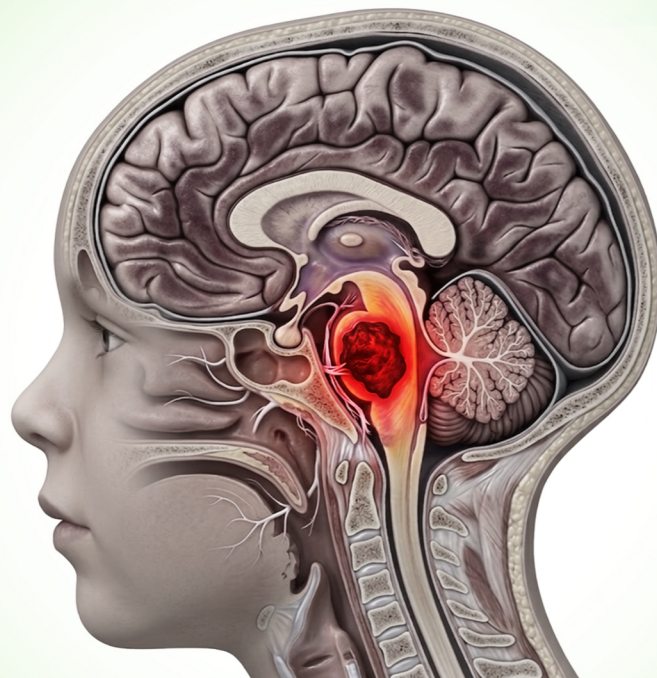


Neuron

Newsletter from Neuro One Hospital

Issue -06 ■ May-2026



From Inoperable to Curable & Treatable

The New Era of Brainstem Tumor Surgery

Neuron - A Newsletter from



Neuro One Hospital

Leaders in neuro care



Brainstem tumors were once considered inoperable due to their location among the most vital centers for breathing, heartbeat, and consciousness. Families were told that surgery was impossible, and treatment options were bleak.

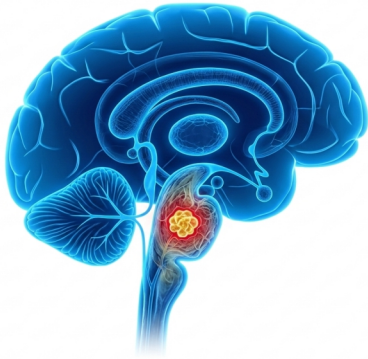
Today, through advanced microsurgical techniques, neuronavigation, intraoperative neuromonitoring, and improved anatomical understanding, we at Neuroone Hospital routinely perform safe biopsies, partial resections, and even near-total and gross-total resections in selected patients.

This newsletter showcases our journey — from caution and fear to confidence and precision, supported by real cases that demonstrate how far brainstem tumor surgery has advanced.

Regards,

Dr **S.Vijay Kumar** MCh.,
 Keyhole Brain and Spine Surgeon
Founder and Managing Director
 Neuroone Hospital

send you feedback to
drsvijay@neuroone.in



Why ?

Brainstem Tumors were labeled

INOPERABLE

The brainstem contains:

- ▶▶ Breathing centers
- ▶▶ Heartbeat regulation
- ▶▶ Swallowing & speech nuclei
- ▶▶ Facial nerve nuclei
- ▶▶ Motor & sensory tracts
- ▶▶ Pathways coordinating balance & consciousness

Even 1 mm of damage can cause:

- Paralysis
- Loss of swallowing
- Hearing and speaking difficulties
- Coma
- Respiratory failure

Historically:

- ◀◀ Surgery was discouraged
- ◀◀ Biopsies were considered too dangerous
- ◀◀ Radiotherapy alone was used
- ◀◀ Outcomes were poor
- ◀◀ Surgery was almost never attempted.

✦ Modern neurosurgery has transformed this scenario.

How ? We Have Progressed

Era : 1 *Don't Touch the Brainstem*

Before modern imaging and microsurgery:

- Tumor consistency could not be predicted
- Even small biopsies risked paralysis
- Survival after surgery was poor

Most patients were treated symptomatically.

