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Case report

A Rare Case of Extra Dural Dorsal Meningioma; Case Report and Analytique Review of Literature about 77 Cases

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Abstract

Spinal meningiomas are usually intra dural tumors, the purely extra dural localization is exceptional, they are easily mistaken for malignant tumor resulting in inadequate management. Only 77 cases have been reported in the literature. Less than 28 cases have been confirmed after durotomy since 1898. We report a new observation followed by an analytical review of the literature with a study of the socio-epidemiological, radiological parameters and of the neurosurgical and progressive management of extra dural spinal meningiomas. Observation: a 57-year-old, female patient with no medical history was admitted to our training for slow dorsal spinal cord compression progression since 06 months. Neurological examination found FRANKEL stage C paraplegia, higher level D7 hypoaesthesia without sphincter disorders. The medullary MRI objectified an intraspinal process of 1.5x2x1cm, well limited, of the right posterolateral of D8-D9 causing compression of the dorsal cord with an intramedullary hyper signal in T2. The D8-D9 laminectomy was performed. Surgical exploration found an extra dural lesion without intra dural extension. The excision was macroscopically complete. Histological examination was in favor of a benign meninigothelial. The post-operative course was marked by a partial and progressive recovery of the neurological deficit and no recurrence. ***Discussion:*** the retrospective analysis of literature about 49 publications was founded that, the incidence in 1933 by Elsberg was 5.5%, Haft in 1963 found 3.5%. In 2020 our study found 3.46% of all spine meningioma. The mean age is 44.19 years [8 years -85 years] with a female predominance of 2/1. The mode of revelation is in 11.53% of fortuitous discovery, in 59.93% by the high state of spinal cord compression stage C of FRANKEL. The topography is dorsal = 51.31%, cervical = 44.76%. MRI scan has been use since 1996 at 67.60%. Laminectomy was performed in 71.79% with durotomy in 11%. The excision is complete with SIMPSON I in 70% and SYMPSON III in 27%. The predominant histological is a grade 1 of meningioma = 73.41%, grade 2 = 6.32%, grade 3 = 1.26% in 19 % meningioma was not specified by the authors. ***Conclusion:*** The prognosis of extra dural spinal meningiomas according to our study is good overall with only 3 cases of recurrence of spinal meningioma in 36 patients, or 8.33% after a mean follow-up of 31.59 months [1 -168 months] with P=0,012.

Keywords: ***extra dural, spinal meningioma***

Background

Spinal meningiomas represent 15-25% of all central nervous system meningiomas. In 1887, Sir Victor Horsley and Sir William Gower performed the first successful surgery for spinal meningioma [1]. These meningiomas are usually intra dural but in some cases they can have an extra dural extension with an incidence of 3.46% to 6.8% according to the literature [2]. The purely extra dural localization is exceptional, 77 cases have been reported in the literature with less than 28 cases confirmed after durotomy since 1887 [1]. Historically, the clinical radiological characteristics and even during the operation suggested lesions with high potential for malignancy [1]. In some cases these tumors are characterized by slow growth, which delays the onset of clinical signs and poses a problem of diagnosis. They are easily mistaken for malignant tumor resulting in inadequate management.

We report a new observation in this sens, followed by an analytical review of the literature with a study of the socio-epidemiological, its clinical features, neuroimaging parameters and the neurosurgical and progressive management of extra dural spinal meningiomas.

I - Case Report

A 56-year-old women without medical history who was admitted to our hospital for progressive paraparesis for 06 months, with weakness and paraesthesia of both lower legs. Neurological examination showed paraparesis of FRANKEL stage C. She had difficulty maintaining her balance due to weakness. She had hyperesthesia and dysesthesia on light touch, pain, and temperature sense below the T7 dermatome level. The position and vibration senses were intact. She did not have gait disturbance and sphincter dysfunction. The medullary MRI (**Figure 1-A-B**) revealed an epidural mass with a diameter of 1.5x2x1cm in the right posterolateral position opposite T8-79 leading which is the site of a hyper signal in T2-weighted. This lesion took contrast in T1-weighted after gadollinium and the lesion extended into the T8-T9 foramen. There was no signs of erosion of vertebral body. The lesion compresse the marrow and responsible for a medullary hypersignal.

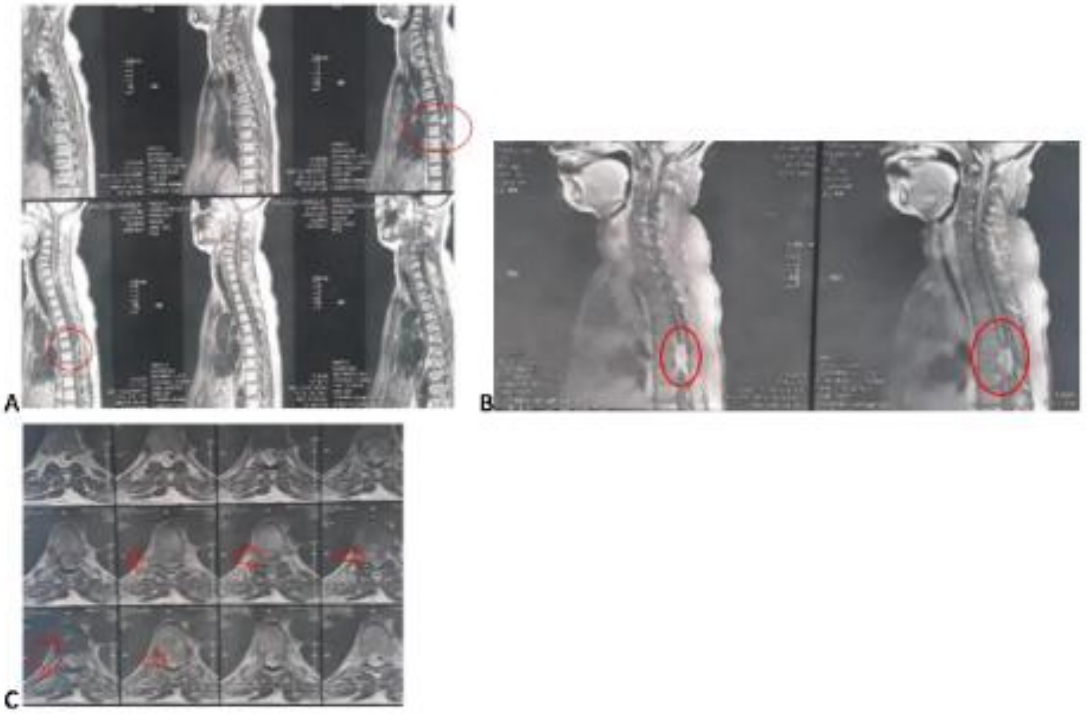

Figure 1: A-MRI sagittal section in T1-weighted sequences showing a lesional process right posterolateral extra medullary intra canal opposite D8 hypo intense in T1 causing compression of the spinal cord. We observe a spread of the posterior tumor with the ends in a flared dome giving the classic aspect of flap horn in view of D8 . B-Spinal MRI in sagittal T1 section after injection of gadolinium showing an intraspinal lesion, with a homogeneous and intense contrast enhancement. Posterior tumor spread with flared domed ends giving the classic flap horn look to D8 . C- Spinal MRI in axial sections showing a hypointense process in right on T2-weighted sequence with mass effect on the dura and a lysed CSF and a slight perilesional edema. This process had a right foraminal extension.

