

Rehabilitation particularities in neuro-oncology – a case series

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Types of brain tumors

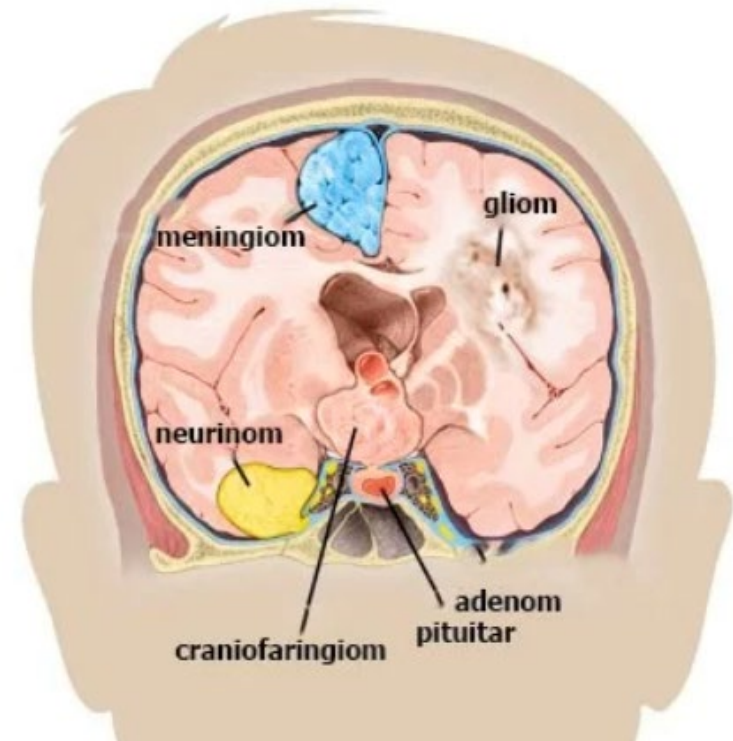
- **Malignant tumors:**

- Primary:** glioblastoma (80%), astrocytoma, oligodendroglioma, ependymoma, medulloblastoma, cerebral lymphoma

- Secondary:** *metastasis* – lung, breast, melanoma, colon, genitourinary, sarcomas;

!irreversible vital tissue damage!!

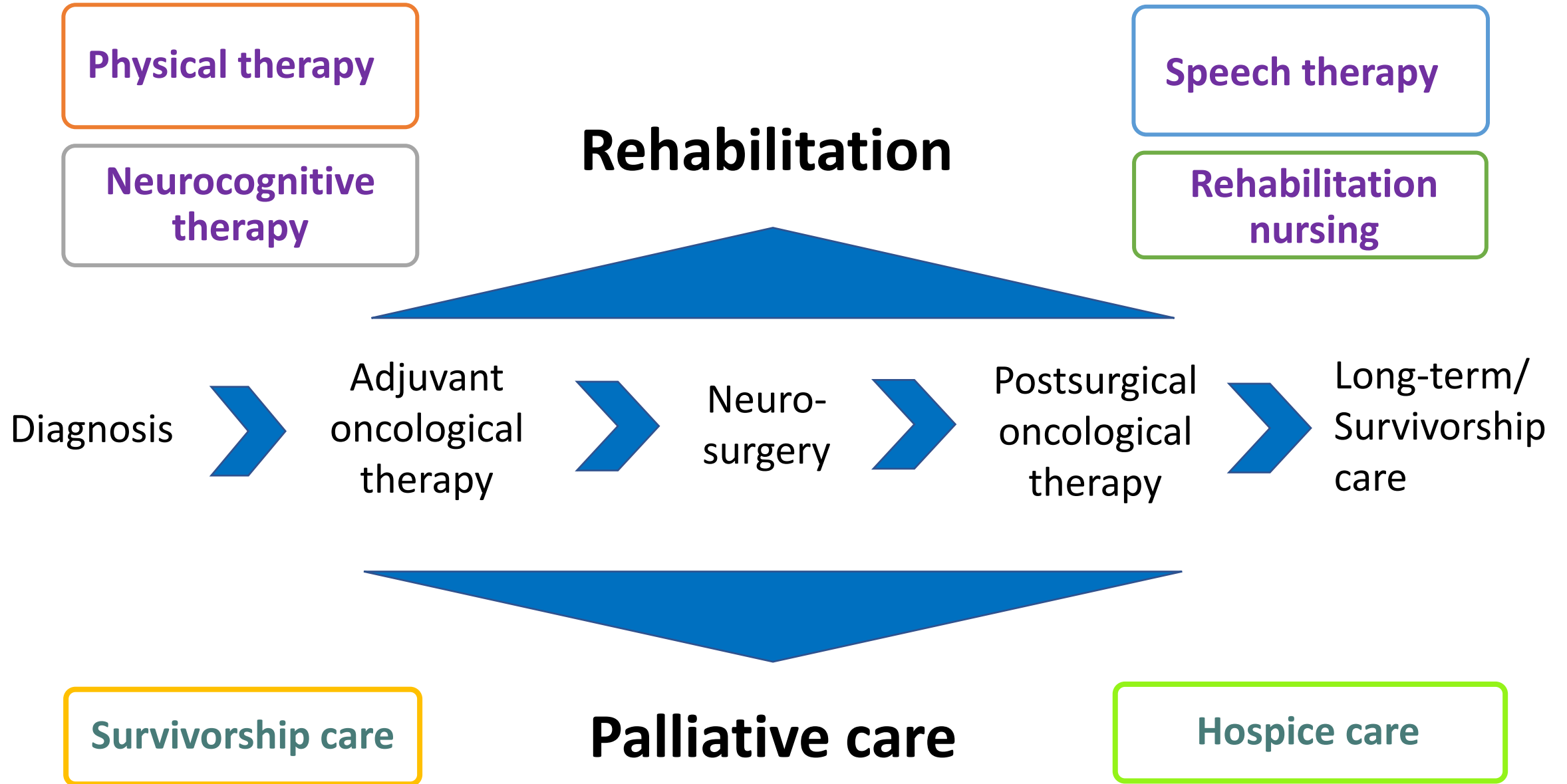
- **Benign tumors** - increased aggressiveness -> Meningioma



