

Compendious Sight on Brain Tumor

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Abstract – The brain and spinal cord make up the central nervous system (CNS). Cancer may start within the CNS or, more commonly, it may spread there. Primary brain tumors are tumors that form from brain cells. Usually portrayed as low grade or high grade. A low-grade tumor for the most part develops gradually, but it can turn into a high-grade tumor. A high-grade tumor is more likely to develop quicker. A secondary brain tumor may be a cancerous tumor that begun in another portion of the body, such as the breast, lung, or colon, and after that spread to the brain. In this way a brain tumor could be a mass of unusually developing cells within the brain or cranium. It can be benign (noncancerous) or malignant (cancerous). Whether benign or malignant, all brain tumors are serious. A developing tumor in the long run will compress and harm other structures within the brain.

Index Terms – Brain Tumor, Benign, Malignant.

1. INTRODUCTION

Brain tumors are common, requiring common therapeutic suppliers to have a fundamental understanding of their diagnosis and management. The foremost predominant brain tumors are intracranial metastases from systemic cancers, meningiomas, and gliomas, particularly, glioblastoma. Central nervous system metastases may happen anywhere along the neuroaxis, and require complex multidisciplinary care with neurosurgery, radiation oncology, and restorative oncology. Meningiomas are tumors of the meninges, generally generous and frequently overseen by surgical resection, with radiation treatment and chemotherapy saved for high-risk or refractory disease.

Glioblastoma is the foremost common and forceful harmful essential brain tumor, with a restricted reaction to standard-of-care concurrent chemo radiation [1][2][3]. Primary brain tumors are classified by the sort of cell or tissue the tumor influences as well as the area and grade of the tumor. Brain cancer cells may travel short distances inside the brain but generally don't spread beyond the brain. The chance of creating a malignant (cancerous) brain or spinal cord tumor is less than 1 percent. Men are at a slightly expanded hazard (ie) almost one in 143, whereas women have a one in 185 chance of getting this cancer type, in spite of the fact that women are at a more noteworthy hazard for certain types of brain tumors.

Rest of the paper is organized as follows, Section II contain What Is a Brain Tumor? Section III contain Defining Brain Tumors, Section IV contain Brain Tumor: Risk Factors, Section V explain the Clinical Presentation, Section VI describes Brain Tumors: Classification, Section VII contain Symptoms, Section VIII deals with the diagnosis methods, and Section IX contains the conclusion of the paper.

2. WHAT IS A BRAIN TUMOR?

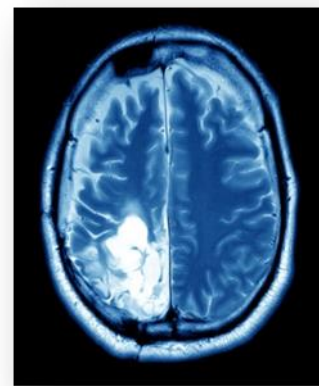


Figure 1. Overall Structure of Brain Tumor

Masters insinuate to a tumor based on where the tumor cells begun, and whether they are cancerous (hurtful) or not (kind). All brain tumors can create to hurt ranges of typical brain tissue on the off chance that cleared out untreated, which may be devastating and conceivably deadly. Brain and spinal line tumors are diverse for everybody. They shape completely distinctive regions, make from particular cell sorts, and may have assorted treatment choices [4]. Brain cancer is one of the first powerful and difficult-to-treat malignancies. Furthermore, inside the about 50 years since the start of the war on cancer, the prospects for people who make brain cancer have advanced much more slowly than those of individuals with other sorts of cancer. In spite of a require of progress inside the clinic, inquire about on this bunch of conditions is advancing tirelessly, and medicines with the potential to convert the field are on the skyline.

3. DEFINING BRAIN TUMORS

3.1. Benign

The scarcest commanding sort of brain tumor is frequently called a kind brain tumor. They begin from cells inside or enveloping the brain, don't contain cancer cells, create slowly, and customarily have clear borders that do not spread into other tissue. They may ended up exceptionally colossal some time recently causing any side impacts. In the event that these tumors can be ousted totally, they tend not to return. Still, they can cause basic neurological side impacts depending on their measure, and region near other structures inside the brain. A few benign tumors can advance to gotten to be threatening.