Preoperatively radiological image differential diagnosis was lymphoma meningioma or schwanoma. Our patient benefited of pre operatory examens and they become normal. Laminectomy was performed with a T8-T9. In per operatory the microscopic examination found of the epidural space mass revealed an meningioma (**Figure 2**)

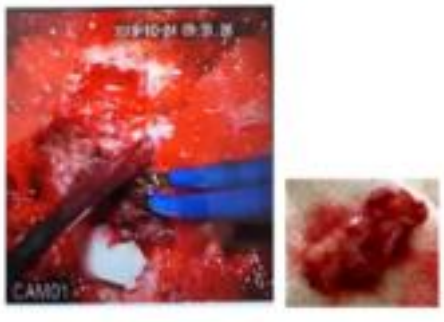

FIGURE 2 : Intraoperative view showing the exrese of extradural meningioma. Discovery of very haemorrhagic greyish process adhering to the dural sheath. We performed a SYMPSON 1 excision

The lesion was soft and so hemorrhagic with many small vessels. The surgical excision was macroscopically complete. Histological examination was in favor of a meninigothelial type meningioma grade 1 of WHO. After long time of physiotherapy, the post-operative course was marked by a progressive partial recovery of the neurological deficit after 4 months of clinical follow-up MRI no founded recurrence. (**Figure 3**)

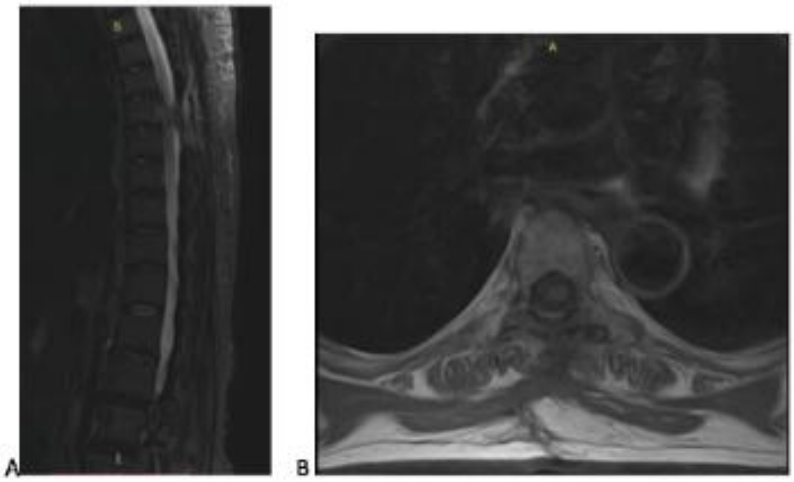

Figure 3; MRI control A- sagittal section inT2 sequence postoperatively showing complete exeresis with decompression of the medulla. B - axial section in T1 postoperative showing complete exeresis SIMPSON I

Methodology: Rationale of the study; spinal extra dural meningioma pathophysiology and it's characteristics was insufficiently known. We decided to make a review of all similar case in the literature (**Table 1**). Then we find epidemiology, socio demography and the features and the management of this disease.

