

Snowman-like appearance in spinal capillary hemangioma with combined intra- and extramedullary components: two case reports

Takeshi Kidoguchi

Kanazawa University

Shingo Tanaka

t-shingo@med.kanazawa-u.ac.jp

Kanazawa University

Mitsutoshi Nakada

Kanazawa University

Case Report

Keywords: spinal capillary hemangioma, snowman-like appearance, intramedullary, extramedullary

Posted Date: October 11th, 2026

DOI: <https://doi.org/10.21203/rs.3.rs-11052522/v1>

License: © ⓘ This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

Additional Declarations: No competing interests reported.

Abstract

Background

Capillary hemangiomas are benign tumors primarily found in the soft tissues of the head and neck, and their occurrence in the spinal cord is rare. Because of its rarity and nonspecific radiological features, it is often difficult to differentiate from more common intradural-extramedullary tumors.

Case presentation:

We report two cases of thoracic spinal capillary hemangioma with intra- and extramedullary components. MRI demonstrated strongly and homogeneously enhancing tumors with a snowman-like appearance. Intraoperatively, both tumors were highly vascular, with contiguous intra- and extramedullary components closely associated with the spinal pia mater. The tumors were resected en bloc after control of tumor-related vessels. Histopathological examination demonstrated proliferation of capillary-sized vessels without stromal cells, consistent with capillary hemangioma. Postoperative recovery was uneventful.

Conclusion

A snowman-like appearance is not necessarily specific to spinal hemangioblastoma and may also occur in spinal capillary hemangioma with combined intra- and extramedullary components. Capillary hemangioma should therefore be considered in the differential diagnosis when this imaging pattern is observed.

Introduction

Capillary hemangiomas are benign tumors that are characterized by simple proliferation of capillaries. Capillary hemangiomas frequently occur in the skin or soft tissues of head and neck, and these in the central nervous system, such as the spinal cord, are very rare [1]. When occurring in the spinal cord, capillary hemangiomas may arise in the epidural, intradural-extramedullary, or intramedullary space [2]. Because of its nonspecific imaging features and rarity, preoperative diagnosis is often difficult. We report characteristic radiological findings through the two cases of thoracic spinal capillary hemangioma composed of both intra- and extramedullary components.

Case presentation

Case 1

A 46-year-old man presented with back pain. He had no relevant past medical or family history. Neurological examinations revealed hypoesthesia at the T4-8 level. Spinal magnetic resonance imaging

(MRI) revealed a tumor at the T6, which was isointense on T1-weighted images and hyperintense on T2-weighted images and showed homogeneous gadolinium (Gd) enhancement (Fig. 1A, B, C, D). The tumor significantly compressed the spinal cord, accompanied by spinal cord edema extending cranio-caudally. Based on these findings, hemangioblastoma, ependymoma and schwannoma were listed in the differential diagnosis. Spinal surgery was performed. The tumor was red in color and had no adhesions to the dura mater or nerves (Fig. 1E). The administration of indocyanine green (ICG) resulted in the early delineation of the entire tumor, suggesting that the tumor was highly vascular. Therefore, the tumor was resected en bloc while managing the tumor-related vessels using ICG (Fig. 1F). Intraoperatively, the tumor consisted of contiguous intra- and extramedullary components closely associated with the spinal pia mater (Fig. 3A) (supplementary video 1). Hematoxylin and eosin staining demonstrated nodular proliferation of capillary sized vessels without stromal cells, nuclear atypia, mitosis or necrosis (Fig. 1G). On immunohistochemistry, the blood vessels stained positive for CD34 (Fig. 1H) and negative for S-100 protein (data not shown) and inhibin- α (Fig. 1I). Therefore, pathological diagnosis was spinal capillary hemangioma. Postoperative MRI confirmed complete tumor resection and improvement of the spinal cord edema (Fig. 1J, K). At the 4-month follow-up, only decreased tactile and temperature sensation in the left T5-T12 region remained, but the patient's chief complaint of back pain resolved.

