

Laleno, Diana Christine. Proceeding-Free Paper International 4th Congress of Asian Society for Neuroanesthesia and Critical Care (ASNACC) and 22nd Annual Meeting of Korean Society for Neuroscience in Anesthesiology and Critical Care (KSNACC) at Busan, Korea. **ANAESTHESIA MANAGEMENT IN INTRACRANIAL TUMOR WITH HEPATOPATHY AND LEFT HEART ENLARGEMENT.**

ANAESTHESIA MANAGEMENT IN INTRACRANIAL TUMOR WITH HEPATOPATHY AND LEFT HEART ENLARGEMENT

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Abstract

Anesthesia management for large intracranial tumors with comorbidities enlarged heart and abnormal liver function have the risk of brain bleeding, edema, the limited of heart enlargement to any changes in blood volume, limited ability of drug metabolism by the liver dysfunction. The elevations of SGOT and SGPT describe injury or death in the liver cells. Without proper anesthesia management can increase the risk of brain, heart failure, and liver dysfunction significantly.

A 40-year-old female patient, weighing 65 kg. Diagnosed as suspicious a meningioma. The patient is indicated for craniotomy for tumor expenditure. From ECG there is left ventricle hypertrophy. Laboratory value of SGOT is 166 U/l and SGPT was 211 U/l. Blood pressure when entering the operating room 176/100 mmHg, pulse rate 98 beats / min, respiratory rate 20 breaths / min, temperature 37⁰ C, and GCS E4V5M6. Patients were induced with 100 mg Fentanyl, Propofol 100 mg titrating, facilities intubation with rocuronium 40 mg, 70 mg lidocaine, and maintenance with isoflurane and oxygen Inhalants and continuous propofol and fentanyl and rocuronium intermittent additions. Infusion attached two lanes. The operation lasted for seven hours and twenty minutes. With attached nasal oxygen

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cannula and 3 liters / min, the patient was transferred to the ICU. Patients treated for one day in the ICU, then moved into ward. For five days the patients treated in the room then discharged patients and outpatients with neurosurgeons.

Careful perioperative preparation, structured rigorous extra include preoperative preparation completeness of monitoring, drug selection and dosage, as well as techniques that do not aggravate the flow hepatic portal blood, which, planning the implementation of anesthesia until postoperative management are very important in patients with intracranial tumors with coexisting hepatopathy and heart disease.

Keywords: brain tumor, left heart enlargement, hepatopathy, intracranial pressure control.

Introduction

Although meningiomas are considered a type of primary brain tumor, they do not grow from brain tissue itself, but instead arise from the meninges, three thin layers of tissue covering the brain and spinal cord. These tumors most commonly grow inward causing pressure on the brain or spinal cord, but they may also grow outward toward the skull, causing it to thicken. Most meningiomas are benign, slow-growing tumors. Some contain cysts (sacs of fluid), calcifications (mineral deposits), or tightly packed bunches of blood vessels. There are several systems used to name, or group, these tumors. One system names meningiomas by the type of cells in the tumor. Syncytial (or meningothelial) meningiomas are the most common and feature unusually plump cells. Fibroblastic meningiomas feature long, thin shaped cells. Transitional meningiomas contain both types of cells. Another system uses the

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terms benign, atypical and malignant (or anaplastic) to describe the overall grade of meningiomas. In this system, benign meningiomas contain easily recognized, well-differentiated (resembling normal) cell types which tend to grow slowly. Atypical tumors represent 10–20% of meningiomas. They contain proliferating cells that may 4 American Brain Tumor Association be faster growing and more likely to grow back after treatment, even after seemingly complete resection (surgical removal). Therefore, these tumors must be followed carefully for early signs of recurrence.

Pathophysiology

Malignant or “anaplastic” tumors are poorly differentiated forms that often recur rapidly. Although they are quite rare (1–3%), malignant meningiomas can be highly aggressive and difficult to treat. Another common practice is to attach the location of the tumor to its name. For example, a parasagittal meningioma is located near the sagittal sinus, a major blood vessel at the top of the cerebral hemispheres. A sphenoid ridge meningioma is found along the ridge of bone behind the eyes and nose. Some meningiomas can cause problems despite their benign nature, because they are difficult to remove when they are located in functionally sensitive or hard to reach areas. Depending on the situation, stereotactic radiotherapy or radiosurgery may be particularly helpful in some of these cases.

