Radiology Case Reports 15 (2020) 2607–2612

Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.elsevier.com/locate/radcr

Case Report

Combination therapy with preoperative embolization and en block laminectomy using thread saw for spinous process solitary fibrous tumor: A case report☆,☆☆

Tomohiro Yamada, MD, Tomohiko Hasegawa, MD, PhD, Yoji Shido, MD, PhD, Yu Yamato, MD, PhD, Go Yoshida, MD, PhD, Tatsuya Yasuda, MD, PhD, Tomohiro Banno, MD, PhD, Hideyuki Arima, MD, PhD, Shin Oe, MD, PhD, Hiroki Ushirozako, MD, PhD, Koichiro Ide, MD, Yuh Wanatabe, MD, Yukihiro Matsuyama, MD, PhD*

Department of Orthopedic Surgery, Hamamatsu University School of Medicine, 1-20-1 Handayama Higashi-ku, Hamamatsu, Shizuoka 431-3192, Japan

ARTICLE INFO

Article history:
Received 15 September 2020
Revised 2 October 2020
Accepted 2 October 2020

Keywords:
Solitary fibrous tumor
Preoperative embolization
en bloc laminectomy
Thread saw

ABSTRACT

Solitary fibrous tumors are rare mesenchymal neoplasms with highly recurrence rates after intratumor resection. We report 2 cases of solitary fibrous tumors treated with combination therapy with embolization and en bloc laminectomy using thread saw. To the best of our knowledge, this is the first such report. In the 2 cases, the hypervascular tumors were located in the spinal process and infiltrating the multifidus. Preoperative embolization was useful for decreasing intraoperative bleeding, and using thread saw was an ideal technique for deciding the cut surface height of the pedicle to achieve gross total resection.

Introduction

Solitary fibrous tumors (SFTs), spindle cell neoplasms of mesenchymal origin, were first reported in 1931 [1]. Previously referred to as hemangiopericytoma, SFTs are primary observed within deep soft tissues, notably in the pleura of the lung and on serosal surface [2,3]. Surgery with the aim of preserving function, relieving pain, and controlling local recurrence is the standard treatment strategy for osseous SFTs in the spine [4,5]. However, only few previous reports have described SFTs in spinous processes, and surgical treatment including preoperative management is not well known. We report 2 cases with

☆ Conflict of Interest: The authors declare that there are no conflicts of interest.

☆☆ Acknowledgments: The authors gratefully acknowledge Takashi Tuchida, Department of Pathology, Hamamatsu University School of Medicine, for supervising all pathological analyses.

* Corresponding author.
E-mail address: cordial27@gmail.com (T. Yamada).

