Deontological issues - possible misdiagnosis of cerebral metastases

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Abstract

Authors analysed a number of 4588 (52, 24% over 50 years old) patients operated for cerebral tumors in the Clinic Emergency Hospital "Bagdasar-Arseni" from Bucharest, between 2000-2010, with peculiar attention to the concordance between the preoperative and postoperative diagnosis, related to the actual policy to evaluate a neurosurgical patient before surgery. 903 cases were cerebral metastases and 69,5% aged over 50 years old. In 9,7% of cases we recorded a preoperative misdiagnosis of a metastasis due to few main reasons: unavailable information about a present primitive cancer, treacherous MRI image with a single confusing appearance of a cerebral lesion, age less than 50 years old, clinical presentation and biological evaluation inconsistent with malignancy. Authors point that these situations can have serious consequences related to professional competence, deterioration of the patient-doctor relationship, increasing costs for completion of diagnosis and treatment, and inadequate information about patient's prognosis.

Keywords: cerebral metastases, deontological issues, diagnosis, concordance

Introduction

Cerebral metastases represent the spread of a neoplasm from a primary site to the brain. The most common primary tumors metastatic to brain include lung cancer (adenosquamous and small cell especially), breast cancer, melanoma, renal cancer and colon cancer. Metastases are frequently found at the grey/white junction. They are usually well demarcated from the brain parenchyma. The majority of metastases (greater than 75%) are found supratentorially with the minority (less than 10%) found in the brainstem. The patients present with signs and symptoms referable to either increased intracranial pressure or focal pathology (4). A contrast enhanced MRI will give the best view of suspected metastatic cancers. Therapy for the metastatic cancer is based upon the therapy that would be or has been given to the primary cancer. In any event corticosteroids can be useful for reduction of patients' symptoms. Metastases to the brain is the most feared complication of systemic cancer and the most common intracranial tumor in adults. The incidence of brain metastasis is rising with the increase in survival of cancer patients. Currently, cancer patients live longer as a result of important advances in cancer diagnosis and management, and in particular, the

widespread use of MRI to detect small metastases. Approximately 40% of intracranial neoplasms are metastatic (9). Multiple, large autopsy series suggest that, in order of decreasing frequency, lung, breast, melanoma, renal, and colon cancers are the most common primary tumors to metastasize to the brain. Brain metastases are an increasingly important cause of morbidity and mortality in cancer patients. Thus, brain metastases presents a therapeutic challenge for the treating physician and is an emotionally and physically debilitating event for the patient. Early diagnosis and aggressive treatment of brain metastasis may result in remission of brain symptoms and may enhance the quality of the patient's life and prolong survival (2, 12). The radiologist plays a primary role in the management of cancer patients by helping detect, localize, and diagnose the lesion. The prognosis for patients with brain metastases typically is poor (13). Of particular relevance to imaging is the fact that for patients with a solitary brain metastasis who undergo treatment by surgical resection, the survival rate after 1 year is approximately doubled. Most available treatment is palliative; however, consideration should be given to prolonging the patient's quality of life through specific therapy to the brain (15). Most patients with a known primary tumor undergo imaging studies when neurologic signs and symptoms develop. Magnetic resonance imaging (MRI) with contrast enhancement currently is the procedure of choice, because MRI is more sensitive and specific than other imaging modalities in determining the presence, location, and number of metastases. Contrast-enhanced computed tomography (CT) scanning is used widely because of its accessibility and

low cost. With regard to screening for intracranial metastases, no consensus has been reached concerning when to use CT or MRI for initial staging evaluation of a patient with cancer. However, brain MRI for patients with primary cancers that frequently metastasize to the brain (eg, bronchogenic carcinoma) is probably cost effective. Numerous studies have shown that contrast-enhanced MRI detects 2-3 times as many lesions as contrast-enhanced CT, especially lesions less than 5 mm in diameter. In addition, approximately 20% of patients with solitary metastatic lesions on CT show multiple lesions on MRI. The decision to perform imaging for patients with other cancers is made on the basis of the clinical evaluation. In the presence of multiple cerebral metastases from an unknown primary source, a limited search for the primary tumor is of value; such a search includes a chest radiograph, breast examination and mammography, and abdominal ultrasound (US). An extensive search for an occult malignancy is unrewarding. Surgery may be required for patients presenting with a solitary intracranial tumor or to search for a possible primary tumor. They occur some limitations of techniques: approximately one third of patients operated on for a single cerebral metastasis diagnosed with contrast-enhanced CT probably have more than one lesion. Contrast-enhanced MRI is more sensitive than CT in detecting the number of cerebral metastases. The diagnosis of a brain tumor is best made by cranial MRI. This should be the first test obtained in a patient with signs or symptoms suggestive of an intracranial mass. MRI is superior to CT and should always be obtained with and without contrast material such as gadolinium. A

contrast-enhanced CT scan may be used if MRI is unavailable or the patient cannot undergo MRI (eg, because of a pacemaker). CT is adequate to exclude brain metastases in most patients, but it can miss low-grade tumors or small lesions located in the posterior fossa. Tumor calcification is often better appreciated on CT than on MRI. Body positron emission tomography (PET) scans performed for staging of systemic malignancies have a sensitivity of only 75% and a specificity of 83% for identification of cerebral metastases. Therefore, they are less accurate than MRI, which remains the gold standard. On CT or MRI, most brain metastases are enhancing lesions surrounded by edema, which extends into the white matter. Unlike primary brain tumors, metastatic lesions rarely involve the corpus callosum or cross the midline. The radiographic appearance of brain metastases is nonspecific and may mimic other processes, such as infection. Therefore, the CT or MRI scan must always be interpreted within the context of the clinical picture of the individual patient, particularly as cancer patients are vulnerable to opportunistic CNS infections or may develop second primaries, which can include primary brain tumors. Magnetic resonance spectroscopy (MRS) and perfusion imaging can help differentiate low-grade from high-grade brain tumors but cannot distinguish different tumor types of the same grade.

