.

Prostatic cancer is also an uncommon donor in tumor-to-tumor metastasis. We were able to identify 15 previously reported cases of donor prostatic cancer in tumor-to-tumor metastasis, none of which involved SFT. The most common recipient tumor was meningioma (7 cases) [13], followed by renal cell carcinoma (6 cases) [14–16], follicular adenomas of the thyroid gland (1 case) [17], renal oncocytoma (1 case) [18].This case is also the first reported in the literature to involve prostatic cancer metastasizing to SFT.

Tumor-to-tumor metastasis can have synchronous or metachronous onset (Table 1). We present the case with synchronous onset of prostatic cancer metastasizing to lung SFT. This evidence then guided us to confirm the origin and donor site of metastatic prostatic cancer.

Conclusions

In conclusion, we present the first tumor-to-tumor metastasis of prostatic cancer metastasizing to a malignant SFT of the lung. This case exemplifies the importance of careful scrutiny of pathologic

specimens, because unusual pathologic findings may be of utmost clinical importance. In addition, our present case also emphasizes the need for adequate sampling, as only one of the 75 sections of the tumor contained small metastatic foci.

Abbreviations

SFT: Solitary fibrous tumor; CT: Computed tomography; PSA: prostatic specific antigen; PSMA: prostate specific membrane antigen.

Declarations

Acknowledgments

Not applicable.

Funding

National Science Foundation of Fujian Province (2017J01817);Youth Project of Fujian Provincial Health and Family Planning Commission(2014-1-47);Project of Fujian Medical University(2016QH026).

Availability of data and materials

There are no additional supporting data available.

Authors' contributions

Yuane Lian carried out histopathological evaluation and drafted the manuscript. Changyin Feng assisted with the pathological analysis. Deyong Kang assisted with the pathological analysis and participated in the design of the study. Yinghong Yang conceived of the study, and participated in its design and coordination and helped to draft the manuscript. All authors read and approved the final manuscript.

Competing interests

The authors declare that they have no competing interests.

Consent for publication

The patient gave general consent for the use of their tissue/data for research purposes as authorized by the Institutional Review Board of Affiliated Union Hospital, Fujian Medical University. Written informed consent for publication of clinical details and clinical images was obtained from the patient. A copy of the consent form is available for review by the Editor of this journal.

Ethics approval and consent to participate

The ethical approval and documentation for a case report was waived with approval of the Institutional Review Board of Affiliated Union Hospital, Fujian Medical University.

References

1. Fried BM. Metastatic Inoculation of a Meningioma by Cancer Cells from a Bronchiogenic Carcinoma. Am J Pathol. 1930;6:47–52.

2. Petraki C, Vaslamatzis M, Argyrakos T, Petraki K, Strataki M, Alexopoulos C, Sotsiou F. Tumor to tumor metastasis: report of two cases and review of the literature. Int J Surg Pathol. 2003;11:127–35.
3. Chen HW, Dry SM, Seeger LL. Primary lung carcinoma metastatic to a solitary fibrous tumor. Skeletal Radiol. 2004;33:226–9.
4. Gonullu G, Sullu Y, Basoglu A, Elmali M, Karaoglanoglu M, Yucel I. Metastatic breast carcinoma to solitary fibrous tumor in the lung. Indian J Cancer. 2010;47:76–8.
5. Sen S, Menon S, McCulloch T. Mesenteric solitary fibrous tumour containing metastasis from breast carcinoma: an unusual example of tumour to tumour metastasis. Diagn Histopathol. 2010;16:397–9.
6. Kragel C, Wei S. Renal cell carcinoma metastasizing to solitary fibrous tumor of the pleura: a case report. J Med Case Rep. 2011;5:248.
7. Scheipl S, Moinfar F, Leithner A, Sadoghi P, Jorgensen M, Rinner B, Liegl B. Tumour-to-tumour metastasis: male breast carcinoma metastasis arising in an extrapleural solitary fibrous tumour - a case report. Diagn Pathol. 2014;9:203.
8. Velez-Cubian FO, Gabordi RC, Smith PV, Toloza EM. Tumor-to-tumor metastasis: an unusual case of breast cancer metastatic to a solitary fibrous tumor. J Thorac Dis. 2016;8:E374-8.
9. Tosic L, Baschera D, Jentsch B, Feuerstein T, Alfieri A. Tumor-to-tumor metastasis of lung adenocarcinoma into a spinal intradural solitary fibrous tumor: a case report. Acta Neurochir (Wien). 2018;160:2393–6.
10. Shishido Y, Aoyama A, Hara S, Hamakawa H, Takahashi Y. Tumor-to-Tumor Metastasis: Pulmonary Carcinoid Metastasizing to Solitary Fibrous Tumor. Am J Case Rep. 2019;20:1205–9.
11. Campbell LV Jr, Gilbert E, Chamberlain CR Jr, Watne AL. Metastases of cancer to cancer. Cancer. 1968;22:635–43.
12. de Perrot M, Fischer S, Brundler MA, Sekine Y, Keshavjee S. Solitary fibrous tumors of the pleura. Ann Thorac Surg. 2002;74:285–93.
13. Guraya SS, Prayson RA. Metastatic prostatic adenocarcinoma with neuroendocrine differentiation to meningioma. J Clin Neurosci. 2016;34:30–2.
14. Shin T, Kan T, Sato F, Mimata H. Tumor-to-Tumor Metastasis to Chromophobe Renal Cell Carcinoma: A First Report. Case Rep Urol. 2011;2011:520839.
15. Cavalcante A, Cordeiro MD, Sierra PS, Pontes J Jr, Albuquerque EV, Barbosa PF, Mattedi RL, Faraj SF, Coelho RF, Nahas WC. A rare case of tumor-to-tumor metastasis: Prostate cancer to chromophobe renal cell carcinoma. Urol Case Rep. 2019;23:17–8.
16. Vyas M, Menon S, Desai SB. Collision tumor of kidney: A case of renal cell carcinoma with metastases of prostatic adenocarcinoma. Indian J Med Paediatr Oncol. 2013;34:21–3.
17. Ro JY, Guerrieri C, el-Naggar AK, Ordonez NG, Sorge JG, Ayala AG. Carcinomas metastatic to follicular adenomas of the thyroid gland. Report of two cases. Arch Pathol Lab Med. 1994;118:551–

