Part II: Nursing management of patients with nervous system disorder

Lecture outlines

Assessment and diagnostic test

Intracranial pressure

Brain tumor

Meningitis

Brain abscess

Epilepsy

Learning objectives

At the end of this chapter, the students should be able to:

1. Define the terms
2. Identify the diagnostic tests used to determine alterations in function of each of the nervous system disorders.
3. Compare causes, Pathophysiology clinical manifestations, management, and nursing interventions for ICP, brain tumor, brain abscess, meningitis, and epilepsy.
4. Discuss the complications of ICP, brain tumor, brain abscess, meningitis, and epilepsy.
5. Describe medical and surgical interventions for each.
6. Use the nursing process as a framework for care of patients with increase intracranial pressure.
7. Use the nursing process as a framework for care of patients with brain tumor.
8. Use the nursing process as a framework for care of patients with brain abscess.

9. Use the nursing process as a framework for care of patients with meningitis and epilepsy.

10. Identify the teaching needs of patients with nervous system disorders.

**Assessment and diagnostic test**

a. Types of Agnosia and Corresponding Sites of Lesions

<table>
<thead>
<tr>
<th>Type of Agnosia</th>
<th>Affected Cerebral Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual</td>
<td>Occipital lobe</td>
</tr>
<tr>
<td>Auditory</td>
<td>Temporal lobe (lateral and superior portions)</td>
</tr>
<tr>
<td>Tactile</td>
<td>Parietal lobe</td>
</tr>
<tr>
<td>Body parts and relationships</td>
<td>Parietal lobe (posteroinferior regions)</td>
</tr>
</tbody>
</table>

b. Types of Aphasia and Region of Brain Involved

<table>
<thead>
<tr>
<th>Type of Aphasia</th>
<th>Brain Area Involved</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auditory-receptive</td>
<td>Temporal lobe</td>
</tr>
<tr>
<td>Visual-receptive</td>
<td>Parietal-occipital area</td>
</tr>
<tr>
<td>Expressive speaking</td>
<td>Inferior posterior frontal areas</td>
</tr>
<tr>
<td>Expressive writing</td>
<td>Posterior frontal area</td>
</tr>
</tbody>
</table>
c. Assessing Cranial Nerve Function

<table>
<thead>
<tr>
<th>CRANIAL NERVE</th>
<th>CLINICAL EXAMINATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>I (olfactory)</td>
<td>With eyes closed, the patient is asked to identify familiar odors (coffee, tobacco). Each nostril is tested separately</td>
</tr>
<tr>
<td>II (optic)</td>
<td>Snellen eye chart; visual fields; ophthalmoscopic examination</td>
</tr>
<tr>
<td>III (oculomotor)</td>
<td>For cranial nerves III, IV, and VI: test for ocular rotations, conjugate movements, nystagmus.</td>
</tr>
<tr>
<td>IV (trochlear)</td>
<td>Test for pupillary reflexes, and inspect eyelids for ptosis.</td>
</tr>
<tr>
<td>V (trigeminal)</td>
<td>Have patient close the eyes. Touch cotton to forehead, cheeks, and jaw. Sensitivity to superficial pain is tested in these same three areas by using the sharp and dull ends of a broken tongue blade. Alternate between the sharp point and the dull end. Patient reports “sharp” or “dull” with each movement. If responses are incorrect, test for temperature sensation. Test tubes of cold and hot water are used alternately. While the patient looks up, lightly touch a wisp of cotton against the temporal surface of each cornea. A blink and tearing are normal responses. Have the patient clench and move the jaw from side to side. Palpate the masseter and temporal muscles, noting strength and equality.</td>
</tr>
<tr>
<td>VI (abducens)</td>
<td></td>
</tr>
<tr>
<td>VII (facial)</td>
<td>Observe for symmetry while the patient performs facial movements: smiles, whistles, elevates eyebrows, frowns, tightly closes eyelids against resistance (examiner attempts to open them). Observe face for flaccid paralysis (shallow nasolabial folds). Patient extends tongue. Ability to discriminate between sugar and salt is tested.</td>
</tr>
<tr>
<td>VIII (acoustic)</td>
<td>Whisper or watch-tick test Test for lateralization (Weber test)</td>
</tr>
</tbody>
</table>
Test for air and bone conduction (Rinne test)

