Diagnostification of *Basis Cranii Anterior* Meningiomas

Healthcare

Keywords: Meningioma, CT, MRI, Prishtina.

Arjan Idrizaj

General Hospital 'Rezonanca'
Faculty of Medical Sciences 'Rezonanca', Prishtina, Kosova.

Abstract

Meningiomas are brain tumors that develop from meninges. In 90% of cases are benign. Meningiomas commonly are found at the surface of the brain, either over the convexity or at the skull base. In rare cases, meningiomas occur in an intraventricular location. Meningiomas account for approximately 20% of all primary intracranial neoplasms. Meningiomas are multiple in 5-40% of cases, particularly when they associated with neurofibromatosis type 2 (NF2). Meningiomas afflict women more often than men. The female-tomale ratio ranges from 1.4:1 to 2.8:1. Aim of study: To evaluate incidence of meningiomas of basis crani anterior (MBCA) during 2010-2013 at General Hospital "Rezonanca" in Prishtina, and to compare the importance of CT and MRI in early diagnosis of meningiomas. Materials and methods. In the study we included 34 cases with meningiomas diagnosed with CT or MRI imaging at General Hospital "Rezonanca" in Prishtina, during 2010-2013. Results. 14 cases (41.2%) were meningioma the bases crani anterior. The overall morbidity of meningiomas was 0.81/100.000 populations. Menigeomas was higher among female sex as the total number of meningiomas (67.6%, p = 0:04), as well as to the meningioma of basis crani anterior (71.4%, p = 0:11). The average age of women with meningeom has been lower compared to men, as the total number of meningiomas (54.2 + / -13.5 vs. 55.6 + / -9.4, p = 0.73), as well as the MBCA (40.7 + / vs. -6.8. 45 + / -3.6, p = 12:15). Conclusion. CT and MRI are valuable methods for diagnosing of meningiomas, therefore, considered as the gold standard in diagnostic procedures of these pathologies.

Introduction

Meningeomas are brain tumors that develop from the meningitis. In 90% of cases are benign. They are usually found on the surface of the brain, the convexity or at the base of the cranium. Rarely may they have intraventricular localization. Meningeomas constitute 20% of intracranial tumors, so that they are among the most frequent tumors (1). Meningeomas can be multiple in 5-40% of cases, especially with neurofibromatosis type 2 (NF2). Menongeomas appear more often in females, so that the ratio F / M is from 1.4:1 to 2.8:1. With radiographic examinations can be detected hyperostosis and the increase of blood vessels in the skull, and also intracranial calcification (2)

In CT-scanning meningeomas increase homogeneity and intensity after injection of contrast material. Edema around the lesion can be large. There may be present hyperstosis and intratumoral calcifications. Usually tumor komprimon the brain tissue without invading it.

In T1 and T2 the MRI tumors have different signal intensity. Meningeomas increases the intensity and homogeneity after gadolinium gadopentetat injection. Edema may be more visible on MRI compared with CT scanning. (3)

Aim of Study

To investigate the incidence of the Basis Crani Anterior meningeomas during 2010-2013 diagnosed in the General Hospital "Resonance" in Prishtina and also to compare the role of CT and MRI imaging in early diagnosis of meningeomas.

Material and Methods

In the paper were included 34 cases with meningeoma, diagnosed with CT or MRI examination in the General Hospital "Rezonanca" in Prishtina, during the period 2010-2013. From the total number of meningeomas we have split them into separate group meningeomas with localization in Basis Crani Anterior. The number of cases we have presented it according to the years of the diagnosis and localization of meningeomas, by sex and by age group. Also, we have analyzed the frequency of imaging findings with CT or MRI.

Results are presented in tabular form, and from statistical data we have used the index structure, dynamic, basic and array indexes, arithmetic average and standard deviation.

The statistical significance we have calculated through hi-square test and t-test of arithmetic averages on the exact level of significance. As a critical value for the interpretation of statistical significance we have taken factor alpha value = 0:05.

Results

The largest number of cases with meningeomas is diagnosed in 2013, with a total of 10 (29.4%) cases, while a smaller number of cases is recorded in 2011, with a total of 7 (20.6%) cases. The overall rate of morbidity of meningeomas was 1.96 per 100,000 residents. From the total number of meningeomas, 14 cases (or 41.2%) were with Basis Crani Anterior meningeomas (MBCA), which in terms of overall morbidity represent 0.81 cases per 100,000 residents (Table 1).

