

# Cervical, Intradural Extramedullary Solitary Fibrous Tumor of the Spinal Cord: A Case Report and Review of the Literature

## Abstract

Solitary fibrous tumors (SFTs) are rare, spindle cell neoplasms of the mesenchymal origin. Lesions localized to the spine are exceptionally uncommon, only described in the literature in case reports and small case series. While these lesions are typically benign, there are a few reports in which they recur or present as malignancies. The patient presented in the case herein was a 72-year-old male, who presented with a 1-year history of lower extremity weakness, pain, and numbness and was found to have a cervical, intradural extramedullary tumor. In addition to the case report, the authors perform a thorough review of all previously published cases of spinal SFT.

**Keywords:** Solitary fibrous tumor, spine, tumor

## Introduction

Solitary fibrous tumors (SFTs) are rare spindle cell neoplasms of the mesenchymal origin. These lesions were first described in 1931<sup>[1]</sup> as a localized form of pleural mesothelioma. In the time since, SFTs have been reported in numerous extra-pleural locations, including the orbit, upper respiratory tract, nasopharyngeal sinuses, periosteum, soft tissues, skin, prostate, meninges, epiglottis, liver, and thyroid.<sup>[2-12]</sup> The first seven cases of SFT of the central nervous system were described in 1996 by Carneiro *et al.*, two of which were intraspinal.<sup>[13]</sup> A comprehensive review by Bisceglia *et al.* in 2011 found that of the 220 cases of SFT reported in the literature since 1996, roughly one-fifth were intraspinal lesions.<sup>[14]</sup> Since the initial report of intraspinal SFTs, approximately 85 additional intraspinal SFTs have been described in the literature.<sup>[13-72]</sup> Presented herein is an illustrative case of an SFT with an extensive literature review, focused predominately on cervical/thoracic, intradural, and extramedullary tumors.

## Illustrative Case Solitary Fibrous Tumor

The patient, in this case, was a 72-year-old male who presented with a 1-year history of lower extremity weakness, pain, and

numbness. Symptoms were initially localized to the right lower extremity and progressively worsened, evolving to include the left lower extremity. Three weeks before presentation, the patient began having difficulty walking and experiencing instability at the knee joint. Interestingly, the patient reported that the pain was limited to his right lower extremity, while the only symptom on the left side was weakness. The patient underwent magnetic resonance imaging (MRI) of the cervical and thoracic spine and was found to have an intradural enhancing lesion, with associated spinal cord compression [Figure 1a and b]. The mass, located along the ventral and right lateral surface of the thoracic cord at the C7 vertebral level, appeared to be causing prominent mass effect, severe canal narrowing, and hydrosyringomyelia.

The patient underwent C5–C7 laminectomies with intraoperative neuromonitoring. After opening the dura, a large, extremely hard, and fibrous extramedullary tumor was found closely adherent to the spinal cord [Figure 2a]. The tumor was debulked, and a biopsy was sent for frozen section. Subsequently, microdissection was performed to remove the tumor from the cord. All tumors were removed, including some areas with a poor resection plane [Figures 1c, d and 2b]. The operation was well tolerated by the patient, with no complications during the follow-up period.