Material and methods

Between 2000-2010, 4588 files of patients operated for a brain tumor in the Clinic Emergency Hospital "Bagdasar-Arseni" from Bucharest, were retrospectively analyzed with peculiar attention to the concordance between the preoperative and postoperative diagnosis. 903 cases (100%) were recorded as cerebral metastases of different etiologies, after pathological examinations of the specimens. We recorded age, sex, symptoms on presentation and their duration, type of investigations and lesions description, clinical and biological profile, and if existed a known primary tumor. Actual protocol before operation in a patient with a brain tumor supposes: cerebral CT scan native and contrast, cerebral MRI native and contrast, MRI angiography when necessary, DSA angiography in specific cases. Patient has a standard chest x-ray, skull x-ray, EEG, EKG, cardiologic examination after 45 years old, ophthalmologic evaluation, standard blood test and urine test. Patient's files analyze were done due to electronic patient database from our hospital and statistical data was obtained by Microsoft Excel ®. Concordance analysis was done by assigned key-words, inconsistent data was manually evaluated for excluding/including the cases related to different written expressions.

Results

773 cases (85,6%) presented initially a single cerebral metastases, and 556 patients (61,5%) were investigated by contrast CT scan and contrast MRI scan. 347 patients were operated only after a contrast CT (115 patients-12,7%) or MRI (232 patients-25,69%).

From the 773 cases (100%) operated with a single lesion, in 590 cases the primary tumor was not known before neurosurgical procedure (76,32%). In the time of hospitalization 309 cases (40%) benefitted of other investigations (whole-body contrast CT, bronchoscopy, digestive endoscopy, etc) and the primary cancer was documented. 281 patients (36,35%)

remained cases with a non-documented primary cancer were referred to the oncology department for other specific investigations and supplementary pathologic histochemistry analysis for identifying the organ of tumor origin.108 patients (13,19%) obtained a diagnose of the primary cancer origin during the oncologic treatment. From a number of 173 cases (22,38%) with an unknown origin of the primary tumor, 123 continued investigations and treatments and a diagnosis was possible in the lifetime and 50 patients (6,46%) deceased without the primary cancer known.

In 75 patients (9,70%)operated for a single cerebral lesion, without a known primary tumor, we recorded a misdiagnose of a cerebral metastasis , after analyzing the concordance between the preoperative and postoperative diagnosis. We analyzed the most important criteria for a correct diagnosis: 1) history and symptoms- history was not conclusive for a primary known cancer. The most frequent symptom at presentation was headache, dizziness, and memory disturbances. 2) age: medium age was 51,6 years old, they were 34 females and 41males; 3) diagnose imaging study- 35 patients were investigated by both CT and MRI, 22 had only MRI and 18 had only a CT; most of the situations revealed a confusing image with a primary brain tumor or cerebral abscess. 4) clinical and biological standard preoperative evaluation was inconsistent with malignancy- absence of any inflammatory syndrome, no suspicion of cancer on the standard evaluations. In all cases clinical and biological profile was not conclusive for a neoplastic disease.
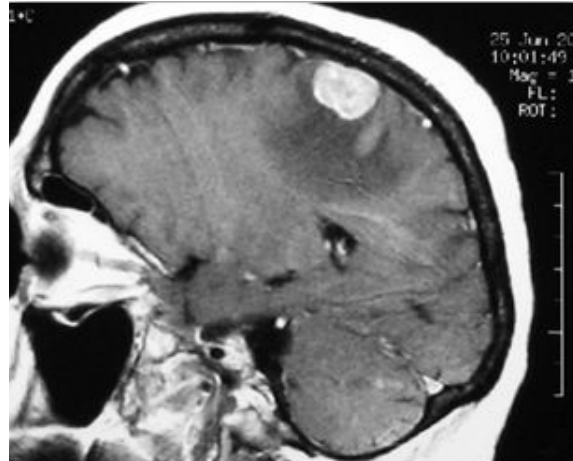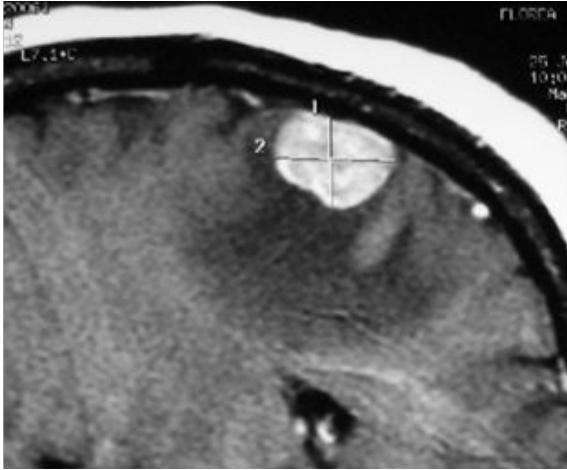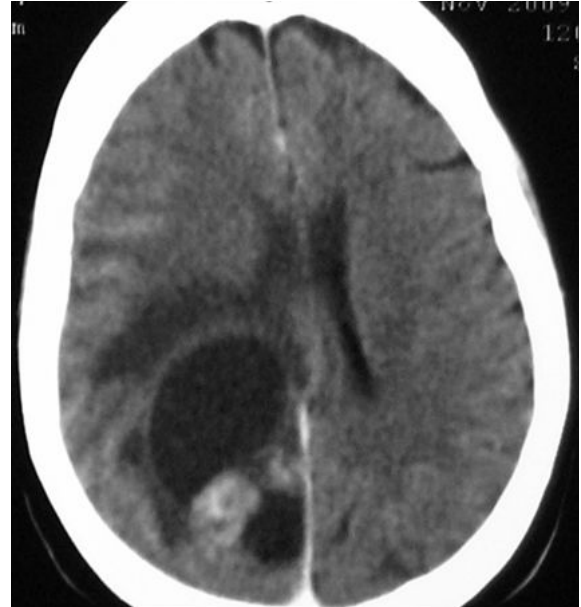

