Araştırma Makalesi *Research Article*

Pamukkale Tıp Dergisi
Pamukkale Medical Journal

doi: 10.5505/ptd.2017.53824

Spinal meningiomas: 24-Case clinical series

Spinal Meningiomalar: 24 Olguluk klinik seri

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Abstract

Purpose: Meningiomas are originated from arachnoid cells. Spina meningiomas constitutes an approximate 25-45% of all intradural spinal tumors. In general these are tumors slowly growing at intradural extramedullary localization and mostly of benign characteristics.Their treatment is total excision with hemilaminectomy, laminectomy or laminoplasty. Demographics, surgical treatment results, and factor considered to affect these results of 24 spinal meningioma cases operated at our clinic between 2005-2016 were aimed to be inspected.

Materials and methods: In our study, 24 spinal meningioma cases operated at our clinic between 2005-2016 were inspected in terms of age, gender, complaint, complaint duration, localizations, neurological examination results,their correlations with dura, applied surgical method, and all these parameters' effects on the clinical course.

Results: 20 of 24 cases (83.4%) were female and 4 of them were male (16.6%). Average age was found to be 57.7 (27-85) year. The most common complaint was pain with 75% (18 cases, and weakness and numbness in arms and legs followed with 12.5% (3 cases). As per the localization, 70.8% (17 cases) resided at thoracic, 25% (6 cases) at cervical, and 4.2% (1 case) at lumbar region.Gross total mass excision was established in 83.4% of patients (20 cases) via laminectomy and 16.6% of them (4 cases) via laminoplasty.2 patients developed cerebrospinal leakage, 4 patients developed superficial infection, and 2 patients developed temporary neurological deficit as postoperative complications.

Conclusion: Spinal meningiomas are the most frequently seen intradural extramedullary secondary spinal tumors and of benign characteristics. In these patients, early diagnosis,early period surgery within a short term after the detection, and total resection as far as possible are of significant importance to acquire long term positive results.

Pam Med J 2017;10(3):228-233

Keywords: Spinal meningioma, total resection, intradural extramedullary tumor.

Özet

Amaç: Meningiomlar araknoid hücrelerden köken alırlar. Spinal meningiomalar tüm intradural spinal tümörlerin yaklaşık %25-%45 ini oluşturmaktadırlar. Genellikle intradural ekstramedüller lokalizasyonda yavaş büyüyen ve çoğunlukla benign karekterde olan tümörlerdir. Tedavileri hemilaminektomi, laminektomi veya laminoplasti ile total eksizyondur. 2005-2016 yılları arasında kliniğimizde opere edilen 24 spinal meningioma olgusunun demografik özellikleri, cerrahi tedavi sonuçları ve bu sonuçlar üzerinde etkili olduğu düşünülen faktörlerin incelenmesi amaçlanmıştır.

Gereç ve yöntem: Çalışmamızda, 2005-2016 yılları arasında kliniğimizde opere edilen 24 spinal meningioma olguları yaş, cinsiyet, şikayet, şikayet süreleri, lokalizasyonları, nörolojik muayene bulguları, durayla olan ilişkileri, uygulanan cerrahi yöntem ve tüm bu parametrelerin klinik seyre etkileri açısından incelendi.

Bulgular: 24 olgunun 20'si kadın (%83.4), 4'ü erkekdi. (%16.6). Yaş ortalaması 57.7 (27-85) yıl olarak bulundu. En sık şikayet ağrı %75 (18 olgu) olup bunu kol ve bacaklarda kuvvetsizlik ve uyuşma %12.5 (3 olgu) takip etti. Lokalizasyon olarak torakal %70.8 (17 olgu), servikal %25 (6 olgu), lomber %4.2 (1 olgu) yerleşimli idi. Hastaların %83.4'üne (20 olgu) laminektomi, %16.6'sına (4 olgu) laminoplasti yapılarak %80 oranında gros total kitle eksizyonu sağlandı. Postoperatif komplikasyon olarak 2 hastada beyin omurilik sıvısı sızıntısı, 4 hastada yüzeyel enfeksiyon, 2 hastada geçici nörolojik defisit gelişti.

Sonuç: Spinal meningiomlar intradural ekstrameduller en sık görülen ikinci spinal tümörler olup benign özelliktedirler. Bu hastalarda tanıya erken gidilmesi, tespit edildikten kısa bir süre sonra erken dönem cerrahi ve mümkün olduğunca total rezeksiyon yapılması uzun dönem olumlu sonuçlar elde edilmesi açısından önemlidir.