https://doi.org/10.1016/j.radcr.2020.10.008

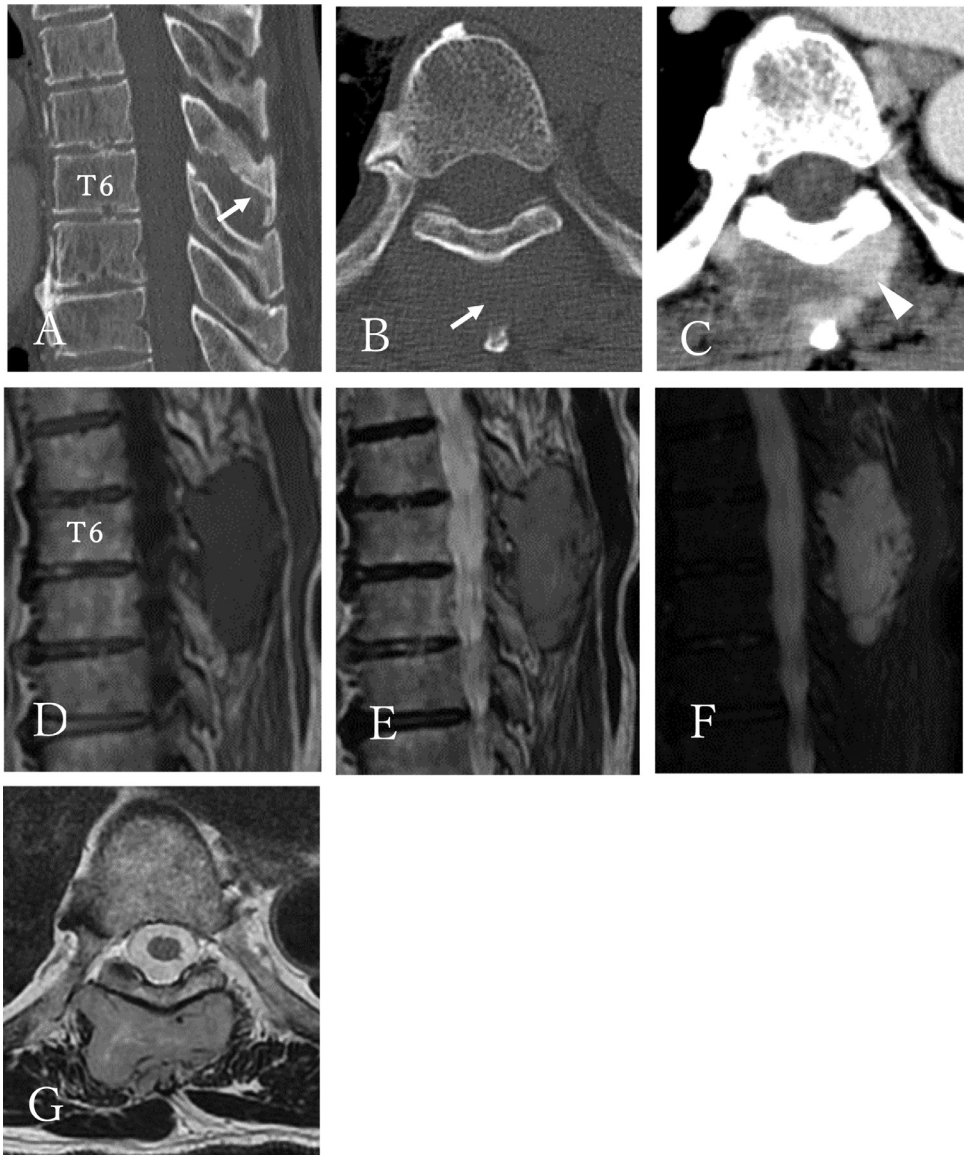

Fig. 1 – A 64-year-old man. Computed tomography (CT) showing mass around T6 spinous process (A, B). Plain CT showing osteoclastic lesions (white arrow). (C) Contrast-enhanced CT showing mass enhanced peripherally (white arrowheads). Magnetic resonance imaging (MRI) showing mass infiltrating the multifidus. (D) T1-weighed sagittal image. (E) T2-weighed sagittal image. (F) Contrast-enhanced MRI on sagittal image. (G) T2-weighed axial image.

thoracic spinous process SFTs that were gross totally resected and bleeding was controlled successfully.

Case presentation

Case 1

A 69-year-old man was pointed out for a painless mass located over his back during medical checkup in early 2016. He underwent computed tomography (CT)-guided biopsy. The mass was suspected to be SFT, and he was referred to our hospital in early 2017. On examination, he was noted to have a palpable, mobile mass over the back around T6, measuring approximately 6 × 3 cm. He denied any associated symptoms or neurological deficit. CT revealed osteoclastic lesions in T6 spinous process and a mass with peripheral enhancement in the early phase (Figs. 1A–C). Magnetic resonance imaging (MRI) revealed a mass located around the spinous process, infiltrating the bilateral multifidus, and that enhanced homogeneously with contrast medium (Figs 1D–G). Angiography revealed that the tumor was fed by the left T6 radiculopial artery (Fig 2A). We performed embolization with gelatin sponge, n-butyl 2-cyanoacrylate, and coiling preoperatively (Fig. 2B). Our surgical approach was the intermuscular plane between the multifidus and longissimus muscle, and the multifidus was detached from the transverse process as a margin (Fig. 3A). Then, we accomplished en bloc laminectomy using a thread saw (Fig. 3B). During laminectomy, an assistant used a pulley to prevent medial laminectomy or intratumor resection, and we successfully performed en bloc laminectomy