Meninges

the three layers of meninges dura mater arachnoid pia mater tentorium
parasagittal region subarachnoid space cerebellopontine angle posterior fossa spinal
cord meningioma

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Incidence

Meningiomas account for about 34% of all primary brain tumors. They are most likely to be diagnosed in adults older than 60 years of age, and the incidence appears to increase with age. Meningiomas are rarely found in children. They occur about twice as often in women as in men. Cause Researchers are studying several theories about the possible origins of meningiomas. Between 40% and 80% of meningiomas contain an abnormal chromosome 22. This chromosome is normally involved in suppressing tumor growth. The cause of this abnormality is not known.

Meningiomas also frequently have extra copies of the platelet-derived growth factor (PDGFR) and epidermal growth factor receptors (EGFR), which may contribute to the growth of these tumors. Previous radiation to the head, a history of breast cancer, or neurofibromatosis type 2 may be risk factors for developing meningioma. Multiple meningiomas occur in 5–15% of patients, particularly those with neurofibromatosis type 2.

Some meningiomas have receptors that interact with the sex hormones such as progesterone, androgen and less commonly, estrogen. The expression of progesterone receptor is seen most often in benign meningiomas, both in men and women. The function of these receptors is not fully understood, and thus, it is often challenging for doctors to advise their female patients about the use of hormones if they have a history of a meningioma. Although the exact role of hormones in the growth of meningiomas has not been determined, researchers have observed that occasionally meningiomas may grow faster during pregnancy.

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American Brain Tumor Association If you have questions about using hormone replacement therapy (HRT) during menopause, please discuss your concerns with your doctors.

Symptoms Meningiomas are usually slow growing and, therefore, may grow to a large size before causing symptoms. These tumors are most often found in the coverings of the parasagittal/falcine region (near the top of the brain) and the convexity (the outer curve) of the brain. Other common sites include the sphenoid ridge at the bottom of the brain, called the skull base. As the tumor grows, it may interfere with the normal functions of the brain. The symptoms will depend on the location of the tumor. The first symptoms are usually due to increased pressure on the brain caused by the growing tumor. Headache and weakness in an arm or leg are the most common, although seizures, personality change or visual problems may also occur. Pain and loss of sensation or weakness in the arms or legs are the most common symptoms of spinal cord meningioma.

Diagnosis will begin with a neurological examination, followed by an MRI and/or a CT scan. MR angiography (a MRI scan of the blood vessels) or an arteriogram (a blood vessel X ray) may be performed to help the doctors plan an embolization, a procedure to block the blood vessels in the tumor. Used for tumors that have an extensive blood supply, embolization may help reduce bleeding during surgery. If you have a tumor, these tests help your doctor determine the location, size and probable type of tumor. However, only an examination of a sample of tumor tissue under a microscope confirms the exact MENINGIOMA diagnosis. Such a tissue sample can only be obtained through a surgical biopsy or excision. Treatment SURGERY Surgery is the primary treatment for meningiomas located in an

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accessible area of the brain or spinal cord, although some tumors may be inoperable. Another factor that neurosurgeons consider is whether your vital organs (heart, lungs, kidneys and liver) are strong enough to withstand anesthesia and surgery.

The goals of surgery are to obtain tumor tissue for diagnosis and to remove as much tumor as possible. If Common locations of meningiomas parasagittal convexity falicine sphenoid ridge suprasellar olfactory groove foramen magnum the tumor cannot be removed, a biopsy to obtain a sample of tumor tissue may be performed. A computer program that combines different MR images taken before surgery may be used to make a three dimensional, or stereotactic, map of your brain. This map helps the neurosurgeon plan the surgery to remove as much of the tumor as possible while avoiding parts of the brain that control vital functions.

During the operation, the surgeon may use stereotactic imaging and instrument guiding technologies to navigate through the brain. Occasionally, surgery is performed within a specialized MRI (intraoperative MRI), which allows the surgeon to view the tumor during the operation and determine the extent of tumor that is removed. High powered microscopes may be used to help the surgeon to better see the tumor. Ultrasonic aspirators are used to break up and suction out parts of the tumor.

