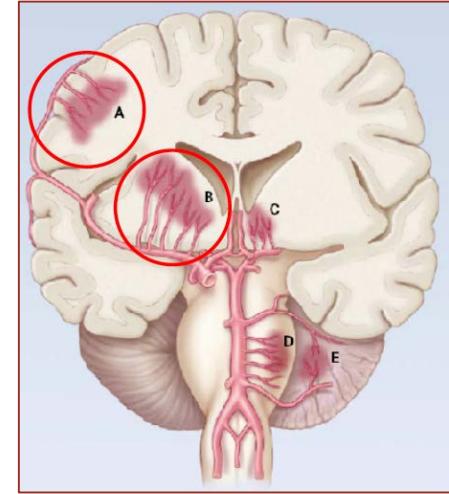


Centre cérébrovasculaire

**Symposium annuel
"Hémorragies
intracrâniennes :
State of the Art"**

Jeudi 4 octobre 2018



Hémorragie intracérébrale. *Prise en charge médicale, indications chirurgicales*

Mauro Oddo

**Service de Médecine Intensive Adulte,
CHUV, Lausanne**

ICH is a medical emergency

Initial evaluation and clinical stabilization

ABC' s

- Initial assessment and stabilization of airway patency, breathing, and circulation.

Neuroimaging

- Once clinical stability is achieved, an urgent imaging study for rapid and accurate diagnosis should be performed.

Standardized neurologic assessment

- To determine baseline severity
- Frequent neurological examinations, at least every hour, to detect early clinical deterioration and signs of increased intracranial pressure (ICP)

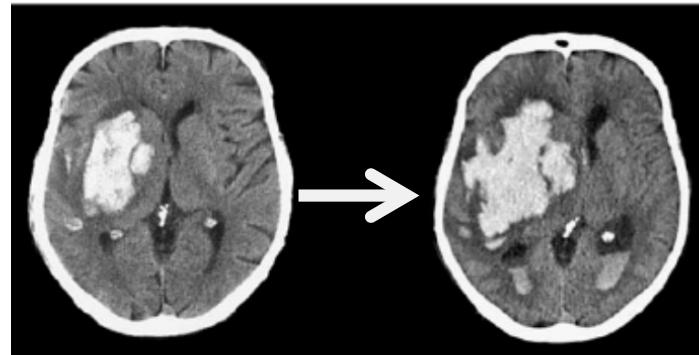
ABP, coagulation, surgery

- Blood pressure management,
- Reversal of coagulopathy, and
- Evaluation of the need for early surgical intervention.

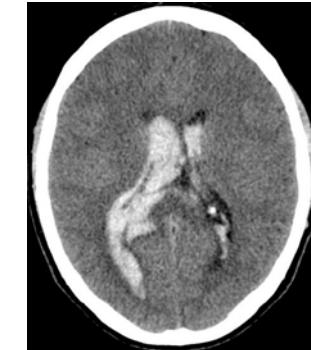
Emergency neurological life support: intracerebral hemorrhage. Neurocrit Care. 2015;23 Suppl 2:83–93.

❖ PATHOPHYSIOLOGY

- ❖ HEMATOMA SIZE
- ❖ HEMATOMA EXPANSION



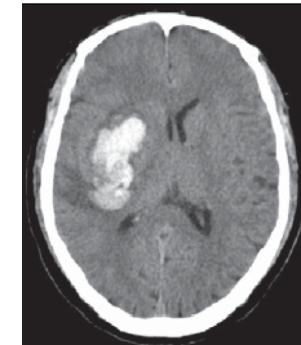
- ❖ HYDROCEPHALUS
- ❖ INTRAVENTRICULAR HEMORRHAGE