3.2. Malignant

Malignant brain tumors contain cancer cells and regularly don't have clear borders. They are considered to be life-threatening since they create rapidly and assault including brain tissue. In spite of the fact that dangerous brain tumors outstandingly seldom spread to other zones of the body, they can spread all through the brain or to the spine. These tumors can be treated with surgery, chemotherapy and radiation, but they may repeat after treatment.

3.3. Primary Brain Tumors

Whether cancerous or benign, tumors that begin in cells of the brain are called primary brain tumors. Primary brain tumors may spread to other parts of the brain or to the spine, but once in a while to other organs.

3.4. Metastatic or Secondary Brain Tumors

Begin in another portion of the body and after that spread to the brain. These tumors are more common than primary brain tumors and are named by the area in which they start. They are treated based on where they start, such as the lung, breast, colon or skin [6].

4. BRAIN TUMOR: RISK FACTORS

A risk factor is anything that increments a person's chance of developing a brain tumor. In spite of the fact that chance variables frequently influence the improvement of a brain tumor, most do not specifically cause a brain tumor. A few individuals with a few hazard components never create a brain tumor, whereas others with no known hazard components do. Knowing your chance components and talking about them along with your specialist may assist you make more informed decisions. But, at this time, there are no known ways to anticipate a brain tumor through lifestyle changes. Most of the time, the cause of a brain tumor is unknown, but the following factors may raise a person's risk of developing a brain tumor:

- **Age:** Brain tumors are more common in children and older adults, although people of any age can develop a brain tumor.

- **Gender:** In general, men are more likely than women to develop a brain tumor. However, some specific types of brain tumors, such as meningioma, are more common in women.
- **Home and work exposures:** Exposure to solvents, pesticides, oil products, rubber, or vinyl chloride may increase the risk of developing a brain tumor. However, there is not yet scientific evidence that supports this possible link.
- **Family history:** About 5% of brain tumors may be linked to hereditary genetic factors or conditions. Scientists have also found "clusters" of brain tumors within some families without a link to these known hereditary conditions. Studies are underway to try to find a cause for these clusters.
- **Exposure to infections, viruses, and allergens:** Infection with the Epstein-Barr virus (EBV) increases the risk of CNS lymphoma. EBV is more commonly known as the virus that causes mononucleosis or "mono". In other research, high levels of a common virus called cytomegalovirus (CMV) have been found in brain tumor tissue.
- **Electromagnetic fields:** Most studies evaluating the role of electromagnetic fields, such as energy from power lines or from cell phone use, show no link to an increased risk of developing a brain tumor in adults. Because of conflicting information regarding risk in children, the World Health Organization (WHO) recommends limiting cell phone use and promotes the use of a hands-free headset for both adults and children.
- **Race and ethnicity:** In the United States, white people are more likely to develop gliomas but less likely to develop meningioma than black people. Also, people from northern Europe are more than twice as likely to develop a brain tumor as people in Japan.
- **Ionizing radiation:** Previous treatment to the brain or head with ionizing radiation, including x-rays, has been shown to be a risk factor for a brain tumor.
- **Head injury and seizures:** Serious head trauma has long been studied for its relationship to brain tumors. Some studies have shown a link between head trauma and meningioma, but not between head trauma and glioma. A history of seizures has also been linked with brain tumors, but because a brain tumor can cause seizures, it is not known if seizures increase the risk of brain tumors, if seizures occur because of the tumor, or if anti-seizure medication increases the risk.