Figure 1.1
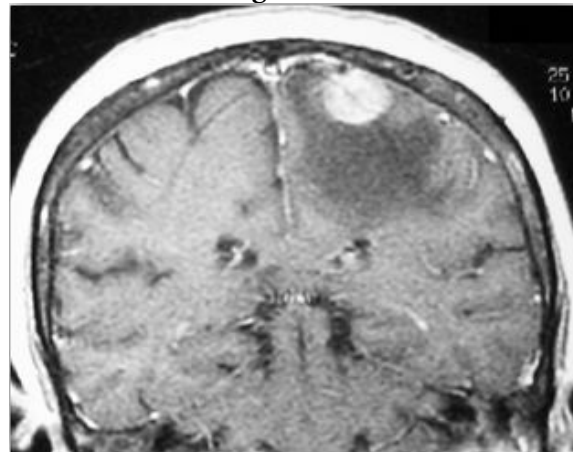
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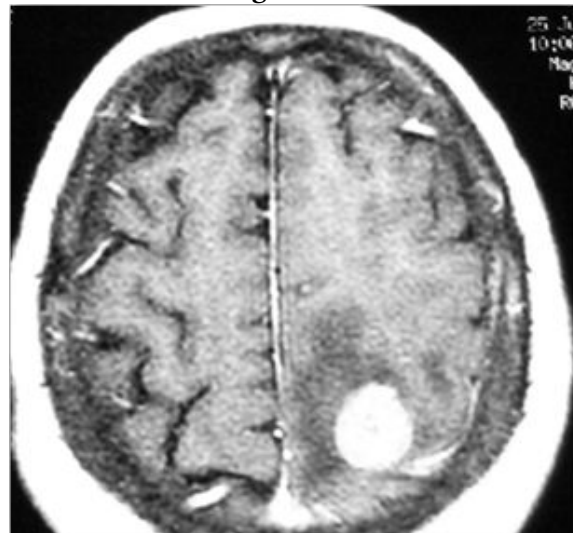
Figure 1.3

Figure 1.4

Figure 1 (1.1, 1.2, 1.3, 1.4) Contrast MRI axial and sagital ,T1-left parietal lesion, well delineated, attached of dura mater, with moderate surrounding edema, suggesting a meningioma. Pathological examination after surgery revealed a metastases of a papillary adenocarcinoma.

Discussion

Treacherous image on a contrast CT scan or MRI, with a confusing appearance of a single cerebral lesion, is, undoubtedly, one of the major source of diagnosis errors. This is the reason for which we will take in review the most important radiologic data related on the degree of confidence of every investigation.

CT scan. On noncontrast CT, the density of metastatic lesions may be less than, equal to, or greater than that of adjacent brain parenchyma. Most of the patterns are variable and are nondiagnostic. Noncontrast CT is performed to detect hemorrhage into metastases. Hyperdensity in a metastasis is more likely to be hemorrhage than calcification (see the image below).

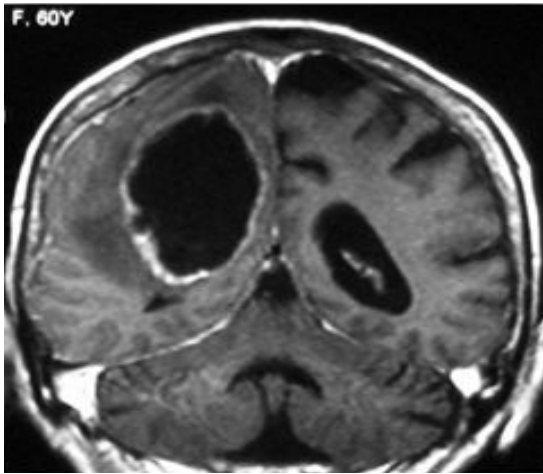IV administration of contrast material (30-40 g iodine) increases the diagnostic accuracy of CT.
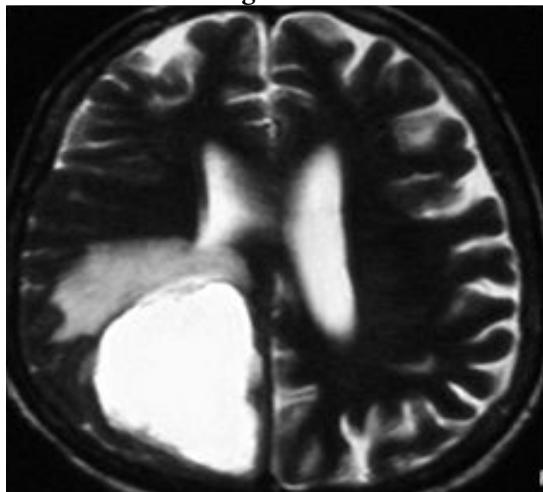

Figure 2.1

Figure 2.2

Figure 2 (2.1, 2.2) Contrast CT scan revealing a right parieto-occipital cystic lesion, with a contrast enhancing nodule inside attached from the falx and cerebral mantle, with severe mass effect on the posterior right ventricular horn, and midline shift, suggesting a cystic glioma. Pathological evaluation after surgery revealed an undifferentiated carcinoma of pulmonary origin (chest x-ray was inconsistent for tumor).
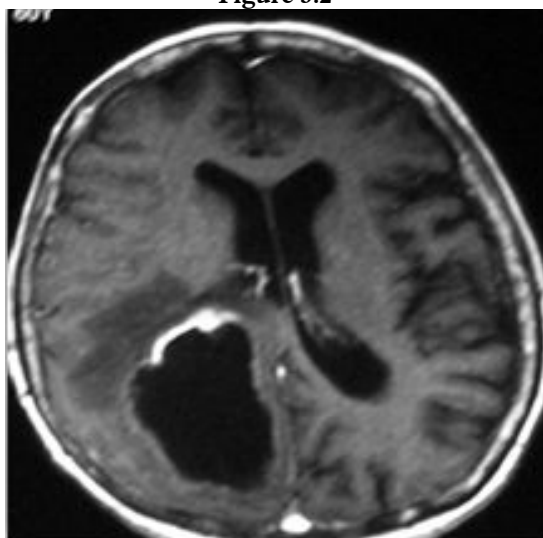
Figure 3.1