Table 1: All cases of spinal extra dural meningioma in literature since 1886

YEARS	Autors	age/sexe /cas/total	localisatio	clinical	Symptom neur	exploration	management	Histolo	evolution
1960	RAKO	8/F/1/1	D6D7	NP= non specified	NP	radiography myelography Destruction of pedicule left D6-D7	hemilam TG Rtotal gross resection	Meningioma	NP
1961	LOMBARDI	NP /3/1/71	NP	NPnon specified	NP	RX MYELO 3 Menin calcified 2 lysis of pedicule	Laminectomy	Meningioma	NP
1963	HAFT	24/M/1/371	D7D8	1 paraparesia without gait and spincter trouble Neurological examen normal		myelography show total bloc to T7 T8	Laminectomy D6-D8 in first time and second time For intra dural exploration Subtotal resection	Men meningothelial and psammomateus	partial Recuperation and presence of spasticity 8months later
1966	EARLY	14/M /1 /1	D3D5	since 5 weeks paraparesia without sensitive and motor trouble.		Rx standart lysis of pedicule of D4 Myelography = complet bloc epidural mass	Laminectomy of D3-D5 dural Attach of meningio endurotomy total excision	Meningiom psammomateus	Partial Recuperation Follow up 7weeks
1966	SOO	-44/F /1/2	-D5D6	-4weeks of paraplegia without gait trouble		Rxnorthrosis Myelography = total bloc and ,Panty reaction positif	Laminectomy Dural Attache and laterale extension Total exicision	Meningioma meningiocytic	Partial Recuperation after 30days of surgery Follow up 6mounts
1967	RATH	20/F/1	C3C5	cervical spinal cord compression + deficit of limbs since 3week	Vomiting	cervical Rx and angiography = normal Lumbar myelography = partial bloc D8	first Operation. laminectomy C5-C8. Tumor was extradural infiltration of foramen second Operation. 1month later with laminectomy T8-T10.	TGR -Mening meningothelial - meningiome psammomateous	After second operation good evolution + reeduca. Follow up 1month
1968	HALLPIKE	44/M/1	D4D7	Since 6 weeks Admission for paresthesia paraplegia	Thoracic pain and cough - dorsal pain since 6 months	RX thoracic masse pulmo + erosion 6eme cote droite myelographie bloc D6	Laminectomy D5,D6,D7. extension foraminal in the chest. Dural opening TGR	meningioma calcified lysis of pedicule	Good after 01month and persistance of spastic
1969	FORTUNA	53/F/52 76/F/52 40/F/52 31/M/52	D7D10 D7D8 D4D6 D1D2	-3years and half unable to walk since 5months gait and sphincter disturbance - since 6months dorsal pain complicate 4 months by heaviness of limb - since 6months For heaviness of limb complicate for gait disturbance -2years by dorsalgia with limb heaviness		RX dorsal + myelography - RX dorsal + myelography - RX dorsal + myelography - RX dorsal + myelography and thoracic extension D1D2	Laminectomy D7D10. TGR -Laminectomy D7D8. TGR - Laminectomy D4D6. Dural dural infiltred TGR - Laminectomy D1D2. duroplasty TGR	Meningioma most hemorraghe a and psamomma -meningio psamoma -meningio psammoma	Good after 8years recurrence=0 -2 years good evolution recurren=0 - 3year and half good evolution recurrence =0 -7years recurrence=0
1973	BORGHI	-60/F/4 -23/F/4	D4 D1	-since 6months low back pain+paresthesia+heaviness of limb -since 6months neck pain + meduller compression		RX thorax =RAS Myelography=bloc in T4 -RX rachis=normal myelography=bloc in T1	Laminectomy STR Dural opening Laminectomy TGR posterieur dural Attach	Meningioma psammomateous Menin endothelial	Any amelioration With followup of 14years -1month of follow up
1977	SARTOR	29/M/1	C3C4	Neck pain + synd cord cervical compression since 6months + quadriparesia		RX =diastasis C1C2 myelographie angiography of vertebral arteries =blush	Laminectomy C3C3 SUBTR durotomy	meningiome fibromatous and endotheliomatous	NP
1980	KUMAR	55/M/1	D6	Low back pain + heaviness inferior limb inf since 8months		Myelography =bloc D6 lesion 3X1.5X1cm	Laminectomy GTR	meningioma	Death by collapsus after 27h
1980	STERN	49/F/1	D3D6	NP	NP	RX Myelography	Biopsy GTR	Meningioma	Partial regression
1982	KAYA	11/M/1	C4C7	tetra paresia spastic 16months later + sphinct trouble		RX+MYELO Queckenstedt TEST	Laminectomy C2C7 (durale attach) GTR	Meningioma psammomateus	Good evolution paraparesie after 4-8.5years of follow up
1983	MILZ	70/F/2 45/F/2	-D5 -D8	-Since 2months gait and walking disturbance -30monts medullar spine compression	-stomach ache - Chest pain	RX = nle Myelographie bloc D5 Myelographie= bloc D8	Laminec+TGR thoracotomie+ laminectr ouverture dural TGR	Menin endothelial menin psammomateux	Bonne Favorable pres 3semain
1992	HAN JUN CHEN	14/F/1	C2C6	Quadriparesia since 6months enable to walk and sphincter disorder		Rx of neck = lysis of pedicule and foramen Myelography= cervical block TDM=intra spine lesion calcified extension left foramen	Laminectomy C2C7 GTR	men meningothelial	Good after 14days
1996	ROUX	17/F/54 74/F/54 63/F/54 81/F/54 NP/NP/54	CER D8 D3D4 D6D7 D8	Moara Delay 11,2months(1.5-48)	1 latero cervical mass	RX +MYELO+ TDM+ MRI ECHO PER OPER + LASER for hemostase	NP Complete resection	Mening meningothelial or psammomateus	Non recurrence follow up 28months [3years -15years]
1998	KING	NP/NP/74 NP/NP/74	NP NP	Medullar compression		NP	74% coag of insertion base -25% TGR lam in voie post	Meningioma Meningioma	NP NP
1999	SOLERO	5F /174 3M/174	CER CER	NP NP		NP	LaminectomY GTR 96.5%	meningioma	Mortality =1% recurrence = 6%
1997	SATO (43)	59/M/1	C3C5	since 7years neck pain	Nausea and vomiting	MRI = epidural mass on posterior of odontoid. And bone intact	Biopsy	meningioma atypical	RXtherapy.
2000	ACHARI	26/M/1	C2C5	Since 16 months Dysthesia+quadriparesia		TDM = an extradural, hyperdense mass with calcification, encasing the dura from all sides except from the left, in the cervical canal from second to fourth cervical vertebrae MIR = lymphoma ou tuberculosis ou metastasis	It was also emerging from the right C3-C4 intervertebral foramina. STR laminectomie	presence of calcospheria e and ischelial meningioma	NP
2001	BUCHFELDER	76/M/1	T6T7	NP		MRI	Lamin+thoracotomy GTR	men meningioma	NP
2001	GAMACHE	63/F/1	C4C5	Since 10history of progressive weakness in her left shoulder and left arm, with worsening difficulty ambulating	after a knee replacement in the past year, he attributed her progressive upper extremity weakness to arthritis	TDM + MIR = OPLL + CLP	laminectomy C4-C6 + durotomy GTR	Meningioma in plaque	Neurological improvement
2002	MESSORI	14/M /1	C5C7	Tretraparesie since many years		RX CERV=calcification in CT= cervical MRI =: ISOT1 et hypo T2	Laminotomiy durotomy GTR	Mening meningothelial et corps psamommateus	after 9 years he can walk and have activity follow up by MRI
2002	ZEVGARIDIS	75/F/1	D11-D12	Narrow lumbar canal syndrome progressing 2 years	Incidentalloma chest pain	CT = lumbar spinal stenosis L3L4 Myelography IRM	laminectomy attachement à la racine TGR	Psammomateous Meningioma	18 months after surgery. Recurrence=0 follow-up MRI.
2002	SUZUKI	58/M/1	D11-D12	Paresthesia entre T10-T12	Incidentalloma	RX = chest mass CT thoracic mass MRI = retro mediastinal pulmonary mass antero poste sus diaphrag Paravertebral	Laminectomy + thoracoscopy + use of cavitron TGR	Meningioma fibroblastic with calcification	Neurological improvement