Symptoms

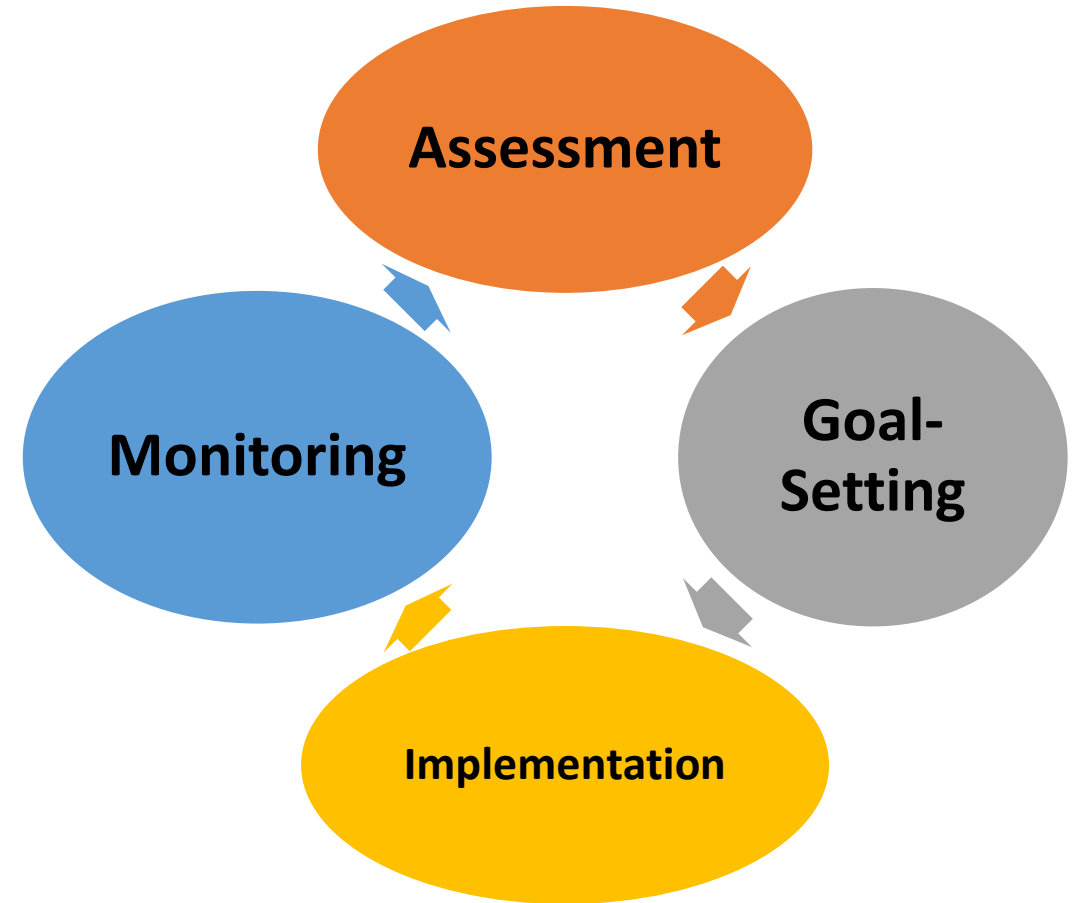
- Cognitive impairments 80%
- Motor deficits -> gait disturbances 20–30%
- Speech difficulties
- Visual impairments
- Sensory impairments
- Sphincter disorders
- Fatigue