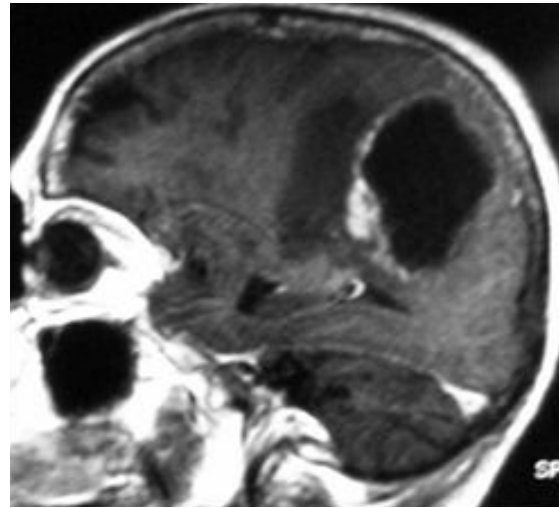**Figure 3.2**

Figure 3.3

Figure 3.4

Figure 3 (3.1, 3.2, 3.3, 3.4) Contrast MRI axial and sagital T1, T2- right cystic near-round lesion with a fluid content, enhancing contrast peripherally, with mass effect and moderate edema, suggesting a cerebral abscess. Pathological examination revealed a metastasis of a breast carcinoma. Finally a right breast small nodule was discovered and treated.
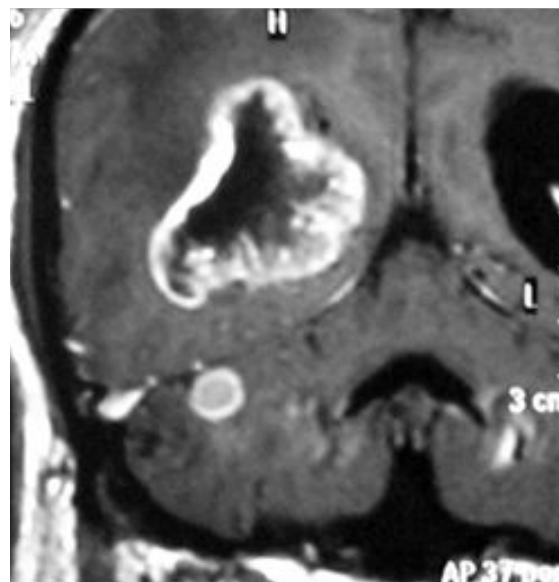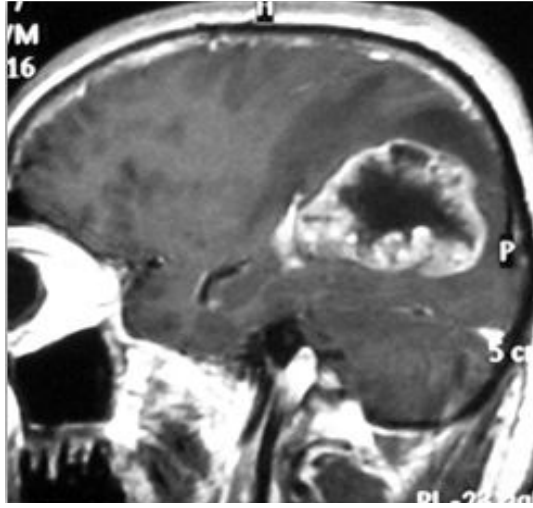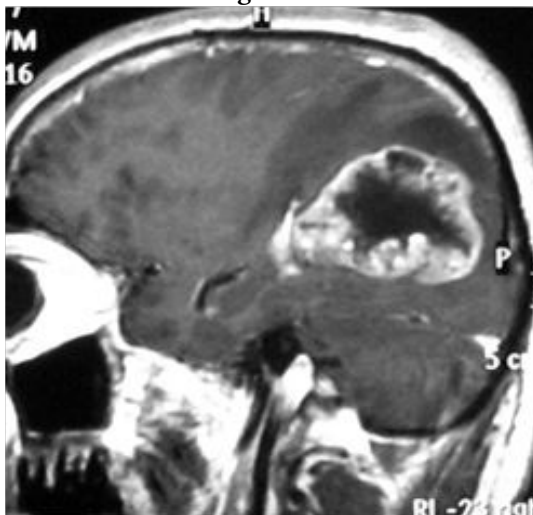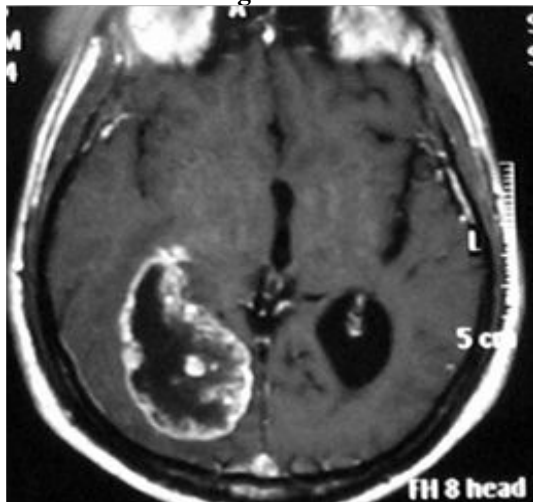

Figure 4.1

Figure 4.2

Figure 4.3

Figure 4.4

Figure 4 (4.1, 4.2, 4.3, 4.4) Contrast MRI, axial and sagital T1,T2-left temporo-occipital mass lesion enhancing contrast marginally, with necrotic content, with mass effect on the ventricular horn and midline shift, with serious peritumoral edema, suggesting a glioblastoma. Postoperative pathological evaluation revealed a metastases of colon carcinoma.
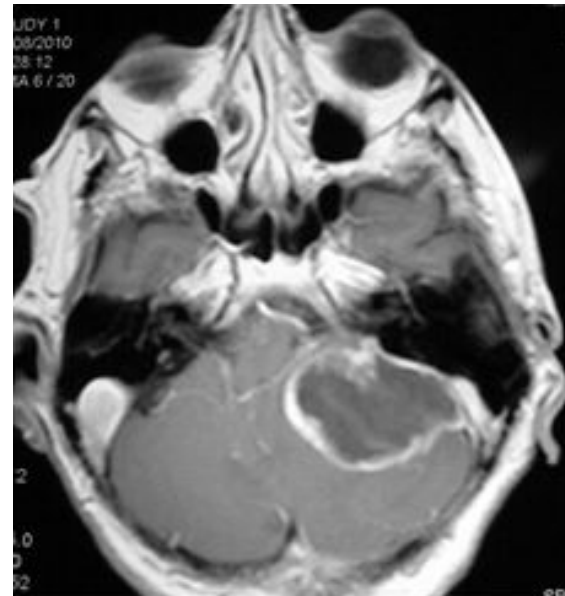