In cases where the tumor cannot be removed completely, partial removal can help decrease symptoms. Radiation may then be used to treat the remaining tumor. **RADIATION** Radiation therapy (external beam) may be used for inoperable tumors, tumors that are not completely removed in surgery, atypical and malignant tumors, or recurrent tumors. There are different types of radiation, which use various doses and

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schedules. Most forms of radiation, however, are aimed at the tumor and a small area around the tumor. Conventional external beam radiation is “standard” radiation given five days a week for five or six weeks.

A form of “local radiation” may be used instead of or to supplement conventional radiation. Stereotactic radiation aims converged beams of radiation at the tumor. Intensity modulated radiation therapy, also called IMRT, conforms radiation beams to the shape of the tumor. Additional information about these forms of radiation therapy is available from our office.

Stereotactic radiosurgery utilizes numerous finely focused beams of radiation to accurately administer a single high-dose treatment to the tumor, while minimizing the effects to adjacent normal tissue. Therefore, despite the name, this is a noninvasive procedure and there is no real “surgery” involved. This may be particularly advantageous for patients that are poor surgical candidates, have tumors in high-risk regions of the brain, or have recurrences that are no longer amenable to conventional forms of surgical and radiation therapies. The disadvantages are that if no surgery or biopsy is done, no tissue is obtained for examination under the microscope; the technique may only inhibit further growth, stabilizing – rather than killing or removing – the tumor, and the technique is limited to relatively small tumors, usually those that are less than three centimeters in size.

For large tumors, or tumors located close to critical structures, conventional or stereotactic radiotherapy is often used instead. While stereotactic radiosurgery involves the use of a single large dose of focused radiation, stereotactic radiotherapy, a form of SRS, involves the administration of smaller doses of focused radiation over a longer period of time (up to several weeks). This reduces the

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potential for swelling or injury to surrounding structures. OTHER TREATMENTS

Some treatments are offered in organized research studies called clinical trials.

These are generally used for recurrent or inoperable tumors resistant to radiation.

Immunotherapy or the use of biological agents to stimulate the immune system There are also several drugs used to treat the symptoms of a brain tumor. Steroids are used to decrease swelling, or edema, around the tumor. Anti-seizure drugs control seizures. Anti-nausea drugs prevent vomiting and help control nausea. Additional suggestions for managing side effects are offered on the ABTA website at www.abta.org.

Watchful waiting Depending on the location of the tumor, symptoms caused by the tumor and sometimes patient preference, some meningiomas may be carefully watched. Scans will be recommended during the time of observation, and it is very important to be sure those scans are done. Any new or changed symptoms should be promptly reported to your doctor. Recurrence Most meningiomas are benign and treatable with surgery. However, brain tumors recur when all of the tumor cells cannot be removed with surgery or killed with other treatments. Over time, those cells multiply and result in tumor regrowth.

In general, at five years following surgery, about 5% of completely resected benign meningiomas, 30% of partially resected benign meningiomas and 40% of atypical meningiomas have recurred. Although rare, it is also possible that the meningioma may recur as a more aggressive, or higher grade, tumor. Depending on general health and the growth characteristics of the tumor, repeat surgery and possibly radiation therapy can be considered if the tumor recurs.

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Focused forms of radiation therapy, such as stereotactic radiotherapy or radiosurgery, may be repeated or used following a history of conventional radiation therapy. Treatments offered in clinical trials may also be used for recurrent tumors. Recovery As with any brain tumor treatment, the length of recovery time varies.

The age and general health of the patient, the location and size of the tumor, and the type of treatment all affect the recovery time. Prior to your surgery, ask your doctor what side effects you might expect. MRI showing two views of a meningioma arising from the right side of the falx MRI scans courtesy of Patrick Wen, MD TUMOR 12 American Brain Tumor Association Muscle coordination or speech problems may occur following surgery depending on the location of the tumor; they are often temporary.

During this healing time, many brain tumor patients discover the benefits of rehabilitative services. The goal of rehabilitative medicine is to restore physical, vocational and psychological functions. Services may include physical, occupational and/or speech therapy to help reduce some of the symptoms that may accompany a tumor or treatment. Cognitive retraining – a memory training method – is used to teach another part of the brain to take over the tasks of the impaired portion. Visual aids may be required for those with tumors near the optic nerves. Just as important are support services – those which help both patients and their families live with the diagnosis of a brain tumor.