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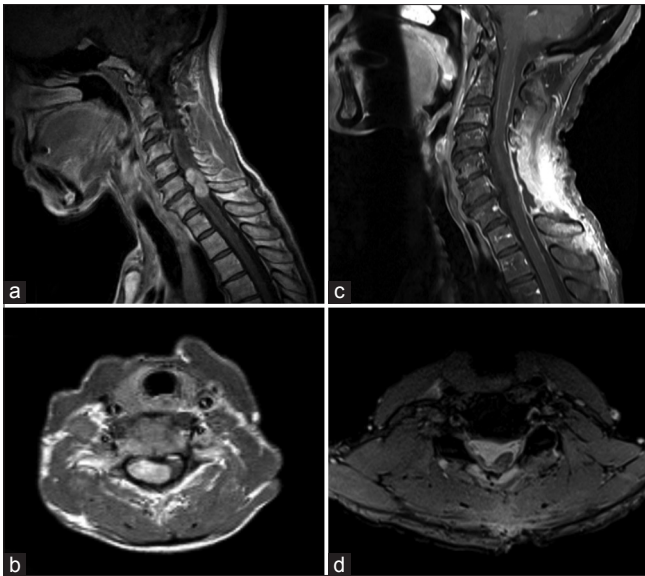
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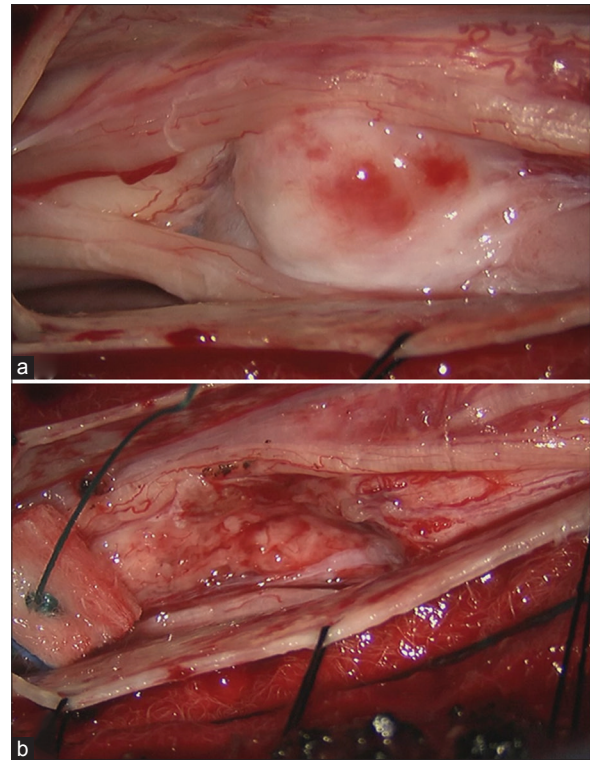
**Figure 1: Pre- and post-operative magnetic resonance imaging demonstrating solitary fibrous tumor. (a) Preoperative sagittal postcontrast T1 images. (b) Preoperative axial postcontrast T1 images. (c) Postoperative sagittal postcontrast T1 images. (d) Postoperative axial T2 images**

### Histological Findings

Histologically, the specimen was composed of spindle-shaped cells arranged in intersecting fascicles within an abundant collagen network. Immunohistochemical stains demonstrated that the mass was strongly, diffusely positive for CD34 and BCL-2 and negative for S100 and EMA. In addition, stain for Ki-67 revealed a low proliferation rate. Collectively, these findings supported a diagnosis of SFT.

### Discussion

Spinal SFTs can be classified, according to their compartment of development, as intramedullary, intradural extramedullary, or extradural.<sup>[41]</sup> To the authors' knowledge, there have been only three cases of cervical, intradural extramedullary SFTs, including the present case [Table 1].<sup>[18,20,21,24,26,33,44,46,47,59,61,62,68,71,73-75]</sup> As these lesions are rare, no large case series have been performed on spinal SFTs; however, comprehensive reviews have been conducted by Fargen *et al.*,<sup>[76]</sup> Bisceglia *et al.*,<sup>[14]</sup> and more recently Albert and Gokden.<sup>[16]</sup> According to these studies, the majority of spinal SFTs are intradural and occur in the cervical and thoracic segments. Males and females are roughly equally affected.<sup>[14,76]</sup> Fargen *et al.* reported that the patients included in their analysis almost universally presented with pain, sensory loss, motor weakness, urinary dysfunction, or a combination of these symptoms.<sup>[76]</sup> Generally, SFTs are considered to be benign or indolent; however, malignant cases have been reported in the literature.<sup>[77-79]</sup> The current consensus treatment for spinal SFTs consists of surgical resection via laminotomy or laminectomy. The extent of surgical resection has been implicated as the most important



**Figure 2: Intraoperative microscope view of solitary fibrous tumor. (a) Exposed view, prior to tumor resection. (b) Exposed view of the resection cavity**

prognostic factor.<sup>[80,81]</sup> Fargen *et al.* reported that 25% of cases exhibited recurrences, half of which underwent subtotal resection (STR). Further analysis showed that STR was associated with a 16-fold increased odds of recurrence (odds ratio 15.9, 95% confidence interval 5.5–46.1).<sup>[76]</sup> The role of radiotherapy and chemotherapy is yet to be defined against these tumors.<sup>[24]</sup> However, it is suggested that there is minimal benefit in benign cases and that these therapies are likely ineffective for malignant SFTs.<sup>[14]</sup>