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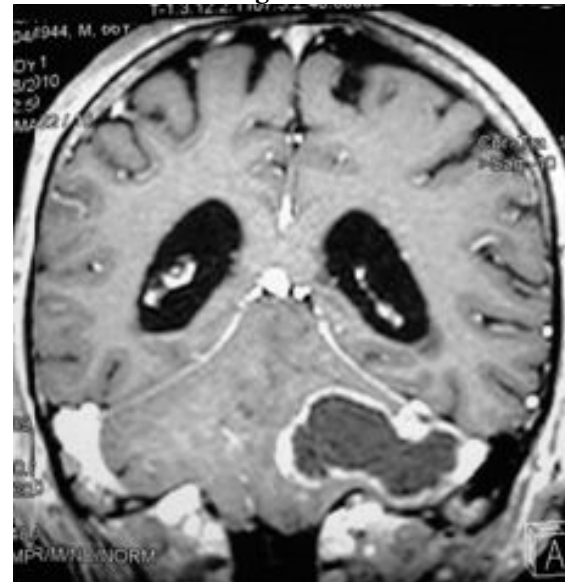
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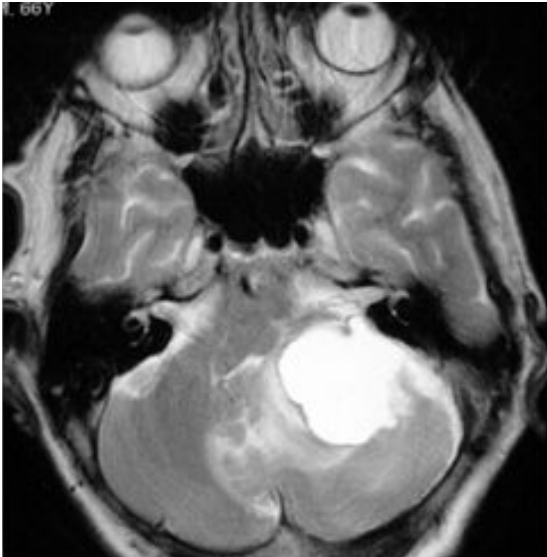
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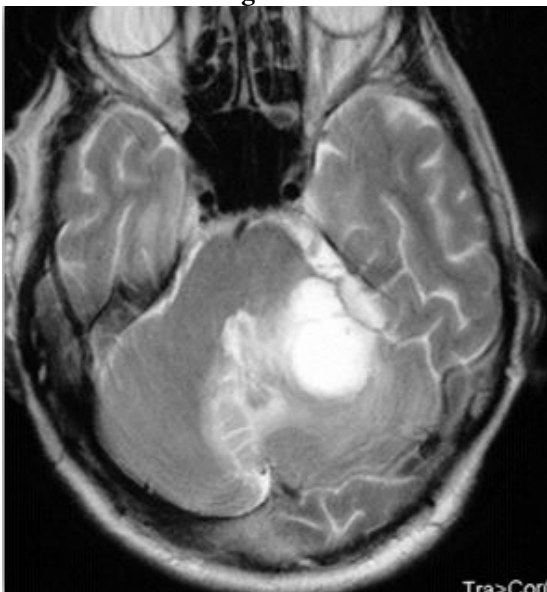
Figure 5.4

Figure 5 (5.1, 5.2, 5.3, 5.4) Contrast MRI, axial and sagital T1,T2-left cerebellar cystic mass lesion, enhancing contrast peripherally, with a significant contact with the petrous bone in the area of internal auditory canal, with mass effect on the brain stem and fourth ventricle, suggesting a cerebellar abscess. Postoperative pathological examination revealed a metastasis of a clear cell carcinoma.
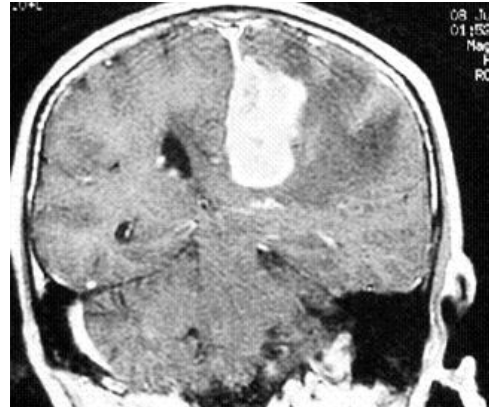
Figure 6.1