Case 2

A 70-year-old woman presented with numbness in both lower extremities. Her past medical history included hypertension and uterine fibroids. Neurological examination revealed bilateral sensory disturbance below the T10 level. MRI revealed a tumor at the T9-10 level. The tumor exhibited T1 isointensity and T2 hyperintensity with homogeneous Gd-enhancement, accompanied by craniocaudal spinal cord edema, and markedly compressed spinal cord, similar to case 1 (Fig. 2A, B, C, D). Spinal surgery was performed. This tumor appeared reddish, suggesting high vascularity (Fig. 2E). The tumor was resected while managing the tumor-related vessels using ICG video angiography. The tumor comprised extramedullary and intramedullary components, both adherent to the pia mater. The intramedullary component was not adherent to the spinal cord parenchyma (Fig. 2F and 3B) (supplementary video 2). Histopathological findings demonstrated lobular proliferation of capillary-sized vessels, similar to case 1, with no evidence of stromal cells; immunohistochemical staining was positive for CD34 and negative for S-100 protein (data not shown) and inhibin- α (Fig. 2G, H, I). These findings were consistent with a diagnosis of capillary hemangioma. Postoperative MRI confirmed complete tumor resection and improvement of spinal cord edema (Fig. 2J, K). At the 6-month follow-up, sensory disturbance below the T10 level had almost completely resolved, with only residual numbness in both lower extremities.

Discussion

Spinal capillary hemangioma is a rare intradural spinal cord tumor. Epidemiologically, it shows a predilection for patients between 40 and 60 years of age and occurs more frequently in men than in women [3]. The origin of spinal capillary hemangioma is thought to arise from blood vessels in the dura

mater, nerve roots or pia mater [4]. The site of tumor origin is thought to determine its spinal localization, namely extradural, intradural-extramedullary, or intramedullary. Intradural-extramedullary lesions are reported to be the most frequent, and intramedullary extension is rare. Surgical resection is the recommended treatment, whereas radiotherapy is typically reserved for cases in which surgical intervention is unfeasible or only incomplete resection has been achieved [5]. Standard treatment for spinal capillary hemangioma has not been established.

The differential diagnosis includes hemangioblastoma, schwannoma, meningioma, and ependymoma. Because of overlapping radiological features and its rarity, capillary hemangioma may be misdiagnosed.

Radiologically, spinal capillary hemangiomas typically exhibit isointense signals on MRI T1-weighted images, hyperintense signals on T2-weighted images, and strong homogeneous enhancement, reflecting their rich vascularity [6]. Although spinal cord edema is not a typical finding, some cases arising in the spinal pia mater have been reported to present with edema [2, 7].

There are no specific imaging features that definitively characterize spinal capillary hemangiomas. Previous reports have suggested that flow voids, T2 hyperintensity, and spinal cord edema may provide diagnostic clues [8]. However, these findings lack specificity. Flow voids are also frequently observed in hemangioblastomas and were absent in both of our cases. T2 hyperintensity is a common feature in many spinal tumors and spinal cord edema can be seen in various intradural tumors.

To date, little attention has been paid to the morphological configuration of these tumors on imaging. In our two cases of intradural spinal capillary hemangioma with intra- and extramedullary extension, the intramedullary and extramedullary components were positioned back-to-back across the spinal pia mater (Fig. 3A, B). On radiological imaging, the intramedullary and extramedullary components appeared as two adjacent, strongly enhancing lesions separated by the spinal pia mater, creating a snowman-like configuration (Fig. 3C). A “snowman sign” has previously been described in spinal hemangioblastomas with combined intramedullary and extramedullary components and was reported as a characteristic imaging feature for distinguishing this tumor localization from tumors confined to the extramedullary space [9]. This configuration has also been illustrated in a subsequent review of spinal capillary hemangiomas as a characteristic morphology of hemangioblastomas with intramedullary and extramedullary extension [10]. However, both of our capillary hemangiomas demonstrated a comparable appearance. These findings suggest that the snowman-like appearance is not necessarily specific to hemangioblastoma, but may instead reflect the anatomical configuration in which a tumor extends across the pia mater into both the intra- and extramedullary compartments. Therefore, when a spinal tumor consists of contiguous intramedullary and extramedullary components with strong homogeneous enhancement, capillary hemangioma should also be considered in the differential diagnosis, in addition to hemangioblastoma.