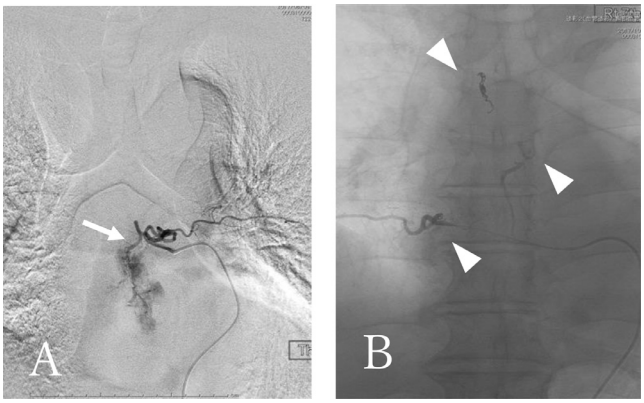

Fig. 2 – (A) Preoperative angiogram showing that the tumor was fed by the left T6 radiculopial artery (white arrow). (B) Embolization was performed at the left T6, right T5, and right T7 radiculopial artery (white arrowheads).

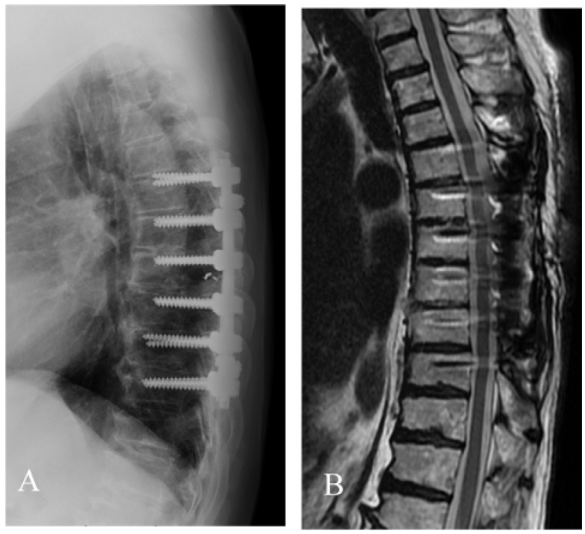

Fig. 4 – (A) Postoperative radiographs: posterior fixation at T5-10. (B) 1-year postoperative magnetic resonance imaging findings showing no tumor recurrence.