6.
18. Petts G, Rashid T, Hrouda D, Ngo NT. Tumour-to-tumour metastases: prostate carcinoma metastasising to a renal oncocytoma. BMJ Case Rep. 2013;2013.

Figures

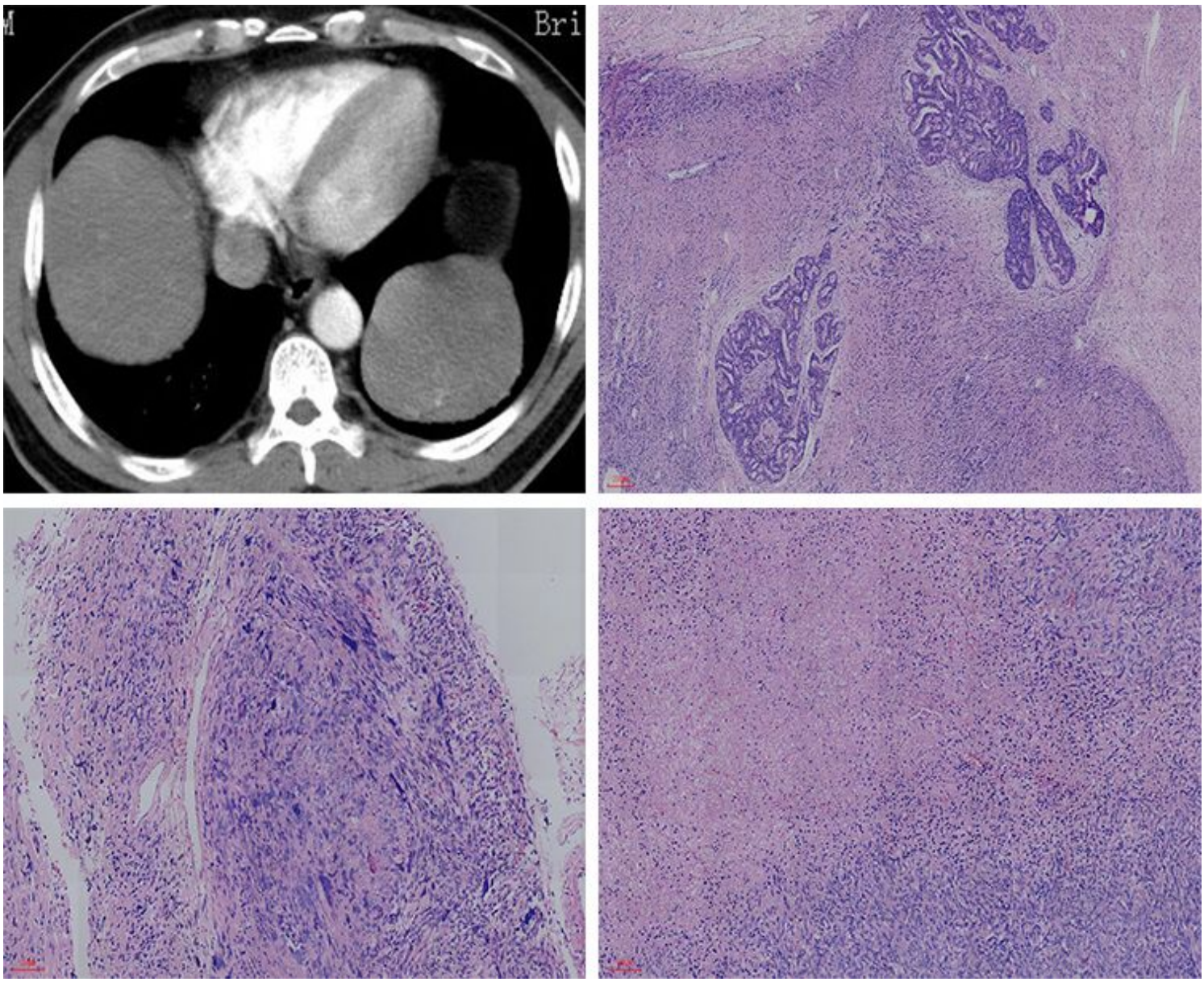

Figure 1

A.Computed tomography scan revealed a large swelling mass in the left lung. B. solitary fibrous tumor showing a cellular spindle-cell neoplasm with a patternless architecture. Two foci of cribriform-shaped epithelioid cells was incidentally found within the tumor (HE staining, ×40).C. A part of tumor cells exhibited nuclear atypia(HE staining, ×100).D.Areas of necrosis in the tumor(HE staining, ×100).