Table 1. Meningeomas by year and degree of morbidity

Years		Meningeomas			Basis Crani Anterior Meningeomas (BCAM)		
		Nr.	%	Mb/100000*	Nr.	%	Mb/100000*
2010		8	23.5	0.46	3	21.4	0.17
2011		7	20.6	0.40	3	21.4	0.17
2012		9	26.5	0.52	4	28.6	0.23
2013		10	29.4	0.58	4	28.6	0.23
Total	Nr.	34	100.0	1.96	14	100.0	0.81
	(%)	100.0	-	-	41.2	-	-

* Nr. i of residents = 1.733.872 (Statistical Office of Kosovo, 2011)

In 2011 the number of diagnosed cases has decreased to 12.5%, compared to 2010, while the largest increase in the number of cases diagnosed with meningeoma is made between the year 2011 to 2012 (increasing to 28.6%) (Table 2).

Table 2. Indexes of the dynamics for patients diagnosed with meningeoma in the General Hospital 'Rezonance' for 2010-2013

Year	Nr. of cases	Basic index	Arrey index
2010	8	100.0	100.0
2011	7	87.5	87.5
2012	9	112.5	128.6
2013	10	125.0	111.1

The frequency of meningeomas was higher among female sex not only in the total number of meningeomas (67.6%, p = 0:04), but also to the Basis Crani Anterior meningeomas (MBCA), (71.4%, p = 0:11).

The average age of women with meningeoma has been lower compared to men, only in the total number of meningeomas (54.2 + / -13.5 vs. 55.6 + / -9.4, p = 0.73), but also to the Basis Crani Anterior meningeomas (BCAM), (40.7 + / vs. -6.8. 45 + / -3.6, p = 12:15) (Table 3).

Table 3. Meningeomas by sex and age of patients

Sex	Meningeomas			Basis Crani Anterior meningeomas (BCAM)		
	Nr.	%	Age (Mean+/-SD)	Nr.	%	Age (Mean+/-SD)
F	23	67.6	54.2+/-13.5	10	71.4	40.7+/-6.8
M	11	32.4	55.6+/-9.4	4	28.6	45.0+/-3.6
Total	34	100.0	54.7+/-12.2	14	100.0	41.9+/-6.3
	Chitest=4.2 P=0.04		Ttest=0.35 P=0.73	Chitest=2.6 P=0.11		Ttest=1.52 P=0.15

Mostly attacked by meningeomas has been the age group 61-70 years (with 14 cases, or 41.2%), while less was attacked the age group 31-40 years (with 6 cases, or 17.6%) (Table 4).

