

COMPLEX MULTIMORBIDITY WITH DIAGNOSIS HURDLES BUT WITH FAVORABLE REHABILITATIVE OUTCOMES IN AN OLD ADULT PATIENT

Andreea-Iulia Vlădulescu-Trandafir^{1,2}, Andreea-Valentina Suciu^{1,2}, Ruxandra-Luciana Postoiu^{1,2}, Gelu Onose^{1,2}

*¹The Teaching Emergency Hospital “Bagdasar-Arseni
(TEHBA), Bucharest, Romania*

*²The University of Medicine and Pharmacy “Carol Davila”
(UMFCD), Bucharest, Romania*

Disclosure statement

I have no actual or potential conflict of interest in relation to this program/presentation.

Introduction

- ❖ **Stroke is the second-leading cause of death worldwide and the third-leading cause of death and disability (including, but not limited to: immobilization, functional decline, and progressive deconditioning) combined [1,2].**
- ❖ Early rehabilitation is essential to prevent complications associated with prolonged bed rest, including respiratory dysfunction, pressure ulcers, muscle wasting, and thromboembolic events [3,4].
- ❖ However, the clinical course of these patients is often complicated by intercurrent medical conditions that may limit both the intensity and continuity of rehabilitation [2-4].

1. Naghavi M, Kyu HH, Bhoomadevi A, Aalipour MA, Aalruz H, Ababneh HS, et al. Global burden of 292 causes of death in 204 countries and territories and 660 subnational locations, 1990–2023: a systematic analysis for the Global Burden of Disease Study 2023. The Lancet. 2025 Oct 18;406(10513):1811–72. doi:10.1016/S0140-6736(25)01917-8 PubMed PMID: 41092928.
2. Feigin VL, Stark BA, Johnson CO, Roth GA, Bisignano C, Abady GG, et al. Global, regional, and national burden of stroke and its risk factors, 1990-2019: A systematic analysis for the Global Burden of Disease Study 2019. Lancet Neurol. 2021 Oct 1;20(10):1–26. doi:10.1016/S1474-4422(21)00252-0 PubMed PMID: 34487721.
3. Green TL, McNair ND, Hinkle JL, Middleton S, Miller ET, Perrin S, et al. Care of the Patient With Acute Ischemic Stroke (Posthyperacute and Prehospital Discharge): Update to 2009 Comprehensive Nursing Care Scientific Statement: A Scientific Statement From the American Heart Association. Stroke. 2021 May 1;52(5):E179–97. doi:10.1161/STR.0000000000000357 PubMed PMID: 33691469.
4. Mao YX, Zhang Y, Wen YH, Hu C. Effects of evidence-based early mobilization on prognostic outcomes in older patients with acute ischemic stroke. Front Public Health. 2026 Mar 16;14:1774045. doi:10.3389/FPUH.2026.1774045

Introduction

- ❖ Secondary prevention strategies after stroke, particularly antiplatelet therapy, are essential to reduce the risk of recurrent ischemic events, **especially in patients with significant cardiovascular and metabolic comorbidities, such as prior myocardial infarction with coronary stenting and diabetes (silent angina) [5,6].**
- ❖ However, these treatments significantly increase the risk of bleeding, especially in vulnerable patients [7,8]. This balance becomes even more complex in the presence of hematological abnormalities, which limit both therapeutic options and the safety of rehabilitation interventions [8,9].

5. Kleindorfer DO, Towfighi A, Chaturvedi S, Cockcroft KM, Gutierrez J, Lombardi-Hill D, Kamel H, Kernan WN, Kittner SJ, Leira EC, et al. 2021 Guideline for the prevention of stroke in patients with stroke and transient ischemic attack: a guideline from the American Heart Association/American Stroke Association. *Stroke*. 2021;52:e364–e467. doi: 10.1161/STR.0000000000000375

6. Diener, H, Hankey, G. Primary and Secondary Prevention of Ischemic Stroke and Cerebral Hemorrhage: JACC Focus Seminar. *JACC*. 2020 Apr, 75 (15) 1804–1818. <https://doi.org/10.1016/j.jacc.2019.12.072>

7. Hilken NA, Algra A, Diener HC, Bath PM, Csiba L, Hacke W, Kappelle LJ, Koudstaal PJ, Leys D, Mas JL, Sacco RL, Greving JP. Balancing Benefits and Risks of Long-Term Antiplatelet Therapy in Noncardioembolic Transient Ischemic Attack or Stroke. *Stroke*. 2021 Oct;52(10):3258–3265. doi: 10.1161/STROKEAHA.120.031755. Epub 2021 Jul 26. PMID: 34304604; PMCID: PMC8478107.