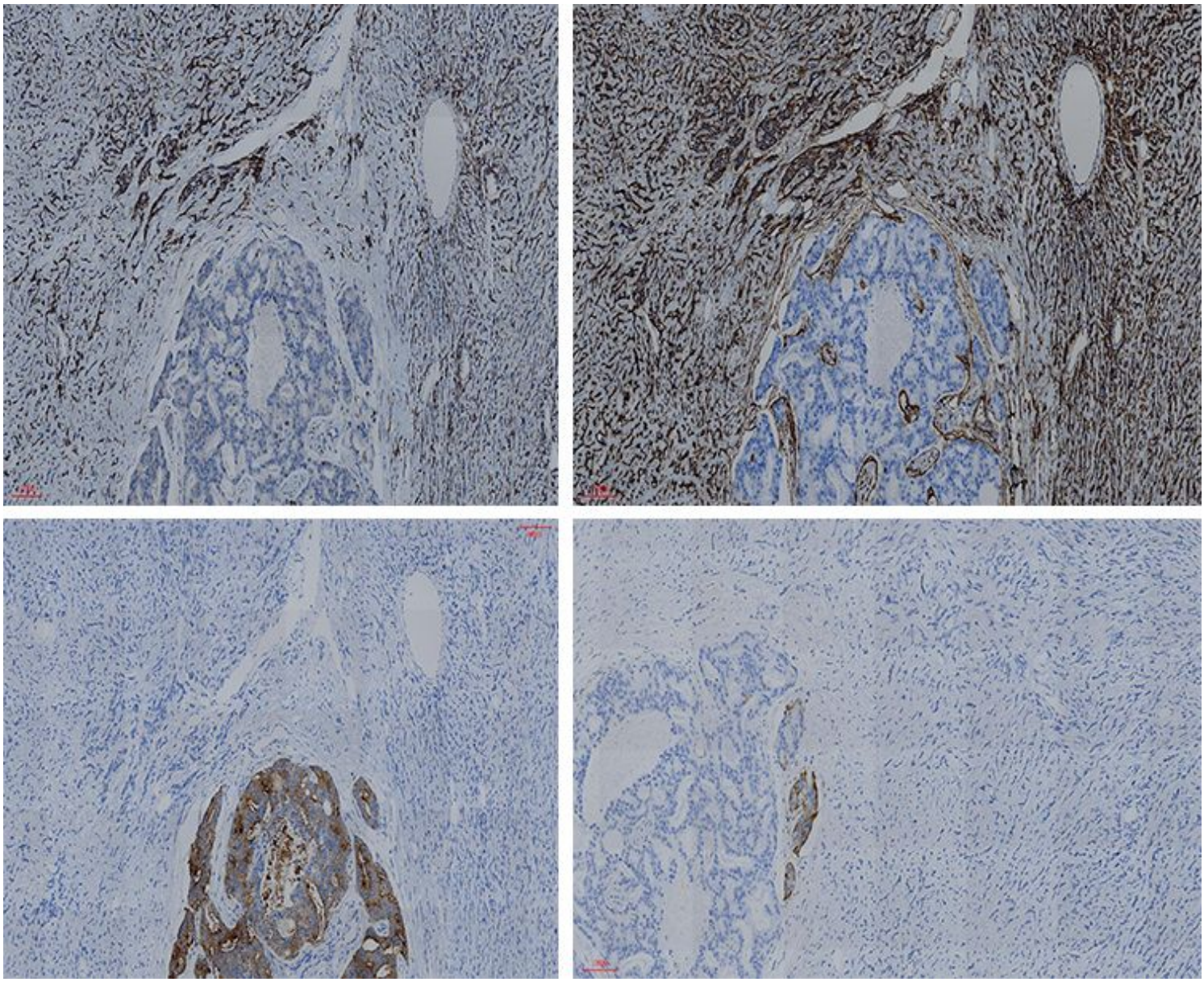

Figure 2

SFT tumor cells revealed positive for CD34 (A, immunostaining, ×100), Bcl-2(B, immunostaining, ×100). Epithelioid cells are negative for CD34 (A, in contrast to the solitary fibrous tumor, immunostaining, ×100), but immunoreactive with PSA (C, immunostaining, ×100), PSMA (D, immunostaining, ×100).