<table>
<thead>
<tr>
<th>IX (glossopharyngeal)</th>
<th>Assess patient's ability to swallow and discriminate between sugar and salt on posterior third of the tongue.</th>
</tr>
</thead>
<tbody>
<tr>
<td>X (vagus)</td>
<td>Depress a tongue blade on posterior tongue, or stimulate posterior pharynx to elicit gag reflex. Note any hoarseness in voice. Check ability to swallow. Have patient say “ah.” Observe for symmetric rise of uvula and soft palate.</td>
</tr>
<tr>
<td>XI (spinal accessory)</td>
<td>Palpate and note strength of trapezius muscles while patient shrugs shoulders against resistance. Palpate and note strength of each sternocleidomastoid muscle as patient turns head against opposing pressure of the examiner's hand.</td>
</tr>
<tr>
<td>XII (hypoglossal)</td>
<td>While the patient protrudes the tongue, any deviation or tremors are noted. The strength of the tongue is tested by having the patient move the protruded tongue from side to side against a tongue depressor.</td>
</tr>
</tbody>
</table>

d. Glasgow Coma Scale

<table>
<thead>
<tr>
<th>Test</th>
<th>Reaction</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eye-opening response</td>
<td>Open spontaneously</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Open to verbal command</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Open to pain</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>No response</td>
<td>1</td>
</tr>
<tr>
<td>Verbal response</td>
<td>Oriented and converses</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Disoriented and converses</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Uses inappropriate words</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Makes incomprehensible sounds</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>No response</td>
<td>1</td>
</tr>
<tr>
<td>Motor response</td>
<td>Obey verbal command</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Localizes painful stimulus</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Flexion — withdrawal</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Flexion — abnormal (decorticate rigidity)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Extension (decerebrate rigidity)</td>
<td>2</td>
</tr>
</tbody>
</table>
The Glasgow Coma Scale provides an objective way to evaluate a patient's level of consciousness and to detect changes from the baseline. To use this scale, evaluate and score your patient's best eye-opening response, verbal response, and motor response.

A total score of 15 indicates that he is alert; oriented to person, place, and time; and can follow simple commands.

A comatose patient will score 7 points or less.

A score of 3 indicates deep coma and a poor prognosis.

e. **Diagnostic Tests for Patients with Neurological Disorders**

1. Complete medical history and physical examination.

2. **A cranial computed tomography (CT):** scan uses many x-rays to create pictures of the head, including the skull, brain, eye sockets, and sinuses. It is used primarily to rule out:

   - organic disease such as a tumor or bleeding in the brain as a cause of the headache problem.
   - detection of a brain tumor or a blood clot.
   - Special CT scans are done to study the paranasal sinuses.

3. **Electroencephalogram (EEG):** a procedure that records the brain's continuous, electrical activity by means of electrodes attached to the scalp.

4. **Brain MRI,** is a magnetic resonance imaging is performed to:

   - monitor a patient's brain activity.
• detect brain trauma caused by accidents and also,
• detects possible occurrences of stroke and brain aneurysms as well.

5. **Electro diagnostic tests** (i.e., electromyography (EMG) and nerve conduction velocity, or NCV)

• These studies are used to evaluate and diagnose disorders of the muscles and motor neurons.
• Electrodes are inserted into the muscle, or placed on the skin overlying a muscle or muscle group, and electrical activity and muscle response are recorded.

6. **Positron emission tomography (PET)**: in nuclear medicine, a procedure that measures the metabolic activity of cells.

7. **Arteriogram (Also called an angiogram)**: an x-ray of the arteries and veins to detect blockage or narrowing of the vessels.

8. **Spinal tap** (Also called a lumbar puncture.)

• a special needle is placed into the lower back, into the spinal canal. This is the area around the spinal cord.
• The pressure in the spinal canal and brain can then be measured.
• A small amount of cerebral spinal fluid (CSF) can be removed and sent for testing to determine if there is an infection or other problems.

9. **Evoked potentials**: procedures that record the brain's electrical response to visual, auditory and sensory stimuli.
10. **Neurosonography**: a procedure that uses ultra-high-frequency sound waves that enable the physician to analyze blood flow in cases of possible stroke.

11. **Ultrasound** (Also called sonography.)

Ultrasounds are used to view internal organs as they function, and to assess blood flow through various vessels.

**Intracranial pressure**

**Objectives:**

At the end of this session, the student will be able to:

1. Define the term increased intracranial pressure.
2. List the etiology of ICP.
3. Mention the main clinical manifestations of ICP.
4. Utilize the nursing process for patient with ICP.

ICP is the pressure exerted by the contents of the cranium, and it normally ranged from 10 to 20 mm Hg.

The rigid cranial vault contains brain tissue (1400 g), the volume of the cranium is made up of three components:

1. Brain tissue (1400 g),
2. Cerebrospinal fluid (CSF) (75 mL).
3. Blood. (75 mL).

The Monro-Kellie hypothesis states that, because of the limited space for expansion within the skull, an increase in any one of the components
causes a change in the volume of the others. Because brain tissue has limited space to expand, compensation typically is accomplished by displacing or shifting CSF, increasing the absorption or diminishing the production of CSF, or decreasing cerebral blood volume. Without such changes, ICP will begin to rise.

**Pathophysiology**

Increased ICP affects many patients with acute neurologic conditions. This is because pathologic conditions alter the relationship between intracranial volume and ICP. Although elevated ICP is most commonly associated with head injury, it also may be seen as a secondary effect in other conditions, such as brain tumors, subarachnoid hemorrhage, and toxic and viral encephalopathy. Increased ICP from any cause decreases cerebral perfusion, stimulates further swelling (edema), and may shift brain tissue through openings in the rigid dura, resulting in herniation, a dire and frequently fatal event.