Although gross total resection carries a good prognosis and lower risk of recurrence, these resections are not without risks.<sup>[24]</sup> As treating these lesions requires a challenging microsurgical resection, the possibility of postoperative morbidity remains. Damage to the spinal tracts, particularly in intramedullary SFTs, is a potential complication and must be mediated through the use of neuromonitoring.<sup>[20,25]</sup> In cases where there is no clear plane of resection and close adherence to the spinal cord, the use of cutting instruments and lasers is found to be useful.<sup>[47]</sup>

The ability to distinguish SFTs from other spindle cell tumors is important for clinicians as these lesions have similar features. The differential diagnosis includes meningioma, schwannoma, and neurofibroma.<sup>[36]</sup> A definitive diagnosis can be made through a combination of histopathological and immunohistochemical analysis.<sup>[82]</sup> Histologically, SFT cells are found encircled by dense collagen networks in fascicular, storiform, herringbone, or patternless

**Table 1: Literature review of reported cases of cervical/thoracic, intradural extramedullary solitary fibrous tumors**

Authors (years)	Age/sex	Location	Compartment	Treatment	Follow-up	Outcome/notes
Malek <i>et al.</i> (1997)	33/male	T7-8	Intradural, extramedullary	GTR		
Brunori <i>et al.</i> (1999)	46/female	T12-L1	Intradural, extramedullary	GTR	4 months disease-free	
Vorster <i>et al.</i> (2000)	51/male	T2-3	Intradural, extramedullary	GTR	7 months no recurrence	
Kurtkaya <i>et al.</i> (2001)	70/female	T3	Intradural, extramedullary	GTR	12 months disease-free	
Caroli <i>et al.</i> (2004)	54/male	C7-T1	Intradural, extramedullary	GTR	15 months no recurrence	
Pizzolitto <i>et al.</i> (2004)	36/male	T7-8	Intradural, extramedullary	GTR	18 months no recurrence	
Pakasa <i>et al.</i> (2005)	27/male	T5-7	Intradural, extramedullary	STR	Recurrence 14 years later →S3-5 and coccygeal nerve roots; intradural, extramedullary→GTR	
Arantes <i>et al.</i> (2009)	22/male	T1-2	Intradural, extramedullary	GTR	18 months disease-free	
Bisceglia <i>et al.</i> (2011)	47/male	T3-4	Intradural, extramedullary	GTR	11.5 years disease-free	Tumor embedded in posterior nerve rootlets
Vassal <i>et al.</i> (2011)	52/female	T8-9	Extradural and intradural, extramedullary	GTR	62 months disease-free	
Mariniello <i>et al.</i> (2012)	75/female	T6-7	Intradural, extramedullary	GTR	1 year disease-free	
Brigui <i>et al.</i> (2013)	56/male	T6-7	Intradural, extramedullary	GTR	29 months disease-free	
Hwang <i>et al.</i> (2014)	48/male	C7-T1	Intradural, intramedullary, and extramedullary	STR	No recurrence at 6 months	
Robert <i>et al.</i> (2014)	49/female	T9-10	Intradural, intramedullary, and extramedullary	STR	No recurrence at 6 months	
Yuan <i>et al.</i> (2014)	48/male	T9	Intradural, extramedullary	GTR		Dumbbell-shaped; communicating with thoracic cavity
Sade <i>et al.</i> (2015)	43/male	Thoracic	Intradural, extramedullary	Surgery		Dumbbell-shaped
Biswas <i>et al.</i> (2017)	35/female	T10-11	Intradural, extramedullary, and extradural component	STR (2 stages)	Local recurrence and pulmonary metastases at 5 months→palliative radiotherapy and chemotherapy	Malignant tumor
Present case	72/male	C6-7	Intradural extramedullary	GTR		

GTR – Gross total resection; STR – Subtotal resection; Surgery – Otherwise unspecified surgical resection

arrangements on hematoxylin and eosin staining.<sup>[13,83]</sup> Positive staining for CD34, vimentin, BCL-2,<sup>[13,14,61,84,85]</sup> and CD99<sup>[86]</sup> and negative staining for EMA and S-100<sup>[84]</sup> are hallmark findings in SFTs.