2004	VARGAS	70/F/2	T3T5	Gait disorder + sphincter disorder		MRI = posterolateral epidural lesion, lateral and anterolateral left, and foraminal extension	STR	Mening meningothelial	Clinical improvement 3-month follow-up without recurrence
2006	TAKEUCHI	50/M/1	C3C4	spastic tetraparesis 05 days 4/5. Pyramidal syndrome Weakness of 4 limbs		CT = intra-lesional calcification MRI – extradural tumor right foraminal extension and encircling vertebral artery Differential diagnosis metastases, lymphoma tuberculoma Meningioma	Laminectomy and facetomy Tumor aspiration Dural opening without intra injury TGR	meningothelial meningioma	Partial improvement with spastic tetra paresis without recurrence 2 after MRI and X-ray follow-up.
2006	Carlos Restrepo	57/F/1	C7-T2	Sd de compression medullaire + hyperreflexia avec faiblesse musculaire, signe Rohinck,		MRI – lesion extended to foramen C7 – T1 dumbbell aspect paraspinal and extrapleural suggesting neurogenic tumor as neurofibroma	Laminectomy + GTR Radiotherapy	Psammatous meningioma	Followed by 8 months recurrence=0
2007	YAMADA	22/F/1	C3C5	since 04 years heaviness of limbs and hemiparesis 3/5 dte and 4/5 on the left		MRI – lesions with calcification on scan and contrast enhancement and hypo T2 with spina bifida C3C4	Laminectomy and laminoplasty C3C5 Subtotal resection 80% with residue Dural opening	calcified plaque meningioma	Neurological improvement after 3 months and 1 year
2007	FRANK	45/F/1	C6C7	Spinal cord compression syndrome + urinary disorder since 7 months	cervical arthrosis since 8months	CT = Intraspinal lesion and foraminal extension Diagnostic differential =schwannoma neurofibroma, chordoma, synovial cyst infectious, and meningioma MRI	biopsy + Partial laminectomy + subtotal foraminotomy resection + posterior osteosynthesis C5-T1	Psammomatous meningioma	gradual improvement and follow-up by MRI = 3-6 months recurrence=0
2008	NAMER, (55)	4 patients 17 years- 23years= 4/86	NP	NP	NP	04	laminectomy 03 GTR 01 STR	Meningioma in plaque calcified	NP
2008	DAGAINE (56)	63/M/1	D4D5	walking disorders + back pain for several months.		MRI = extramedullary lesion on the right.; right foraminal D5 extension which was discreetly enlarged.	Laminectomy of T4 - T5. GTR Dural opening	psammomatous. Méningioma	Improvement at six months and one year The MRI checks for no recurrence
2009	SANTIAGO	43/M /1	D2D3	Paraparesis since 1month		MRI = epidural lateral mass D2-D3, foraminal extension and bone body of D3,	D2-D3 laminectomy TGR	meningioma typical psammomatous	NP
2011	LUNARDI	56/F/1	C1-C2	2-year history of progressive weakness of the hands and both lower extremities. during the last 7 months before difficulty climbing the stairs; during the last month before, episodes of urine retention		(MRI) scan: a large tumor displacing the spinal cord to the right side, emerging from the left c1 – c2 intervertebral foramen. gadolinium, the lesion presented with slight partial (cT)=intralesional calcifications and erosion of the left lateral masses of c1 and c2	Arthrectomy C1 laminectomy The part of the lesion behind the dens was left in situ to be removed by a second transoral approach	typical psammomatous meningioma with diffuse calcifications.	uneventful, partial improvement. After 2 years the neurological deficits are unchanged and the patient has not decided to another operation
2012	TULI	42/F/1	D4D6 avec extension pleurale	Since 4months progressive low extremity weakness and numbness		CT scan= vertebral and para-vertebral injury Chest MRI = spinal and pleural lesion evoking metastasis or lymphoma Brain MRI = mass of 0.7x1.3x 0.9 cm extra-axial parietal lateral, homogeneous with contrast enhancement and isointense with hyperostosis	Laminectomy + GTR + osteosynthesis T4-5 by pedicle screw fixation and the allograft was performed for stabilization + Radiotherapy	Meningioma grade 1	non recurrence after six months follow up by MRI
2012	SHRESTHA R, H.	45/F/1	T9T10	NP	Health check up	NP	Laminectomy + approach thoracoscopy TGR	menin meningothelial	NP
2014	VALDEZ A	48/F/1	C7D2	6 months spinal cord compression syndrome		MRI = a spinal epidural mass with invasion of the bone and thorax, dumbbell appearance evoking a metastasis or neurofibroma Chest x-ray = pulmonary apex mass	laminectomy GTR	psammomatous Meningioma.	Good evolution after 3 days
2014	LIANG Wu	62/F/346 42/M/346 40/M/346 50/M/346 27/F/346 29/M/346 22/F/346 40/F/346 25/M/346 41/M/346 28/F/346 44/F/346	T7T8 -C3C5 -C7T12 -C1C4 -C4C6 -C1C3 -C2C6 -T6T7 -C2C5 -C2C4 -C3C6 -C3C5	5mois+5d com 1mois+sd com 12mois+sd com 9mois+sd com 1mois+sd com 2mois+sd com 10mois+sd co 8mois+sd com 1an+sd com 8mois+sd com 2mois+sd com+cervicalgie	Dleur thora Anesth en bande thor	IRM=metastasis IRM=cavernoma IRM=lymphoma IRM=metastasis IRM=schwannoma IRM=schwannoma IRM=lymphoma IRM=metastasis IRM=metastasis IRM =cavernoma IRM=metastasis	LAM+ GTR STR+lam STR+ RT STR GTR STR STR+RT GTR 1STR + 3STR GTR STR STR	Men psamo Men psamo Men mening Men psam+fib Men psamo Men psamo Men menin Men psamo Men menin Men transi Men menin Men psamon	24mois recur=0 112mois recur=0 96mois recur=0 96mois recur=0 72 mois recur=0 88mois recur=0 76mois recur=0 69mois recur=0 84mois recur=0 168mois recur=0 24mois recur=0 28mois recur=0 38mois recur=0
2014	SIWARDEKAR	26/F/1	C3C6	-neck pain + quadriparesia		MRI = extradural lesion in plaque, invaded the lateral processes and sheathing vertebral artery and extension foraminal poster lateral lesion = malignant tumor.	-hemilaminectomy C3-C6. STR TGR Dural opening	meningothelial Meningioma	Clinical follow-up 1-16 years and MRI without recurrence
		22/F/1	D4D5	-paraplegie spastique + trouble sphincterien = 7 days the		-MRI = postero lateral and anterior plaque lesion of D4-D5 hypo T1 and iso T2 = metastasis, lymphoma, granulomatous	-laminectomy Dural opening	meningothelial Meningioma	3-month clinical follow-up and MRI without recurrence
2014	NSIR BEN	70/M/1	D5	Paraparesis Heaviness limb	Chest pain	-MRI = anterior lateral extradural lesion hypointense/T1- and in T2 hyperintense, = metastasys	Laminectomy +Thoracotomy GTR radiotherapy	MENIN atypical grade II de WHO	recurrence 2years after on MRI second excision and thoracotomy controlle by MRI without recurrence
2015	GURUPRASSAD	-60/M	C1C4	-Neck pain + with tingling and burning paresthesia of all the four limbs for 8 months and progressive spastic quadriparesis with bladder disturbances urinaire		- (MRI) – extradural en plaque lesion extending from C1 to C4, part of which was traversing through the right C2/3 intervertebral neural foramen, encasing the vertebral artery.	Laminectomy C2-C4 . A near-total excision of the mass was performed coagulating the dural attachments, a small remnant, encasing the vertebral artery was intentionally left behind, No Intradural tumor after exploration.	- meningothelial meningioma ((WHO) Grade I).	Improvement of lower limb (+1/5 - +4/5) over a period of 2 weeksMRI at 6 months follow-up showed no tumor recurrence
		-41/M/1	C3C7	- complaints of tingling sensation in the right hand, with progressively increasing spastic quadriparesis of 4 months duration		- MRI = an extradural en plaquelesion extending from C3 to C7 on the left side, with intense contrast enhancementno evidence of any transforaminal extension	-laminectomy C3 to C7 level. The mass was reddish white, highly vascular, and soft in consistency. This was present more on the left side without any ventral extension. Complete excision of. No intradural extension.	- Histopathological examination meningothelial meningioma.	- Significant alleviation in spasticity and improvement in motor power was seen Grade 5/5 bilateral). at follow-up of 6-24 months did not reveal any residual mass Postoperative MRI 6 months
2016	SOHEILLA	38/F/1	D3D4 et D5D6 postero lateral droit	he presented with a grand mal seizure and left hemiparesis		(MRI) = In the right parietal paramedian and bilateral falcine MRI= extramedullary mass, located between D3–D4 vertebral levels, extending to the left D3–D4 foramen Another extramedullary mass was located D5–D6 vertebral levels, extending to the right D5–D6 foramen . Both lesions compressed the spinal cord dorsally = metastase	Laminectomy of D4 and hemilaminectomy D5 GTR	meningothelial Meningioma	improvement in the muscle strength of the lower extremities; follow-up MRI complete removal of. No apparent tumor recurrence in a follow-up 6 months later.
2016	YANG, T., WU, L.,	55/F/1	D6D9	Back pain + and weakness in both legs. No sphincter dysfunction was noted. Neurological examination revealed a paraparesis, since 3years		(MRI) = well-circumscribed oval lesion in the dorsal-lateral space at T8-8 . The lesion was. The 'dural tail sign' was positive. differential diagnoses = lymphoma, metastatic tumor, angiolipoma	laminectomy. GTR	meningioma angiomatous	Gradually, over the next 6 months, the patient's bilateral leg strength improved to grade 4/5, and no tumor recurrence
2017	KAHAYAL	9/F/1	T5T7	Spastic walking + limbs paraparesis since 3year		MRI = lesion 40 X 18 mm, lysis of vertebral body = hemangioma.	Laminectomie GTR Attache durale	Meningioma Chordoïde	good after 8 days reeducation
2017	ISHILA PANT	50/M/1	C5C7	compressiof medullar Syndrome since 6years		MRI – changement of vertebral body C5C7 with intra spine lesion hypointens T1- suggesting tuberculoma , neurofibroma	Laminectomy GTR	Men meningothelial	Neurological improvement since 3year after surgery by MRI and clinical
2018	ANNA LOIS i.al,	35/M/1	C1C4	insidious neck pain, numbness and stiffness in all four limbs and bilateral upper limb and truncal loss of temperature sensation over several months. Neurological revealed mildly reduced power in all four limbs with spastic tone and gait disorder	Neck tumefaction	MRI= infiltrative, extradural soft tissue right side of the spinal canal extending from C1 to C4. The right vertebral artery was encased at foramina, –cord edema, CT angiogram= scalloping C1- C4= lymphoma; neurofibroma, Metastasis parcom	Anterior decompression and fusion of the cervical C2 C3 et total laminectomy C1- C4 et partial laminectomy and fusion of C2 et C3 STR	meningothelial meningioma (WHO grade I)	Neurological improvement and follow up 4years by MRI without recurrence
2018	WONJI HONG	58/F/1	D7	progressive weakness and paresthesia of both lower legs for four months		MRI = mass approximately 3.0 x 1.0 cm in the posterior epidural space of the seventh thoracic vertebral level. The mass caused compression and signal change of the spinal cord, compressive myelopathy lymphoma; metastase	Laminectomy Partielle Radiotherapy	meningioma atypical grade 2	he neurologic symptoms were relieved, and no recurrence was shown on three month follow up CT
2018	SREEDHARALA SRINIVASA SATYANARAYANA	65/F/1	D2-D3	Back pain complicated by walking disorder for 2 months without sphincter disorder	NP	MRI = lesion 2, 4 X0,9X1, 5 cm lateralized on the left with myelopathy	Laminectomy TGR	Meningothelial Meningioma with Psammoma Body	Total recovery
2019	SANG BUM KIM	65/F/1	T7T8		Heart pain and epigastralgia and nocturnal chest pain for 2 years	Thoracic CT chest mass MRI = extra dural extramedullary spinal lesion infiltrating right neuroforamen with homogenous contrast enhancement	Laminectomy + thoracotomy + neuromonitoring Dural opening TGR	meningioma meningothelial type, grade 1, OMS.	Total recovery without recurrence
2020	OUR CASE	57/F/1	D7-D9	For 6 months without spinal cord compression + paraplegia 2/5		CT hypodense intraspinal lesion with homogeneous contrast enhancement	D7D9 laminectomy Macroscopically complete exercise = TGR	meningothelial Meningioma ,grade 1.	Partial going from 2/5 to 4/5 more after 6 months