Figure 6.2
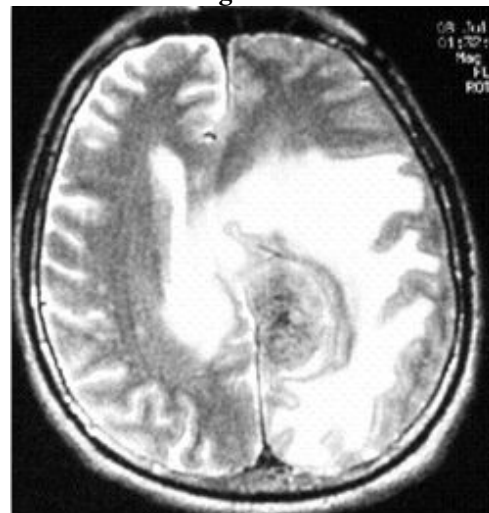
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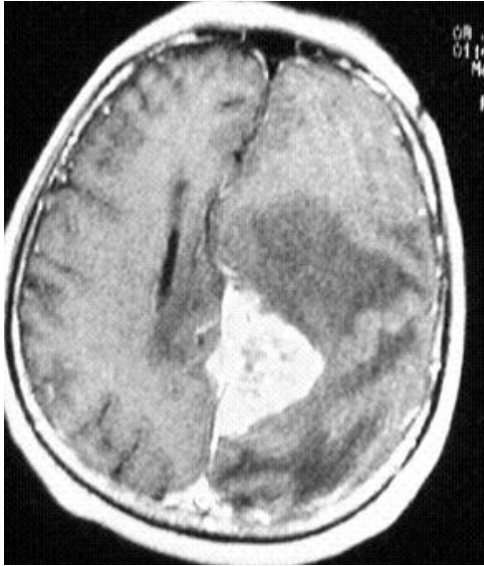
Figure 6.4
Figure 6 (6.1, 6.2, 6.3, 6.4) Contrast MRI, axial and
sagital T1,T2- left solid parietal lesion highly contrast
enhancing, attached on the falx in the posterior third,
with a severe peritumoral edema, and mass effect
with midline shift. Content of the lesion in un-
homogenous with necrosis and intratumoral vessels.
The aspect suggest a atypical falx meningioma.
Postoperative pathological examination revealed a
metastasis of a lung epidermoid carcinoma.
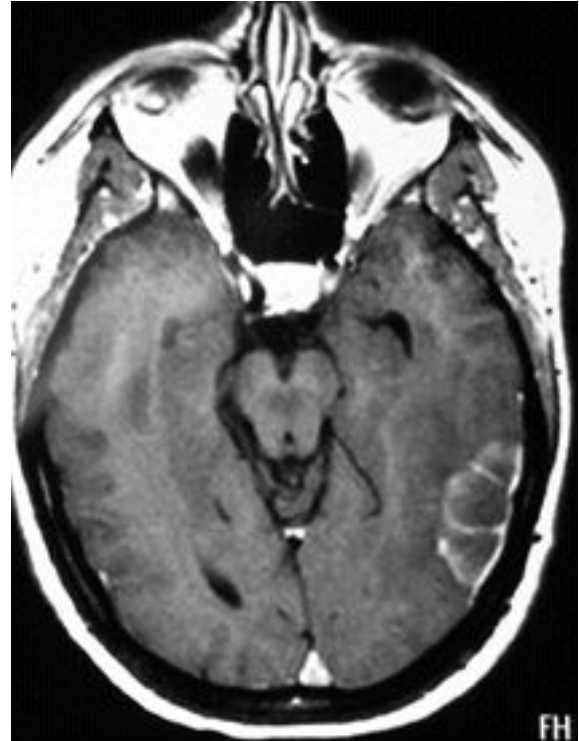
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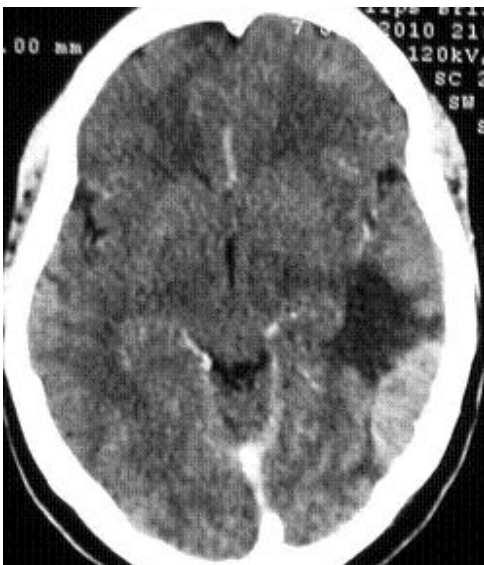
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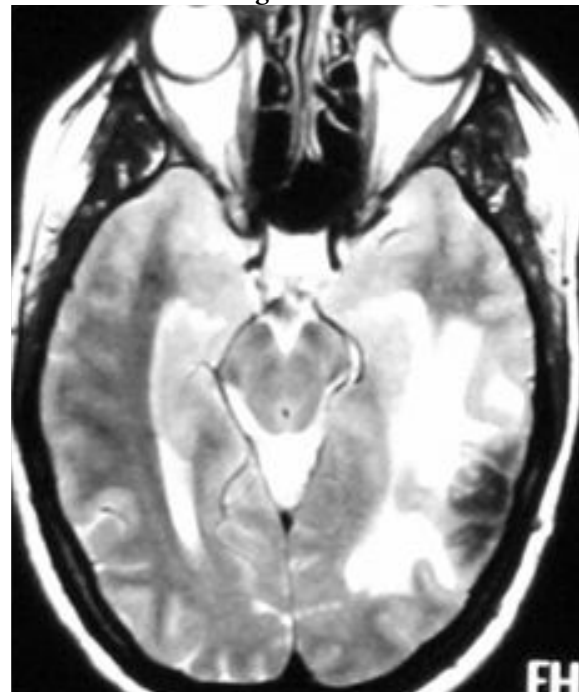
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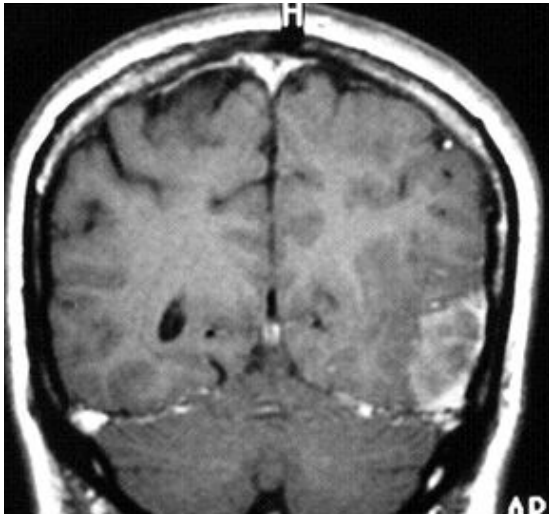
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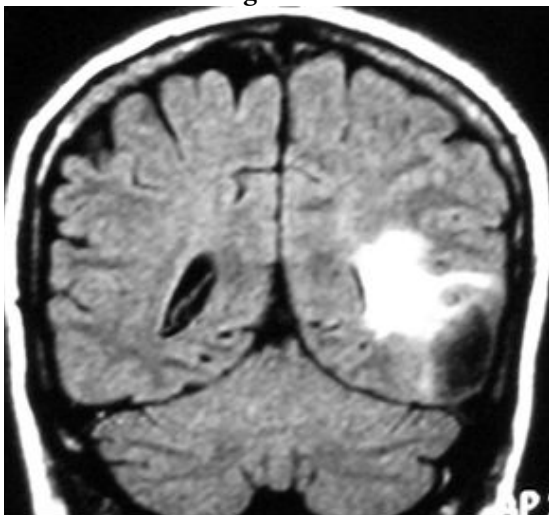
Figure 7.4

Figure 7 (7.1, 7.2, 7.3, 7.4, 7.5) Contrast CT scan and contrast MRI, T1, T2- left solid temporo-occipital lesion attached to the dura, enhancing homogenously contrast on the CT and trabecular on the MRI, with regional mass effect, invading the brain surface, suggesting a superficial glioma. Postoperative pathological examination revealed a metastasis of highly differentiated adenocarcinoma

Most metastases enhance after a standard dose of IV contrast. Use of a higher dose of contrast (80-85 g of iodine) and delaying scanning by 1-3 hours after injection of the contrast agent lead to a further increase in the detection of multiple metastases; such an approach is appropriate if MRI is not available.