8. Lip GYH, Lane DA, Lenarczyk R, Boriani G, Doehner W, Benjamin LA, Fisher M, Lowe D, Sacco RL, Schnabel R, Watkins C, Ntaios G, Potpara T. Integrated care for optimizing the management of stroke and associated heart disease: a position paper of the European Society of Cardiology Council on Stroke. *Eur Heart J*. 2022 Jul 7;43(26):2442–2460. doi: 10.1093/eurheartj/ehac245. PMID: 35552401; PMCID: PMC9259378.

9. Mingot-Castellano ME, Álvarez Román MT, Bastida JM, Butta N, Caballero Navarro G, Canaro Hirnyk M, Entrena Ureña L, Gómez Del Castillo Solano MDC, Ramirez Lopez A, Sánchez González B, Valcarcel Ferreira D, Pascual Izquierdo C. Navigating the Hemostatic Balance: Anticoagulation and Antiplatelet Therapy in Patients with Thrombocytopenia. *J Clin Med*. 2026 Mar 17;15(6):2273. doi: 10.3390/jcm15062273. PMID: 41899195;

Materials and Methods

Ethics: Approval of the Ethics Committee (no. 10088/27.02.2026) and informed consent obtained from the patient and his family, including consent for data use in accordance with General Data Protection Regulation (GDPR);

Design: prospective single-patient descriptive case report;

Setting: Neuromuscular Rehabilitation Clinic, Emergency Hospital “*Bagdasar-Arseni*”, Bucharest;

Patient & data collection: Clinical, imaging, and laboratory data were prospectively collected from medical records and interdisciplinary evaluations; the patient was longitudinally followed across multiple admissions

Case presentation

75-year-old male

Reason for admission:

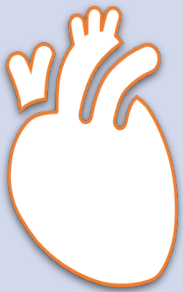
- left hemiparesis;
- mild liquid dysphagia;
- immobility-related deconditioning;
- severe locomotor deficit, all following recurrent right parietal ischemic strokes.

Baseline functional status:

Bed-confined, dependent for basic activities.

Congresul Național de Medicină Fizică, de Recuperare și Balneoclimatologie

PERSONAL PATHOLOGIC HISTORY



Cardiovascular

- chronic ischemic heart disease (post-MI, 3 stents);
- chronic cardiac failure;
- arterial hypertension



Metabolic

- type 2 diabetes
- dyslipidemia



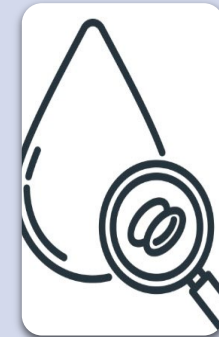
Neurologic

- multiple ischemic strokes
- vascular epilepsy
- neurocognitive impairment



Gastro-intestinal

colonic angiodysplasia



Hematological

pancytopenia
(under evaluation)

OBJECTIVE EXAMINATION UPON ADMISSION

General status: moderate

Skin and mucosa: pale; multiple lower limb excoriations; ecchymosis at the left knee

Adipose tissue: increased abdominal adiposity

Lymphatic system: superficial lymph nodes are non-palpable and non-tender

Respiratory system: vesicular breath sounds bilaterally, no pulmonary rales; SpO₂ 98% on room air

Cardiovascular system: pulse 72 bpm; blood pressure 110/80 mmHg; regular heart sounds, no murmurs

Digestive system: abdomen distended due to adipose panniculus, non-tender, mobile with respiration; liver and spleen within normal limits

Genitourinary system: kidneys non-palpable; spontaneous voiding.