Table 4. Meningeomas by age group and sex

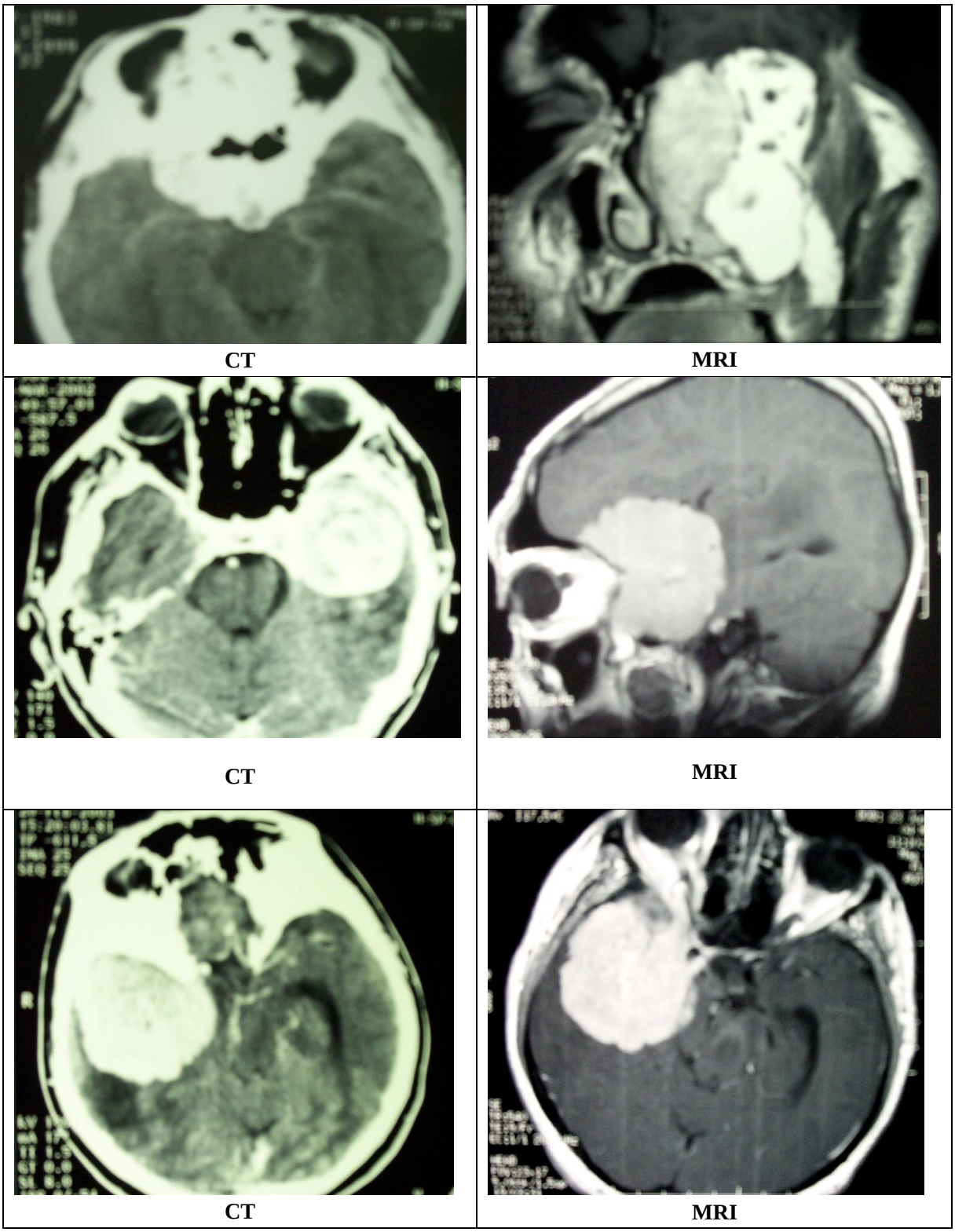
Age grup	Meningeomas		Basis Crani Anterior meningeomas (BCAM)	
	N	%	N	%
31- 40	6	17.6	6	42.9
41- 50	7	20.6	7	50.0
51- 60	7	20.6	1	7.1
61- 70	14	41.2	-	0.0
Total	34	100.0	14	100.0
	Chitest=4.82, P=0.19		Chitest=4.43, P=0.11	

We found extensive edematous changes in 73.5% of cases, whereas cystic changes we found in 38.2% of cases. Meningeoma has been with calcification in 26.5% of cases. Bone changes in the shape of hyperostosis we found in 55.9% of cases, while bone destruction we have found in 23.5% of cases (Table 5).

Table 5. Meningeoma number of cases ascertained by imaging changes with CT or MRI (n = 34)

Ascertained imaging changes	Nr	%
Edema	25	73.5
Cystic changes	13	38.2
Calcifications	9	26.5
Hyperostosis	19	55.9
Bone destruction	8	23.5

Fig.1. Some of the images made with CT and MRI of the Basis Crani Anterior meningeomas (BCAM) in the General Hospital "Rezonanca" in Prishtina