Pam Tıp Derg 2017;10 (3):228-233

Anahtar sözcükler: Spinal meningioma,total rezeksiyon,intradural ekstramedüller tümör.

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Gönderilme tarihi: 25.01.2017 Kabul tarihi: 11.04.2017

Introduction

Meningiomas are tumors originated from arachnoid cells particularly of benign and rarely malign characteristics. They constitute 25-45% of all intradural spinal tumors [1,2]. The vast majority of spinal meningiomas are intradural extramedullary [3,4].

There reside mostly at thoracic region, and then cervical and lumbar locations respectively [5]. Spinal meningiomas are most frequently encountered in women rather than men. The ratio of women to men is 4:1. They peak in fifth and sixth decade [6,7].

Meningiomas are 90% benign and encapsulated with highly slow globoid growing patterns. The duration between the diagnosis and symptoms are around 1-2 years. They frequently apply with complaints including leg pain, sensorimotor deficit, and sphincter dysfunction [5]. The most frequently encountered complaint is leg pain. In advanced late cases, myelopathy results occur as a result of cord compression. Sphincter deficits including sensorimotor deficit, hyperactive tendon reflexes, pathologic reflexes, and urinary and fecal incontinence may occur [6,8–10].

In direct graphies, interpedincular distance widening for 50%, cavitation in rear contour of neurocentrum, and interforaminal widening may occur considering prolonged development tumors. Bone deformities are better seen via CT, and intratumoral calcification is typical. Particularly posterolateral calcification, dural tail, foraminal widening are distinct [11]. The golden standard in early diagnosis of spinal meningiomas, operation planning, and long ter m follow-ups is MRI today [12,13]. It is isointense or slightly hypointense to cord and nerve roots in T1 and 75% hyperintense in T2.

Total excision of the tumor should be aimed in surgery. Its prognoses are substantially well. Recurrences may occur between 1.3-1.4% after subtotal surgery [14,15]. Complications may arise including aseptical meningitis, arachnoiditis, spinal instability, cerebrospinal fluid leakage fistula, and late-period postlaminectomy kyphosis. Radiosurgery and stereotactic cyberknife may be combined for invasive and malign ones [16,17].

Material and method

The purpose was to inspect all treatment results and any factor affecting the treatment results of 24 cases operated with spinal tumor diagnosis between 2005-2015 at our clinic, of whom pathology results were meningioma.

Clinic, radiologic, and histopathological examinations were conducted for diagnosis. Cases were scanned retrospectively, and file details, imaging results, and surgery notes were inspected.

Cases were inspected and evaluated in terms of age, gender, complaint findings, complaint periods, imaging methods, spinal track residing regions, neurological examination results, their correlations with dura, surgical methods, and early surgery period results. Early period surgery results are acquired by comparing postoperative Day 10 neurological examination and initial admission neurological examination results (Figure 1).

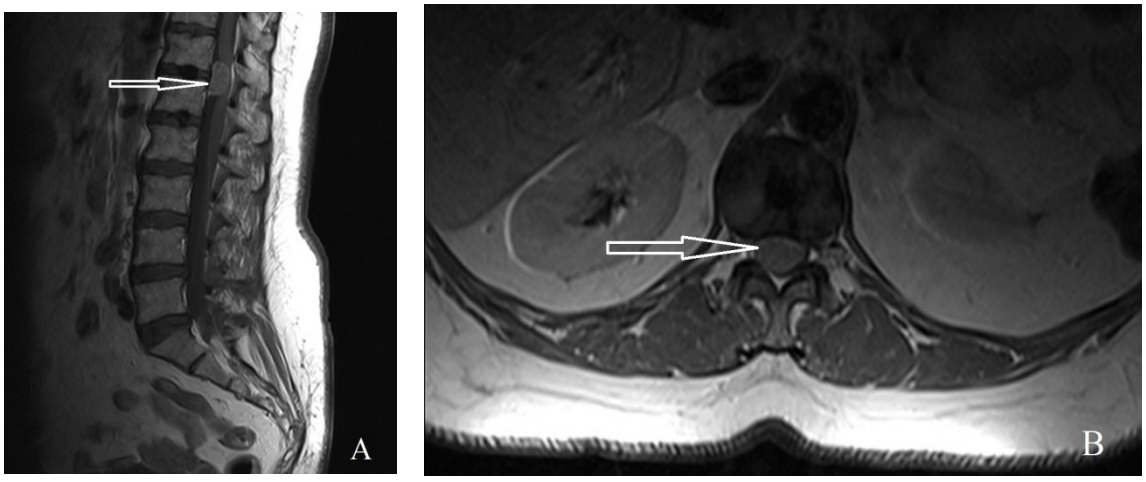

Figure 1. Preoperative meningioma (arrow) seen in sagittal **(A)** and axial **(B)** contrast MRI sections at T12-L1 level

Results

The average age of our cases was 57.7 (27-85) year, being 83.4% (20 cases) female and 16.6% (4 cases) male.