Rehabilitation planning

- **Acute Phase:** Immediately after surgery to manage deficits, improve function and prevent complications.
- **During Active Treatment:** Crucial during radiation or chemotherapy to manage fatigue and functional decline.
- **Long-Term/Survivorship:** Addresses long-term cognitive changes, motor issues or psychological needs.



Rehabilitation goals

- ✓ Compensate cognitive deficits (+ language impairments)
- ✓ Improve mobility & balance (+ spasticity)
- ✓ Manage pain & fatigue
- ✓ Manage dysphagia
- ✓ Manage sphincter/autonomic dysfunction
- ✓ Maintain social participation + compensate / restore independence in daily living



Rehabilitation Therapy Management

Specialized Nursing + Kinesiotherapy

Focused on:

- ✓ prevention of secondary complications
- ✓ support the recovery process

Key areas:

- ☐ vital assessment
- ☐ repositioning
- ☐ skin care
- ☐ nutritional interventions
- ☐ progressive mobilization
- ☐ respiratory care

Manual therapy: soft tissue/myofascial release, trigger point therapy.

Rehabilitation Therapy Management

Physical agents Interventions

- *Pain therapy* : Transcutaneous electric nerve stimulation (**TENS**), Deep Oscillation (DO), repetitive Peripheral Magnetic Stimulation (rPMS)
- *Dysphagia therapy*: Neuromuscular electrical stimulation (VitalStim)
- *Proprioceptive* and visual-spatial rehabilitation: Vibramoov, Prism Exposure (spatial neglect therapy), mirror therapy, Intensive Visual Stimulation (IVS)



Supportive Robotic & Orthotic Devices

Enables intensive repetitive practice, enhance motor learning through feedback, support cortical reorganization. (Lokomat, Armeo, Andago, Robert)

Neurocognitive therapy + rTMS (repetitive transcranial magnetic stimulation)

Rehabilitation Outcome – functional improvement or selection bias?

Key Evidence

1. **Early mobilization post-craniotomy** ↓ venous thromboembolism risk
2. Improvements in **communication, cognition, motor function and sphincter control** are maintained up to 6 months.
3. Functional gains **comparable to stroke and TBI patients**

Limitations

- Comorbidities -> selection bias??
- **Functional status during rehabilitation predicts survival**; patients achieving higher discharge mobility scores showed significantly better survival outcomes.

Case no. 1

- N.S, 71 y.o., male, 23.01-05.02.2026
- **Diagnosis:** right temporal intracranial mass op in 07.12.2025 (**Grade IV glioblastoma**) – **total resection**
- **Functional impairments:** - motor deficit characterized by **left-sided hemiplegia; CFP;** moderate impairment in mobility and self-care
- **Comorbidities:**
 - bilateral pneumonia caused by *Pseudomonas* spp.,
 - COPD, GOLD stage II–III
 - Previous gastric ulcer surgery – undocumented
 - Chronic alcoholism
 - Chronic smoking

Case no. 1

- **General examination:** underweight, dehydrated skin, bilateral wheezing; SaO2 = 92% (oxygen supplementation : 2 L/min); normal cardio-vascular examination. No sphincter disorders.
- **Local examination:** mild dysarthria (left CFP); Muscle strength: **positive paresis tests, upper limb > lower limb**; muscle strength **4/5 MRC left side**, more pronounced in the lower limb. Slightly increased muscle tone on the left, active reflexes, positive Babinski sign.
- **Functional status:** the patient can maintain a seated position independently and the upright position with assistance from another person.