Neuro-mio-arto-kinetic (NMAK) EXAMINATION

Mental status: conscious, partially oriented; no meningeal signs

Cranial nerves: no abnormalities;

Motor function:

- Muscle strength: MRC 4/5 in the left upper and lower limbs
- No evident sensory deficits (difficult to assess)
- Decreased muscle tone

Posture: Abnormal left lower limb positioning: hip in abduction and external rotation, irreducible knee flexion (15°);

Reflexes: Osteotendinous reflexes within normal limits

No spasticity

Functional status: bed-confined;

NMAK EXAMINATION

Scale	Admission
FIM - cognitive	25/35
FIM - motor	30/91
Modified Rankin Scale	5/5
FAC	0/5
Barthel Index	20/100
GOS-E	3/8
ADL	2/6
QoL	63/112

Table 1 – Objective evaluation at admission; Abbreviations: **ADL**: Activities of Daily Living, **FAC** Functional Ambulation Category, **FIM**: Functional Independence Measure, **GOS-E**: Glasgow Outcome Scale – Extended, **QoL**: Quality of Life

LABORATORY FINDINGS - A fragile balance at admission

Parameter	Value	Unit	Interpretation
Hemoglobin	11.2 ↓	g/dL	Mild Anemia
MCV	93.7	fL	Normocytic
MCHC	34.1	g/dL	Normochromic
Iron	66	μg/dL	Low-normal
RBC	3.5 ↓	×10 ⁶ /μL	Mild erythropenia
WBC	4.4 ↓	×10³/μL	Mild Leukopenia
Platelets	43 ↓↓↓	×10³/μL	Severe thrombocytopenia
Neutrophils	2.0 ↓	×10 ³ /μL	Mild Neutropenia
Lymphocytes	1.2 ↓	×10 ³ /μL	Mild Lymphopenia
Monocytes	1.1 ↑	×10 ³ /μL	Mild Monocytosis
ESR	78 ↑	mm/h	Inflammation (?)
Albumin	3.3 ↓	g/dL	Mild Hypoalbuminemia
Magnesium	0.7 ↓↓↓	mg/dL	Severe hypomagnesemia

Table 2 – Pathologic laboratory findings at admission; Abbreviations: ESR – Erythrocyte Sedimentation Rate; Hb – Hemoglobin; MCH – Mean Corpuscular Hemoglobin; MCHC – Mean Corpuscular Hemoglobin Concentration; MCV – Mean Corpuscular Volume; PLT – Platelets; RBC – Red Blood Cells; WBC – White Blood Cells.

Hematologic findings

- Bone marrow findings:
 - ☐ Hypercellular marrow (~80%)
 - ☐ Erythroblastic hyperplasia
 - ☐ Macro/megaloblastoid changes
 - ☐ No clear malignant pattern
- Erythropoietin ↑ (34.8 mUI/mL)
- B12 vitamin, folate – normal
- Immunogram – normal
- Infectious disease screening - normal

Persistent pancytopenia without a definitive cause

A new problem emerges: a bleeding event

- **Fever (38°C) with chills**
 - **Melena**
 - **Emergency surgical consult** -> indication for urgent upper GI endoscopy
 - **Management initiated:**
 - Transfusion: **2 units** Packed Red Blood Cells + **2 units plasma**
 - Hemostatic treatment
 - Hemodynamic and biological monitoring
- Further evaluation:** Colonoscopy (after bowel preparation)