The most frequent application complaint was pain with 75% (18 cases). Extremity weakness and numbness were encountered in 12.5% (3 cases).

In 2 of the 3 cases with motor deficit in neurological examination has paraparesis (2/5 strength) and the other one had monoparesis (43/5 strength). 2 hypoesthesia cases (8.4%) and 1 of the 3 cases with motor deficit (4.2%) had a sphincter disorder such as urinary incontinence.

In 91.6% of the cases (22 cases), along with the direct graphy (DG), magnetic resonance imaging (MRI) was used, and in 8.4% (2 cases), direct graphy, MR, and computerized tomography were used altogether. All of them underwent MRI and surgery.

70.8% of our cases (17 cases) resided at thoracic region, 25% (6 cases) at cervical region, and 4.2% (1 case) at lumbar region (Figure 1). 79.2% (19 cases) were intradural extramedullary (ID-EM), and 20.8% (5 cases) was extradural (ED). In one of our thoracic cases, the tumor between T5-7 was adherent to the anterior wall. We applied anterior engaged dural coagulation and excision to this case of ours. Gross total resection was performed in 87.5% of the cases (21 cases), and subtotal resection was performed in 12.5% (3 cases). Laminectomy was applied to 83.4% (20 cases) and laminoplasty was applied to 16.6% of patients (4 cases). When evaluating early period surgical results, 66.6% the cases with deficit (2 cases) partially recovered from 3/5 paraparesis to 4/5 paraparesis. No change occurred in 33.4% (1 case). 2 cases experienced cerebrospinal fluid leakage and 4 cases showed superficial skin infection in postop period, and they are controlled through suitable treatments. In a single patient underwent laminectomy of our thoracolumbar residence cases, postlaminectomy kyphosis developed during our long term follow-ups, and deformity surgery was performed by operating for a second time. This did not appeared in laminoplasty cases. Temporary neurological deterioration was seen in 8.4% of our cases (2 cases), and their neurological manifestation was recovered in a week (Table 1, Table 2).

Table 1: Gender, complaint findings, imaging methods, spinal track involvement levels and residence, neurological finding distribution

Meningioma		n	%
Gender	Male	4	16.6
	Female	20	83.4
Initial complaint	Pain	18	75
	Weakness and numbness	3	12.5
	Hypoesthesia	2	8.4
	Sphincter problem	1	4.2
Imaging methods	DG and MRI	22	91.6
	DG, MRI, and CT	2	8.4
Tract levels	Lumbar	1	4.2
	Thoracic	17	70.8
	Cervical	6	25
Residences	Intradural extramedullary	19	79.2
	Extradural	5	20.8
Neurological examination	Motor deficit	3	12.5
	Sensation disorder	2	8.4
	Sphincter disorder	1	4.2

DG: Direct graphy; MRT: Magnetic Resonance Imaging; CT: Compaterized Tomography

Table 2: Form of the surgery and early surgery results

Meningioma		n	%
Performed surgery	Gross total excision	21	87.5
	Subtotal excision	3	12.5
Early surgery results	Partial recovery	2	66.6
	No change	1	33.4
	Temporary cisorder	2	8.2

Discussion

Meningiomas are tumors originated from arachnoid cells, with highly slow growing patterns, particularly of benign and rarely malign characteristics. There are dural originated and have globoid configuration. They constitute 25-45% of all intradural spinal tumors [1,2]. The vast majority of spinal meningiomas are intradural extramedullary (ID-EM) [3,4].

Meningiomas are mostly reported in the literature to be extramedullary. Albanese et al. and Cavanough et al. reported that 25% of the spinal cord tumors are meningiomas and 40% thereof are ID-EM. Pathology results of 24 of 105 spinal tumor cases were meningioma. 19 of the 49 ID-EM tumors (38.8%) were meningioma. Our series is in conformance with the literature [1–4].

When inspecting meningiomas in general, average age varies in 5th and 6th decades, and females are predominant. Cavanaugh et al. and Gezen et al. indicated that the average age was 54.7 year, varying between 34 and 82 [6,7]. Riad et al. showed in their studies that meningiomas are encountered more frequently in women for 75-85% [5]. The average age was 57.7 and more frequent in 5th and 6th decades, which is in conformance with the literature. Women to men ratio is 83.4%, indicating that it is more common in women. Our series are in conformance with the literature in this respect [1,5–7].

