Intracranial Hypertension Pathogenesis

The pathogenesis involves an imbalance between the production and absorption of intracranial contents—brain tissue, cerebrospinal fluid (CSF), and blood—leading to increased pressure. Several mechanisms can contribute to this imbalance:

1. **Increased Brain Volume (Mass Effect)**

1. **Tumors** (like meningiomas), abscesses, or hematomas increase the brain's volume, exerting pressure on surrounding structures.
2. **Cerebral edema**, which is swelling of the brain due to trauma, ischemia (e.g., stroke), infection, or metabolic disturbances (e.g., hepatic encephalopathy), causes fluid accumulation in the brain parenchyma.

2. **Increased Cerebrospinal Fluid (CSF) Volume**

1. **Hydrocephalus**: When there is an obstruction in the flow of CSF or impaired absorption (e.g., due to infections or hemorrhage), CSF builds up in the ventricles.
2. **Idiopathic Intracranial Hypertension (IIH)**: A condition where CSF absorption is impaired without an identifiable mass, infection, or hydrocephalus.

3. **Increased Cerebral Blood Volume**

1. **Venous outflow obstruction** (e.g., due to cerebral venous sinus thrombosis) impedes blood drainage, leading to an increase in intracranial blood volume.
2. **Hyperemia**: Excessive blood flow to the brain due to systemic hypertension or vasodilation can increase ICP.

4. **Altered CSF Absorption**

1. Conditions that affect arachnoid villi, where CSF is absorbed into the venous system, can lead to raised ICP. Inflammatory conditions (e.g., meningitis) or subarachnoid hemorrhage can impair this absorption.

5. **Compensatory Mechanisms and Limits**

1. The brain has limited capacity to compensate for increased volume, as the skull is a rigid structure. The Monro-Kellie doctrine describes how increases in one component (brain, blood, or CSF) must be compensated by a decrease in another to maintain normal ICP. When compensatory mechanisms fail, ICP rises.

Consequences of Increased ICP:

1. **Cerebral ischemia**: As ICP increases, cerebral perfusion pressure (CPP) decreases, reducing blood flow to the brain.
2. **Brain herniation**: Elevated ICP can cause parts of the brain to be displaced, compressing vital brain structures and blood vessels, leading to life-threatening conditions.

In the case of a patient with a meningioma, the mass effect from the tumor can directly compress brain structures and disrupt CSF flow, contributing to intracranial hypertension. This might explain symptoms like headaches, nausea, vision disturbances, and seizures, which are common in elevated

ICP.