**Causes**

**Increased brain tissue volume**

Tumor

Hemorrhage

Abscess or inflammation

Brain tumor

Cranial surgery

Cytotoxic edema

Vasogenic edema
Ischemia and necrosis.

**Increased cerebrospinal fluid volume**
Obstructive hydrocephalus.
Non obstructive hydrocephalus
Pseudotumorcerebri.

**Increased blood volume**
Increased right atrial pressure.
Dural sinus thrombosis.
High atrial Paco2
Acidosis.

**Clinical manifestation**
1. Change in level of responsiveness, slowing of speech, confusion.
2. Pulse rate slow-high, irregular respiration, rising B.P, moderate elevated temperature.
3. Vomiting.
4. Pupillary changes.
5. Head ache.

**Diagnostic Findings**
1. CT scanning and MRI
2. Cerebral angiography, PET, or SPECT.
3. Trans cranial Doppler studies provide information about cerebral blood flow.

**Complications**
• **brain stem herniation**, results from an excessive increase in ICP in which the pressure builds in the cranial vault and the brain tissue presses down on the brain stem. This increasing pressure on the brain stem results in cessation of blood flow to the brain, leading to irreversible brain anoxia and brain death.

• **Diabetes insipidus**, is the result of decreased secretion of antidiuretic hormone (ADH). The patient has excessive urine output, decreased urine osmolality, and serum hyperosmolality.

• **Syndrome of inappropriate antidiuretic hormone** (SIADH). is the result of increased secretion of ADH. The patient becomes volume-overloaded, urine output diminishes, and serum sodium concentration becomes dilute. Treatment of SIADH includes fluid restriction (less than 800 mL/day with no free water), which is usually sufficient to correct the hyponatremia.

**Medical Management**

1. osmotic diuretic, mannitol given to dehydrate brain and reduce cerebral edema.

2. steriod( dexamethason)

3. drainage of CSF

4. hyperventilation, with volume respirator, reduce blood volume in brain, causing vasoconstriction.

5. Avoid hypoxia.

6. Hypothermia to reduce cerebral metabolic need for oxygen and glucose.

7. Prepare patient for surgical intervention if the condition deteriorates.

8. Maintaining Oxygenation
Nursing Process
The Patient with Increased Intracranial Pressure

A: Assessment

- obtaining a history of events leading to the present illness and the pertinent past medical history.
- evaluation of mental status, LOC, cranial nerve function, cerebellar function (balance and coordination), reflexes, and motor and sensory function.
- pupil checks, assessment of selected cranial nerves, frequent measurements of vital signs and ICP, and use the Glasgow Coma Scale.
- assessment of patient's level of responsiveness:
  - answer question readily and correctly.
  - Responds to simple command.
  - Gives delayed or unequal response.
  - React only to loud voice.
  - Does not respond.

B: Nursing Diagnoses
Based on the assessment data, the major nursing diagnoses for patients with increased ICP include the following:

- Ineffective airway clearance related to diminished protective reflexes (cough, gag)
- Ineffective breathing patterns related to neurologic dysfunction (brain stem compression, structural displacement)
- Ineffective cerebral tissue perfusion related to the effects of increased ICP
- Deficient fluid volume related to fluid restriction
- Risk for infection related to ICP monitoring system (fiberoptic or intraventricular catheter).
• Altered urine and bowel elimination related to effects of medication, indwelling urethral catheter and diminished fluid/food intake.
• High risk for infection related to ICP monitoring system.

C: Planning and Goals
• Maintain of a patent airway,
• normalization of respiration,
• adequate cerebral tissue perfusion through reduction in ICP,
• restoration of fluid balance,
• absence of infection, and absence of complications.

D: Nursing Interventions

1. Achieving cerebral tissue perfusion

• Monitor for bradycardia and rising blood pressure.
• Keep the patient's head in midline position.
• Extreme hip flexion is avoided because this position causes an increase in intra-abdominal and intra thoracic pressure.
• Avoid isometric muscle contractions, emotional stress.
• Suction should not last than 15 seconds.
• Enema and catheters, abdominal distension is avoided, if possible.

2: Attaining normal respiration pattern:

• Monitor for irregular respiration.
• Paco2 should be maintained between 25-30 mmHg.
• Record a neurological observation.
3: Achieving airway clearance:
- Suction.
- Administer oxygen, if needed.
- Discourage coughing and straining.
- Elevate the head of the bed.

4: Preventing infection.
- Keep dressing set clean and dry.
- Aseptic technique is used when changing the dressing.
- Check the drainage system for loose connections, because leakage may lead to infection.
- Monitor for signs and symptoms of meningitis, fever, chills, neck rigidity and headache.