Prognosis People diagnosed with a meningioma often have very specific questions regarding their future. They may want to know the risks involved in their surgery, the need for follow-up care or additional treatments, if or how the tumor might affect their life, and what the chances are for their tumor recurring. Although

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the medical term “prognosis” is usually associated with malignant tumors, a “predication of outcome” may be more applicable to a person with a meningioma. We encourage you to ask your doctor these outcome questions. They can respond to your concerns based on your individual tumor. Your doctor can also explain your treatment plan, the benefits and risks of the treatment plan suggested for you, and what you can expect in the future.

Meningiomas

Meningiomas are the most common benign intracranial tumor. They originate from arachnoid cap cells, which are cells within the thin, spider web-like membrane that covers the brain and spinal cord. The arachnoid is one of three protective layers, collectively known as the meninges, surrounding the brain and the spinal cord. The meninges also include the dura mater and pia mater. Although the majority of meningiomas are benign, these tumors can grow slowly until they are very large if left undiscovered, and, in some locations, can be severely disabling and life-threatening. Most patients develop a single meningioma; however, some patients may develop several tumors growing simultaneously in other parts of the brain or spinal cord.

Some meningiomas are found along the dural lining in the venous sinuses of the brain and skull base, locations where arachnoid cap cells are most abundant. The following subtypes are based on the location of the tumor.

- **Cavernous Sinus Meningioma:** Occurs near the area that drains deoxygenated blood to the heart from the brain.

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- **Cerebellopontine Angle Meningioma:** Located near the margin of the cerebellum; acoustic neuromas (vestibular schwannoma) typically are found in this area.
- **Cerebral Convexity Meningioma:** Located on the upper surface of the brain cerebral convexity.
- **Foramen Magnum Meningioma:** Located near the opening at the base of the skull through which the lower portion of the brainstem passes.
- **Intraorbital Meningioma:** Located in or around eye sockets.
- **Intraventricular Meningioma:** Located in the chambers through which cerebrospinal fluid is carried throughout the brain.
- **Olfactory Groove Meningioma:** Located along the nerves connecting the nose to the brain.
- **Parasagittal/Falx Meningioma:** Located adjacent to the dural fold that separates the two brain hemispheres
- **Petrous Ridge Meningioma:** Portion of the temporal bone (which supports the temple) that contain sections of the organs that facilitate hearing.
- **Posterior Fossa Meningioma:** Occurs near the back of the brain.
- **Sphenoid Meningioma:** Located near the sphenoid bone behind the eyes.
- **Spinal Meningioma:** Located in the spine, in some cases against the spinal cord.
- **Suprasellar Meningioma:** Located near the area of the skull where the pituitary gland is found.
- **Tentorium Meningioma:** Located near where the brain connects to the brain stem, an area known as the tentorium cerebelli.

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Prevalence and Incidence

According to the Brain Science Foundation and the American Society of Clinical Oncology, meningiomas account for about 34 percent of all primary brain tumors, and most often occur in people between the ages of 30 and 70. Malignant meningiomas account for about two to three percent of all meningiomas.

Types and Classification

The World Health Organization (WHO) classification of brain tumors is the most widely utilized tool in grading tumor types. The WHO classification scheme recognizes 15 variations of meningiomas according to their cell type as seen under a microscope. These variations are called meningioma subtypes; the technical term for these cell variations is histological subtypes.

World Health Organization (WHO) Meningioma Classifications		
WHO Grade I — Benign	WHO Grade II — Atypical	WHO Grade III — Malignant
Meningiothelial		
Fibrous (fibroblastic)		
Transitional (mixed)		
Psammomatous		
Angiomatous		
Microcystic		
Secretory	Chordoid	Papillary
Lymphoplasmacyte-rich	Clear	Cellular
Metaplastic	Atypical	Anaplastic

Atypical meningiomas (which account for seven to eight percent of meningioma cases) exhibit increased tissue and cell abnormalities. These tumors grow at a faster rate than benign meningiomas and can invade the brain. Atypical meningiomas have a higher likelihood of recurrence than benign meningiomas.

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Malignant meningiomas show increased cellular abnormalities, and grow at a faster rate than benign and atypical meningiomas. Malignant meningiomas are the most likely to invade the brain, spread to other organs in the body and recur more often than the other two types.