5. CLINICAL PRESENTATION

Patients with primary brain tumors can present with generalized or central signs and symptoms. Ordinarily, generalized symptoms happen afterward within the infection pathogenesis as the tumor develops and causes expanded intracranial weight driving to migraine, seizure, sickness, spewing, and changed mental work [8]. Central indications such as central neurological shortfall (e.g., hemi paresis and aphasia) are attributed to low-grade or high-grade tumors and reflect the intracranial area of the tumor. Generally 77% of all patients with essential brain tumors report a gloomy tension-type cerebral pain [9] that can endure for more than six months in 50% of patients. Although migraine is the foremost common beginning displaying indication other indications are frequently related with migraines counting seizures in 50% of patients, visual unsettling influences in 40% of patients, and queasiness and heaving in 38% of patients [10]. Seizures are common in patients with brain tumors with 15-95% of patients presenting with at slightest one seizure amid the course of their sickness. Patients with low-grade gliomas display with seizures more frequently (65-95%) than patients with GBMs (15-25%). In one expansive study, 23% of patients had experienced at least one seizure some time recently tumor determination [11]. Eighteen percent of patients with GBM initially presented with seizures. Patient age, tumor area and histology are related with seizure event. Patients aged 30-50 years experienced seizures more regularly [11].

6. BRAIN TUMORS: CLASSIFICATION

Tumors of the central nervous system regularly have a wide morphological range and classification is subordinate on the acknowledgment of regions with the characteristic histology for a specific tumor type [12]. Immunocytochemical methods may be required to illustrate the expression by the tumor cells of an antigen regularly communicated by a specific cell sort and in this way to help in classification. Tragically there are no antibodies that unequivocally distinguish the distinctive tumor types. The nearness or nonappearance of an antigen as it were includes a encourage piece of data making a difference to demonstrate the tumor sort. Four malignancy grades are recognized by the WHO system, with grade I tumors the naturally slightest forceful and grade IV the biologically most forceful tumors. The histological criteria for malignancy grading are not uniform for all tumor types and hence all tumors must be classified before the danger grade can be decided. Only one or two threat grades can be ascribed to a few tumor types. Brain tumors are well known to advance, getting to be more harmful with time. Such progression will initially be central. A patient's diagnosis is based on the foremost malignant portion of the tumor. It takes after that malignancy grading on biopsies. Stereotactic biopsy is continuously, a least evaluating as more anaplastic regions may be present in non-biopsied regions.

7. SYMPTOMS

The symptoms of a brain tumor often are the same as those of other diseases and may create gradually. In spite of the fact that a brain tumor rarely causes headaches, someone with no history of headaches who develops them should be seen by a doctor. Headaches from a brain tumor tend to be more awful upon waking and ease during the day. Other symptoms may include

- vomiting and nausea
- new onset of seizures
- weakness involving one side of the body, such as an arm and leg on the same side
- trouble talking or change in speech
- loss of coordination
- changes in vision or abnormal eye movements
- memory or personality changes
- ringing and hearing loss in one ear

The specific symptoms of a brain tumor depend on its size and location. They can be caused by several factors, including:

- increased pressure in the skull
- damage to vital tissue
- swelling and fluid buildup

Hydrocephalus, sometimes called "water on the brain," which results when the flow of cerebrospinal fluid is blocked and builds up in the brain.

8. DIAGNOSIS

Diagnosis often begins with a medical history. It depends upon the symptoms, health habits, past illnesses and treatments. Neurological examination will be done in order to check the following:

- reflexes
- coordination
- alertness
- response to pain
- muscle strength
- eyesight

The following are the imaging tests which are done during the diagnosis process:

- *Computed tomography (CT) scan:* This test creates cross-sectional images of the brain. It uses an x-ray camera that

rotates around the body. A dye sometimes is injected into a vein prior to the scan to make the tumor more visible.