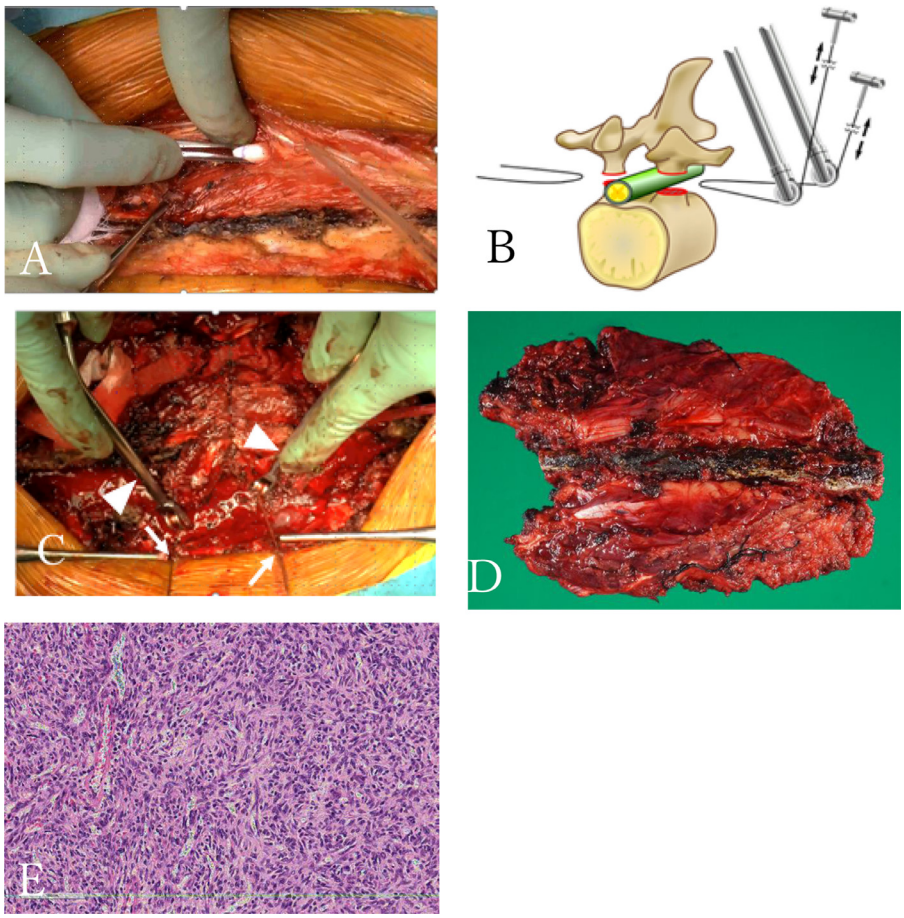

Fig. 3 – (A) Intraoperative view showing intermuscular plane between the multifidus and longissimus muscle. (B) Schematic view of thread saws. (C) During laminectomy using a thread saw (white arrows), the assistant surgeon put pulleys on the thread saw to prevent medial laminectomy (white arrowheads). (D) Gross total resection was achieved postoperatively. (E) Histopathological examination showing tumor composed of spindle cells with bland, uniform, thin nuclei arranged randomly.