Goals and Treatment

- **Rehabilitation program goals:**
 - *prevention of complications from immobilization;*
 - *initiate walking with an assistive device,*
 - *prevention of joint contractures in left body;*
 - *maintain current range of motion and improve;*
 - *strengthen paretic muscles, and improve movement in the left limbs.*
- **Cognitive therapy** -> cognitive regression: temporal, spatial and self-disorientation;

Evolution and results

!!!Worsening of respiratory symptoms -> transfer to a Pneumology Unit for COPD exacerbation -> **patient returned in PRM Unit to continue the rehabilitation program.**

Results

- moderate motor deficits at admission => standing and walking with device assistance
- altered cognitive status => cognitive improvement.

	ADL	DRS	Rankin	Barthel	FAC	MRC
Admission	2/6	8/29	4	40/100	2	-4/5 left body
Discharge	4/6	5/29	3	70/100	4	+4/5 left body
Results						

Case no. 2

- M.C-H., 56 y.o., male, 19.01- 05.02.2026
- **Diagnosis:** right temporal intracranial mass op in 30.12.2025- (**Grade IV glioblastoma**) – **partial resection**
- **Functional status:** - motor deficit characterized by **left hemiparesis predominantly on the lower limb**; mild impairment in mobility and self-care
- **Comorbidities:** none.

Case no. 2

- **General examination:** normal general examination. No sphincter disorders.
- **Local examination:** left hemiparesis, mostly affecting the lower limb;
muscle strength: upper limb = 4/5 MRC; lower limb = 4/5 MRC,
osteotendinous reflexes: accentuated on left side; negative ataxia tests.
- **Functional status:** the patient can maintain a seated position independently, difficulty walking short distances (limited dorsiflexion and flexion of the left knee).

Goals and Treatment

- **Rehabilitation program goals:**
 - *maintain current range of motion and improve;*
 - *strengthen paretic muscles, and improve motor control in the left body*
 - *initiate walking independently*