E: EVALUATION

Expected patient outcomes may include the following:

1. Maintains patent airway
2. Attains optimal breathing pattern
   a. Breathes in a regular pattern
   b. Attains or maintains arterial blood gas values within acceptable range
3. Demonstrates optimal cerebral tissue perfusion
   a. Increasingly oriented to time, place, and person
   b. Follows verbal commands; answers questions correctly
4. Attains desired fluid balance  
   a. Maintains fluid restriction  
   b. Demonstrates serum and urine osmolality values within acceptable range
5. Has no signs or symptoms of infection  
   a. Has no fever  
   b. Shows no signs of infection at arterial, IV, and urinary catheter sites
6.  
   a. Has no redness, swelling, or purulent drainage from invasive intracranial monitoring device
7. Absence of complications  
   a. Has ICP values that remain within normal limits  
   b. Demonstrates urine output and serum electrolyte levels within acceptable limits

**Meningitis**
Meningitis is an inflammation of the pia mater, the arachnoid, and the cerebrospinal fluid (CSF)–filled subarachnoid space.

Meningitis is classified as:

1. **Septic meningitis:** Septic meningitis is caused by bacteria. The most common pathogens causing septic meningitis in the are Streptococcus pneumoniae and Neisseria meningitidis.
2. **Aseptic meningitis:** In aseptic meningitis, the cause is viral or secondary to lymphoma, leukemia, or human immunodeficiency virus (HIV). Outbreaks of N. meningitidis infection are most
likely to occur in dense community groups, such as college campuses and military installations.

Pathophysiology

- Meningeal infections generally originate in one of two ways:
  a. through the bloodstream as a consequence of other infections, or by
  b. Direct spread, such as might occur after a traumatic injury to the facial bones or secondary to invasive procedures.

- N. meningitides concentrates in the nasopharynx and is transmitted by secretion or aerosol contamination. Bacterial or meningococcal meningitis also occurs as an opportunistic infection in patients with acquired immunodeficiency syndrome (AIDS).

Infectious organisms gain access to meninges and subarachnoid spaces

(Viral, bacterial, yeast)

↓

Exudates form

↓

Meningeal irritation/inflammation

↓

Cortical irritation

↓

Cerebral edema

↓

Increased ICP
Clinical Manifestations

1. Headache and fever are frequently the initial symptoms. Fever tends to remain high throughout the course of the illness. The headache is usually either steady or throbbing and very severe as a result of meningeal irritation. Meningeal irritation results in a number of other well-recognized signs common to all types of meningitis.

2. Nuchal rigidity (stiff neck): This is an early sign. Any attempts at flexion of the head are difficult because of spasms in the muscles of the neck. Forceful flexion causes severe pain.

3. Positive Kernig's sign: When the patient is lying with the thigh flexed on the abdomen, the leg cannot be completely extended.

4. Positive Brudzinski's sign: When the patient's neck is flexed (after ruling out cervical trauma or injury), flexion of the knees and hips is produced; when the lower extremity of one side is passively flexed, a similar movement is seen in the opposite extremity. Brudzinski's sign is a more sensitive indicator of meningeal irritation than Kernig's sign.

5. Photophobia (extreme sensitivity to light): This finding is common, although the cause is unclear.

6. Disorientation and memory impairment are common early in the course of the illness.

7. Seizures occur in 30% of adults with S. pneumoniae meningitis and are the result of areas of irritability in the brain.

Assessment and Diagnostic Findings
A. Bacterial culture and Gram staining of CSF and blood are key diagnostic tests. The presence of polysaccharide antigen in CSF further supports the diagnosis of bacterial meningitis.

Medical Management

1. Penicillin antibiotics (eg, ampicillin, piperacillin) or one of the cephalosporins (eg, ceftriaxone sodium, cefotaxime sodium) may be used.
2. Vancomycin hydrochloride alone or in combination with rifampin may be used if resistant strains of bacteria are identified.
3. High doses of the appropriate antibiotic are administered IV.
4. Dexamethasone has been shown to be beneficial as adjunct therapy in the treatment of acute bacterial meningitis and in pneumococcal meningitis if it is administered 15 to 20 minutes before the first dose of antibiotic and every 6 hours for the next 4 days.
5. Dehydration and shock are treated with fluid volume expanders.
6. Seizures, which may occur early in the course of the disease, are controlled with phenytoin (Dilantin).

Nursing Management

- Protecting the patient from injury secondary to seizure activity or altered LOC
- Monitoring daily body weight; serum electrolytes; and urine volume, specific gravity, and osmolality, especially if syndrome of inappropriate antidiuretic hormone (SIADH) is suspected
- Preventing complications associated with immobility, such as pressure ulcers and pneumonia
- Instituting infection control precautions until 24 hours after initiation of antibiotic therapy (oral and nasal discharge is considered infectious)

**Nursing Management**

1. Neurologic status and vital signs are continually assessed.
2. Pulse oximetry and arterial blood gas values are used to quickly identify the need for respiratory support.
3. Insertion of a cuffed endotracheal tube (or tracheotomy) and mechanical ventilation may be necessary to maintain adequate tissue oxygenation.
4. Arterial blood pressures are monitored to assess for incipient shock, which precedes cardiac or respiratory failure.
5. Rapid IV fluid replacement may be prescribed, but care is taken to prevent fluid overload.
6. Measures are taken to reduce body temperature as quickly as possible because fever increases the workload of the heart and cerebral metabolism.
7. Protecting the patient from injury secondary to seizure activity or altered LOC.
9. Preventing complications associated with immobility, such as pressure ulcers and pneumonia
9. Instituting infection control precautions until 24 hours after initiation of antibiotic therapy (oral and nasal discharge is considered infectious).