Era : 2 *Biopsy is Possible, CSF Diversion*

With the rise of:

- CT & MRI
- Stereotactic frames
- CSF diversion techniques

Neurosurgeons began performing:

- Stereotactic biopsy
- Decompression of exophytic (outward-growing) tumors
- VP shunts for hydrocephalus

This improved diagnosis and prevented life-threatening complications.

Era : 3 *Safe Surgical Corridors*

The understanding of safe entry zones into the brainstem revolutionized surgery. These entry corridors avoid critical cranial nerve nuclei and long tracts.

Key safe zones include:

- Peritrigeminal approach – *lateral pons*
- Suprafacial / Infracial triangles – *dorsal pons*
- Transvermian midline – *dorsal exophytic tumors*
- Retrosigmoid CP angle corridor – *lateral or exophytic tumors*
- Foramen of Magendie route – *midline posterior 4th ventricle tumors*

This allowed internal decompression with minimal damage.

Era : 4

Modern Multimodal Brainstem Surgery

Today, Neuroone Hospital performs surgeries with:

- Margins were poorly defined
- IONM (MEP, SSEP, facial nerve EMG)
- Neuronavigation
- Ultrasonic aspirator (CUSA)
- Fluorescein-guided visualization
- Neuronavigation-based safe entry planning
- DTI tractography for corticospinal mapping
- High-definition microscopes

As a result:

- ✓ Tumors once considered “inoperable” can now be removed safely
- ✓ Children can walk again
- ✓ Swallowing improves
- ✓ Pain and ataxia reduce
- ✓ Survival improves

Safe resection is now a reality, including:

- ◆ STR (Subtotal Resection)
- ◆ NTR (Near Total Resection)
- ◆ GTR (Gross Total Resection)

Technologies

that Enabled Safe Brainstem Surgery

1. Intraoperative Neuromonitoring (IONM)

- Real-time monitoring of:
 - Motor pathways
 - Sensory pathways
 - Cranial nerves V, VI, VII, VIII
 - Brainstem auditory pathways
- Ensures safe removal without disturbing vital functions.

2. Microsurgical High-Resolution Operating Microscopes

Allow precise dissection, identification of small vessels and gentle separation of tumor from nerves.

3. Ultrasonic Surgical Aspirator (CUSA)

- This tool:
 - Selectively softens and aspirates tumor
 - Preserves healthy tissue
 - Minimizes bleeding
- Especially useful in intrinsic pontine and medullary tumors.

4. Diffusion Tensor Imaging (DTI)

- Shows displacement of tracts in:
 - Pontine tumors
 - Medullary tumors
- Helps plan the safest entry zone.

5. Fluorescein-Guided Surgery

- Enhances tumor margins in high-grade or infiltrative gliomas.

Safe Entry Zones

Why do we need “safe entry zones”?

Because there is no way to simply “cut open” the brainstem. We must enter through tiny pathways that naturally have fewer vital fibers.

Safe zones used at Neuroone Hospital:

1) Peritrigeminal Zone

- ❑ Used for lateral pontine tumors
- ❑ Avoids facial nerve nucleus & long tracts

2) Transvermian Approach

- ❑ Used for dorsal exophytic tumors projecting into 4th ventricle
- ❑ Allows gross total or near-total resection in low-grade tumors

3) Suprafacial/Infrafacial Triangles

- ❑ Used for deep pontine lesions
- ❑ Avoids facial colliculus

4) Retrosigmoid CP Angle Corridor

- ❑ Used when tumor protrudes laterally
- ❑ Common in exophytic astrocytomas

5) Foramen of Magendie Approach

- ❑ Ideal for 4th ventricle tumors
- ❑ Used for exophytic dorsal pontine gliomas

When Inoperable Becomes Curable

Our Gross Total Resection (GTR) Success Stories

CASE # 1

Gross Total Resection of Dorsal Exophytic Brainstem Astrocytoma

Patient Profile

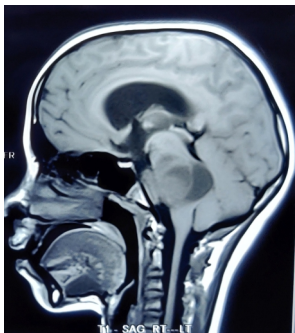
11-year-old girl with progressive neurological symptoms affecting vision and swallowing.