II - Results

TABLE 2, patients and tumor datas

VARIABLE/PATIENT DATAS	VALUE OR RANG
Patients number of case (1887-2020)	78 patients to 49 articles
incidence	3,46%
Men	24(31%) - unspecified = 8(10%)
Women –SEX RATIO	46 (59%) – ½ favor of women
Age	44.19 years [8 to 85 years]
Symptoms duration	14,93 months [1weeks -120 months]
Clinical symptom	
Minor symptom	23/65 = 35,38% - unspecified= 13 patients
medullar compression state	33 = 50,76% (33/56) GRADE C of FRANKEL
Non neurological symptom	9 cas (13,84%)
Exploration	MRI = 48 (67,66%) MYELOGRAPHY=18
others	Echography= 6, arteriography=3, neurostimulation=12
Tumor location	Dural attach=35,89%(28 cas),nervous attach=64,10% (50cas
Cervical ;	34 (44,76%)
Position of tumor - Posterolateral	21(69%)
anterior	3(9%)
Cervicothoracic ;	3(3,39%)
Thoracic ;	39 (51,31%)
Position of tumor - Posterolateral	29 (74%)
Anterior	4(10%)
Dumbell sharp meningioma	9 cas /78 (11,53 %)
Type of meningioma	Unspecified =15 (19%)
Grade 1	58cas (73,41%), meningothelial type in 26cases (44,82 %)
Grade 2	5cas (6,32%)
Grade 3	invasive type in 1 case (1.26%)
Neurosurgery traitment	78cases (100%)
Laminectomie only	56 cases (71.79%)
Dural opening	29 CAS (37,17%) and duroplasty = 15cas
Radiotherapy	6cases (7,69%)
Physiotherapy	
Evolution pronostic	
Follow up – Recurence	In 46 cas, Mean of follow up= **31,59 months** [1 -168].
	3cas of recurrence to 36 cas of following up =8,33 %