Hemangiopericytomas (HPCs) display many of the same characteristics as SFTs, sometimes making differential diagnosis a challenge. A new paradigm has gained traction among pathologists in the past decade, which views HPC as a variant within the broader spectrum of SFT.<sup>[87]</sup> Recent evidence supports this view, including a study by Schweizer *et al.*, where a similar NAB2-STAT6 fusion protein was found in both SFT and HPC.<sup>[88]</sup> However, this is not universally accepted. Given the better prognosis associated with SFTs, particularly in the central nervous system, most experts retain that distinguishing the two entities remains clinically significant.<sup>[14,89]</sup>

On MRI, SFTs appear isointense on T1-weighted sequences and hypointense on T2-weighted sequences.<sup>[36,47]</sup> Intraoperative appearance of SFTs can aid in distinguishing them from other, similar neoplasms. Intradural

extramedullary SFTs lack involvement of the spinal roots (unlike neurinomas) and have a hard tumor consistency, little to no vascularization, and an absent or weak dural adherence (unlike meningiomas). In addition, unlike schwannomas and meningiomas, there is a firm attachment to the spinal cord and no clear arachnoidal interface. Intramedullary SFTs also have a hard consistency (unlike metastases and astrocytomas) and scarce vascularization (unlike hemangioblastomas).<sup>[47]</sup>

### Conclusion

We report a rare case of a cervical, intradural extramedullary SFT of the spinal cord. To date, with the inclusion of the case herein, there are only three similar cases reported in the literature. Thus, continual reports must be contributed to inform clinicians regarding how to identify, differentiate, classify, and treat these lesions.

### Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and



other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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### Conflicts of interest

There are no conflicts of interest.