Regarding the location, Riad et al. indicated that it is more frequent at thoracic region with 80%, and lumbar and sacral residence are rare. It was mostly seen in our series at thoracic region with 70.8%, and cervical region followed with 25% [5–8].

When the literature is inspected, the most frequent complaint was seen to be the pain. Riad et al. indicated that half of their cases in their studies had pain. In our study, the most frequent complaint of our cases was pain with 75%, and extremity weakness and numbness followed with 12.5% (3 cases). Hypoesthesia was determined in 8.2% (1 case) and sphincter problem was found in 4.2% (1 case). When the literature is inspected, the initial symptom is seen to be segmental and radicular pain intensifying at nights. In advanced late cases, as a result of the compression of the tumor on the cord, myelopathy findings, which are cord compression results) revealed. Sphincter deficits including sensorimotor deficit, hyperactive tendon reflexes, pathologic reflexes, and urinary and fecal incontinence may occur [5,6,8–10].Pain complaint was found to be the main complaint in our series in conformance with the literature, and also the ratio of our cases applying with weakness conformed to the literature.

The place of direct graphies and CT in meningioma diagnosis are limited. In direct graphies, interpedincular distance widening, cavitation in rear contour of neurocentrum, and interforaminal widening may occur considering prolonged development benign tumors. Messori et al. showed that the hyperdense mass in the calcification is specific [11]. CT was not superior to MRI in any manner, and it may be of help to diagnosis in case the MRI is contraindicated. As various plane cross-section can be acquired via MRI, it is useful in revealing the exact boundaries and location of the mass, and its invasion findings to adjacent structures. The golden standard in early diagnosis of meningiomas, operation planning, and long term follow-ups is MRI [12,13]. Meningiomas appear isointense

or slightly hypointense to cord and nerve roots in T1 and 75% hyperintense in T2. In cases with extraforaminal extension, CT is a must to evaluate the bone structure [11-13]. In 91.6% of the cases (22 cases) in our series, along with the direct graphy, MR was used, and in 8.3% (2 cases), direct graphy, MRI, and CT were used altogether. All of them underwent MRI and surgery.

Riad et al. stated the clinical symptom formation range to be between 12-24 months and average complaint period to be 13.7 months. This period was between 10 to 36 months in our series, and the average complaint period was 13.6 months [5,8–10].

Laminectomy was applied to 83.4% (20 cases) and laminoplasty was applied to 16.6% (4 cases) of our cases for surgical approach [18]. 1 of the cases of ours with extradural extension underwent laminectomy through posterolateral intervention and mass excision through costatransversectomy. In 80% of the cases, possible upper and lower extremity as well as sphincter complications during the surgery were avoided by using motor and sensory stimulated potential monitorization (MEP-SEP) [19].

No recurrence or relapse was encountered and no malign transformation was seen in follow-ups between 6 months and 4 years in our cases. In a single patient underwent laminectomy of our thoracolumbar residence cases, postlaminectomy kyphosis developed during our long term follow-ups, and deformity surgery was performed by operating for a second time. This did not appeared in laminoplasty cases. In the literature, the most frequent region of the postlaminectomy kyphosis is lumbosacral region and long term results of the laminoplasty are far better [18].

During postoperative 10. day neurological examinations of three cases of ours with motor deficit, strength losses were seen to be lowered and motor strengths were observed to be increased. Morandi et al. and Yoon et al. indicated that the postoperative recovery in the neurological examination of their own series was between 14-25% [5,6,8,20].

2 patients developed cerebrospinal leakage, 4 patients developed superficial infection, and 2 patients developed temporary neurological deficit as postoperative complications. Their treatments were completed within their hospitalization periods, and then they were discharged. 1 of the cases of ours developed postlaminectomy kyphosis in late period follow-ups. Klekamp et al. and Misra et al. stated the cerebrospinal leakage fistula, aseptic meningitis, and arachnoiditis to be the postoperative complications in their own series [21,22].

In conclusion, we offered a series consisting of 24 cases in this study of ours. Meningiomas are the second most frequently encountered intradural extramedullary spinal tumors of benign characteristics. Meningiomas are readily diagnosed through modern imaging methods of today. The main purpose of the treatment should be the total resection and cord decompression. For cases with dural infiltration, dura coagulation, total dura resection, and duraplasty should be applied. Surgical scheduling is planned as urgent or elective as per the neurological manifestation. In subtotal excision or malign spinal meningiomas, radiosurgery, Cyberknifer radiosurgery, and chemotherapy could be applied as an alternative treatment [16,17,23]. Substantial factors affecting the prognosis include early diagnosis before neurological findings decrease the life quality of the patient and tumor excision through total resection as soon as possible.