III. Discussion

1 - Epidemiology

Extra dural meningioma is a rare form of spinal meningioma, with a large predominance of women. In the literature, 77 cases (tables 1-2) out of 49 publications on extradural spinal meningiomas have been described including our case among of 2255 spinal meningiomas. After our study extra dural spinal meningioma represents approximately 3,46% of all spinal meningiomas. This incidence represent in the literature:

- In 1933: Elsberg found an incidence of 5.5%
- In 1961: Bernaseoni and Cassinari found an incidence of 6.8%
- In 1963: Haft and Shenkin found an incidence of 3.5% [3]
- In 1969: Singh, Fortuna et al found an incidence of 6.4% [4]
- In 2014 Lian Wu [5] found out of 346 patients admitted for spinal meningiomas 12 patients (3.5%) of extra dural forms.

The major part of authors found an incidence of less than 5% according in our study , in agreement with Liang Wu and all [5], Solero and al [6], Elsberg [7]

2 - Etiopathogenia

A - Several factors are implicated in the tumorogenesis of meningiomas. In order to understand the mechanisms of this pathogenesis, the authors have referred to several theories:

For Cushing, extra dural meningioma results from the proliferation of proliferating arachnoid cells that sit extra durally, and which give the hard appearance of plaque meningioma [8].

Anothers explained by the following hypotheses: first by proliferation of ectopic arachnoidal cells around the periradicular nerve root sleeves secondary by the displacement of the primitive embryonic remnants of the arachnoid mater and villi along the periradicular dura, thirdly by the migration of islands of arachnoid tissue into the extradural space. Other authors suggest that the extra dural growth of meningiomas arises from clusters of meningothelial cells located near the posterior root of the spinal nerve. This explains the exclusive posterolateral topography of extradural spinal meningiomas [9-10].

For Bain and Shintka (1956), the schwannoma cells could differentiate into meningocytes and form a foraminal meningioma [11].

In addition to those theories, the tumorogenesis of extradural meningiomas is stimulated by several factors such as the loss of part of chromosome 22, type 2 of neurofibromatosis (NF2)

[12]. In our case, the patient did not have a genetic predisposition like neurofibromatosis.

Svetlana Blit shteyn and all, [13] have shown that the role of sex hormones in the growth of meningiomas. In our study we found a difference in incidence between the two sexes, with a sex ratio of 0.52 in favor of women.

Meningioma is the most common radio-induced tumor, much more common than gliomas and sarcomas. For Harrisonne et all, Dweik et al [14] a radio-induced meningioma is suspected;

- If it is in the irradiated field
- After a latency of 5 years after of irradiation sessions
- A different histology from the tumor initially irradiated
- And a greater incidence in the irradiated group than in the control group.

In addition Cushing [8]. revealed that recent techniques have shown the presence of small fragments of viral DNA and viral proteins in human tumors, including meningiomas.

Among the environmental factors implicated, Frank [15] have found spinal trauma, but it is not clear whether this is an etiological factor or not. We found 1 case of extra dural spinal meningioma in a patient who presented with a spinal trauma 4 years before the discovery of extra dural spinal meningioma [16].

3 - Anatomopathology

The pathological examination of extradural meningiomas in our study was in favor of:

- Grade 1 of meningioma in 58 cases (73.41%): meningothelial type in 26 cases is 44.82%; psamonmateux in 22 cases or 37.93%, and the other types 17.24% or 10 cases.
- Grade 2 of meningioma in 5 cases (6.32%)
- Grade 3 of meningioma, invasive type in 1 case (1.26%).
- In 15 cases the type of meningioma was not specified.

In our case the histoloigical was in favor of a meningothelial type of meningioma (grade 1). These results are in agreement with the Soheila study [17]. Dahani [18] on 23 cases of spinal meningiomas also found that the WHO grades II and III are rarely in the spine. Spinal meningioma is often solitary, round, well defined, lobulated with a flat surface on the dura side. Our reported case is that of a solitary meningioma.

4 - Physiopathology

The spinal cord is an axial nerve structure surrounded by an inextensible bone tunnel. It is protected by three types of meninges: the dura mater, the arachnoid and the pia mater. It is attached on each side to bundles of nerve fibers that form the spinal roots. Therefore, any expansive process in the spinal canal can cause compression of the spinal cord, nerve roots and vessels.

Tumors, especially extra dural meningiomas, are among the causes of spinal cord compression. This compression gives rise to:

- A sub-lesion syndrome produced by the functional interruption of fibers ascending and descending.
- A lesional syndrome, results from the involvement of gray formations segmental medulla, or one or more roots at the level of compression.

5 - Clinical Aspects

We note a female predominance of 59% with a sex ratio of 0.52 in accordance with the studies of Roux and all, Liang Wu, Soheila, Tuli on extra dural spinal meningiomas [5-9-17-19]. In our case, it is a 56-year-old patient. The mean age of diagnosis is 44.19 years with 8 years to 85 years. Our patient had 57 years old.

Due to the progressive evolution of meningiomas and the non-specificity of clinical signs, diagnosis is often made at an advanced stage.

Among the 78 cases reported in the literature, 69 (88,46 %) patients developed a clinical signs of slow spinal cord compression, 9 cases (11.53%) presented non-neurological symptoms according to the studies of Kumar, Tuli, Roux, Sam bung, Nsbir, Zevgaridis, Hallpick and Suzuki [9-10-19-20-21-22-23]. Non neurological signs were; a chest pain simulating gastritis, a case simulating heart pain, a case simulating a pneumopathy, 4 cases of incidentaloma, 01 case discovered by a latero-cervical mass, 01 case discovered during an assessment of extension of an adenocarcinoma.

23/65 (35.38%) of the patient were admitted with a minor neurological symptomatology for spinal cord syndrome and resistant to the analgesics [19-6].

According to King [24], a spinal cord compression is diagnosing in a severe stage of disease. Our meta-analysis found that 59.93% of patients are admitting with spinal cord compression in severe stage of disease. Our patient was admitted to a slow spinal cord compression in the stage C of FRANKEL.

Yaldiz and all, Wonju Hong, Li Wu [6-25-26] found patients admitted with stage 3-5 spinal cord compression of GUIOT or Grade C of FRANKEL respectively in 85%, 66.66% and 83, 33%. In our study, patients were also admitted with advanced spinal cord compression in 58.93% of cases.

The means duration of symptoms is 15 months which superior than the intra-dural spinal meningiomas 12 months +/- 3 to 27 months [27]. This state could be explained by the fact that the intra dural lesions directly contact the nerve centers and the long tracts.