Conclusion

We encountered two cases of thoracic spinal capillary hemangioma with combined intramedullary and extramedullary components closely associated with the pia mater, producing a characteristic snowman-like appearance on MRI. These features may provide useful clues for preoperative diagnosis and surgical planning.

Declarations

Competing interests

The authors declare no competing interests.

Author Contribution

T.K.: Data curation, Writing – original draft. S.T.: Conceptualization, Investigation, Methodology, Project administration, Writing – original draft, Writing - review & editing, supervision. M.N.: Project administration, Writing - review & editing, supervision. All authors reviewed and approved the final version of the manuscript.

Data availability

No datasets were generated or analysed during the current study

References

1. Nowak DA, Widenka DC (2001) Spinal intradural capillary haemangioma: a review. *Eur Spine J* 10:464–472
2. Zhao Z, Zheng J, Zhou Y (2022) Intradural extramedullary capillary hemangioma with intramedullary component: a case series. *Med (Baltim)* 101:e29862
3. Abe M, Tabuchi K, Tanaka S, Hodozuka A, Kunishio K, Kubo N et al (2004) Capillary hemangioma of the central nervous system. *J Neurosurg* 101:73–81
4. Gonzalez R, Spears J, Bharatha A, Munoz DG (2014) Spinal lobular capillary hemangioma with an intramedullary component. *Clin Neuropathol* 33:38–41
5. Matsumoto H, Shimokawa N, Sato H, Takami T (2023) Adjuvant multimodal treatment for spinal intradural extramedullary capillary hemangioma with subpial growth: illustrative case. *J Neurosurg Case Lessons* 5:CASE2314
6. Wu L, Deng X, Yang C, Xu Y (2013) Intramedullary spinal capillary hemangiomas: clinical features and surgical outcomes. *J Neurosurg Spine* 19:477–484
7. Cai Z, Hong X, Zhang Z, Ding X, Sun W, Hu G (2024) Microsurgical treatment of spinal intradural capillary hemangioma: a consecutive case series of 18 patients and literature review. *Clin Neurol*

8. Yamamoto Y, Shimauchi-Ohtaki H, Honda F, Shirakura T, Aramaki K, Shintoku R et al (2024) Thoracic intra and extramedullary capillary hemangioma with subacute clinical course: a case report and literature review. *NMC Case Rep J* 11:85–91
9. Imagama S, Ito Z, Wakao N, Sakai Y, Kato F, Yukawa Y et al (2011) Differentiation of localization of spinal hemangioblastomas based on imaging and pathological findings. *Eur Spine J* 20:1377–1384
10. Wu S, Sharma KK, Ho CL (2022) Lumbar spinal epidural capillary hemangioma: a case report and literature review. *Am J Case Rep* 23:e936181