Conflict of interest: The authors declared no conflict of interest.

References

1. Achari G, Behari S, Mishra A,Pandey R, Jain VK. Extradural meningioma en-plaque of the cervical cord. Neurol Res 2000;22:551-553.
2. Caroli E, Acqui M, Roperto R, Ferrante L, D'Andrea G. Spinal en-plaque meningiomas: a comtemprary experience. Neurosurgery 2004;55:1275-1279.
3. Albanese V, Platania N. Spinal intradural extramedullary tumors. Personal experience. J Neurosurg Sci 2002;46:18-24.
4. Cavanaugh DA, Jawahar A, Lee JA, Wilkinson K, Kerr III EJ, Nunley PD. Intraspinal meningioma in a 101-year-old: should age determine the aggressiveness of intervention? Surg.Neurol 2008;69:130-134.
5. Riad H, Knafo S, Segnarbieux F, Lonjon N. Spinal meningioma: Surgical outcome and literatüre review. Neurochirurgie 2013;59:30-34.
6. Gezen F, Kahraman S, Canakci Z. Review of 36 cases of spinal cord meningioma. Spine 2000;25:727-731.
7. Haegelen C, Morandi X, Riffaud L, Amlashi SFA, Leray E, Brassier G. Results of spinal meningioma surgery in patients with severe preoperative neurological deficits. EurSpine J 2005;14:440-444.

8. Morandi, X, Haegelen C, Riffaud L, Amlashi S, Adn M, Brassier G. Results in the operative treatment of elderly patients with spinal meningiomas. Spine 2004;29:2191-2194.
9. Saraceni C, Harrop JS. Spinal meningioma: chronicles of contemporary neurosurgical diagnosis and management.Clin Neurol Neurosurg 2009;111:221-226.
10. Sandalcioglu, IE, Hunold A, Müller O, Bassiouni H, Stolke D, Asgari S. Spinal meningiomas: critical review of 131 surgically treated patients. Eur Spine J 2008;17:1035-1041.
11. Messori A, Rychlicki F, Salvolini U. Spinal epidural en-plaque meningioma with an unusual pattern of calcification in 14-year-old girl: case report and review of the literature. Neuroradiology 2002;44:256-260.
12. Abul-Kasim K, Thurnher MM, McKeever P, Sundgren PC. Intradural spinal tumors:current classification and MRI features. Neuroradiology 2008;50:301-314.
13. Lee JY. Radiological findings of spinal schwannomas and meningiomas: focus on discrimination of two disease entities. Eur Radiol 2009;19:2707-2715.
14. Gottfried ON, Gluf W, Quinones-Hinojosa A, Kan P, Schmidt MH. Spinal meningiomas: surgical management and outcome. Neurosurg Focus 2003;14:1-7.
15. Nadkarni B, Arora A, Kumar S, Bhatia A. - Recurrent spinal meningioma:a case report withreview of the literature. J OrthopSurg (Hong Kong) 2005;13:326-329.
16. Robert LD, Mi-Ryeong R, Pimkhuan K, Iris CG, Steven DC, John RA. CyberKnife radiosurgery for benign intradural extramedullary spinal tumor. Neurosurgery, 2006;58,4:674-685.
17. Chang UK, Rhee CH, Youn SM, Lee DH, Park SQ. Radiosurgery using the Cyberknife for benign spinal tumors. Korea Cancer Center Hospital experience. J Neuroonc 2011;101:91-99.
18. Gambardella G, Gervasio O, Zaccone C. Approaches and surgical results in the treatment of ventral thoracic meningiomas. Review of our experience with a posterolateral combined transpedicular-transarticular approach. ActaNeurochir (Wien) 2003;145:385-392.
19. Voulgaris S, Alexiou GA, Mihos E, et al. Posterior approach to ventrally located spinal meningiomas. Eur Spine J 2010;19:1195-1199.
20. Yoon SH, Chung CK, Jahng TA. Surgical outcome of spinal canal meningiomas. J. Korean Neurosurg Soc 2007;42:300-304.
21. Klekamp J, Samii M. Surgical results for spinal meningiomas. Surg Neurol 1999;52:552-562
22. Misra SN,Morgan HW. Avoidance of structural pitfalls in spinal meningioma resection. Neurosurg Focus 2003;14:1-6.
23. Gerszten PC, Burton SA, Ozhasoglu C. Radiosurgery for benign intradural spinal tumors. Neurosurgery 2008;62:887-895.