According to topography, our study agrees with Zevgaridis [10], Soheilla [17] and Tuli [9]. Those authors found a predominance of spinal extra dural meningiomas at the dorsal level, followed by cervical localization. We have found the same proportions respectively of 51.31% and 44.76%. In our case the patient had a backache. On the other hand, Liang Wu and all [5] find a cervical predominance of 75% of extra dural spinal meningioma in their study.

Clinical forms: 1- the cervical compression of marrow, in our series we found that 44.76% of patients presented a spinal cord compression at the cervical site. On the other hand, Liang Wu [5] found a cervical predominance at 75% of extra dural spinal meningioma in his study especially of psamonmatous plaque meningiomas.

2-the dorsal compression of marrow, in our case the patient had a backache. Our study agrees with Zevgaridis [10], Soheilla [17] and Tuli [9]. These authors found a predominance of spinal extra dural meningiomas at the dorsal level, followed by cervical site. We found, respectively, 51.31%, 44.76% and 3.39% of the dorsal, cervical and cervico-dorsal sites of extra dural spinal meningiomas.

6 - Neuroimaging

MEDULAR MRI: MRI scann was a gold exploration. It has allowed in the diagnosis of 48 cases (67.60%) of extradural spinal meningiomas. In our case, MRI was in favor of an intradural lesion and the diagnosis of extradural meningioma was a surprise during the operation. These results are in disagreement with the ZHANG's study [29] which found 100% because our study takes into account a

series of 78 patients from 1960 to 2020 and report cases before the advancement of MRI. Since the first car reported after using MRI in 1996 by Roux [19].

The extra dural meningiomas had an appearance on the T1-weighted sequences, hypo intense in 66.6% (N = 32 cases), in iso intense in (31.91%) 15 cases, in hyper intense in 1 case or 2%.

In the T2-weighted sequence, the lesion is hypointense in 40.25% (N = 19 cases), isointense in 3 cases (6.25%) and hyperintense in T2 in 21.27% (N = 10 cases).

In the T1 sequency after injection of gadolinium, the lesion is intensely and homogeneously enhanced in 75% and intensely heterogeneous in 25%.

Our results are in agreement with the study of Soheilla and Anna lois [17-30].

Zhang [29] found in T1sequency that epidural meningiomas were iso intense in 57% or hypointense in 43% compared to the marrow.

In T2 it appears hypointensy in 50% and isointensy in 36% and heterogeneous in 14%

In T1 injected it appears moderate in 36% and intense in 64%. In 94% there is a sign of the comet tail.

Radiologically, extra dural spinal meningiomas suggest, a metastasis tumor in 40.42% (N = 19) is iso intense T1 sequences and hyper T2 with homogeneous contrast enhancement and body and pedicle lysis. Lymphoma or tuberculoma was suggested in 34.04% (N = 16) by iso intensy and hyperintensy in T2-T1 sequencies with homogeneous against 50% suggesting lymphoma for Vargas and Lai [31-32]. In 21.27% (N = 10) of cases the lesion evokes a schwannoma by the T1 sequency Hypo intensy and hyper intensy T2 with heterogeneous contrast enhancement seems a cavernous hemangioma in 3 cases (6.23%), a lipoma hemangioma in 3 cases (6.23%), hemangiopericytoma in 2 cases (4.25%), pott's disease with granuloma in 4 cases (8.51%).

At the dorsal level our study found 74% of the postero lateral lesion with 72.41% on the left against 27.58% on the right. The lesion is postero anterior in 16% and 10% in the anterior. In our patient the lesion was dorsal and of left postero lateral localization in agreement with our study. Romandhane [32] found that 75% lateral localization but in 42% at the ventral level and 35% at the dorsal level. An aspect of dural tail in 9 cases (19.14%) with myelopathy in 6 cases (12.76%) was also found.

7 - Patients Management

Goal: It consists of performing a complete excision of the tumor in order to decompress the marrow and improve the functional prognosis of the patients. The management is multidisciplinary associated in addition to the neurosurgeon with a physiotherapy and correct follow-up in order to confirm the cure and prevent recurrence by radiotherapy according the histological result.

Corticosteroids are prescribed before and after surgery. Chest radiography will always be required to eliminate pneumonia or lung disease. Because of paraplegia or tetraplegia, patients were confined to their bed so an ultrasound of the lower limbs become necessary to eliminate a deep or superficial venous thrombosis. Anticoagulants are systematic to prevent thromboembolic events.

Analgesics and anti-inflammatory drugs are also prescribed before and after the procedure, as well as vitamin B therapy.

8 - Surgical Management

The objectives are radical treatment of spinal meningioma, a complete resection of the tumor and decompression of the marrow. To confirm the diagnosis after a histological examination of the surgical specimen, consequently improve the patient's life quality and have good functional results [32]. All of the 78 patients were treated surgically. Laminectomy was performed in 56 cases, (71.79%) in agreement with the study of King and Roux [19-24]. Laminotomy is performed especially in young patients in 2 cases (2.5%), so that the anterior approach was performed in 2 cases, (2.5%) [2-33-34]. Thoracotomy is performed in 8 out of 78 cases, especially in the forms with extension. Dumbell shap thoracic meningioma was found in 8 cases / 9 or 88.89% in agreement with Suzuki and al [22] who recommends thoracotomy and thorascopy in this form of spinal extra dural meningioma.

Total excision was performed in 54 cases out of 78 cases, (69.23%) of Sympson I in agreement of King's study [24] as well as Solero and all [6] who respectively found Sympson I excision in 74 % and 96.5%. On the other hand, Liang Wu found Sympson I excision in 33.33% versus 66.67% Sympson II excision for cervical meningiomas because of the stranglehold of the vertebral arteries in the lesion [35,36]

The using of cavitron is noted in (2 cases) 2.56% especially by Suzuki and Takeuchi [22-37]. The using of laser and cavitron in 2 cases were noted by Roux and King [19-24].

Duroplasty because of an infiltrated dura, was performed in 10.25% [3-9-38-39-40-41] against 2.5% in King's study [24]. The excision was sub-total in 21 cases, (26.93%) means Sympson III. In our case, tumor excision was total (Sympson I) (**Figure A**). Our patient was able to recover normal walking 4 months after the operation.

In our study 29 cases or 37.17% of purely extra dural meningiomas after durotomy was founded. This technique is in agreement with the studies of Fortuna and Dagaine [4-38] who believe that durotomy should be the rule in the setting of purely extra dural spinal meningioma. Our patient underwent a durotomy confirming the purely extra dural aspect of the meningioma. The lesion was soft and largely suction in 22 cases (28.05%) in our series.