### References

- Klemperer P, Rabin CB. Primary neoplasms of the pleura. A report of five cases. *Arch Pathol* 1931;11:385-412.
- Cowper SE, Kilpatrick T, Proper S, Morgan MB. Solitary fibrous tumor of the skin. *Am J Dermatopathol* 1999;21:213-9.
- Takehima Y, Yoneda K, Sanda N, Inai K. Solitary fibrous tumor of the prostate. *Pathol Int* 1997;47:713-7.
- Dorfman DM, To K, Dickersin GR, Rosenberg AE, Pilch BZ. Solitary fibrous tumor of the orbit. *Am J Surg Pathol* 1994;18:281-7.
- Challa VR, Kilpatrick SE, Ricci P, Wilson JA, Kelly DL Jr. Solitary fibrous tumor of the meninges. *Clin Neuropathol* 1998;17:73-8.
- Safneck JR, Alguacil-García A, Dort JC, Phillips SM. Solitary fibrous tumour: Report of two new locations in the upper respiratory tract. *J Laryngol Otol* 1993;107:252-6.
- Kottke-Marchant K, Hart WR, Broughan T. Localized fibrous tumor (localized fibrous mesothelioma) of the liver. *Cancer* 1989;64:1096-102.
- Witkin GB, Rosai J. Solitary fibrous tumor of the upper respiratory tract. A report of six cases. *Am J Surg Pathol* 1991;15:842-8.
- Cameselle-Teijeiro J, Varela-Duran J, Fonseca E, Villanueva JP, Sobrinho-Simoes M. Solitary fibrous tumor of the thyroid. *Am J Clin Pathol* 1994;101:535-8.
- Batsakis JG, Hybels RD, el-Naggar AK. Solitary fibrous tumor. *Ann Otol Rhinol Laryngol* 1993;102:74-6.
- O'Connell JX, Logan PM, Beauchamp CP. Solitary fibrous tumor of the periosteum. *Hum Pathol* 1995;26:460-2.
- Suster S, Nascimento AG, Miettinen M, Sichel JZ, Moran CA. Solitary fibrous tumors of soft tissue. A clinicopathologic and immunohistochemical study of 12 cases. *Am J Surg Pathol* 1995;19:1257-66.
- Carneiro SS, Scheithauer BW, Nascimento AG, Hirose T, Davis DH. Solitary fibrous tumor of the meninges: A lesion distinct from fibrous meningioma. A clinicopathologic and immunohistochemical study. *Am J Clin Pathol* 1996;106:217-24.
- Bisceglia M, Galliani C, Giannatempo G, Lauriola W, Bianco M, D'angelo V, *et al.* Solitary fibrous tumor of the central nervous system: A 15-year literature survey of 220 cases (August 1996-July 2011). *Adv Anat Pathol* 2011;18:356-92.
- Aftab S, Casey A, Tirabosco R, Kabir SR, Saifuddin A. Fat-forming solitary fibrous tumour (lipomatous haemangiopericytoma) of the spine: Case report and literature review. *Skeletal Radiol* 2010;39:1039-42.
- Albert GW, Gokden M. Solitary fibrous tumors of the spine: A pediatric case report with a comprehensive review of the literature. *J Neurosurg Pediatr* 2017;19:339-48.
- Alston SR, Francel PC, Jane JA Jr. Solitary fibrous tumor of the spinal cord. *Am J Surg Pathol* 1997;21:477-83.
- Arantes M, Honavar M, Vaz AR, Resende M, Pereira JR. Solitary fibrous tumor of the thoracic spine. *Neurochirurgie* 2009;55:573-5.
- Basaran R, Kaksi M, Onoz M, Balkuv E, Sav A. Intradural solitary fibrous tumor of the lumbar spine: A distinctive case report. *Case Rep Neurol Med* 2015;2015:708472.
- Bisceglia M, Dimitri L, Giannatempo G, Carotenuto V, Bianco M, Monte V, *et al.* Solitary fibrous tumor of the central nervous system: Report of an additional 5 cases with comprehensive literature review. *Int J Surg Pathol* 2011;19:476-86.
- Biswas R, Halder A, Ramteke PP, Pandey R. Malignant solitary fibrous tumor of thoracic spine with distant metastases: Second reported case and review of the literature. *J Craniovertebr Junction Spine* 2017;8:79-81.
- Bohinski RJ, Mendel E, Aldape KD, Rhines LD. Intramedullary and extramedullary solitary fibrous tumor of the cervical spine. Case report and review of the literature. *J Neurosurg* 2004;100:358-63.
- Bouyer B, Guedj N, Lonjon G, Guigui P. Recurrent solitary fibrous tumour of the thoracic spine. A case-report and literature review. *Orthop Traumatol Surg Res* 2012;98:850-3.
- Brigui M, Aldea S, Bernier M, Bennis S, Mireau E, Gaillard S, *et al.* Two patients with a solitary fibrous tumor of the thoracic spinal cord. *J Clin Neurosci* 2013;20:317-9.
- Bruder M, Tews D, Mittelbronn M, Capper D, Seifert V, Marquardt G, *et al.* Intramedullary solitary fibrous tumor – A benign form of hemangiopericytoma? Case report and review of the literature. *World Neurosurg* 2015;84:189.e7-12.
- Brunori A, Cerasoli S, Donati R, Giangaspero F, Chiappetta F. Solitary fibrous tumor of the meninges: Two new cases and review of the literature. *Surg Neurol* 1999;51:636-40.
- Ciappetta P, D'Urso PI, Cimmino A, Ingravallo G, Rossi R, Colamaria A, *et al.* Intramedullary solitary fibrous tumor of dorsal spinal cord. *Neuropathology* 2010;30:273-8.
- Cincu R, Rodriguez R, Perez A, Blanco T, Arroategui I, Barcia C, *et al.* Solitary fibrous tumor of the thoracic spine. *J Neurosci Rural Pract* 2010;1:118-9.
- Donnellan RB, Govender D, Chite SH, Landers AT. An unusual presentation of solitary fibrous tumor. *Spine (Phila Pa 1976)* 2000;25:749-51.
- Endo K, Komagata M, Ikegami H, Nishiyama M, Tanaka S, Imakiire A, *et al.* Dumbbell-type solitary fibrous tumor in the cervical spine. *J Orthop Sci* 2003;8:428-31.
- Farooq Z, Badar Z, Zaccarini D, Tavernier FB, Mohamed A, Mangla R, *et al.* Recurrent solitary fibrous tumor of lumbar spine with vertebral body involvement: Imaging features and differential diagnosis with report of a case. *Radiol Case Rep* 2016;11:450-5.
- Hashimoto K, Miyamoto K, Hosoe H, Kawai G, Kikuike K, Shimokawa K, *et al.* Solitary fibrous tumor in the cervical spine with destructive vertebral involvement: A case report and review of the literature. *Arch Orthop Trauma Surg* 2008;128:1111-6.
- Hwang US, Kim SB, Jo DJ, Kim SM. Intramedullary solitary fibrous tumor of cervicothoracic spinal cord. *J Korean Neurosurg Soc* 2014;56:265-8.
- Ikeda T, Wada N, Nomura M, Tamiya S, Ushijima M. A case of solitary fibrous malignant tumor with multiple metastases. *Nihon Kokyuki Gakkai Zasshi* 2011;49:913-6.
- Ishii K, Nakamura M, Matsumoto M, Mukai M, Toyama Y, Chiba K, *et al.* Intramedullary solitary fibrous tumor of the spinal cord. *J Orthop Sci* 2009;14:450-4.
- Jallo GI, Roonprapunt C, Kothbauer K, Freed D, Allen J, Epstein F, *et al.* Spinal solitary fibrous tumors: A series of four