Clinical Presentation

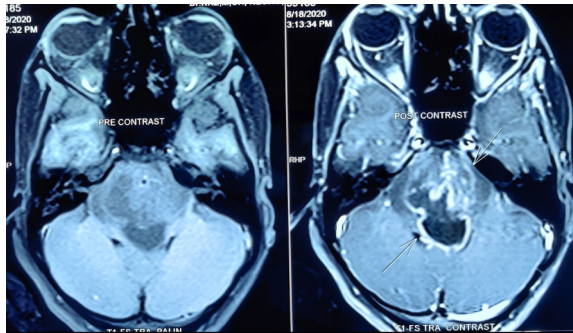
- The child developed:
- Double vision
 - Difficulty swallowing
 - Persistent headache
 - Facial weakness
 - Imbalance while walking

Radiological Findings

- MRI revealed:
- Dorsal exophytic tumor arising from the pons
 - Obstruction of the fourth ventricle
 - Associated hydrocephalus



PREOP 1

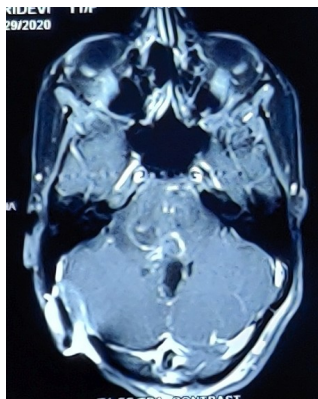


PREOP 2

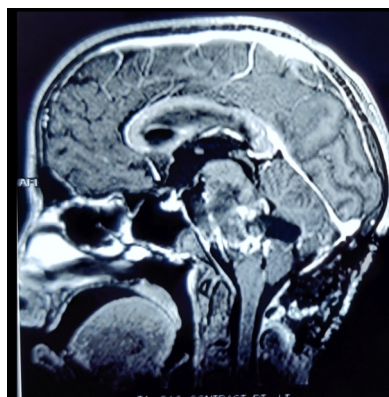
The imaging suggested a **pilocytic astrocytoma**, a tumor known to be potentially curable with complete removal.

Clinical Challenge

The tumor was located within the brainstem, a region controlling vital functions such as breathing, swallowing, and facial movement. Surgical removal required extreme precision to avoid permanent neurological injury.



POSTOP 1



POSTOP 2

Treatment Strategy

The surgical team performed:

- Midline suboccipital craniotomy
- Transvermian approach to the fourth ventricle
- Microsurgical gross total resection
- Ventriculoperitoneal shunt placement

Continuous neuromonitoring was used to preserve cranial nerve function.

Outcome

Following surgery:

- Swallowing improved significantly
- Walking ability returned
- Neurological recovery progressed steadily
- Follow-up imaging showed complete tumor removal

Clinical Significance

This case demonstrates that selected brainstem tumors can be completely cured when safe surgical corridors and modern microsurgical techniques are used

CASE # 2

Complete Excision of Dorsal Medullary Tumor with Preservation of Neurological Function

Patient Profile

43-year-old woman presenting with progressive neurological symptoms affecting sensation and coordination.

Clinical Presentation

Symptoms included:

- Tingling sensations in the limbs
- Episodes of focal seizures
- Gradual progression of neurological discomfort

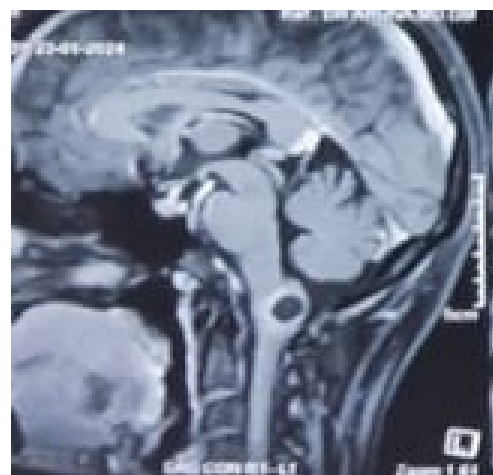
Radiological Findings

MRI showed:

- Intrinsic lesion in the dorsal medulla
- Mild contrast enhancement
- Clear surface bulge



PREOP 1



PREOP 2 CONTRAST

The tumor was located in a region responsible for breathing and vital autonomic control.