**Brain Abscess**

Brain abscesses account for approximately 1% of space-occupying brain lesions and are more common in males during the first two decades of life.

**Pathophysiology**

A brain abscess is a collection of infectious material within the tissue of the brain. Bacteria are the most common causative organisms. The most common predisposing conditions for abscesses are:
1. otitis media and sinusitis.
2. An abscess can result from intracranial surgery, penetrating head injury, or tongue piercing.

Organisms causing brain abscess may reach the brain by:
   a. hematologic spread from the lungs, gums, tongue, or heart, or
   b. from a wound or intra-abdominal infection.

Clinical Manifestations

The clinical manifestations of a brain abscess result from alterations in intracranial dynamics (edema, brain shift), infection, or the location of the abscess.

1. Headache, usually worse in the morning, is the most prevailing symptom.
2. Fever, vomiting and focal neurologic deficits occur as well.
3. Focal deficits such as weakness and decreasing vision reflect the area of brain that is involved.
4. As the abscess expands, symptoms of increased ICP such as decreasing LOC and seizures are observed.

Medical Management

1. Large IV doses of antibiotics are administered to penetrate the blood–brain barrier and reach the abscess. The choice of the specific antibiotic medication is based on culture and sensitivity testing and directed at the causative organism.
2. Corticosteroids may be prescribed to help reduce the inflammatory cerebral edema if the patient shows evidence of an increasing neurologic deficit.
3. Antiseizure medications (phenytoin, phenobarbital) may be prescribed to prevent or treat seizures.
Nursing Management

1. Continuing assess the neurologic status,
2. Administering medications, assessing the response to treatment, and providing supportive care.
3. Ongoing neurologic assessment alerts the nurse to changes in ICP, which may indicate a need for more aggressive intervention.
4. Blood glucose and serum potassium levels, need to be closely monitored when corticosteroids are prescribed.
5. Administration of insulin or electrolyte replacement may be required to return these values to normal or acceptable levels.

Brain tumor

Brain tumor includes both benign and metastatic lesions. All areas and structures of the brain can be affected. Most benign tumors affect the meninges, whereas most malignant tumors affect the glial cells.

Primary brain tumors originate from cells and structures within the brain. Secondary, or metastatic, brain tumors develop from structures outside the brain and occur in 10% to 20% of patients with cancer. Brain tumors rarely metastasize outside the CNS, but metastatic lesions to the brain occur commonly from the lung, breast, lower gastrointestinal tract, pancreas, kidney, and skin (melanomas).

Types of Primary Brain Tumors

Brain tumors may be classified into several groups:

A: Tumors arising from the coverings of the brain (eg, dural meningioma),
B: Tumors developing in or on the cranial nerves (eg, acoustic neuroma),
C: Tumors originating within brain tissue (eg, glioma),
D: Metastatic lesions originating elsewhere in the body.
E: Tumors of the pituitary and pineal glands and of cerebral blood vessels are also types of brain tumors.
Gliomas

Glial tumors, the most common type of intracerebral brain neoplasm, are divided into many categories. Astrocytomas are the most common type of glioma and are graded from I to IV, indicating the degree of malignancy (Diepenbrock, 2004). The grade is based on cellular density, cell mitosis, and appearance. Usually, these tumors spread by infiltrating into the surrounding neural connective tissue and therefore cannot be totally removed without causing considerable damage to vital structures. Oligodendroglial tumors represent 20% of gliomas and are categorized as low-grade or high-grade (anaplastic).

Meningiomas

Meningiomas, which represent 15% to 20% of all primary brain tumors, are common benign encapsulated tumors of arachnoid cells on the meninges.
Meningiomas most often occur in areas proximal to the venous sinuses.

Acoustic Neuromas

An acoustic neuroma is a tumor of the eighth cranial nerve, the cranial nerve most responsible for hearing and balance. An acoustic neuroma may grow slowly and attain considerable size before it is correctly diagnosed. The patient usually experiences:

1. loss of hearing, tinnitus, and episodes of vertigo and staggering gait.
2. As the tumor becomes larger, painful sensations of the face may occur on the same side, as a result of the tumor's compression of the fifth cranial nerve. Most acoustic neuromas are benign, can be surgically removed, and have a good prognosis.
Pituitary Adenomas
Pituitary tumors represent about 7% to 12% of all brain tumors and cause symptoms as a result of pressure on adjacent structures or hormonal changes (hyperfunction or hypofunction of the pituitary).

Angiomas
Brain angiomas (masses composed largely of abnormal blood vessels) are found either in or on the surface of the brain. They occur in the cerebellum in 83% of cases. Some persist throughout life without causing symptoms; others cause symptoms of a brain tumor. Because the walls of the blood vessels in angiomas are thin, these patients are at risk for hemorrhagic stroke. In fact, cerebral hemorrhage in people younger than 40 years of age should suggest the possibility of an angioma.