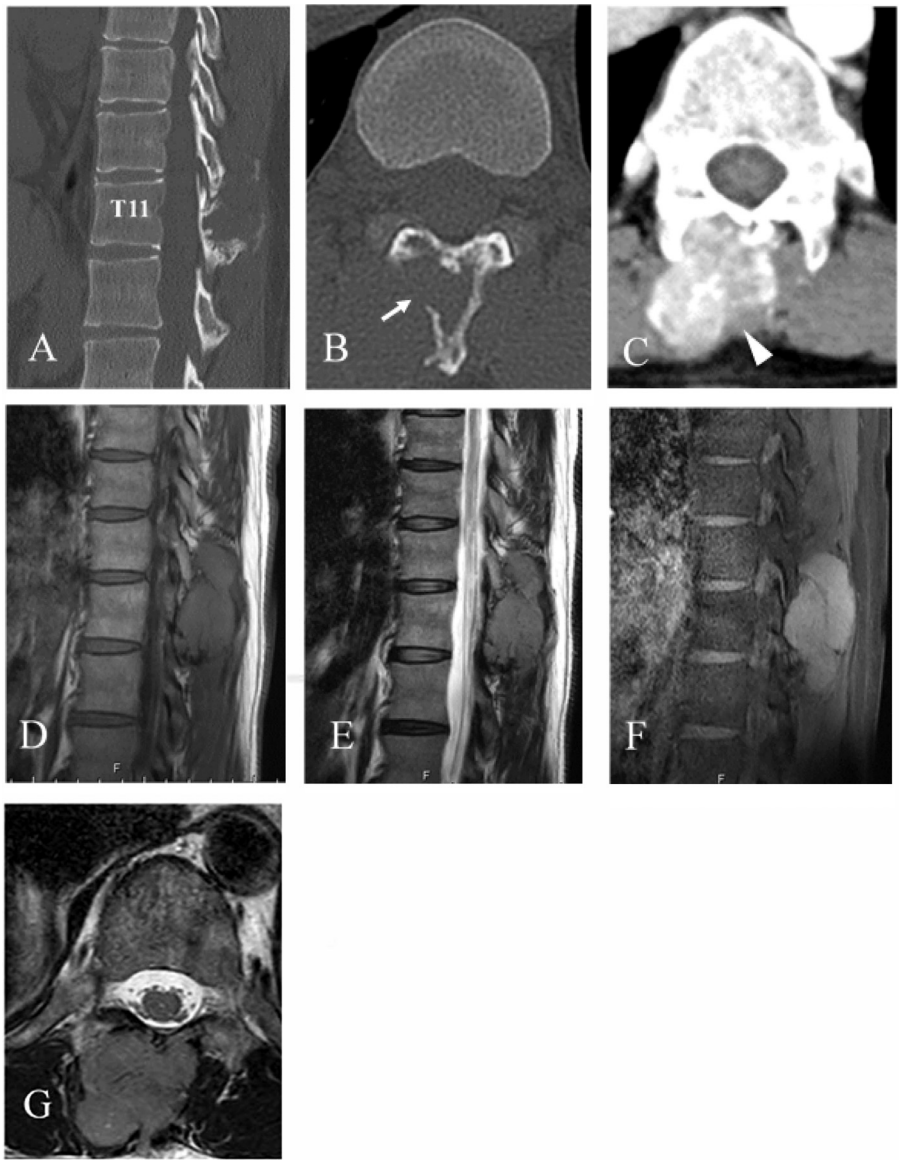

Fig. 5 – A 46-year-old man. Computed tomography (CT) showing mass around T11 spinous process (A, B). Plain CT showing osteoclastic lesions (white arrow). (C) Contrast-enhanced CT showing mass enhanced peripherally (white arrowheads). Magnetic resonance imaging (MRI) showing mass infiltrating the multifidus. (D) T1-weighed sagittal image. (E) T2-weighed sagittal image. (F) Contrast-enhanced MRI on sagittal image. (G) T2-weighed axial image.

without intratumor resection (Fig. 3 C andD). Intraoperative bleeding was 600 mL, and we achieved gross total resection. Histological examination revealed tumor composed of spindle cells with bland, uniform, thin nuclei arranged randomly (Fig. 3E). The proportion of Ki-67-positive cells was 4%, mitotic figures were not observed, and the margin was negative. Immunohistochemical analysis revealed that the tumor cells stained for vimentin, CD34, and BCL-2, but not for S-100 protein, confirming the diagnosis of SFT. The patient showed no recurrence 3 years after surgery (Figs. 4A and B).

Case 2

A 46-year-old man initially presented to a nearby clinic because of back pain in early 2018. He had a painful, palpable mass in his center back. CT revealed an osteolytic lesion in the T11 spinous process (Figs. 5A-C), and MRI revealed a mass protruding from the spinous process enhanced homogeneously (Figs. 5D-G). After CT-guided needle biopsy (Figs. 6), SFT was suspected, and he was referred to our hospital. Fluorodeoxyglucose-positron emission tomography (FDG-PET) revealed accumulation of FDG in the T11, and no metastasis was observed. Angiography revealed that the tumor was fed mainly by the right T10-L1 radiculopial artery. After performing embolization (Fig. 7), we also performed en bloc laminectomy using a thread saw to achieve gross total resection (Figs. 8A and B). Intraoperative bleeding was 289 mL, and we achieved gross total resection (Figs. 9). The proportion of Ki-67-positive cells was 5%. Immunohistochemical analysis revealed that the tumor cells stained for CD34, STAT6, and BCL-2, verifying the diagnosis of SFT. The patient showed no recurrence 2 years after the surgery.

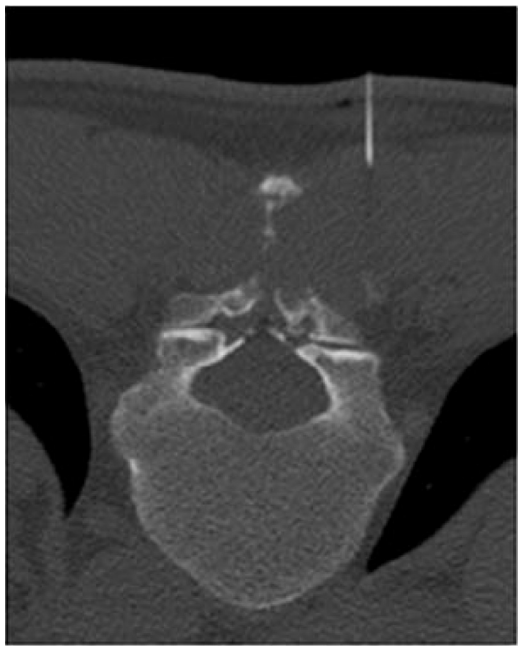

Fig. 6 – Biopsy under computed tomography guidance was performed from the mass.