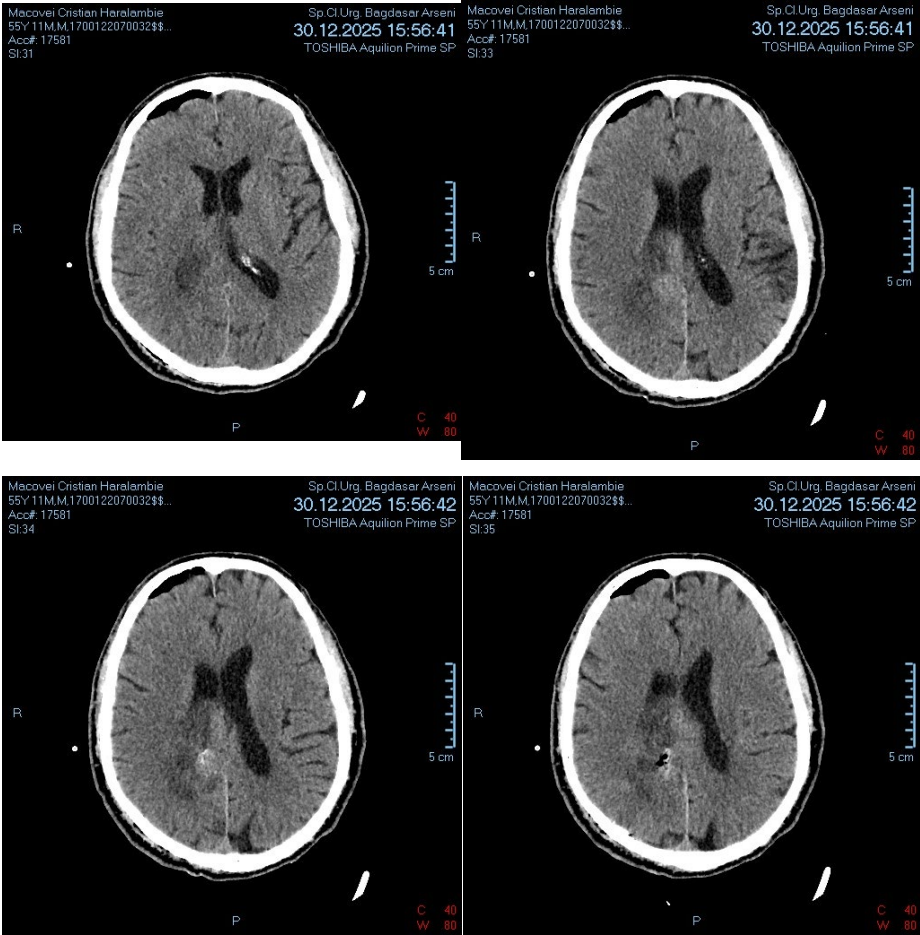
Evolution and results

10 days later – Poor general condition, severe headache on the right side of the head, functional decline (inability to maintain a sitting position and walk)

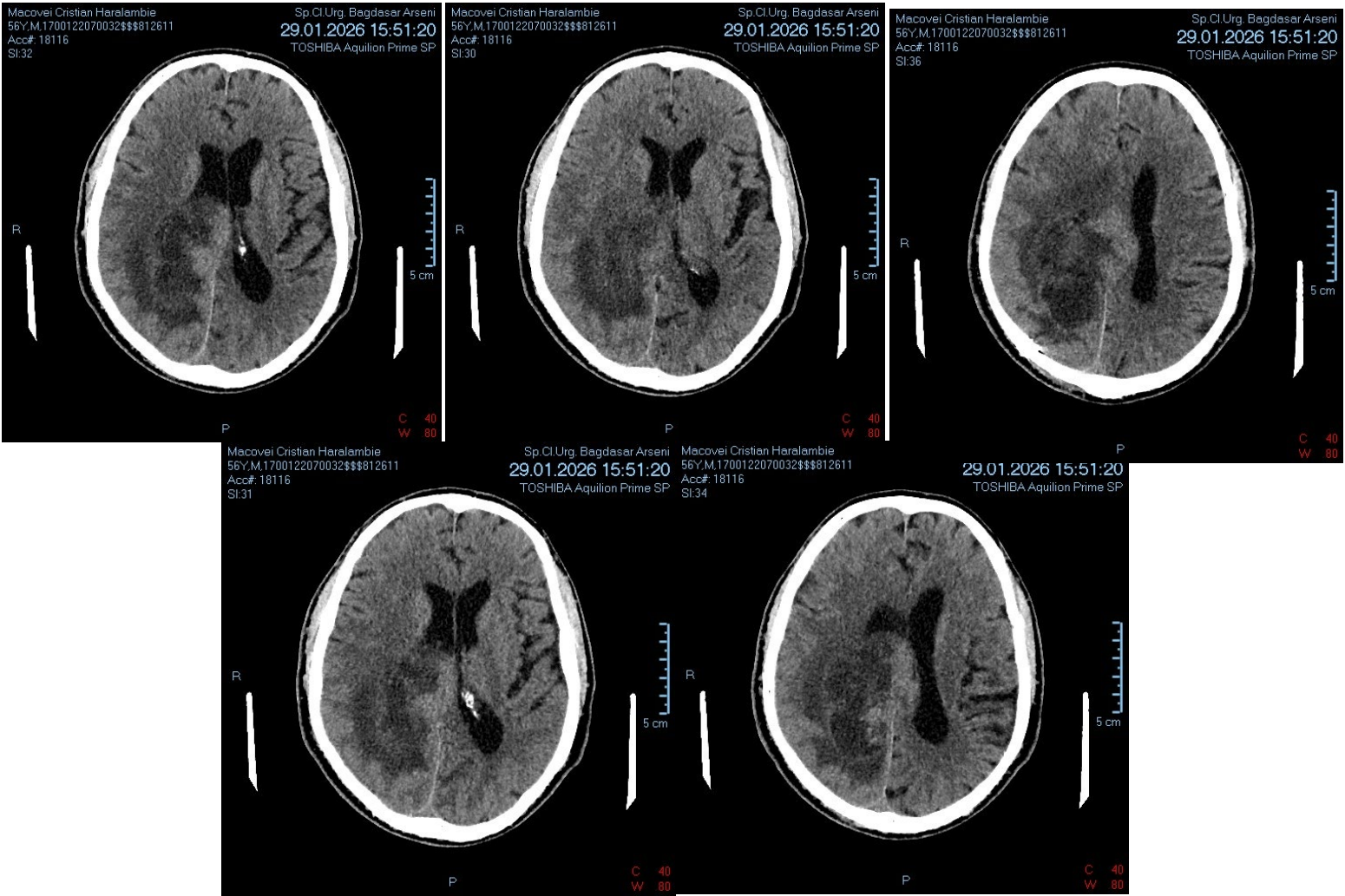
Brain CT: tumor progression + associated vasogenic edema -> treatment with cerebral osmotic agent (Mannitol)