It has a foraminal extension of the lesion in 16 cases (20.51%), as in the cases of Early, Fortuna and Soo [4-41-42].

On the other hand, the meningioma has a dural attachment in 15 cases (19.23%) and attaches to the root in 17 cases (21.79%) in accordance with the studies of Dagaine and Haft [3-38] as the same in our case reported.

9 - Radiotherapy

To minimizing the dose of irradiating by radiotherapy, stereotaxic radiosurgery is a new technique that involves targeting the tumor volume with a high dose and therefore protecting adjacent organs.

For Chang [43] concerning the contribution of the cyberknife radiosurgery on 20 patients followed for benign lesions such as spinal meningiomas a dose of 14–33 Grays is marginal dose delivered in 1–5 fractions. The follow-up of 35.6 months (range, 12–84 months) shows tumor reduction of (57%) and (33%) unchanged but not active. Clinically, there is an improvement in radiculagies and myelopathy in (94%) after radiosurgery. Motor deficit improved in 2 out of 5 patients. The average irradiation as a function of the size of the marrow was 10 and 8 Gy for a volume of 0.40 to 0.81 ± 0.7 cm3. These results are in agreement with those of Klekamp and all, Liang Wu and all [5-43]. In our study, spinal radiotherapy was practiced in 6 cases of extradural spinal meningiomas, 7.69% of cases [9-20-45]. It was performed following after subtotal neurosurgical resection. It's also reduce the radiculagies.

For Romandhane [32] on a serie of 55 patients admitted for spinal meningiomas, radiotherapy was made in 4% of cases in combination with surgery. A recurrence rate was 11%. The postoperative results are usually satisfactory with the functional improvement in 85% of cases.

For J. Brian and al [46] radiotherapy is indicated in cases where surgery cannot be performed or to avoid recurrence after an intervention codified grade 3 for SIMPSON, multiple lesions, or medical comorbidity. However a stereotaxic radiosurgery is possible to deliver high-dose irradiation over a determined tumor volume with a limited of number of fractions, thus minimizing the dose irradiating of the adjacent noble structures [47]. As a viable alternative to microsurgical resection, stereotaxic radiosurgery provides safe and effective long-term and long-term control of benign intradural and extramedullary vertebral tumors with a low complication rate.

10 - Hormonotherapy[48]

To the patients which are recused by neurosurgeon, hormone therapy particulary antiprogesterones reduce the size of the tumor and improve the symptoms of spinal cord compression. This is due to the presence of progesterone receptors in the meningioma. The treatment used in the case of meningioma is Mifeprostone 200mg per day. These long-term treatments are sometimes responsible for hormonal changes in TSH, ACTH and cortisol. In our series there was no hormonal therapy using.

11 - Functional Rehabilitation

This is an essential step in the management of meningiomas, especially in patients with a significant neurological deficit, as it increases the chances of functional recovery. For P.thoumi [49], It permits:

- Functional rehabilitation of motor deficit by fighting against retraction musculo-tendinous and peri articular ossifications.
- Sphincter rehabilitation in case of the presence of gait and sphincter disorders special care.
- Prevent decubitus complications by using of special mattresses and the regular monitoring of the skin points of support.

In our case, the patient did regular rehabilitation sessions, and was able to recover her deficit.

12 - Evolution-Prognosis

Spinal meningiomas are benign tumors, which usually have a good prognosis. However, several criteria are incriminated such as the quality of the surgical excision, age, histological type and diagnostic delay. Functional recovery is conditioned by rehabilitation and regular monitoring.

4 months after the surgery and the rehabilitation sessions, our patient has recovered from her deficit and does not present radiological recurrence.

In this review the average follow-up was 31.59 months [1-168 months]. It has been done by clinical examen, radiological by MRI in 27.2% or CT scan in 9.5%. Our patient underwent radiological follow-up by MRI.

Solero [6] found that, out of 9 patients after surgery 1 case of recurrence (11.11%) after a follow-up of 13 months. On the other hand, Borghi [12], Roux [19] and all did not find a statistically difference between intra dural and extra dural meningiomas after a follow-up of 17 years. For Marcinscano [50] benign meningiomas have a recurrence rate of 7-25%. In atypical meningiomas a recurrence rate was 29-52%, in anaplastic meningiomas it was 50-95% after Simpson 1 or 2 resection and a delay of 2-5 years. According to Ishita Panti [51] after resection of atypical WHO grade 2-3, it may be interesting to apply radiotherapy.

For klekamp and al[44] the recurrence rate of anaplastic meningiomas calculated is 21% after 1 year and 40.3% after 3 years.

The prognosis of extra dural spinal meningiomas according to our study is good overall with only 3 cases of recurrence of spinal meningioma in 36 patients or 8.33% after a mean follow-up of 31.59 months [1-168 months]. The overall prognosis is good in 27 out of 36 cases (75%).

For Borghi [12], young patient have a high probability of presenting a recurrence compared to the elderly subject despite having had a benign meningioma and to avoid recurrence, Liang Wu suggests section or coagulation of the tumor insertion or duroplasty.

For Kenyu [52], the recurrence in extra dural spinal meningiomas is often due to the form with association with extra and intra dural forms or the interest of performing a durotomy or an intraoperative ultrasound.

Ultimately, certain constraints may lead the surgeon to limit the operative act, so the operative goal will not be obtained. Among these constraints we cite:

- The meningioma itself: a calcified meningioma is difficult to eradicate entirely [53]. An angiomatous meningioma will easily bleed, causing the surgeon to reduce the surgical goal.
- The location of the meningioma: a tumor in the prone position requires the mobilization of the marrow, in order to be able to remove it under good conditions. The risk of spinal cord injury is significant, which prevents the surgeon from removing the dural insertion base [55].
- The general condition of the patient: may require limiting the operating time, because of the risk of decompensation of an associated pathology.

Conclusion

Purely extradural spinal meningiomas are exceptional. The thickening of the meningeal envelope, the iso or hypointense T2 signal of the tumor and the absence of bone involvement apart from erosive phenomena are the only semiological elements that can eliminate the diagnosis of metastasis or schwannoma. However, several criteria are incriminated such as the quality of the surgical excision, patient age, the histological type and diagnostic delay of the outcome. Functional recovery depends on rehabilitation and regular follow-up. The prognosis of extra dural spinal meningiomas according to our study is good overall with only 3 cases of recurrence of spinal meningioma in 36 patients, or 8.33% after a mean follow-up of 31.59 months [1 -168 months] with P=0,012.

Conflicts of Interest

The authors have no conflicts of interest to declare.

Informed Consent

Written informed consent was obtained from the patient for publication of this manuscript and any accompanying images

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