- ❖ OEDEMA
- ❖ MASS EFFECT



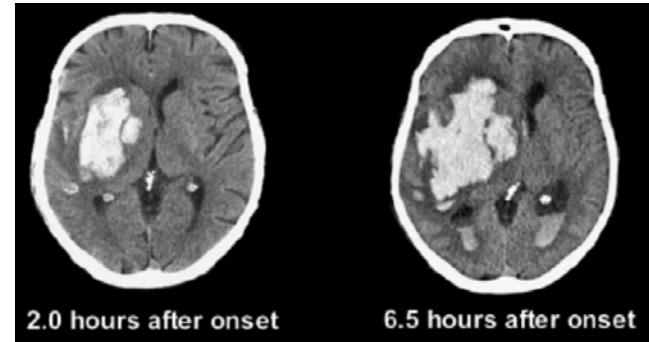
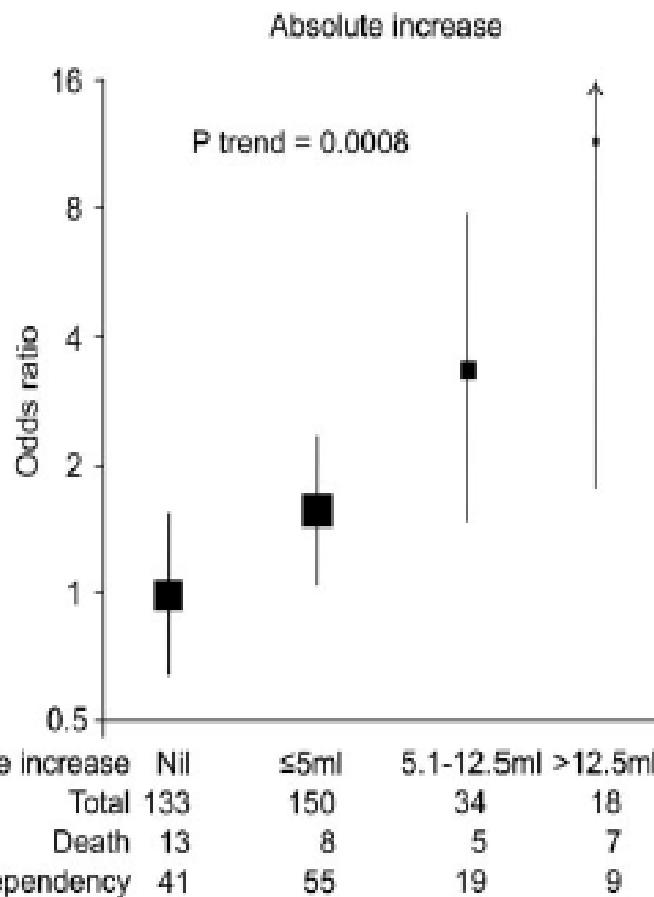
- ❖ SEIZURES



❖ HEMATOMA EXPANSION

Hematoma growth and outcomes in intracerebral hemorrhage

The INTERACT1 study



AOR for unfavorable outcome

Del Court C Neurology 2012

Implications of the “spot sign” (CT-angio)

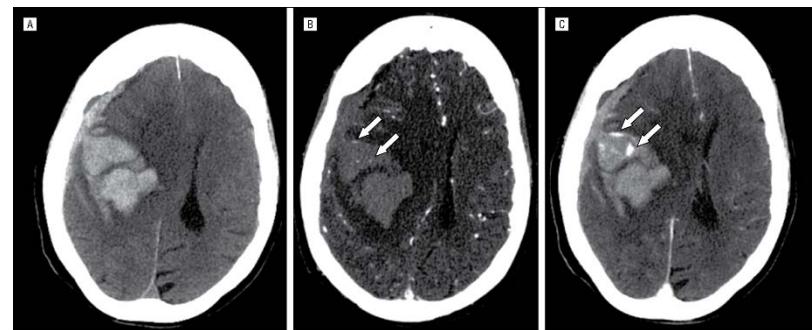
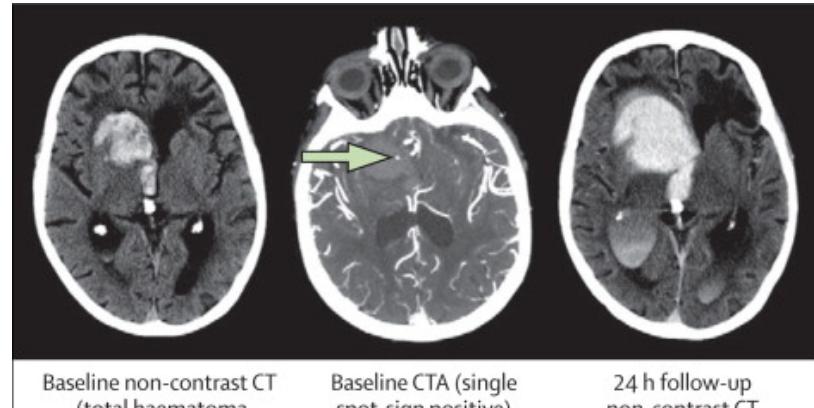
Potent and independent predictor of hematoma expansion