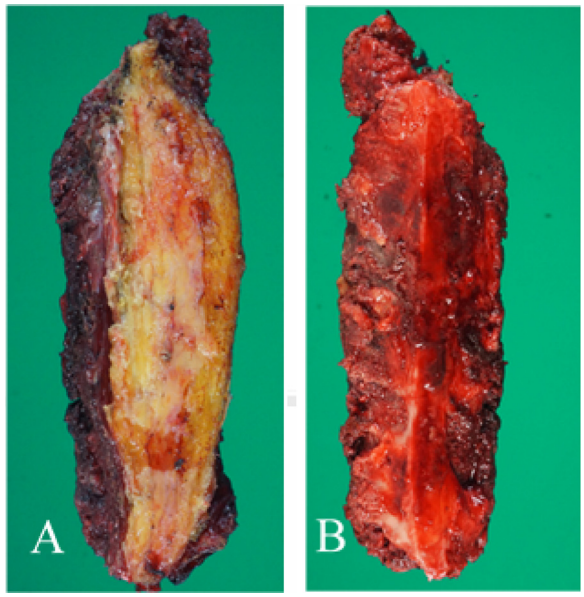

Fig. 8 – Gross total resection was achieved postoperatively. (A) Tumor's dorsal surface was covered with multifidus. (B) Tumor's ventral surface was covered with lamina.

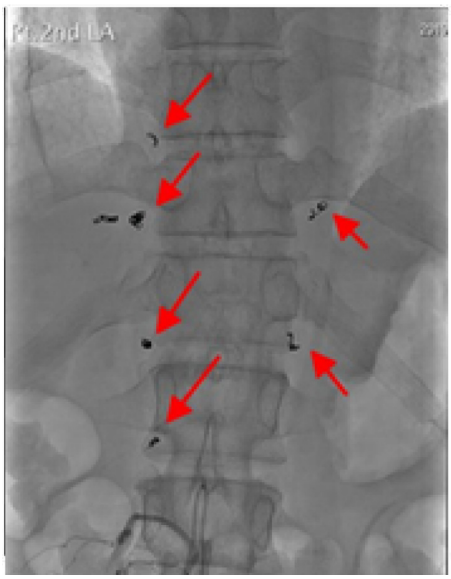

Fig. 7 – Embolization was performed at the right T10-L1 radiculopial artery (red arrow). (Color version of figure is available online.)

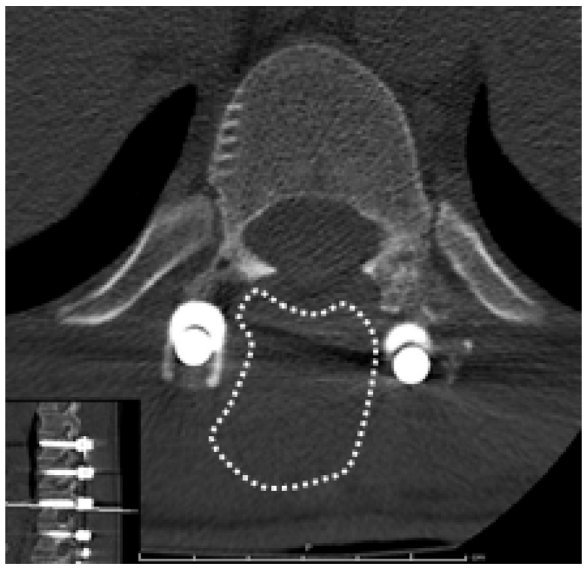

Fig. 9 – Postoperative computed tomography. Tumor was completely resected (white dot line).