Figures

Fig. 1

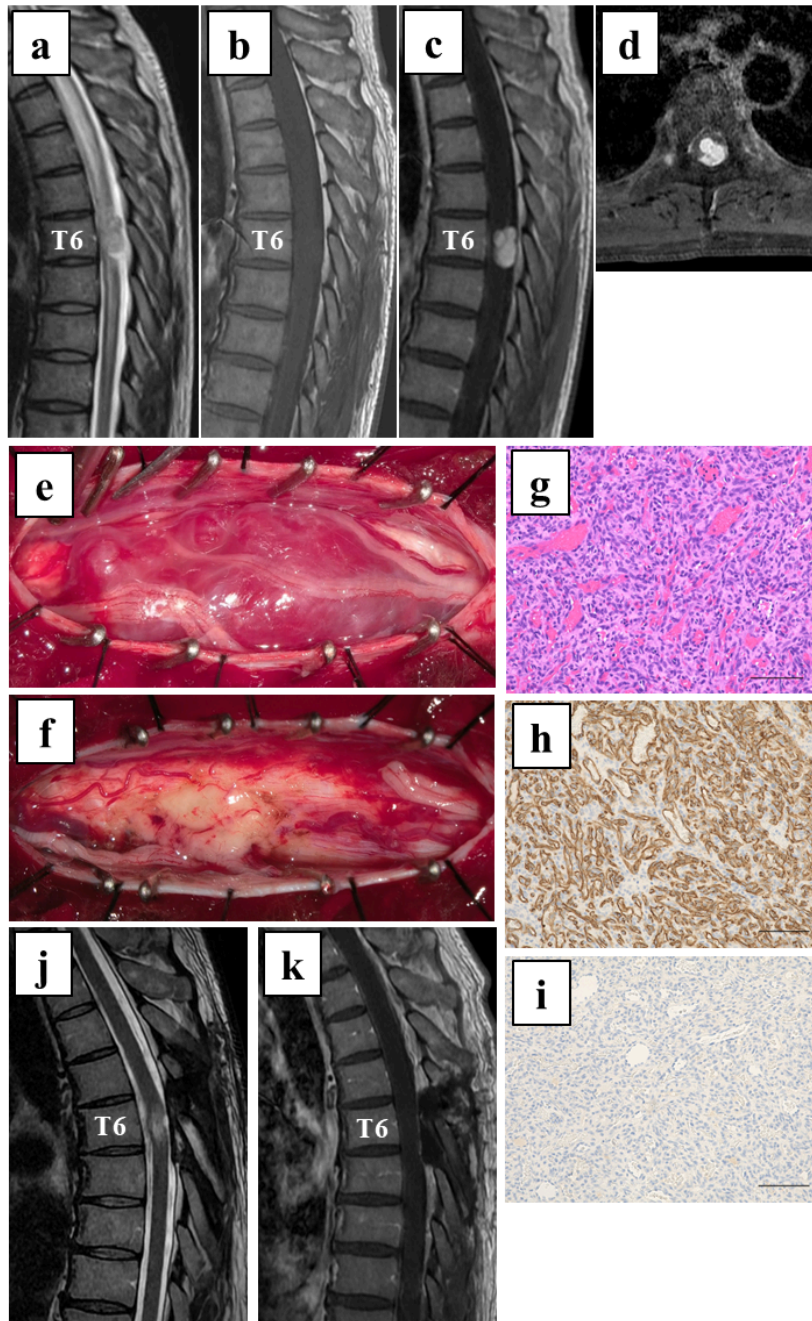


Figure 1

Images of Case 1. (a) Sagittal T2-weighted MR image showing spinal cord edema on the cranial and caudal sides of the tumor lesion. (b, c, d) Sagittal T1-weighted, sagittal Gd-T1-weighted, and axial Gd-T1-weighted images showing a homogeneously enhancing tumor. (e) Intraoperative finding after opening of the dura and arachnoid mater at the T6 level. The spinal tumor appeared reddish. (f) Intraoperative finding after tumor removal. (g) Hematoxylin-eosin (HE) staining showing nodular proliferation of

capillary-sized vessels without stromal cells. Scale bar was 100 μ m. (h, i) Immunohistochemical staining showing positivity for CD34 and negativity for inhibin- α . Scale bar was 100 μ m. (j, k) Postoperative T2 and Gd-T1-weighted MR images showed no residual enhancing tumor and improvement of spinal cord edema.