The detection of additional metastases has important diagnostic and therapeutic implications. In cases in which there is no known primary cancer, if a solitary lesion is found on routine enhanced CT, the presence of an additional lesion may suggest a metastatic process, provided the solitary lesion is believed to be a primary lesion. In cases involving a solitary metastatic lesion of the brain, detection of an additional lesion may have a bearing on treatment; with multiple lesions, surgical treatment may be forgone in favor of chemotherapy, radiation therapy, or both. Contrast-enhanced CT is effective in detecting major leptomeningeal spread. Contrast-enhancing subdural or epidural metastases may be seen, usually secondary to calvarial lesions. Of breast, lung, prostate, and renal-cell neoplasms, 5% metastasize to the calvarium; of these, 15% extend into the subdural space. **Degree of confidence**. On findings of multiple, enhancing solid lesions at the gray matter–white matter junction and prominent surrounding edema in a patient with known primary cancer, a diagnosis of metastases may be confidently made. Approximately 90% of patients with a history of cancer who present with a single supratentorial lesion have brain metastases. Patients with multiple lesions are even more likely to have metastatic disease. Before undergoing definitive therapy, patients who are found to have a single metastasis on contrast-enhanced CT should undergo a contrast-enhanced MRI examination, if facilities for such an examination are available. Routine cranial CT is useful in the staging of cancer in the patient with non–small-cell lung cancer; cranial CT has a sensitivity of 92%, a specificity of 99%, and an accuracy of 98% in detecting brain metastases. Contrast-enhanced CT is perhaps the best method to identify calvarial metastases. In studies comparing contrast-enhanced CT with contrast-enhanced MRI, approximately 20% of patients who demonstrated a single lesion on CT demonstrated multiple lesions on MRI. Mostly, the lesions missed on contrast-enhanced CT were smaller (< 2 cm in diameter) and were located next to the bone in a frontotemporal

location. Dural-based metastases may mimic meningioma. (1, 3, 7, 11, 16)

Magnetic Resonance Imaging. Multiple lesions with marked vasogenic edema and mass effect are typically seen in patients with brain metastases, as shown in the images below. Lesions are isointense to mildly hypointense on T1-weighted images; they are hyperintense on T2-weighted images or with fluid attenuation inversion recovery. Surrounding edema is relatively hypointense on fluid attenuation inversion recovery and on T1-weighted images; they are hyperintense on T2-weighted images. Hemorrhagic metastases or melanoma lesions are hyperintense on T1-weighted images.On T2-weighted images, mucinous adenocarcinoma may be hypointense, owing to calcification; hemorrhagic metastases may be hypointense, owing to the chronic breakdown of blood products. Following administration of a contrast agent, solid, nodular (see first image below), or irregular ring patterns of enhancement are seen. Nonenhancing lesions (see second image below) are less likely to be metastases. Contrast-enhanced MRI is the best method for detection of meningeal tumor seeding, which appears as abnormal dural enhancement. This is a nonspecific finding; however, in the correct clinical setting, it correlates with the presence of sheets of tumor cells affecting the meninges. The usefulness of diffusion-weighted and perfusion-weighted imaging and proton-MR spectroscopy in the initial diagnosis of brain metastases has not been established. Gadolinium-based contrast agents have been linked to the development of nephrogenic systemic fibrosis (NSF) or nephrogenic fibrosing dermopathy (NFD). NSF/NFD has occurred in patients with moderate to end-stage renal disease after being given a gadolinium-based contrast agent to enhance MRI or MRA scans. NSF/NFD is a debilitating and sometimes fatal disease. Characteristics include red or dark patches on the skin; burning, itching, swelling, hardening, and tightening of the skin; yellow spots on the whites of the eyes; joint stiffness with trouble moving or straightening the arms, hands, legs, or feet; pain deep in the hip bones or ribs; and

muscle weakness. **Degree of confidence**. Gadolinium-enhanced MRI is superior to contrast-enhanced CT in the diagnosis of brain metastases. Gadolinium-enhanced MRI has the following advantages: useful for detecting smaller lesions, provides better soft tissue contrast, provides relatively stronger enhancement with paramagnetic contrast agents, no bone artifacts in the images, provides less partial-volume effects, particularly for lesions adjacent to bones, provides direct multiplanar imaging. Use of magnetization transfer with single-dose gadolinium administration is roughly equivalent to triple-dose, postcontrast, spin-echo imaging in detecting lesions and lesion conspicuity. It has been shown that treatment with dexamethasone leads to a reduction in evidence on MRI of peritumoral edema and, occasionally, a lessening in the extent of contrast enhancement. If a lesion is found and a definitive diagnosis cannot be established, biopsy should be performed. Detection of additional lesions is important when considering surgical treatment of a solitary lesion. Magnetization transfer used with routine-dose gadolinium contrast is closely comparable to the high-dose technique. False positives/negatives.On imaging, dural-based metastases may resemble meningioma. Leptomeningeal carcinomatosis may resemble chronic meningitis; however, an appropriate history or detection of primary cancer may be sufficient for establishing the diagnosis. Leptomeningeal enhancement may occur after the administration of radiation or following extra-axial hemorrhage; it may also occur below a craniotomy site. Single or multiple ring-enhancing lesions with edema may resemble infectious processes. Solitary lesions resemble primary brain tumors (5,8,16).

Nuclear Imaging. Currently, nuclear medicine studies are not employed routinely as primary imaging techniques for detecting intracranial metastatic disease. Typical findings are multiple intracerebral areas of increased activity. The standard isotope used is technetium-99m (99m Tc). On isotope whole-body bone scans, calvarial metastases may appear as multiple focal areas of increased

activity. With whole-body 18-fluorodeoxyglucose (FDG) positron emission tomography (PET) used in cancer staging, intracerebral metastases may appear as areas of increased metabolism. **Degree of confidence**. Radionuclide studies are sensitive but are highly nonspecific. In studies involving a small number of patients, FDG-PET demonstrated low sensitivity and low specificity. Currently, FDG-PET is not considered superior to CT or MRI in the initial evaluation of suspected brain metastases. **False positives/negatives**. In older reports, radionuclide imaging was reported to detect intracerebral metastases in approximately 90% of patients, but the findings were nonspecific. Neoplasm, inflammation, vascularity, or trauma may cause the abnormal uptake. FDG-PET has been reported to detect approximately two thirds of brain metastases resulting from systemic cancer. (6, 10, 14)

Age is an important factor in judging a cerebral metastasis case, mainly because in the last 10 years, due to the increased accessibility for investigations, an higher number of patients are diagnosed with mass cerebral lesions, and are routinely having a CT or MRI. Another reason is that we statistically assist to a decrease of age in cancer patients, and to an increase of survival of this patients due to specific treatment improvements.