Risk

Factors

As noted earlier, meningiomas most often occur in people between the ages of 30 and 70. Children are not as likely as adults to develop meningioma.

Women are more than two times as likely as men to develop a meningioma. Malignant meningioma diagnoses, however, are three times as likely in men. Spinal meningiomas occur 10 times more frequently in women than in men.

Exposure to ionizing radiation, especially high doses, has been associated with a higher incidence of intracranial tumors, particularly, meningiomas. There also is evidence indicating a connection between meningiomas and low doses of radiation. The most well-known case involves children in Israel who were given radiation for scale ringworm between 1948 and 1960. Within the U.S., dental X-rays are the most common form of exposure to ionizing radiation. A number of studies have linked the number of full mouth dental radiographs to increased risk of meningioma.

The genetic disorder Neurofibromatosis type 2 (NF2) is believed to put people at a higher risk of developing meningioma. Patients with NF2 also may be more likely to develop malignant or multiple meningiomas. Per the Brain Science Foundation, a number of studies have suggested a correlation between meningiomas and hormones. Such findings include the following:

- Increased occurrence of meningioma in women

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- The detection of such hormones as estrogen, progesterone and androgen in some meningiomas
- A link between breast cancer and meningioma
- A connection between meningioma growth, menstrual cycles and pregnancy

Researchers are beginning to explore the possible connection between meningioma risk and the use of oral contraceptives and hormone-replacement therapy procedures.

Symptoms

Because meningiomas commonly are slow-growing tumors, they often do not cause noticeable symptoms until they are quite large. Some meningiomas may remain asymptomatic for a patient's lifetime or be detected unexpectedly when a patient has a brain scan for unrelated symptoms. Presenting signs and symptoms depend on the size and location of the tumor. Symptoms of meningiomas may include any of the following:

- Headaches
- Seizures
- Change in personality or behavior
- Progressive focal neurologic deficit
- Confusion
- Drowsiness
- Hearing loss or ringing in the ears
- Muscle weakness
- Nausea or vomiting
- Visual disorders

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Symptoms can be related more specifically to the location of the meningioma.

Examples include the following:

- **Falx and Parasagittal:** Impaired levels of brain functioning such as reasoning and memory. If located in the middle section, it would likely cause leg weakness/numbness or seizures.
- **Convexity:** May cause seizures, headaches and neurological deficits.
- **Sphenoid:** Vision problems, loss of sensation in the face or facial numbness and seizures
- **Olfactory Groove:** Loss of smell due to compression of the nerves that run between the brain and the nose. If the tumor grows large enough, vision problems may occur due to compression of the optic nerve.
- **Suprasellar:** Vision problems due to compression of the optic nerves/chiasm.
- **Posterior Fossa:** Facial symptoms or loss of hearing due to compression of cranial nerves, unsteady gait and problems with coordination.
- **Intraventricular:** May block the flow of cerebrospinal fluid, resulting in (obstructive hydrocephalus), potentially leading to headaches, lightheadedness and changes in mental function.
- **Intraorbital:** Buildup of pressure in the eyes, leading to a bulging appearance and potential loss of vision.
- **Spinal:** Back pain or pain in the limbs caused by compression of the nerves which run into the spinal cord.

Diagnosis

It can be difficult to diagnose meningiomas for several reasons. Because the majority

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of meningiomas are slow-growing tumors and primarily affect adults, symptoms may be so subtle that the patient and/or doctor may attribute them to the normal signs of aging. Adding to the confusion is that some of the symptoms associated with meningiomas also can be due to other medical conditions. Misdiagnosis is not uncommon and, in fact, may take several years to diagnosis correctly.

When a patient presents slowly increasing signs of mental dysfunction, new seizures or persistent headaches, or if there is evidence of pressure inside the skull (e.g. vomiting, swelling of the optic nerve head in the back of the eye), the first step should be a thorough neurological evaluation, followed by radiological studies, if needed.

Sophisticated imaging techniques can help diagnose meningiomas. Diagnostic tools include computed tomography (CT or CAT scan) and magnetic resonance imaging (MRI). Intraoperative MRI also is used during surgery to guide tissue biopsies and tumor removal. Magnetic resonance spectroscopy (MRS) is used to examine the tumor's chemical profile and determine the nature of the lesions seen on the MRI.