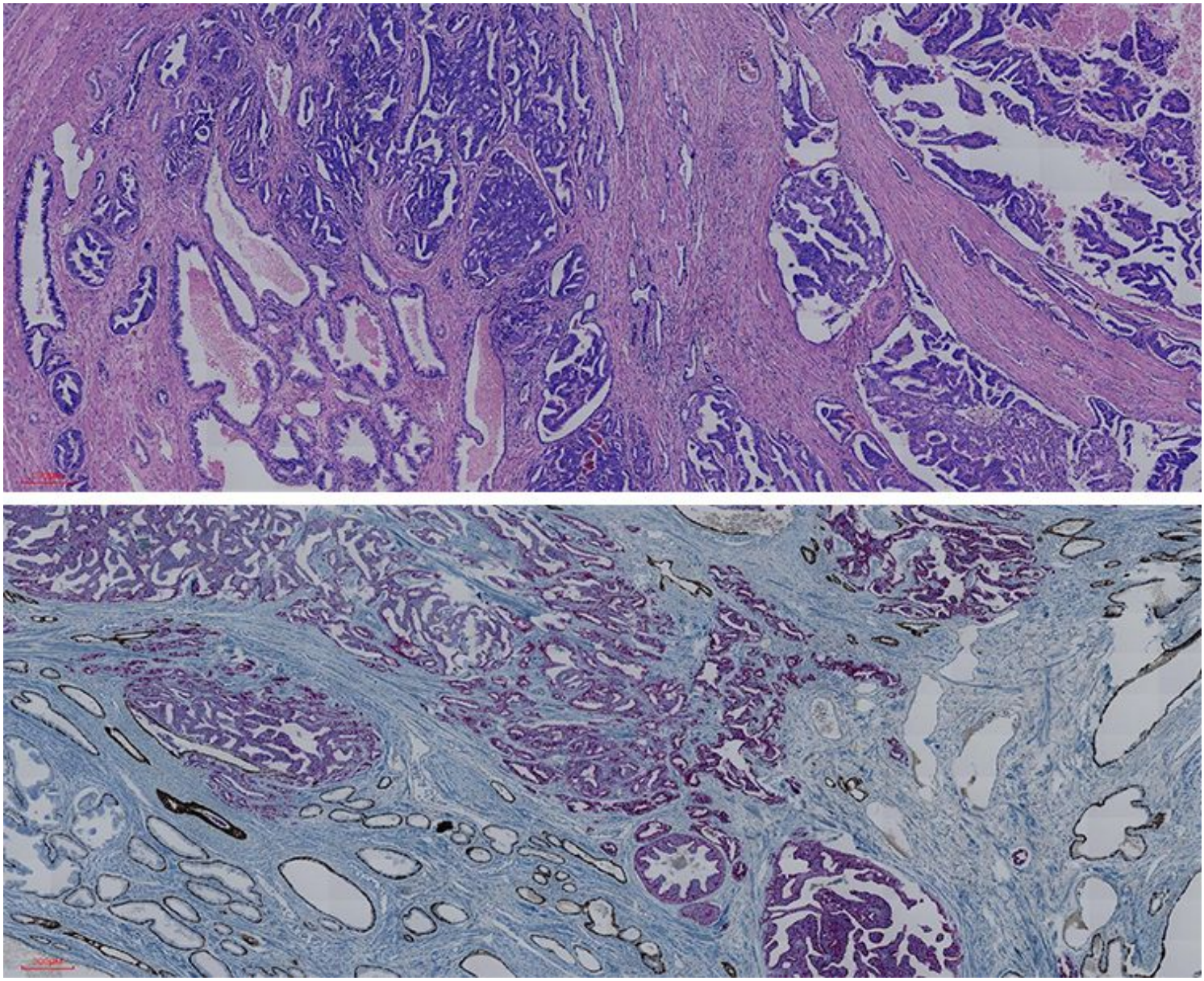

Figure 3

Prostatic cancer displayed with papillary and cribriform architecture (A, HE staining, ×40), which positive for PSA (B, immunostaining staining, ×40).

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- CARE.pdf