**Acute gastrointestinal bleeding in a patient
with pre-existing pancytopenia**

LABORATORY FINDINGS DURING BLEEDING EVENT

Parameter	Value	Unit	Interpretation
Hemoglobin	7.3 ↓↓↓	g/dL	Severe anemia
RBC	2.34 ↓	×10 ⁶ /μL	Moderate erythropenia
MCV	95.8 ↑	fL	Macrocytic
MCHC	32.7	g/dl	Normochromic pattern
Iron	26 ↓	μg/dL	Iron deficiency (bleeding-related)
WBC	2.7 ↓	×10³/μL	Severe leukopenia
Neutrophils	1.0 ↓	×10³/μL	Severe neutropenia
Lymphocytes	0.5 ↓↓	×10³/μL	Severe lymphopenia
Monocytes	1.1 ↑	×10 ³ /μL	Mild monocytosis
Platelets	78 ↓	×10³/μL	Severe Thrombocytopenia
ESR	110 ↑↑	mm/h	Marked elevation (multifactorial)
CRP	64.8 ↑↑	mg/L	Acute inflammation

Table 3 – Pathological laboratory findings during bleeding event; Abbreviations: CRP – C-Reactive Protein; ESR – Erythrocyte Sedimentation Rate; Hb – Hemoglobin; MCHC – Mean Corpuscular Hemoglobin Concentration; MCV – Mean Corpuscular Volume; RBC – Red Blood Cells; WBC – White Blood Cells.

A new problem emerges

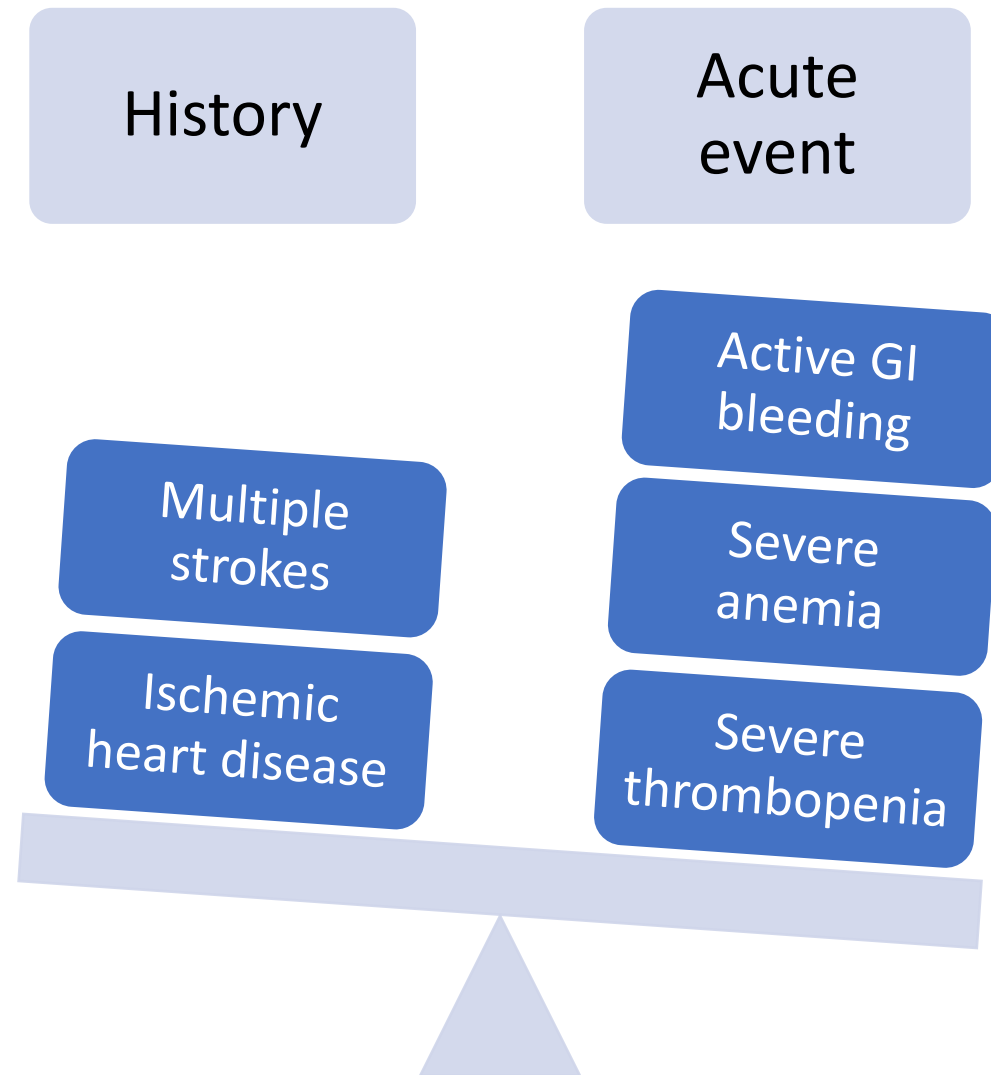
Upper GI endoscopy:

- erosive-hemorrhagic gastro-duodenitis
- superficial ulcers with a hemorrhagic base

Active bleeding source identified

Rehabilitation interrupted → emergency transfer to
General Surgery

The therapeutic dilemma: Antiplatelet therapy vs. bleeding risk



INTERNATIONAL GUIDELINE CONSENSUS ¹⁰⁻¹⁵ - during active GI bleeding –

1. **Temporary interruption of antithrombotic therapy** (clinically significant bleeding ± thrombocytopenia)
2. **Aspirin (secondary prevention): withheld in high-risk bleeding, otherwise maintained**
3. **Platelet transfusion:**
 - <30 ×10⁹/L (bleeding);
 - <50 ×10⁹/L (if endoscopy required);
4. **Supportive management:**
 - endoscopic hemostasis
 - hemodynamic stabilization
 - mechanical venous thrombosis prophylaxis

10. Abraham, N. S., Barkun, A. N., Sauer, B. G., Douketis, J., Laine, L., Noseworthy, P. A., Telford, J. J., & Leontiadis, G. I. (2022). American College of Gastroenterology-Canadian Association of Gastroenterology Clinical Practice Guideline: Management of Anticoagulants and Antiplatelets During Acute Gastrointestinal Bleeding and the Periendoscopic Period. *The American journal of gastroenterology*, 117(4), 542–558. <https://doi.org/10.14309/ajg.0000000000001627>
11. Arnold MJ. Antithrombotic Medication Management in GI Bleeding: Guidelines From the ACG. *Am Fam Physicians*. 2023 May;107(5):552–3.
12. Scott, M.J., Veitch, A. and Thachil, J. (2017), Reintroduction of anti-thrombotic therapy after a gastrointestinal haemorrhage: if and when?. *Br J Haematol*, 177: 185-197. <https://doi.org/10.1111/bjh.14599>
13. Milling TJ, Refaai MA, Sengupta N. Anticoagulant Reversal in Gastrointestinal Bleeding: Review of Treatment Guidelines. *Digestive Diseases and Sciences* 2021 66:11. 2021 Jan 6;66(11):3698–714. doi:10.1007/S10620-020-06728-Y
14. Andreotti F, Geisler T, Collet JP, Gigante B, Gorog DA, Halvorsen S, et al. Acute, periprocedural and longterm antithrombotic therapy in older adults: 2022 Update by the ESC Working Group on Thrombosis. *Eur Heart J*. 2023 Jan 21;44(4):262–79. doi:10.1093/EURHEARTJ/EHAC515 PubMed PMID: 36477865.
15. Sengupta N, Feuerstein JD, Jairath V, Shergill AK, Strate LL, Wong RJ, et al. Management of Patients With Acute Lower Gastrointestinal Bleeding: An Updated ACG Guideline. *American Journal of Gastroenterology*. 2023 Feb 1;118(2):208–31. doi:10.14309/AJG.0000000000002130 PubMed PMID: 36735555.