- Relative risk of 2.3 for hematoma expansion

Is associated with both functional outcome and mortality

- Median 3-month mRS of 5 vs. 3 in spot sign negative patients

More aggressive treatment to reduce hematoma expansion



❖ HEMATOMA EXPANSION: hemostatic agents

Guideline for Reversal of Antithrombotics in Intracranial Hemorrhage: Executive Summary. A Statement for Healthcare Professionals From the Neurocritical Care Society and the Society of Critical Care Medicine



Jennifer A. Frontera, MD, FNCS¹; John J. Lewin III, PharmD, MBA, FASHP, FCCM, FNCS²;

Alejandro A. Rabinstein, MD, FNCS³; Imo P. Aisiku, MD, MBA, FCCP⁴;

Anne W. Alexandrov, PhD, RN, ANVP-BC, FAAN^{5,6}; Aaron M. Cook, PharmD, BCPS⁷;

Gregory J. del Zoppo, MD, MS⁸; Monisha Kumar, MD⁹; Ellinor I. B. Peerschke, PhD, FAHA¹⁰;

Michael F. Stiefel, MD, PhD¹¹; Jeanne S. Teitelbaum, MD^{12,13}; Katja E. Wartenberg, MD¹⁴;

Cindy L. Zerfoss, MSN, RN, ACNP-BC¹⁵

Crit Care Med 2016; 44:2251–2257

- **Prothrombin Complex Concentrates > Fresh Frozen Plasma**

Prothromplex® 25-50 U/kg
Beriplex®

- **dabigatran reversal**

Praxbind® 2.5 mg x 2

- **rivaroxaban, apixaban reversal**

FDA approved 7 May 2018

- **limit platelet transfusion**

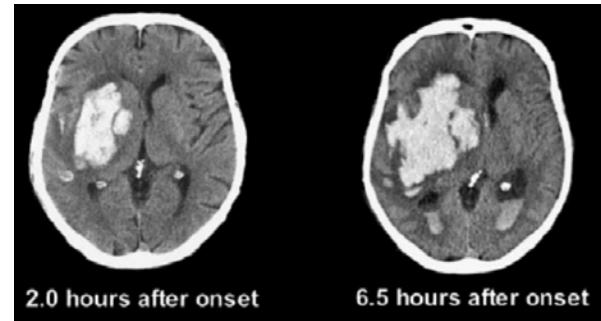


❖ HEMATOMA EXPANSION: blood pressure control

Guidelines for the Management of Spontaneous Intracerebral Hemorrhage

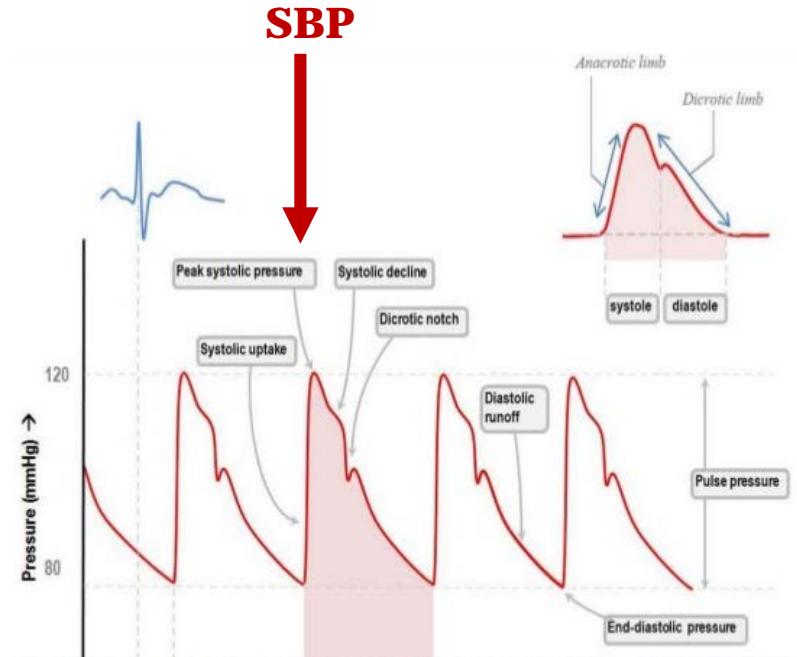
A Guideline for Healthcare Professionals From the American Heart Association/American Stroke Association