History and symptoms plays an important role: most of our cases with so-called misdiagnosis of cerebral metastases had few neurological signs, had a good clinical and biological status, ignoring maybe a possible neoplastic disease. Clinical picture of the individual patient is a reliable factor for the correlation of imaging data, in order to precise, preoperatively a correct diagnosis.

Table 1 focuses on some of the tumor markers often used today. Tests for many other markers are available through commercial testing labs, but these are not commonly used. The list below is limited to those tumor markers that are available to most doctors and have reliable scientific information showing that they are useful. The values listed below are average values, and most labs will list their own "reference ranges". Most of the tests are not screening tests, but they are useful instruments to monitor the evolution of a tumor under treatment.

A suite of deontological issues appear to act as an infringement situation of the normal relation between the patient and the doctor, and can generate a series of legal consequences: the patient and his family considers being lied, the supposed prognosis presented before surgery will appear wrong, life expectancy changes, the costs for completing the diagnosis and treatment will increase tremendously, and the professional reputation of the doctor and his team will suffer. Family may request penalties for malpraxis. In order to avoid such situations, they are three methods to clarify them before surgery: when clinical condition of the patient permits, one can proceed to obtain more data by biological tests (tumor markers), whole body MRI or CT, PET scan, etc., or to proceed to a tumor biopsy. When surgical procedure became urgent, and if the lesion is somehow unclear and not correlated entirely with clinical status, it is recommended to avoid a clear-cut information and to maintain a reserve related to the future of the patient, because in about 9-10% of the cases the supposed brain tumor maybe a metastasis, and this is a fact who changes dramatically all situation.

If a patient over 50 years old, is admitted for a brain tumor, and radiologist's interpretation of the data may be un-conclusive, we need to clarify first if a primary cancer exists.

TABLE 1

Actual used tumor markers and conditions associated with elevated levels (adapted from American Cancer Society, revised on 03.24.2011).

Tumor marker	Normal value	Primary tumor(s)	Additional associated malignancies	Benign conditions	Level above which benign disease is unlikely	Sensitivity
CA 27.291,2	< 38 units per mL	Breast cancer	Colon, gastric, hepatic, lung, pancreatic, ovarian, and prostate cancers	Breast, liver, and kidney disorders, ovarian cysts	> 100 units per mL	Elevated in about 33% of early-stage breast cancers and about 67% of late-stage breast cancers
CEA	< 2.5 ng per mL in nonsmokers < 5 ng per mL in smokers	Colorectal cancer	Breast, lung, gastric, pancreatic, bladder, medullary thyroid, head and neck, cervical, and hepatic cancers, lymphoma, melanoma	Cigarette smoking, peptic ulcer disease, inflammatory bowel disease, pancreatitis, hypothyroidism, cirrhosis, biliary obstruction	>10 ng per mL	Elevated in less than 25% of early-stage colon cancers and 75% of late-stage colon cancers
CA 19-9	< 37 units per mL	Pancreatic cancer, biliary tract cancers	Colon, esophageal, and hepatic cancers	Pancreatitis, biliary disease, cirrhosis	> 1,000 units per mL	Elevated in 80% to 90% of pancreatic cancers and 60% to 70% of biliary tract cancers*
AFP	< 5.4 ng per mL	Hepatocellular carcinoma, nonseminomatous germ cell tumors	Gastric, biliary, and pancreatic cancers	Cirrhosis, viral hepatitis, pregnancy	> 500 ng per mL	Elevated in 80% of hepatocellular carcinomas
						Nonseminomatous germ cell tumors: see β-hCG below
β-hCG	< 5 mIU per mL	Nonseminomatous germ cell tumors, gestational trophoblastic disease	Rarely, gastrointestinal cancers	Hypogonadal states, marijuana use	> 30 mIU per mL	AFP or β-hCG elevated in 85% of nonseminomatous germ cell tumors; elevated in only 20% of early-stage nonseminomatous germ cell tumors
CA 125	< 35 units per mL	Ovarian cancer	Endometrial, fallopian tube, breast, lung, esophageal, gastric, hepatic, and pancreatic cancers	Menstruation, pregnancy, fibroids, ovarian cysts, pelvic inflammation, cirrhosis, ascites, pleural and pericardial effusions, endometriosis	> 200 units per mL	Elevated in about 85% of ovarian cancers; elevated in only 50% of early-stage ovarian cancers
PSA	< 4 ng per mL for screening Undetectable level after radical prostatectomy	Prostate cancer	None	Prostatitis, benign prostatic hypertrophy, prostatic trauma, after ejaculation	> 10 ng per mL	Elevated in more than 75 percent of organ-confined prostate cancers

Legend: CA = cancer antigen; CEA = carcinoembryonic antigen; AFP = alpha-fetoprotein; β-hCG = beta subunit of human chorionic gonadotropin; PSA = prostate-specific antigen.*— The greatest possible sensitivity is 95 percent, given that 5% of the population have Lewis-null blood type and are unable to produce the antigen.

Thereafter we need to evaluate the case and all radiological and medical information by ourselves, and to avoid the traps resulting from an incorrect correlation of data. If radiologist advocates for a malignant primary brain tumor (high-grade glioma, glioblastoma, etc), we need to inform the patient's family that the prognosis is poor, but if a metastasis is confirmed after pathological evaluation of the specimen, the future of the patient might be the worst. Any time when a systemic cancer is revealed by a brain metastasis, statistically, the total surviving time with or without the treatment attain about 6 to 8 months. When radiologic data suspects a brain abscess, and the patient status does not match with an infectious condition, we need to maintain a serious doubt about patient's prognosis, until pathologic examination reveals the final result. A number of tumors, mainly in immune suppressed patients (cirrhosis, diabetes mellitus, renal failure, etc), may exhibit a false pus aspect, as a component of intratumoral necrosis or subacute hemorrhage in different stages of resolution. The neurosurgeon is the most important decision factor and is the one who bears the final responsibility towards neurosurgical indication, neurosurgical procedure and documented information provided to patients and family.

Conclusions

Any patient over 50 years old with a unique brain lesion must be suspected for a cerebral metastases. When doubt exists, cerebral biopsy and additional investigations should be done. According to the recent frequency criteria of cerebral metastases versus the total number of cerebral tumors in adult, between 30 and 40 % of cases may have a cerebral metastases. The patient must be evaluated correctly and the diagnosis must be affirmed with caution. In 6 -8% of the patients with cerebral metastases, the primary neoplasm remain unidentified until the decease. Neurosurgical operation is certainly the most important step to establish a precocious and clear diagnosis.

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