Clinical Challenge

Medullary tumors carry a high risk of respiratory compromise. Surgical intervention required continuous monitoring to avoid life-threatening complications.



CRANIOTOMY



POSTOP

Treatment Strategy

The surgical plan included:

- Posterior fossa craniotomy
- Microsurgical excision of the tumor
- Use of intraoperative neuromonitoring
- CUSA-assisted tumor removal

Outcome after surgery:

- Swallowing improved significantly
- Walking ability returned
- Neurological recovery progressed steadily
- Follow-up imaging showed complete tumor removal

Clinical Significance

This case illustrates that even tumors in the most sensitive regions of the brainstem can be safely removed with modern technology and careful planning.

Click here for [Youtube](#) video of patient's success story

CASE # 3

Near-Total Resection of Pontomedullary Astrocytoma

Patient Profile

33-year-old male with progressive neurological symptoms affecting balance and coordination.

Clinical Presentation

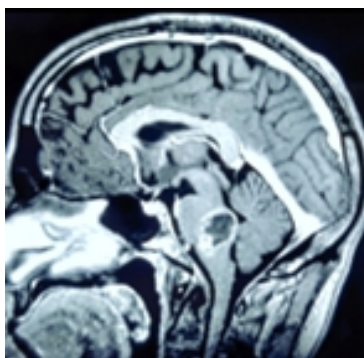
Symptoms included:

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- Gradual progression of neurological discomfort

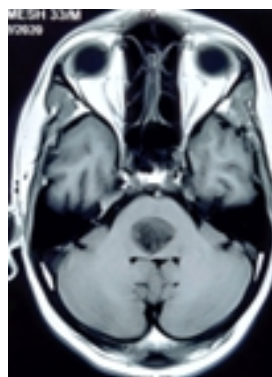
Radiological Findings

MRI showed:

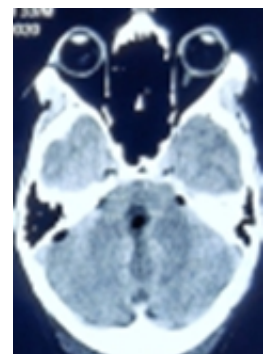
- Intrinsic lesion in the dorsal medulla
- Mild contrast enhancement
- Clear surface bulge



PREOP 1



PREOP 2

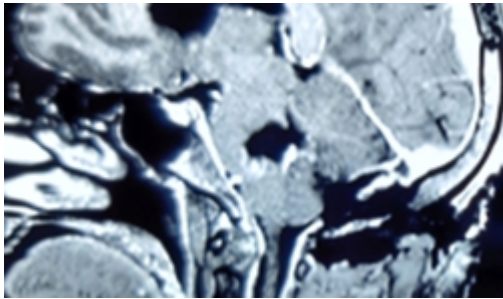


PREOP 3

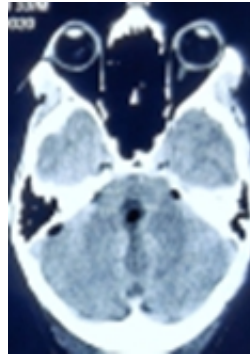
The tumor was located in a region responsible for breathing and vital autonomic control.

Clinical Challenge

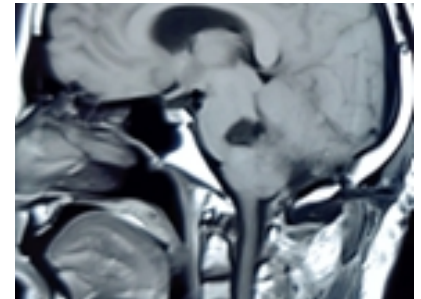
Medullary tumors carry a high risk of respiratory compromise. Surgical intervention required continuous monitoring to avoid life-threatening complications.