Clinical Manifestations
Brain tumors can produce either focal or generalized neurologic signs or symptoms. Generalized symptoms reflect increased ICP, and the most common focal or specific signs and symptoms result from tumors that interfere with functions in specific brain regions.

1. **Increased Intracranial Pressure.**
2. **Headache**
   Headache, although not always present, is most common in the early morning and is made worse by coughing, straining, or sudden movement. It is thought to be caused by the tumor's invading, compressing, or distorting the pain-sensitive structures or by edema that accompanies the tumor.
3. **Vomiting**
   Vomiting, seldom related to food intake, is usually the result of irritation of the vagal centers in the medulla. Forceful vomiting is described as projectile vomiting.
4. **Visual Disturbances**
Papilledema is present in 70% to 75% of patients and is associated with visual disturbances such as decreased visual acuity, diplopia (double vision), and visual field deficits.
many tumors can be localized by correlating the signs and symptoms to specific areas in the brain, as follows:

- A motor cortex tumor produces seizure-like movements localized on one side of the body, called Jacksonian seizures.
- An occipital lobe tumor produces visual manifestations: contralateral homonymous hemianopsia (visual loss in half of the visual field on the opposite side of the tumor) and visual hallucinations.
- A cerebellar tumor causes dizziness, an ataxic or staggering gait with a tendency to fall toward the side of the lesion, marked muscle incoordination, and nystagmus (involuntary rhythmic eye movements), usually in the horizontal direction.
- A frontal lobe tumor frequently produces personality disorders, changes in emotional state and behavior, and an apathetic mental attitude. The patient often becomes extremely untidy and careless and may use obscene language.
- A cerebellopontine angle tumor usually originates in the sheath of the acoustic nerve and gives rise to a characteristic sequence of symptoms. Tinnitus and vertigo appear first, soon followed by progressive nerve deafness (eighth cranial nerve dysfunction). Numbness and tingling of the face and tongue occur (due to involvement of the fifth cranial nerve). Later, weakness or paralysis of the face develops (seventh cranial nerve involvement). Finally, because the enlarging tumor presses on the cerebellum, abnormalities in motor function may be present.

Assessment and Diagnostic Findings

- A neurologic examination.
- **Computed tomography (CT) scans.** CT scans can provide information about the ventricular system.
- **A magnetic resonance imaging (MRI) scan:** is the most helpful diagnostic tool for detecting brain tumors, particularly smaller lesions, and tumors in the brain stem and pituitary regions, where bone is thick.
- **Cerebral angiography**: provides visualization of cerebral blood vessels and can localize most cerebral tumors.
- **An electroencephalogram (EEG)**: can detect an abnormal brain wave in regions occupied by tumor; it is used to evaluate temporal lobe seizures and to assist in ruling out other disorders.

**Managements**

**Medical Management**

- Chemotherapy and external-beam radiation therapy, are used alone or in combination with surgical resection.
- Radiation therapy, the cornerstone of treatment for many brain tumors, decreases the incidence of recurrence of incompletely resected tumors.
- Brachytherapy (the surgical implantation of radiation sources to deliver high doses at a short distance). It is usually used as an adjunct to conventional radiation therapy or as a rescue measure for recurrent disease.
- Corticosteroids may be used before and after treatment to reduce cerebral edema and promote a smoother, more rapid recovery.
- A new technique being investigated is photodynamic therapy. This is a treatment of primary malignant brain tumors that delivers targeted photodynamic therapy while conserving healthy brain tissue

**Surgical Management**
• variety of treatment modalities may be used; the specific approach depends on the type of tumor,

The objective of surgical management is to:

a. remove or destroy the entire tumor without increasing the neurologic deficit (paralysis, blindness) or,

b. to relieve symptoms by partial removal (decompression).

Approaches of Surgical intervention

• Conventional surgical approaches require a craniotomy (incision into the skull), is used in patients with meningiomas, acoustic neuromas, cystic astrocytomas of the cerebellum, colloid cysts of the third ventricle, congenital tumors such as dermoid cyst, and some of the granulomas.

• Stereotactic approaches involve the use of a three-dimensional frame that allows very precise localization of the tumor; a stereotactic frame and multiple imaging studies (x-rays, CT scans) are used to localize the tumor and verify its position. These procedures allow treatment of deep, inaccessible tumors.

Nursing process
A: Assessment

Subjective data

1. Patient's understanding of the diagnosis, changes in personality or judgment.
2. Abnormal sensations or visual problems.
3. Unusual odors with tumors of the temporal lobe.
4. Headache, nausea, or hearing loss.
5. Inability to carry out daily activities.

**Objective data**
1. Motor strength, gait.
2. The LOC. and orientation.
3. Check pupil for response and equality.
4. Cognitive changes in memory, speech, concentration, and communication.