INTERNATIONAL GUIDELINE CONSENSUS ¹⁰⁻¹⁵ - after bleeding control -

Aspirin (secondary prevention): early resumption (same day–≤3 days)

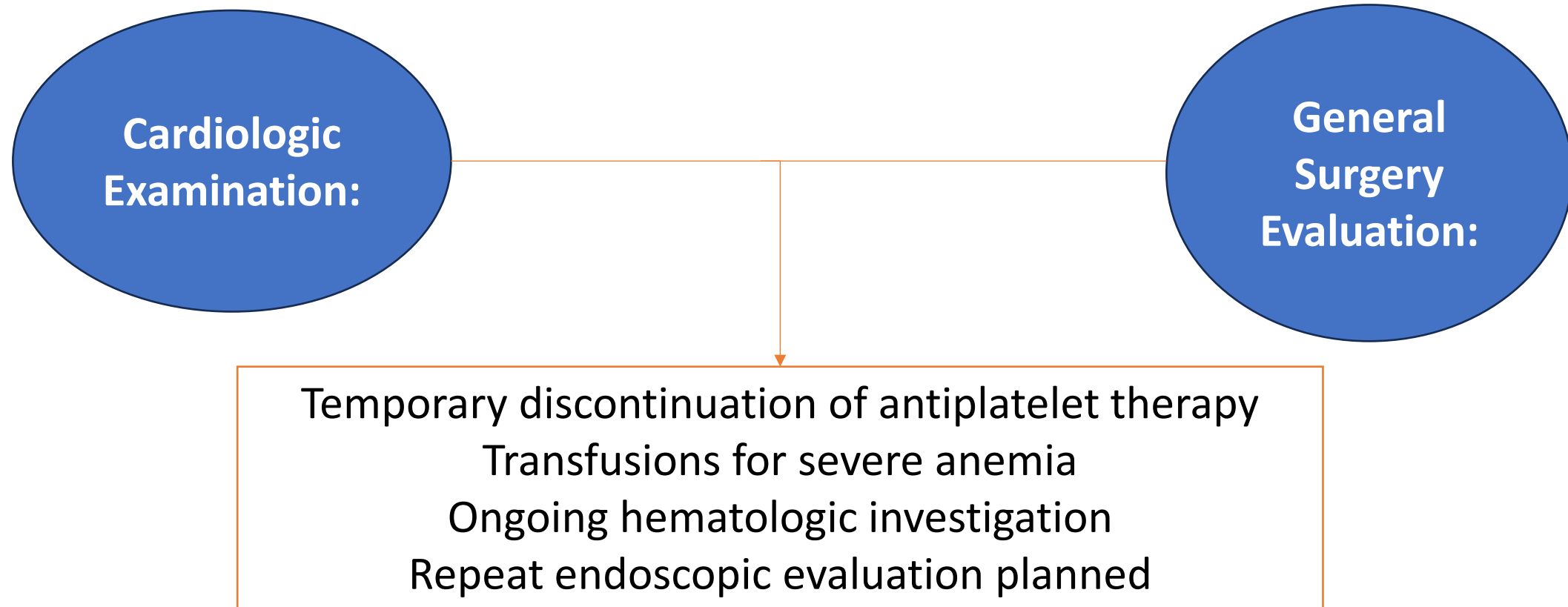
Anticoagulation: delayed resumption (15–30 days), but individualized according to thrombotic risk

High-risk patients (stents, stroke): mandatory multidisciplinary decision

The fundamental principle across all guidelines remains: individualized, multidisciplinary decision-making weighing thrombotic versus hemorrhagic risk, with no single "correct" answer applicable to all patients.