POSTOP 1



POSTOP 2



POSTOP 3

Treatment Strategy

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- Posterior fossa craniotomy
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- Use of intraoperative neuromonitoring
- CUSA-assisted tumor removal

Outcome

After surgery:

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- Follow-up imaging showed complete tumor removal

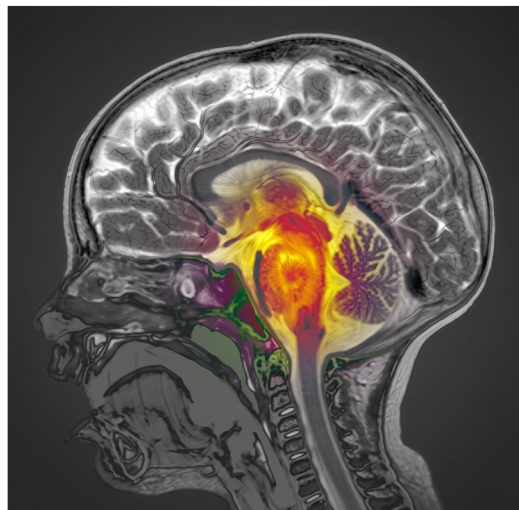
Clinical Significance

This case illustrates that even tumors in the most sensitive regions of the brainstem can be safely removed with modern technology and careful planning.

When Cure is Not Possible

Treatment Still Changes Lives

Not every brainstem tumor can be removed completely. Some tumors, especially diffuse intrinsic pontine gliomas and diffuse midline gliomas, infiltrate the brainstem extensively. Attempting total removal in such cases would risk devastating neurological injury.



However, modern neurosurgery still plays a critical role by:

- Establishing an accurate diagnosis
- Relieving pressure on vital structures
- Improving swallowing, breathing, and mobility
- Allowing safe delivery of radiotherapy and chemotherapy
- Preserving dignity and quality of life

The following cases illustrate how carefully planned surgery can transform outcomes even when cure is not achievable.

CASE # 4

Diffuse Midline Glioma Managed with Biopsy and Stabilization

Patient Profile

Child presenting with progressive neurological decline affecting mobility and coordination.

Clinical Presentation

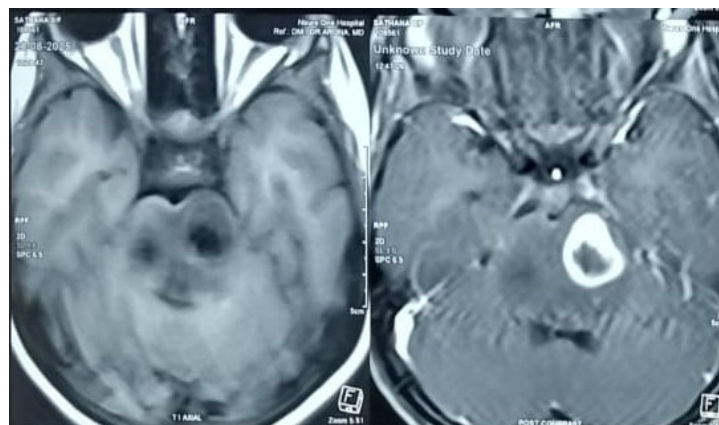
Symptoms included:

- Difficulty walking
- Weakness
- Reduced balance
- Decline in daily activity

Radiological Findings

MRI showed:

- Diffuse intrinsic tumor involving the brainstem
- Features consistent with diffuse midline glioma



PREOP

Clinical Challenge

Diffuse tumors infiltrate normal brain tissue and cannot be safely removed completely.



POSTOP 1



POSTOP 2

Treatment Strategy

The surgical plan included:

- Microsurgical biopsy
- Controlled tumor decompression
- Neurological stabilization
- Preparation for radiotherapy

Outcome

After treatment:

- Neurological status stabilized
- Daily functioning improved
- Further therapy became possible

Clinical Significance

Even when cure is not possible, modern treatment can maintain neurological function and improve quality of life.

CASE # 5

Brainstem Tumor with Hydrocephalus Managed with Emergency CSF Diversion

Patient Profile

Child presenting with symptoms of raised intracranial pressure.