**B: Nursing Diagnoses**
- Self-care deficit (feeding, bathing, and toileting) related to loss or impairment of motor and sensory function and decreased cognitive abilities
- Imbalanced nutrition, less than body requirements, related to cachexia due to treatment and tumor effects, decreased nutritional intake, and malabsorption
- Anxiety related to fear of dying, uncertainty, change in appearance, or altered lifestyle
- Interrupted family processes related to anticipatory grief and the burdens imposed by the care of the person with a terminal illness.

**C: Planning and Goals**
1. Compensating for self-care deficits,
2. Improving nutrition,
3. Reducing anxiety,
4. Enhancing family coping skills, and
5. Absence of complications.

**D: Nursing Interventions**
1. The nurse should encourage the family to keep the patient as independent as possible for as long as possible.
2. Increasing assistance with self-care activities is required.

3. Teach the family how to position the patient for comfort during meals in case of nausea.

4. The patient needs to be clean, comfortable, and free of pain for meals.

5. Oral hygiene before meals helps to improve intake.

6. Check food like and dislike.

7. The presence of family, friends, a spiritual advisor, and health professionals may be supportive to relief anxiety.

8. Spending time with patients allows them time to talk and to communicate their fears and concerns.

9. Open communication and acknowledgment of fears are often therapeutic.

10. Keep the patient's and family's anxiety at a manageable level.

**E: Evaluation**

1. Engages in self-care activities as long as possible  
   a. Uses assistive devices or accepts assistance as needed  
   b. Schedules periodic rest periods to permit maximal participation in self-care

2. Maintains as optimal a nutritional status as possible  
   a. Eats and accepts food within limits of condition and preferences  
   b. Accepts alternative methods of providing nutrition if indicated

3. Reports being less anxious  
   a. Is less restless and is sleeping better  
   b. Verbalizes concerns and fears about death  
   c. Participates in activities of personal importance as long as feasible

4. Family members seek help as needed
a. Demonstrate ability to bathe, feed, and care for the patient and participate in pain management and prevention of complications
b. Express feelings and concerns to appropriate health professionals
c. Discuss and seek hospice care as an option

**Epilepsy**

- Epilepsy is a group of related disorders characterized by a tendency for recurrent seizures.
- Epilepsy is a brain disorder that causes people to have recurring seizures. The seizures happen when clusters of nerve cells, or neurons, in the brain send out the wrong signals. People may have strange sensations and emotions or behave strangely. They may have violent muscle spasms or lose consciousness.

**Causes**

- The main cause is unknown
- Causes of acquired seizures include:
  1. Cerebrovascular disease.
  2. Hypoxemia of any cause, including vascular insufficiency.
  3. Fever (childhood).
  4. Head injury, Hypertension.
  5. **Infectious diseases**, such as meningitis, AIDS and viral encephalitis.
  6. Central nervous system infections.
  7. Metabolic and toxic conditions (eg, renal failure, hyponatremia, hypocalcemia, hypoglycemia, pesticides)
  10. Allergies.
11. **Prenatal injury.** Before birth, babies are sensitive to brain damage that could be caused by several factors, such as an infection in the mother, poor nutrition or oxygen deficiencies.

12. **Developmental disorders,** such as autism and neurofibromatosis.

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**Types of epilepsy**

A: **Generalized Seizures:** in this type the areas of the brain (the cortex) are involved. Generalized Seizure include the following:

1. **Absence seizures.** Absence seizures, also called petit mal seizures, are characterized by staring and subtle body movement. These seizures can cause a brief loss of awareness.

2. **Tonic seizures.** Tonic seizures cause stiffening of the muscles. These seizures usually affect back muscles, arms and legs and may cause to fall to the ground.

3. **Clonic seizures.** Clonic seizures are associated with rhythmic, jerking muscle movements. These seizures usually affect the neck, face and arms.

4. **Myoclonic seizures.** Myoclonic seizures usually appear as sudden brief jerks or twitches of the arms and legs.

5. **Atonic seizures.** Atonic seizures, also known as drop seizures, cause a loss of muscle control, which may cause patient to suddenly collapse or fall down.

6. **Tonic-clonic seizures.** Tonic-clonic seizures, also called grand mal seizures, are characterized by a loss of consciousness, body
stiffening and shaking, and sometimes loss of bladder control or biting the tongue.

**B: Partial Seizures**: In this type only part of the brain is involved.

**Types**

1. With motor symptoms
2. With special sensory or somatosensory symptoms
3. With autonomic symptoms
4. Compound forms

**Tests and diagnosis**

1. **Neurological examination.** test the patient behavior, motor abilities, mental function and other areas.
2. **Blood tests.** to check for signs of infections, genetic conditions or other conditions which may be associated with seizures.
3. **Electroencephalogram (EEG).** This is the most common test used to diagnose epilepsy. In this test.
4. **Computerized tomography (CT) scan.** A CT scans can reveal abnormalities in the brain, such as tumors, bleeding and cysts.
5. **Magnetic resonance imaging (MRI).** to detect lesions or abnormalities in the brain that could be causing the seizures.
6. **Functional MRI (fMRI).** A functional MRI measures the changes in blood flow that occur when specific parts of the brain are working.
7. **Positron emission tomography (PET).** PET scans use a small amount of low-dose radioactive material that's injected into a vein to help visualize active areas of the brain and detect abnormalities.
8. **Neuropsychological tests.** In these tests, doctors assess thinking, memory and speech skills of the patients.
Medical Management
The management of epilepsy is individualized to meet the needs of each patient and not just to manage and prevent seizures. Management differs from patient to patient, because some forms of epilepsy arise from brain damage and others are caused by altered brain chemistry.