Sometimes, the only way to make a definitive diagnosis of the meningioma is through a biopsy. The neurosurgeon performs the biopsy, and the pathologist makes the final diagnosis, determining whether the tumor appears benign or malignant, and grading it accordingly.

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Treatment Options

Surgery

Meningiomas primarily are benign tumors, frequently with defined borders and often enabling complete surgical removal, which offers the best chance for a cure. The neurosurgeon opens the skull through a craniotomy to enable full access to the meningioma. The goal of surgery is to remove the meningioma completely, including the fibers that attach it to the coverings of the brain and bone. However, complete removal can carry potential risks that may be significant, especially when the tumor has invaded brain tissue or surrounding veins.

Although the goal of surgery is to remove the tumor, the first priority is to preserve or improve the patient's neurological functions. With patients for whom total removal of the tumor carries significant risk of morbidity (any side effect that can cause decreased quality of life), it may be better to leave some of the tumor in place and observe future growth with regular imaging studies. In such cases, the patient will be observed over a period of time with regular examinations and MRIs, while for other patients, radiation therapy may be deemed the best approach. It is common for patients to undergo preoperative embolization of the tumor to ensure safety during the surgical procedure. The embolization procedure is similar to a cerebral angiogram except that the surgeon fills the blood vessels in the tumor with glue to stop blood supply to the tumor.

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Observation

Observation over a period of time may be the appropriate course of action in patients who meet the following criteria:

- Patients with few symptoms and little or no swelling in the adjacent brain areas.
- Patients with mild or minimal symptoms who have a long history of tumors without much negative effect on their quality of life.
- Older patients with very slow-progressing symptoms.
- Patients for whom treatment carries a significant risk.
- Patients who choose not to have surgery after being offered alternate treatment options.

Radiation

Therapy

Radiation therapy uses high-energy X-rays to kill cancer cells and abnormal brain cells, and to shrink tumors. Radiation therapy may be an option if the tumor cannot be treated effectively through surgery.

- **Standard External Beam Radiotherapy** uses a variety of radiation beams to create a conformal coverage of the tumor while limiting the dose to surrounding normal structures. The risk of long-term radiation injury with modern delivery methods is very low. Newer techniques of delivery aside from 3-dimensional conformal radiotherapy (3DCRT) include intensity-modulated radiotherapy (IMRT).
- **Proton Beam Treatment** employs a specific type of radiation in which protons, a form of radioactivity, are directed specifically to the tumor. The advantage is that less tissue surrounding the tumor incurs damage.

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- **Stereotactic Radiosurgery (such as Gamma Knife, Novalis and Cyberknife)** is a technique that focuses the radiation with many different beams on the target tissue. This treatment tends to incur less damage to tissues adjacent to the tumor. Currently, there is no data to suggest one delivery system is superior to another in terms of clinical outcome. Each has its advantages and disadvantages.

Chemotherapy

Chemotherapy is rarely used to treat meningioma, except in atypical or malignant subtypes that cannot be adequately treated with surgery and/or radiation therapy.

Outcome

In adults, the patient's age at the time of diagnosis is one of the most powerful predictors of outcome. In general, the younger the adult, the better his or her prognosis tends to be.

There generally is a better outcome if the entire tumor is surgically removed. However, this is not always possible due to the location of the tumor.

Data from the American Society of Clinical Oncology indicates an overall five-year survival rate for meningioma of 69 percent. Individuals with benign meningiomas have an overall five-year survival rate of 70 percent, while those with malignant meningiomas have an overall five-year survival rate of 55 percent.

Additional

Information

These websites offer additional helpful information on meningiomas, including treatment options, support and more. (*Note: These sites are not under the auspice of*

Lalenoh, Diana Christine. Proceeding-Free Paper International 4th Congress of Asian Society for Neuroanesthesia and Critical Care (ASNACC) and 22nd Annual Meeting of Korean Society for Neuroscience in Anesthesiology and Critical Care (KSNACC) at Busan, Korea. **ANAESTHESIA MANAGEMENT IN INTRACRANIAL TUMOR WITH HEPATOPATHY AND LEFT HEART ENLARGEMENT.**

the AANS, and their listing here should not be seen as an endorsement of these sites or their content.)

Reference

American Society of Clinical Oncology – <http://www.cancer.net/>

Brain Science Foundation – <http://www.brainsciencefoundation.org/>