- patients: Case report. *Neurosurgery* 2005;57:E195.
37. 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;27:891-901.
  38. Kakimaru H, Matsusaki M, Sanada H, Iwata A, Uchio Y. Dumbbell-type spinal solitary fibrous tumor with paraplegia. *Orthopedics* 2009;32:213.
  39. Kanahara T, Hirokawa M, Shimizu M, Terayama K, Nakamura E, Hino Y, *et al.* Solitary fibrous tumor of the spinal cord. Report of a case with scrape cytology. *Acta Cytol* 1999;43:425-8.
  40. Kataoka H, Akiyama Y, Kubo S, Itoh H, Hamasuna R, Tajima N, *et al.* Solitary fibrous tumor of the spinal nerve rootlet: Case report and literature survey. *Pathol Int* 1999;49:826-30.
  41. Kawamura M, Izawa K, Hosono N, Hirano H. Solitary fibrous tumor of the spinal cord: Case report and review of the literature. *Neurosurgery* 2004;55:433.
  42. Kirkbride M, Heitman K, Szallasi A. Spinal solitary fibrous tumor mimicking hemangioma. *Clin Neuropathol* 2011;30:149-51.
  43. Kobayashi K, Imagama S, Ito Z, Ando K, Ukai J, Muramoto A, *et al.* Recurrence of solitary fibrous tumor of the cervical spinal cord. *Nagoya J Med Sci* 2014;76:217-23.
  44. Kurtkaya O, Elmaci I, Sav A, Pamir MN. Spinal solitary fibrous tumor: Seventh reported case and review of the literature. *Spinal Cord* 2001;39:57-60.
  45. Lavrador JP, Oliveira E, Neto L, Pimentel J, Francisco AF, Livraghi S, *et al.* Dumbbell-shaped spinal solitary fibrous tumor: Combined approach and a review of the literature. *Neurochirurgie* 2015;61:287-91.
  46. Malek AM, Weller SJ, Price DL Jr., Madsen JR. Solitary fibrous tumor presenting as a symptomatic intraspinal mass: Case report. *Neurosurgery* 1997;40:844-7.
  47. Mariniello G, Napoli M, Russo C, Briganti F, Giamundo A, Maiuri F, *et al.* MRI features of spinal solitary fibrous tumors. A report of two cases and literature review. *Neuroradiol J* 2012;25:610-6.
  48. Metellus P, Bouvier C, Guyotat J, Fuentes S, Jouvet A, Vasiljevic A, *et al.* Solitary fibrous tumors of the central nervous system: Clinicopathological and therapeutic considerations of 18 cases. *Neurosurgery* 2007;60:715-22.
  49. Miyashita K, Hayashi Y, Fujisawa H, Hasegawa M, Yamashita J. Recurrent intracranial solitary fibrous tumor with cerebrospinal fluid dissemination. Case report. *J Neurosurg* 2004;101:1045-8.
  50. Montano N, Rigante L, Papacci F, Novello M, Lauriola L, Meglio M, *et al.* Intradural extramedullary lesion of the conus medullaris. Solitary fibrous tumor. *J Clin Neurosci* 2013;20:715, 765.
  51. Mordani JP, Haq IU, Singh J. Solitary fibrous tumour of the spinal cord. *Neuroradiology* 2000;42:679-81.
  52. Muñoz E, Prat A, Adamo B, Peralta S, Ramón y Cajal S, Valverde C, *et al.* A rare case of malignant solitary fibrous tumor of the spinal cord. *Spine (Phila Pa 1976)* 2008;33:E397-9.
  53. Nagano A, Ohno T, Nishimoto Y, Oshima K, Shimizu K. Malignant solitary fibrous tumor of the lumbar spinal root mimicking schwannoma: A case report. *Spine J* 2014;14:e17-20.
  54. Nakamura Y, Okajima K, Otsuka F, Ohara K. Solitary fibrous tumor attached to the cervical vertebra. *Dermatol Surg* 2007;33:500-4.
  55. Obara Y, Matsumoto M, Chiba K, Yabe H, Toyama Y, Mukai M, *et al.* Solitary cervical fibrous tumor. Case illustration. *J Neurosurg* 2003;98:111.
  56. Ogawa T, Moriyama E, Beck H, Sonobe H. Solitary fibrous tumor of the thoracic spinal cord. *Neurol Med Chir (Tokyo)* 2005;45:371-4.