- worsening functional decline -> left hemiplegia (2/5 MRC), minimal dysarthria
- Severe motor deficit, 1/5 MRC left body
- altered cognitive status -> disoriented TS and self => Transfer to the **Radiotherapy Department** to initiate specialized treatment

30.12.2025 – pre-op



29.01.2026 – tumor progression + associated edema



Evolution and results

Results:

- mild motor deficits at admission => **severe motor deficit** -> **bed-bound**
- coordination and execution difficulties => **worsening in coordination and execution;**
- **altered cognitive status**

	ADL	DRS	Rankin	Barthel	FAC	MRC	MOCCA
Admission	6/6	1/29	1	95/100	4	4/5 left body	24/30
Discharge	1/6	12/29	5	25/100	0	1/5 left body	5/30
Results							

Case no. 3

- G.N. 69 y.o., male, 11.02.2026- 04.03.2026
- **Diagnosis:** right temporal intracranial mass op in 30.01.2026 (Grade IV glioblastoma) – total resection
- **Functional impairments:** motor deficit characterized by left-sided hemiplegia predominantly on the upper limb; hemispatial neglect; moderate impairment in mobility and self-care
- **Comorbidities:**
 - Stage II hypertension
 - Type II diabetes
 - Stable chest pain

Case no. 3

- **General examination:** overweight; normal general examination. No sphincter disorders.
- **Local examination:** left hemiparesis, mostly affecting the upper limb;
left-sided hemispatial neglect; *muscle strength:* upper limb = 3/5 MRC;
left lower limb = +3/5 MRC, no motor control for dorsiflexion;
osteotendinous reflexes: accentuated on left side; negative ataxia tests.
- **Functional status:** the patient is unable to sit upright independently,
needs assistance from another person.

Goals and Treatment

- **Rehabilitation program goals:**
 - *prevention of complications from immobilization;*
 - *prevention of joint contractures in left body;*
 - *maintain current range of motion and improve;*
 - *strengthen paretic muscles, and improve movement in the left limbs;*
 - *initiate standing independently;*
 - *improve awareness over the left body.*
- **Cognitive therapy -> cognitive improvement**

Evolution and results

Results :

- Moderate motor deficits at admission => initiation of standing;
- coordination and execution difficulties => improvement in coordination and execution;
- left hemispatial neglect => **improved left body awarness**
- altered cognitive status => **cognitive improvement**

	ADL	DRS	Rankin	Barthel	FAC	MRC	MOCCA
Admission	1/6	11/29	4	25/100	0	-3/5 left body	18/20
Discharge	1/6	11/29	4	30/100	1	+3/5 left body	22/30
Results							

Take home message - Case discussions

- ❖ **Rehabilitation outcomes depend on the type of cerebral tumor**
- ❖ **A favorable prognosis can be influenced by complications of other comorbidities (+/- tumor-related)**
- ❖ **Poor prognosis for patients with aggressive malignant tumors => they must receive oncological treatment in a timely manner**
- ❖ **Return in a Rehabilitation Center for follow-up after oncological treatment (current whereabouts are unknown for the 4 patients)**

Practical take-home message

!!!no tumor staging – therapy with physical agents not initiated

Physical and rehabilitation medicine:

- ***should bridge acute oncology to long-term disability/palliative care***
- **In neuro-oncology patients PRM should focus on functional adaptation, compensation, and quality of life rather than on the complete restitution.**

**THANK YOU
FOR YOUR
ATTENTION**