Major Anti-seizure Medications

<table>
<thead>
<tr>
<th>Medication</th>
<th>Side Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbamazepine (Tegretol)</td>
<td>Dizziness, drowsiness, unsteadiness, nausea and vomiting, diplopia, mild leukopenia</td>
</tr>
<tr>
<td>lamotrigine (Lamictal)</td>
<td>Drowsiness, tremor, nausea, ataxia, dizziness, headache, weight gain</td>
</tr>
<tr>
<td>Phenobarbital (Luminal)</td>
<td>Sedation, irritability, diplopia, ataxia</td>
</tr>
<tr>
<td>Valproate (Depakote, Depakene)</td>
<td>Nausea and vomiting, weight gain, hair loss, tremor, menstrual irregularities</td>
</tr>
<tr>
<td>Tiagabine (Gabitril)</td>
<td>Dizziness, fatigue, nervousness, tremor, difficulty concentrating, dysarthria, weak or buckling knees, abdominal pain</td>
</tr>
</tbody>
</table>
1. Provide privacy and protect the patient from curious onlookers. (The patient who has an aura [warning of an impending seizure] may have time to seek a safe, private place.)
2. Ease the patient to the floor, if possible.
3. Protect the head with a pad to prevent injury (from striking a hard surface).
4. Loosen constrictive clothing.
5. Push aside any furniture that may injure the patient during the seizure.
6. If the patient is in bed, remove pillows and raise side rails.
7. If an aura precedes the seizure, insert an oral airway to reduce the possibility of the patient's biting the tongue or cheek.
8. Do not attempt to pry open jaws that are clenched in a spasm or to insert anything. Broken teeth and injury to the lips and tongue may result from such an action.
9. No attempt should be made to restrain the patient during the seizure, because muscular contractions are strong and restraint can produce injury.
10. If possible, place the patient on one side with head flexed forward, which allows the tongue to fall forward and facilitates drainage of saliva and mucus. If suction is available, use it if necessary to clear secretions.

**Nursing Care After the Seizure**

1. Keep the patient on one side to prevent aspiration. Make sure the airway is patent.
2. There is usually a period of confusion after a grand mal seizure.
3. A short apnea period may occur during or immediately after a generalized seizure.
4. The patient, on awakening, should be reoriented to the environment.
5. If the patient becomes agitated

**Nursing Care Plan for Patient with Epilepsy**

**A: Assessment**

- Assess any factors or events that may precipitate the seizures. Alcohol intake is documented.
• determines whether the patient has an aura before an epileptic seizure, which may indicate the origin of the seizure (eg, seeing a flashing light may indicate that the seizure originated in the occipital lobe).

• What limitations are imposed by the seizure disorder? Does the patient have a recreational program? Social contacts?

• Is the patient working, and is it a positive or stressful experience? What coping mechanisms are used?

B: Nursing Diagnoses

• Risk for injury related to seizure activity
• Fear related to the possibility of seizures
• Ineffective individual coping related to stresses imposed by epilepsy
• Deficient knowledge related to epilepsy and its control

C: Planning and Goals

2. Control of seizures.
3. Achievement of a satisfactory psychosocial adjustment.
4. Acquisition of knowledge and,
5. Understanding about the condition, and absence of complications

D: Nursing Interventions

1. Administer anticonvulsant therapy as prescribed.
2. Protect the patient from injury during seizures.
3. If the patient is taking antiepileptic medications, constantly monitor for toxic signs and symptoms such as slurred speech, ataxia, lethargy, and dizziness.
4. Teach the patient to take exact dose of medication at the times prescribed.
5. Encourage the patient to eat balanced, regular meals.
6. Advise the patient to be alert for odors that may trigger an attack.
7. Limit or avoid alcohol intake.
8. Encourage to have enough sleep to prevent attacks.
9. Avoid restraining the patient during a seizure.
10. any tight clothing, and place something flat and soft, such as pillow, jacket, or hand, under his head.
11. Avoid any forcing anything into the patient’s mouth if his teeth is clenched.
12. Avoid using tongue blade or spoon during attacks which could lacerate the mouth and lips of displace teeth, precipitating respiratory distress.
13. Turn the patient’s head to the side to provide an open airway.
14. Reassure patient after the seizure subsides by telling him that he’s all right, orienting him to time and place, and informing that he’s had a seizure.

**E: Evaluation**

1. Sustains no injury during seizure activity.
2. Indicates a decrease in fear.
3. Displays effective individual coping.
4. Exhibits knowledge and understanding of epilepsy.
5. Absence of complications.