10. Abraham, N. S., Barkun, A. N., Sauer, B. G., Douketis, J., Laine, L., Noseworthy, P. A., Telford, J. J., & Leontiadis, G. I. (2022). American College of Gastroenterology-Canadian Association of Gastroenterology Clinical Practice Guideline: Management of Anticoagulants and Antiplatelets During Acute Gastrointestinal Bleeding and the Periendoscopic Period. *The American journal of gastroenterology*, 117(4), 542–558. <https://doi.org/10.14309/ajg.0000000000001627>
11. Arnold MJ. Antithrombotic Medication Management in GI Bleeding: Guidelines From the ACG. *Am Fam Physicians*. 2023 May;107(5):552–3.
12. Scott, M.J., Veitch, A. and Thachil, J. (2017), Reintroduction of anti-thrombotic therapy after a gastrointestinal haemorrhage: if and when?. *Br J Haematol*, 177: 185-197. <https://doi.org/10.1111/bjh.14599>
13. Milling TJ, Refaai MA, Sengupta N. Anticoagulant Reversal in Gastrointestinal Bleeding: Review of Treatment Guidelines. *Digestive Diseases and Sciences* 2021 66:11. 2021 Jan 6;66(11):3698–714. doi:10.1007/S10620-020-06728-Y 14
- Andreotti F, Geisler T, Collet JP, Gigante B, Gorog DA, Halvorsen S, et al. Acute, periprocedural and longterm antithrombotic therapy in older adults: 2022 Update by the ESC Working Group on Thrombosis. *Eur Heart J*. 2023 Jan 21;44(4):262–79. doi:10.1093/EURHEARTJ/EHAC515 PubMed PMID: 36477865.
15. Sengupta N, Feuerstein JD, Jairath V, Shergill AK, Strate LL, Wong RJ, et al. Management of Patients With Acute Lower Gastrointestinal Bleeding: An Updated ACG Guideline. *American Journal of Gastroenterology*. 2023 Feb 1;118(2):208–31. doi:10.14309/AJG.0000000000002130 PubMed PMID: 36735555.

Multidisciplinary Efforts



GENERAL SURGERY ADMISSION

Successful endoscopic hemostasis achieved

Favorable clinical and biological evolution

Hemodynamic stabilization

No further evidence of active bleeding

**Patient transferred back to the Neuromuscular
Rehabilitation Clinic**

The End?

Recurrent melena during bowel preparation (Fortrans) + **severe hemoglobin drop** -
Hb 5.8 g/dL -

Emergency Upper GI endoscopy: no active bleeding source

Emergency Colonoscopy: transverse colonic angiodysplasia, superficial ulcers with a hemorrhagic base – hemostasis;

Requirement for transfusion support and hemostatic therapy

Antiplatelet therapy stopped

ANOTHER SETBACK: TRANSIENT NEUROLOGICAL DETERIORATION

Acute and transient confusional state

Patient-reported fall (not witnessed)

Symptoms: headache, vertigo

Neurological evaluation: no focal deficit; findings consistent with an acute confusional state

CT scan: **no acute intracranial lesions**

Transient confusional episode without structural correlate, likely multifactorial (age, cerebrovascular disease, anemia, metabolic stress)

REHABILITATION STRATEGY UNDER CLINICAL INSTABILITY

Despite setbacks, rehabilitation was initiated **early**, adapted during acute complications **and maintained whenever clinically feasible**.

Physical Therapy -Objectives

1. Prevention of complications in a biologically fragile patient (deconditioning, multiple setbacks and comorbidities)
2. **Safe progressive mobilization under biological instability** (pancytopenia, bleeding risk)
3. **Restoration of basic functional independence** (bed mobility, sitting, transfers)
4. **Reconditioning for orthostatism and gait initiation**
5. **Improvement of swallowing and nutritional status**
6. **Maintenance of joint mobility and prevention of abnormal postures**