Discussion

Here, we report 2 cases of SFT that showed hypervascular tumor in preoperative angiogram. Considering the risk of excessive intraoperative bleeding, we performed preoperative embolization. Then, we performed en bloc laminectomy using a thread saw with pulley to achieve gross total resection. SFTs are well-known hypervascular tumors, and previous reports have described the benefit of preoperative embolization for such tumors [6–8]. Some reported that local recurrence seldom occurred if gross total resection was achieved [9,10]. However, once intratumor resection occurred, a high rate of local recurrence was observed, and the tumor will possibly be dedifferentiated [11,12]. Indeed, our cases demonstrated that the tumors were infiltrating into the bilateral multifidus, and it would be difficult to perform operation without intratumor resection by ordinal laminectomy. Therefore, it is important to

achieve gross tumor resection considering the risk of intraoperative bleeding. There are no detailed reports discussing how to resect SFTs that generate in the spinous process. Using a thread saw with pulley enabled us to decide the cutting plane of lamina (Fig. 3B), and preoperative embolization also helped to reduce bleeding in laminectomy.

To the best our knowledge, this is the first report of the surgical procedure for spinal process solitary fibrous tumor infiltrating the multifidus.

Conclusion

In conclusion, combination treatment with preoperative embolization and en bloc laminectomy using a thread saw was found to be effective in spinous process SFTs. We believe our strategy would be useful to control intraoperative bleeding and to achieve gross tumor resection in spinous process SFTs.

Patient perspective

Before surgery, the patients were concerned about the probability of recurrence. After surgery, they indicated that their back pain had disappeared and that they had returned to work. They were relieved to hear that total resection was performed.

Authors' contribution

Tomohiro Yamada wrote and prepared the manuscript, and all of the authors participated in the study design. All authors have read, reviewed, and approved the article.

REFERENCES

[1] Arantes M, Hoavar M, Vaz AR, Resende M, Pereira JR. Solitary fibrous tumor of the thoracic spine. Neurochirurgie 2008;55:573–5.
[2] Gold JS, Antonescu CR, Hajdu C, Ferrone CR, Hussain M, Lewis JJ, et al. Clinicopathologic correlates of solitary fibrous tumors. Cancer 2002;94(4):1057–68.
[3] Jia Q, Zhou Z, Zhang D, Yang J, Liu C, Wang T, et al. Surgical management of spinal solitary fibrous tumor/hemangiopericytoma: a case series of 20 patients. Eur Spine J 2018;27(4):891–901.
[4] Kim DH, Lim JS, Han K-T, Kim M-C. Giant extrapleural solitary fibrous tumor of the thigh. Archi Plastic Surg 2015;42(4):489.
[5] Michael B, Eugene J, Richard D. Solitary fibrous tumors of the pleura. Cancer 1981;47:2678–89.
[6] Perrotta F, Cerqua FS, Cammarata A, Izzo A, Bergaminelli C, Curcio C, et al. Integrated therapeutic approach to giant solitary fibrous tumor of the pleura: report of a case and review of the literature. Open Medicine (Poland) 2016;11(1):220–5.
[7] Santillan A, Zink W, Lavi E, Boockvar J, Gobin YP, Patsalides A. Endovascular embolization of cervical hemangiopericytoma with Onyx-18: case report and review of the literature. J NeuroInterv Surg 2011;3(3):304–7.
[8] Wallace SJ, Teixeira R, Miller NF, Raj M, Sheikh H, Sharma R. Extrapleural superficial solitary fibrous tumor on the posterior shoulder: a case report and review of the literature. Eplasty 2018;18:e31.
[9] Wang J, Zhao K, Han L, Jiao L, Liu W, Xu Y, et al. Solitary fibrous tumor/hemangiopericytoma of spinal cord: a retrospective single-center study of 16 cases. World Neurosurg 2019;123:e629–38.
[10] Williams R, Foote M, Deverall H. Strategy in the surgical treatment of primary spinal tumors. Global Spine J 2012;2(4):249–65.
[11] Yammine K, Nasser HA, Hadi U, Natout MA, Najjar V, Tayar C. Salvage preoperative embolization of an infratemporal solitary fibrous tumor. Medicine (United States) 2018;97(13):1–4.
[12] Zhang P, Hu J, Zhou D. Hemangiopericytoma of the cervicothoracic spine: a case report and literature review. Turkish Neurosurg 2014;24(6):948–53.