  57. Ogungbo B, Prakash S, Kulkarni G, Bradey N, Marks SM, Scoones D, *et al.* Cervical intra-/extramedullary solitary fibrous tumour. *Br J Neurosurg* 2005;19:254-7.
  58. Oike N, Kawashima H, Ogose A, Hotta T, Hirano T, Ariizumi T, *et al.* A malignant solitary fibrous tumour arising from the first lumbar vertebra and mimicking an osteosarcoma: A case report. *World J Surg Oncol* 2017;15:100.
  59. Pakasa NM, Pasquier B, Chambonnière ML, Morrison AL, Khaddage A, Perret AG, *et al.* Atypical presentations of solitary fibrous tumors of the central nervous system: An analysis of unusual clinicopathological and outcome patterns in three new cases with a review of the literature. *Virchows Arch* 2005;447:81-6.
  60. Piana S, Putrino I, Cavazza A, Nigrisoli E. Solitary fibrous tumor of the spinal nerve rootlet: Report of a case mimicking schwannoma. *Arch Pathol Lab Med* 2004;128:335-7.
  61. Pizzolitto S, Falconieri G, Demaglio G. Solitary fibrous tumor of the spinal cord: A clinicopathologic study of two cases. *Ann Diagn Pathol* 2004;8:268-75.
  62. Robert T, Duc C, San Millán Ruíz D, Morard M. Solitary fibrous tumour with intramedullary component: Case report and review of the literature. *Neurol Neurochir Pol* 2014;48:144-9.
  63. Sebaaly A, Raffoul L, Moussa R. Solitary fibrous tumor of the lumbar spine: The great mimicker-report of the fifth case. *Case Rep Orthop* 2014;2014:852830.
  64. Shin DA, Kim SH, Yoon DH, Kim TS. A dumbbell-shaped solitary fibrous tumor of the cervical spinal cord. *Yonsei Med J* 2008;49:167-70.
  65. Son S, Lee SG, Jeong DH, Yoo CJ. Malignant solitary fibrous tumor of tandem lesions in the skull and spine. *J Korean Neurosurg Soc* 2013;54:246-9.
  66. Takenouchi T, Pannullo SC, Stieg PE, Lavi E. Solitary fibrous tumor with multiple intracranial and spinal lesions: Case report. *Neurosurgery* 2011;68:E1148-51.
  67. Tomek M, Bravi I, Mendoza N, Alsafi A, Mehta A, Molinaro L, *et al.* Spinal extradural solitary fibrous tumor with retiform and papillary features. *Ann Diagn Pathol* 2013;17:281-7.
  68. Vorster SJ, Prayson RA, Lee JH. Solitary fibrous tumor of the thoracic spine. Case report and review of the literature. *J Neurosurg* 2000;92:217-20.
  69. Walker CT, Amene CS, Pannell JS, Santiago-Dieppa DR, Rennett RC, Hansen LA, *et al.* Hemorrhagic intramedullary solitary fibrous tumor of the conus medullaris: Case report. *J Neurosurg Spine* 2015;23:438-43.
  70. Wu Y, Huang B, Liang C. Solitary fibrous tumor of filum terminale. *Acta Radiol Short Rep* 2012;1. pii: arsr. 2012.120005.
  71. Yuan L, Chen X, Tian H, Chen S. Dumbbell-shaped intraspinal solitary fibrous tumor extending into the thoracic cavity. *Clin Neuropathol* 2014;33:91-3.
  72. Zhang YW, Xiao Q, Zeng JH, Deng L. Solitary fibrous tumor of the lumbar spine resembling schwannoma: A case report and review of the literature. *World Neurosurg* 2019. pii: S1878-8750(19)30053-1.
  73. Caroli E, Salvati M, Orlando ER, Lenzi J, Santoro A, Giangaspero F, *et al.* Solitary fibrous tumors of the meninges: Report of four cases and literature review. *Neurosurg Rev* 2004;27:246-51.
  74. Vassal F, Manet R, Forest F, Camdessanche JP, Péoc'h M, Nuti C, *et al.* Solitary fibrous tumors of the central nervous system: Report of five cases with unusual clinicopathological and outcome patterns. *Acta Neurochir (Wien)* 2011;153:377-84.
  75. Sade R, Çakır M, Ogul H, Çalikoğlu Ç, Kantarci M. Very rare