Fig. 2

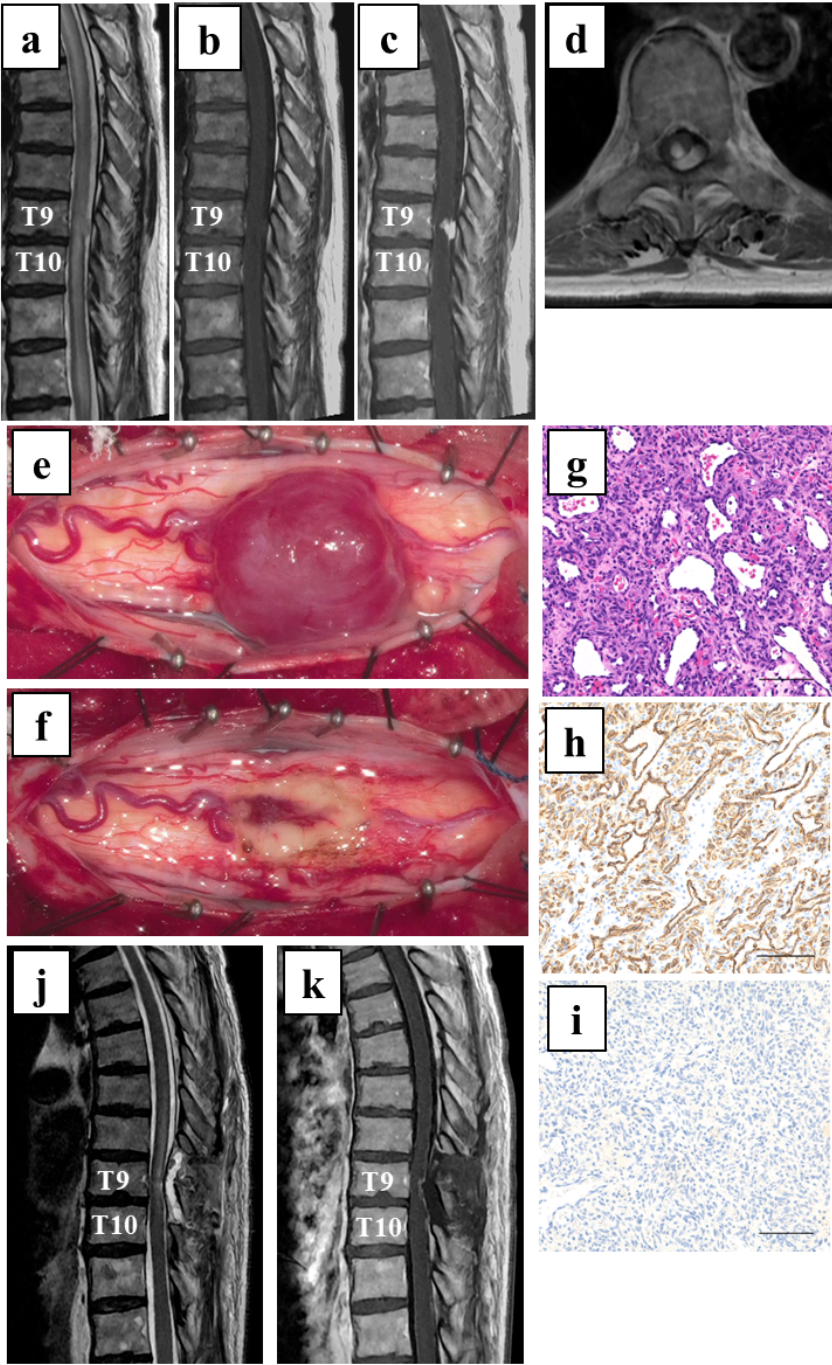


Figure 2

Images of Case 2. (a) Sagittal T2-weighted MR image showing spinal cord edema extending cranially and caudally from the tumor lesion. (b, c, d) Sagittal T1-weighted, sagittal Gd-T1-weighted, and axial Gd-T1-weighted images showing strongly and homogeneously enhancing intra- and extramedullary tumor components. (e) Intraoperative finding after dura and subarachnoid mater opening at the T9–10 level. The tumor appeared reddish and hypervascular. The cranial side is oriented to the left. (f) Intraoperative finding after tumor removal. (g) HE staining demonstrated lobular proliferation of capillary-sized vessels without nuclear atypia, mitotic activity, or necrosis. Scale bar was 100 μm . (h, i) Immunohistochemical staining showing positive staining for CD34 and negative staining for inhibin- α . Scale bar was 100 μm . (j, k) Postoperative T2 and Gd-T1-weighted images showed no residual enhancing tumor and improvement of spinal cord edema.