- **Magnetic resonance imaging (MRI):** This test uses a powerful magnet, radio waves, and a computer to create pictures of the brain. An MRI may provide a better view of some parts of the brain than a CT scan. A special dye may be injected into the bloodstream to enhance the images. A magnetic resonance angiogram is similar to an MRI, but it looks at the flow of blood in arteries. This can help doctors find aneurysms or better define tumors.
- **Positron emission tomography (PET) scan:** For this test, radioactive glucose (sugar) is injected into a vein. A rotating scanner highlights areas where cells are consuming lots of glucose. (Cancer cells use more glucose than normal cells.)
 - If a brain tumor is suspected to be a secondary cancer, imaging tests also may be done of other organs.
 - Along with this imaging test lumbar puncture (spinal tap) will also be done. During this test, spinal fluid is taken from the lower back with a needle. The fluid can be checked for signs of infection or cancer cells.
 - In rare cases, doctors may want to remove a small piece of tumor tissue before diagnosing the cancer. This is called a biopsy.

8.1. Prevention

There is no known way to prevent primary brain tumors. As more is learned about what causes them, more may be done to prevent them. Analysts are examining hereditary and genetic factors, introduction to certain chemicals, and introduction to certain viruses. Some secondary brain tumors that originally begun in other organs can be prevented. For example, avoiding tobacco items diminishes the chance of lung cancer, in this manner diminishing the chance that lung cancer cells ever appear within the brain.

8.2. Treatment

Treatment depends on the tumor's estimate, area, and sort, as well as the patient's age and general health. The most medications incorporate surgery, radiation treatment, and chemotherapy. A combination of treatments—surgery and radiation treatment, for example—is frequently utilized. Some time recently treatment, a quiet may be given corticosteroid drugs to diminish swelling of brain tissue. Anticonvulsant drugs also may be prescribed to prevent or control tumor-related seizures.

When conceivable, surgery is the treatment of choice for primary brain tumors. Surgery can effectively evacuate a few

kind and malignant brain tumors. Indeed in the event that the complete tumor cannot be expelled, specialists will likely take out as much as conceivable to assist relieve symptoms. In a few cases, a tumor cannot be expelled surgically or surgery is as well hazardous. For example, the tumor may adjoin or wrap around critical normal tissues. Harm to these tissues during surgery seem cause the patient critical disability.

Stereotactic surgery, which uses computers and imaging devices to create three-dimensional pictures of the brain, can be utilized to evacuate tumors or to put radioactive materials within the tumor. Stereotactic surgery is especially helpful in reaching tumors deep within the brain. It can offer assistance pinpoint the tumor's edges so that specialists expel less typical tissue. This brings down the chances of side impacts and brain injury.

Radiation treatment, which uses high-powered x-rays to kill cancer cells, often follows surgery. It makes a difference destroy any pieces of the tumor that seem not be surgically expelled and any remaining cancer cells. Radiation therapy is also used when surgery isn't an option. Since high-dose radiation can harm typical tissue, specialists attempt to absolutely target the tumor, restricting the sum of radiation to encompassing parts of the brain. Gamma Knife and Cyber Knife are cases of medications that permit specialists to more absolutely point the radiation beam at the tumor and better spare encompassing normal tissue. Radiation also can be given by putting radioactive material into the tumor itself.

Chemotherapy uses drugs to halt the development of cancer cells. It can be taken by mouth, injected into a vein or muscle, or placed directly into a body part. In common, chemotherapy tends to be less successful against gliomas and meningiomas than surgery or radiation. But it plays a critical part within the treatment of other sorts of brain tumors, such as lymphomas and medulloblastomas.

9. CONCLUSION

Brain cancer may be a malignant growth of unusual brain cells within the brain. A gathering of anomalous cells is called a tumor. A few tumors are benign and a few are malignant. There are a few diverse sorts of tumors that happen within the brain and spinal cord. Diverse cells within the brain and spinal cord give rise to different sorts of tumors. Spinal cord tumors and brain tumors may develop rapidly or slowly. Even benign tumors may cause side effects. The brain is the central organ that administers other organs and systems within the body, so all brain tumors got to be taken seriously. The division of brain tumors which is carried out physically from MRI may be a significant and time devouring errand. The precision of identifying brain tumor area and estimate takes the foremost critical part within the fruitful conclusion and treatment of tumors. So the location of brain tumor must be quick and

precise. Brain tumor discovery is considered a challenging mission in medical image processing.

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