Clinical Presentation

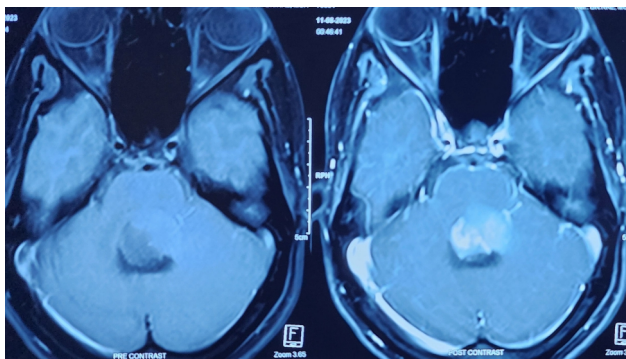
The child developed:

- Persistent vomiting
- Headache
- Drowsiness
- Difficulty walking

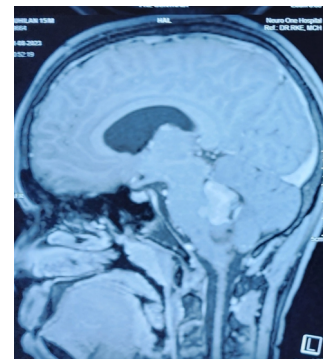
Radiological Findings

Imaging showed:

- Brainstem tumor
- Obstructive hydrocephalus



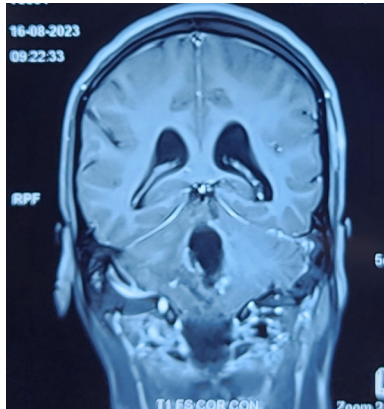
PREOP 1



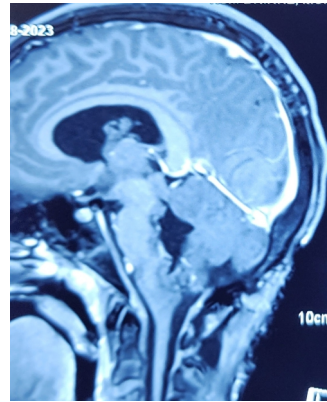
PREOP 2

Clinical Challenge

Hydrocephalus can rapidly lead to neurological deterioration and death if untreated.



POSTOP 1



POSTOP 2

Treatment Strategy

Emergency intervention included:

- Ventriculoperitoneal shunt placement
- Intensive neurological monitoring
- Supportive care

Outcome

Following treatment:

- Consciousness improved
- Vomiting resolved
- Neurological stability achieved

Clinical Significance

Early management of hydrocephalus can be life-saving and allows further treatment to proceed safely.

CASE # 6

Pontine Tumor Managed with Symptom Stabilization

Patient Profile

Patient with progressive neurological decline affecting mobility and independence.

Clinical Presentation

Symptoms included:

- Increasing imbalance
- Difficulty walking
- Gradual functional decline

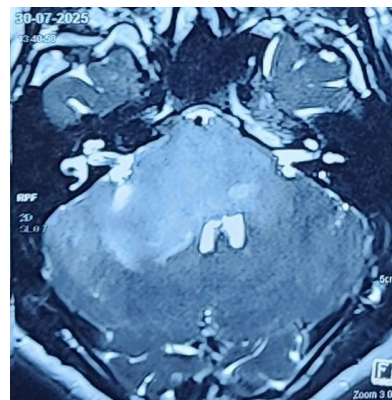
Radiological Findings

MRI demonstrated:

- Diffuse intrinsic pontine tumor
- Involvement of critical motor pathways



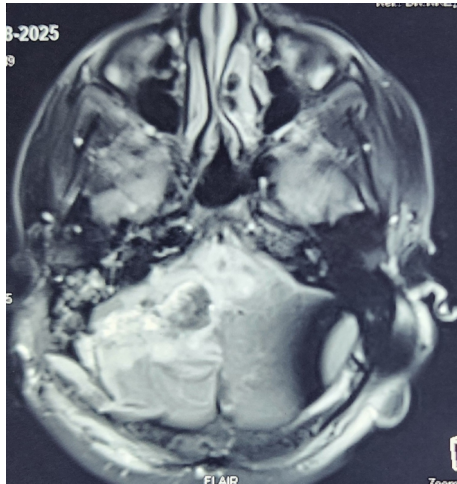
PREOP 1



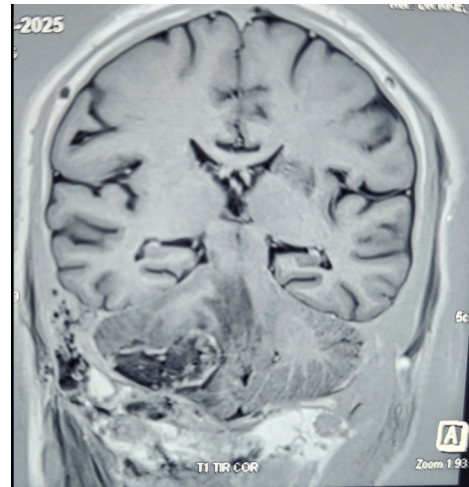
PREOP 2

Clinical Challenge

Aggressive surgical removal would risk severe neurological disability.



POSTOP 1



POSTOP 2

Treatment Strategy

Management focused on:

- Safe biopsy
- Symptom control
- Supportive neurological care
- Planning long-term treatment

Outcome

Following intervention:

- Disease progression stabilized
- Functional status preserved
- Treatment decisions clarified

Clinical Significance

This case highlights the importance of individualized treatment decisions balancing safety and benefit.

CASE SUMMARY TABLE

Case	Tumor Type	Intervention	Result	Category
# 01	Pilocytic astrocytoma	GTR + VP shunt	Recovery	Curable
# 02	Medullary tumor	GTR	Full function preserved	Curable
# 03	Pontomedullary astrocytoma	Near-total resection	Improved function	Treatable
# 04	Diffuse midline glioma	Biopsy	Stabilization	Treatable
# 05	Brainstem tumor + hydrocephalus	VP shunt	Stabilized	Life-saving
# 06	Pontine tumor	Biopsy/ supportive care	Stabilized	Treatable

Hydrocephalus Management

Brainstem tumors often block the 4th ventricle.

- Symptoms include :**
- ◆ Vomiting
 - ◆ Lethargy
 - ◆ Gait issues
 - ◆ Headache

VP Shunt Saves Lives

Several children improved dramatically after shunt placement.

- Benefits:**
- ◆ Restores consciousness
 - ◆ Prevents herniation
 - ◆ Improves appetite and activity
 - ◆ Reduces hospital admissions

Recovery & Rehab

After safe brainstem surgery, recovery is possible.

Improvements commonly seen:

- Balance & gait return
- Facial palsy improves
- Speech becomes clearer
- Swallowing strengthens
- Children return to school
- Adults return to work

The Future Of Brainstem Tumor Care

Safer, Smarter, More Personalized Treatment

Brainstem tumor care is entering a new era driven by advances in imaging, surgery, molecular science and rehabilitation. The focus is shifting from simply prolonging life to preserving neurological function, independence, quality of life.

Key Directions for the Future

1. Precision Diagnosis

Modern tumor care increasingly relies on molecular markers such as genetic and biological signatures. These tools help doctors predict tumor behavior and select the most effective treatment for each patient.

2. Targeted Therapies

New medicines are being developed to act specifically on tumor cells while minimizing damage to healthy brain tissue. These treatments aim to slow tumor growth and improve long-term outcomes.

3. Safer and More Precise Surgery

Advances in neuronavigation, neuromonitoring, and imaging allow surgeons to operate with greater accuracy, reducing complications and preserving vital brainstem functions.

4. Advanced Radiotherapy

Techniques such as focused radiation and precision delivery systems like proton therapy help control tumors while protecting surrounding brain tissue, especially in children.

5. Comprehensive Rehabilitation

Future care will increasingly emphasize early rehabilitation, including physiotherapy, speech therapy, and nutritional support, to help patients return to daily activities as quickly and safely as possible.

The future of brainstem tumor care is
defined by One goal:

to treat the disease while protecting the person.

Through innovation, teamwork, and careful planning, treatments are becoming safer, more effective, and more compassionate—offering patients and families renewed confidence and hope.



Surgical Team

Neurosurgery

Dr S Vijay Kumar

Dr M Sadyojata

Anaesthesia

Dr S Rakul Prasath

Dr M. Aruni Adithya

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