REHABILITATION INTERVENTIONS

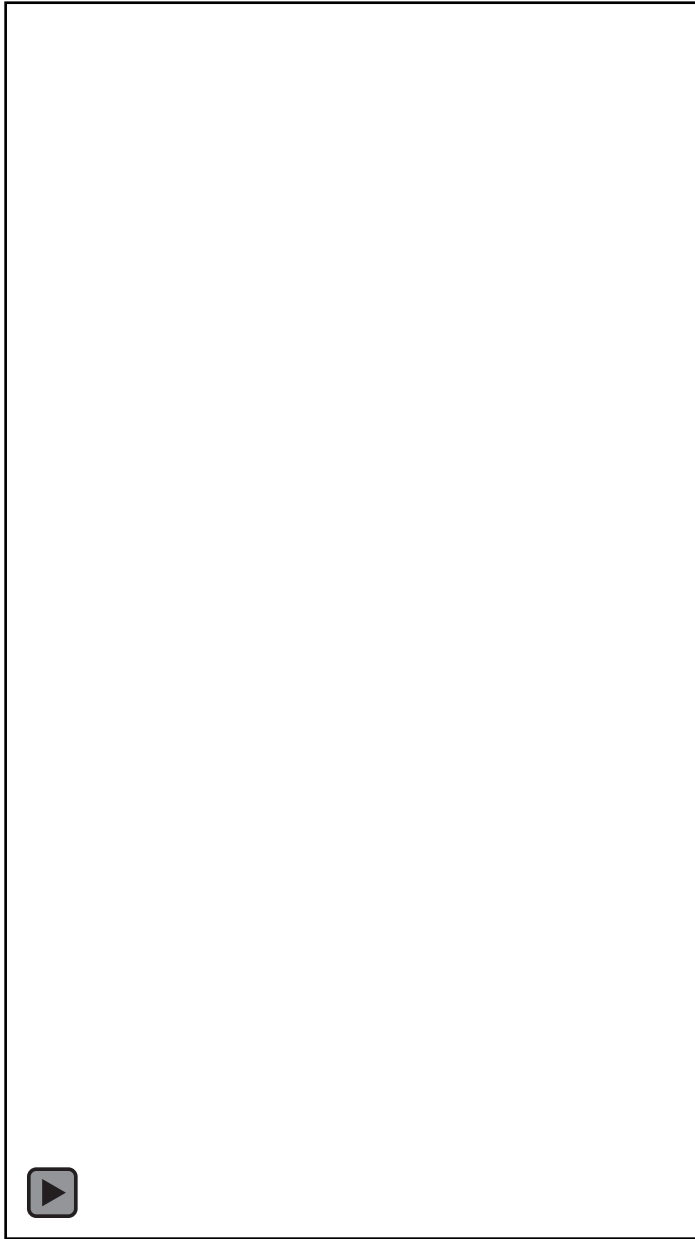
Nursing care: respiratory support and pressure ulcer prevention;

Passive mobilizations that prevent joint ankylosis, maladaptive postures and support venous return;

- **Postures** - avoiding retractions and vicious positions;
- **Active mobilizations:** starting passive-active movements, active-assisted, and active with progressive resistance; isometric and gravity-eliminated exercises.
- **Gradual readaptation** from the lying position to the sitting position, at the beginning with the lower legs extended - sitting elongated, then to the short sitting position - lower legs at the edge of the bed

REHABILITATION INTERVENTIONS

- Transfer to a wheelchair;
- Upper and lower limb training;
- Walking between parallel bars;
- Assisted gait training (~20 m with frame).



FUNCTIONAL EVOLUTION (ADMISSION → DISCHARGE)

Scale	admission	discharge
FIM - cognitive	25/35	30/35
FIM - motor	30/91	55/91
Modified Rankin Scale	5/5	3/5
FAC	0/5	3/5
Barthel Index	20/100	55/100
GOS-E	3/8	5/8
ADL	2/6	4/6
QoL	63/112	80/112

Table 4 – Comparative objective evaluation at admission; Abbreviations: **ADL**: Activities of Daily Living, **FAC** Functional Ambulation Category, **FIM**: Functional Independence Measure, **GOS-E**: Glasgow Outcome Scale – Extended, **QoL**: Quality of Life

Ad vitam prognosis and ad functionem outcomes

Functional and vital outcomes largely depend on sustained rehabilitation and the avoidance of further complications.



TAKE-HOME MESSAGES

- ❖ **Rehabilitation should not be delayed in complex patients - it must be early, continuous, and adapted**
- ❖ **Intercurrent complications are frequent, but do not preclude functional rehabilitation**
- ❖ **Multidisciplinary decision-making is essential, especially in high-risk situations (bleeding vs. thrombosis)**
- ❖ **Consistency of rehabilitation outweighs intensity; even low-intensity interventions have an impact when sustained**



Rehabilitation after Systemic Stress and Multisystem Injury: Bridging Neurological and Musculoskeletal Impairments

Sectia Clinica Recuperare Neuromusculara



SPITALUL CLINIC DE URGENTA
"BAGDASAR-ARSENI"

THANK YOU!

Contact:



andreea-iulia.trandafir@drd.umfcd.ro