- reason of spinal cord compression: Solitary fibrous tumor. *Spine J* 2015;15:1158-9.
76. Fargen KM, Opalach KJ, Wakefield D, Jacob RP, Yachnis AT, Lister JR, *et al.* The central nervous system solitary fibrous tumor: A review of clinical, imaging and pathologic findings among all reported cases from 1996 to 2010. *Clin Neurol Neurosurg* 2011;113:703-10.
  77. Hanau CA, Miettinen M. Solitary fibrous tumor: Histological and immunohistochemical spectrum of benign and malignant variants presenting at different sites. *Hum Pathol* 1995;26:440-9.
  78. Uzoaru I, Chou P, Reyes-Mugica M. Malignant solitary fibrous tumor of the pleura. *Pediatr Pathol* 1994;14:11-8.
  79. Yang XJ, Zheng JW, Ye WM, Wang YA, Zhu HG, Wang LZ, *et al.* Malignant solitary fibrous tumors of the head and neck: A clinicopathological study of nine consecutive patients. *Oral Oncol* 2009;45:678-82.
  80. Briselli M, Mark EJ, Dickersin GR. Solitary fibrous tumors of the pleura: Eight new cases and review of 360 cases in the literature. *Cancer* 1981;47:2678-89.
  81. England DM, Hochholzer L, McCarthy MJ. Localized benign and malignant fibrous tumors of the pleura. A clinicopathologic review of 223 cases. *Am J Surg Pathol* 1989;13:640-58.
  82. Hasegawa T, Hirose T, Seki K, Yang P, Sano T. Solitary fibrous tumor of the soft tissue. An immunohistochemical and ultrastructural study. *Am J Clin Pathol* 1996;106:325-31.
  83. Chan JK. Solitary fibrous tumour – Everywhere, and a diagnosis in vogue. *Histopathology* 1997;31:568-76.
  84. Tihan T, Viglione M, Rosenblum MK, Olivi A, Burger PC. Solitary fibrous tumors in the central nervous system. A clinicopathologic review of 18 cases and comparison to meningeal hemangiopericytomas. *Arch Pathol Lab Med* 2003;127:432-9.
  85. Chilosi M, Facchetti F, Dei Tos AP, Lestani M, Morassi ML, Martignoni G, *et al.* Bcl-2 expression in pleural and extrapleural solitary fibrous tumours. *J Pathol* 1997;181:362-7.
  86. Mentzel T, Bainbridge TC, Katenkamp D. Solitary fibrous tumour: Clinicopathological, immunohistochemical, and ultrastructural analysis of 12 cases arising in soft tissues, nasal cavity and nasopharynx, urinary bladder and prostate. *Virchows Arch* 1997;430:445-53.
  87. Gengler C, Guillou L. Solitary fibrous tumour and haemangiopericytoma: Evolution of a concept. *Histopathology* 2006;48:63-74.
  88. Schweizer L, Koelsche C, Sahm F, Piro RM, Capper D, Reuss DE, *et al.* Meningeal hemangiopericytoma and solitary fibrous tumors carry the NAB2-STAT6 fusion and can be diagnosed by nuclear expression of STAT6 protein. *Acta Neuropathol* 2013;125:651-8.
  89. Hayashi Y, Uchiyama N, Hayashi Y, Nakada M, Iwato M, Kita D, *et al.* A reevaluation of the primary diagnosis of hemangiopericytoma and the clinical importance of differential diagnosis from solitary fibrous tumor of the central nervous system. *Clin Neurol Neurosurg* 2009;111:34-8.