CT **MRI**

CT **MRI**

CT **MRI**

Discussion

A part of diagnosed tumors remain undiagnosed because they do not provide clinical symptoms, another part of them is diagnosed by CT or MRI examination and the greatest part are diagnosed after clinical signs. Usually in CT and MRI they are presented in two forms: as a round mass stretched round as a plate (3). Without contrast i.e. it appears a as circular extent surrounded well, which relocates neighboring brain depending on the size. The mass is usually homogeneous, hyperdense and can have deposits of Ca + + (20-25%), there is a tumor which has been completely calcified (Psamomatose Meningeomas) (4). Edema occurs in 60% of meningeomas, which relates to the toxic effect of the tumor, the compression of the veins, drainage and the growth speed of tumors. In our clinical material edema was found in 73.5% of cases, which results coincide with the results of the author Gradac GB et al., (5) and Kim et al (6), to which extensive edema was found in 75% of cases. Since these are well vaskularized tumors, in the examionation with contrast i.e. 90% are uniformly emphasized, so the measure is usually homogeneous, hyperdensed, can rarely be seen hypodensed small areas (7). Besides intracranial mass may also be seen small adjacent bone changes, usually in the form of hyperostosis, but also its erosion (4). According to our results bone changes in the form of hyperstosis are encountered in greater frequency (55.9%), compared with bone destruction (23.5%), which results coincide with the results of the author Kim et al (6), who has found the hyperostosis in 50% of cases whereas bone destruction in 25% of cases. Similar frequencies of bone changes conclude other authors, too. (8-10) In MRI meningeoma looks to be very well separated from the brain, where among them is a small amount of LCS. In T1 they appear iso or easily hypertensed compared with cerebral cortex. MRI is useful in detecting small meningeomas which are of the same density with the cortex, also there may be disclosed those of flat type (en plaque) as plaque. In some cases except tumor mass can be seen also obesity emphasis bordering with the dural tail, the presence of this image is worth to be more confident in the diagnosis of meningeomas when we have doubts about it (11, 12). Dural tail is interpreted by some authors as Dural reaction while by others as an extension of the tumor itself. With imaging is difficult to give a clear shape of hystological type of meningeomas and to predict patient prognosis. This is also true if we consider that the future of the operated tumor itself does not correlated in all cases, neither with its histological score. About 20-30% of meningeomas do recide with complete surgical resection (8). Meningeomas differential diagnosis is difficult to be made many times with gliomat, shvanomat, metastasis, hemangioma etc.

Conclusions

The Basis crani anterior meningeomas (tumors) are very common brain tumors, with the morbidity rate of 0.81/100.000 residents. CT and MRI are valuable methods for diagnosing meningeomas, therefore, they are considered as the golden standard in diagnostic procedures of these pathologies. From the imaging data we can document the advantage of MRI as the preferred method for diagnosing FCA tumors compared with the CT method.

References

1. Thomas Grumme, Wolfgang Kluge, Konrad Kretzchamar and Andreas Roesler, "Cerebral and Spinal CT ", 142-79, 1.
2. Evans DG. Neurofibromatosis type 2: genetic and clinical features. *Ear Nose Throat J*. Feb 1999;78(2):97-100)
3. Juan M.Taveras "Neuroradiology" Third Edition, 676-719, 1996.
4. Velnar T, Bunc G. Iatrogenic metastasis of a benign meningioma to the periosteum at the site of previous craniotomy: a case report. Wien Klin Wochenschr, 120: 766–769, 2008.

5. Gradac GB, Ferszt R, Bender A, Schorner W. Peritumoral edema in meningiona: a radiological and histological study. Neuroradiology. 1986; 28: 304-12.
6. Kim EY, Weon YC, Kim ST, Kim HJ, Byun HS, Lee JI, Kim JH. Rhabdoid meningioma: clinical features and MR imaging findings in 15 patients. Amm J Neuroradiol. 2007; 28:1462-5.
7. Chamberlain MC, Glantz MJ, Fadul CE. Recurrent meningioma: salvage therapy with long-acting somatostatin analogue. Neurology, 69: 969–973,2007
8. Terstegge K, Schorner W, Henkes H et al. Hyperostosis in meningiomas: MR findings in patients with recurrent meningiomas of the sphenoid wings. Am J Neuroradiol. 1994; 15:555-60.
9. Pieper DR, Al-Mefty O, Hanada Y, Buechner D. Hyperostosis associated with meningioma of the cranial base: secondary changes or tumor invasion. Neurosurgery. 1999; 44:742-7.
10. Sheporaitis LA, Osborn AG, Simirniotoupolos JG et al. Intracranial meningioma. Am J Roengenol. 1992; 13:37-9.
11. Levin VA, Leibel SA, Gutin PH: Neoplasms of the central nervous system. In: DeVita VT Jr, Hellman S, Rosenberg SA, eds.: Cancer: Principles and Practice of Oncology. 6th ed. Philadelphia, Pa: Lippincott Williams & Wilkins, pp 2100-60, 2001.
12. Nobert Hoster, Thomas Liebig "CT of th Head and Spine, 121-95. 2001