Fig. 3

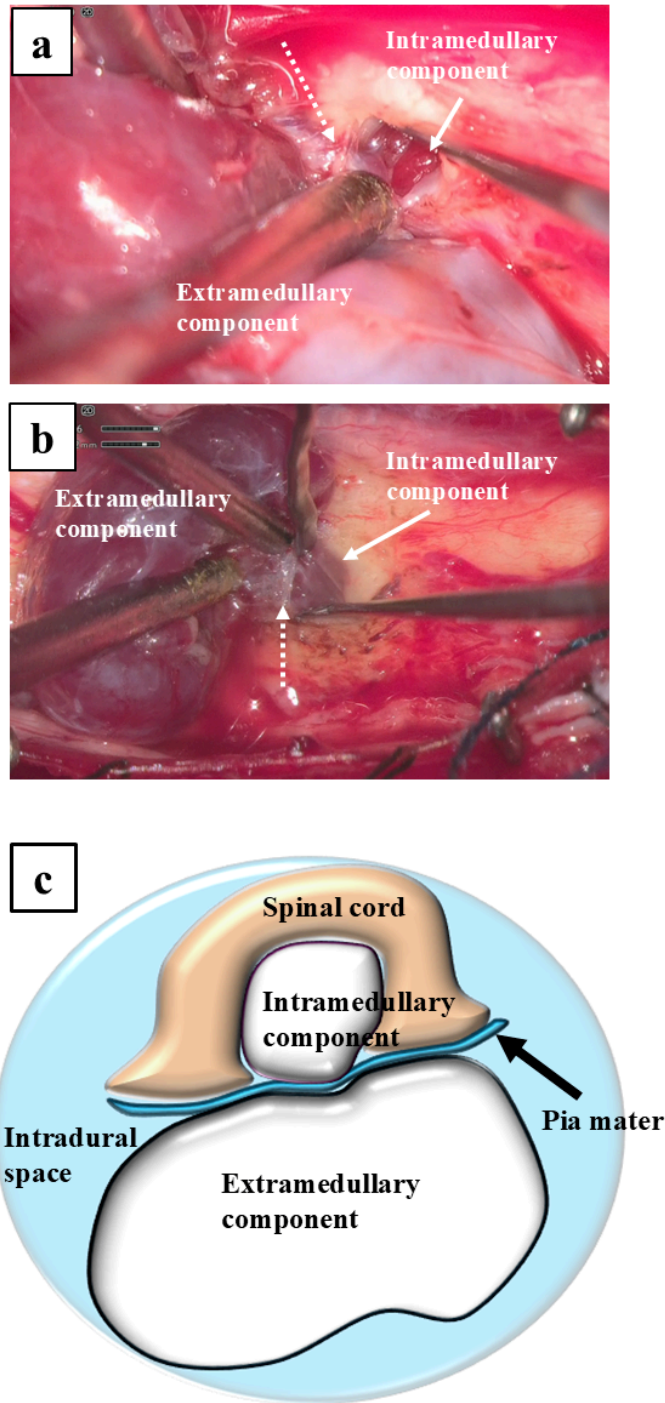


Figure 3

Relationship between the tumor components and the spinal pia mater.

(a) Intraoperative finding in Case 1 showing the intramedullary tumor component through the pia mater (dotted arrow). (b) In Case 2, both the intramedullary and extramedullary components are attached to the pia mater (dotted arrow). (c) The schematic illustration showing the intra- and extramedullary

components of the tumor closely associated with the spinal pia mater. The tumor extends across the pial surface, resulting in a characteristic snowman-like appearance.

Supplementary Files

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

- [supplementaryvideo.1.mp4](#)
- [supplementaryvideo.2.mp4](#)