Stroke. 2015;46:2032-2060



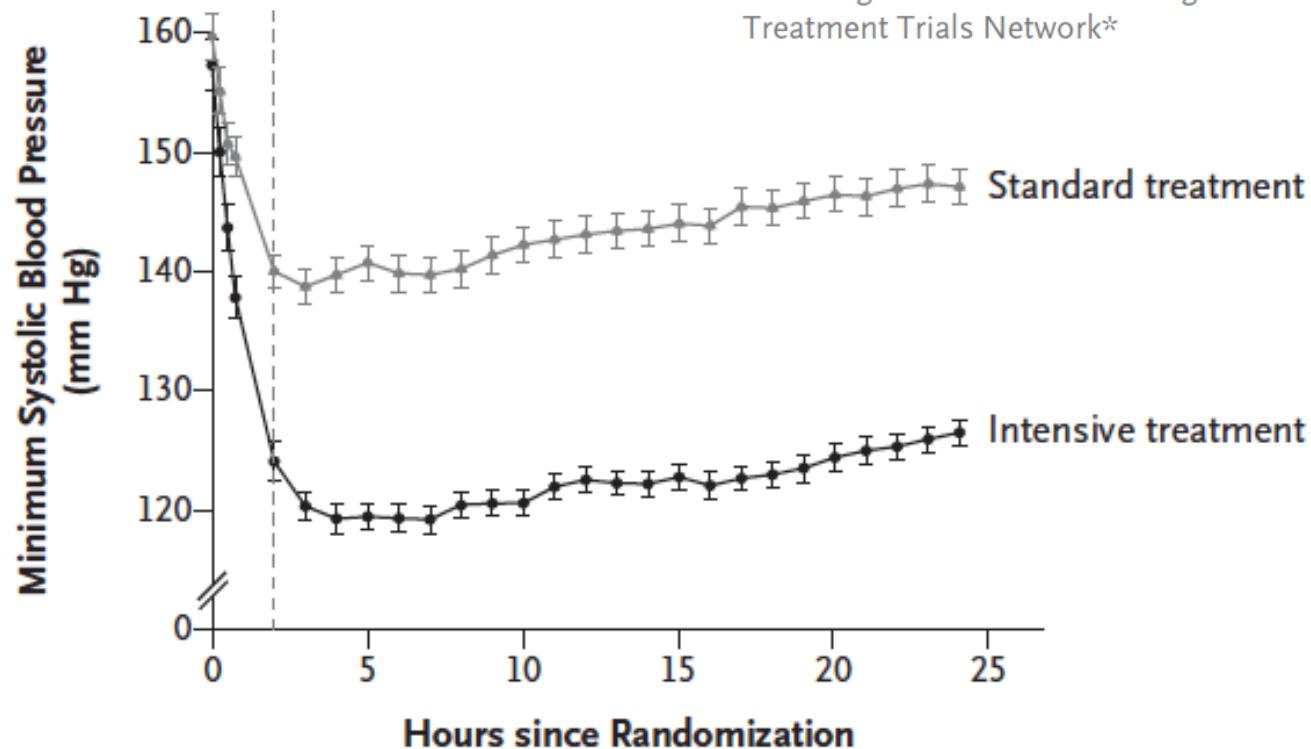
BP: Recommendations

1. For ICH patients presenting with SBP between 150 and 220 mmHg and without contraindication to acute BP treatment, acute lowering of SBP to 140 mmHg is safe (*Class I; Level of Evidence A*) and can be effective for improving functional outcome (*Class IIa; Level of Evidence B*). (Revised from the previous guideline)
2. For ICH patients presenting with SBP >220 mmHg, it may be reasonable to consider aggressive reduction of BP with a continuous intravenous infusion and frequent BP monitoring (*Class IIb; Level of Evidence C*). (New recommendation)



Intensive Blood-Pressure Lowering in Patients with Acute Cerebral Hemorrhage

Adnan I. Qureshi, M.D., Yuko Y. Palesch, Ph.D., William G. Barsan, M.D.,
Daniel F. Hanley, M.D., Chung Y. Hsu, M.D., Renee L. Martin, Ph.D.,
Claudia S. Moy, Ph.D., Robert Silbergleit, M.D., Thorsten Steiner, M.D.,
Jose I. Suarez, M.D., Kazunori Toyoda, M.D., Ph.D., Yongjun Wang, M.D.,
Haruko Yamamoto, M.D., Ph.D., and Byung-Woo Yoon, M.D., Ph.D.,
for the ATACH-2 Trial Investigators and the Neurological Emergency
Treatment Trials Network*

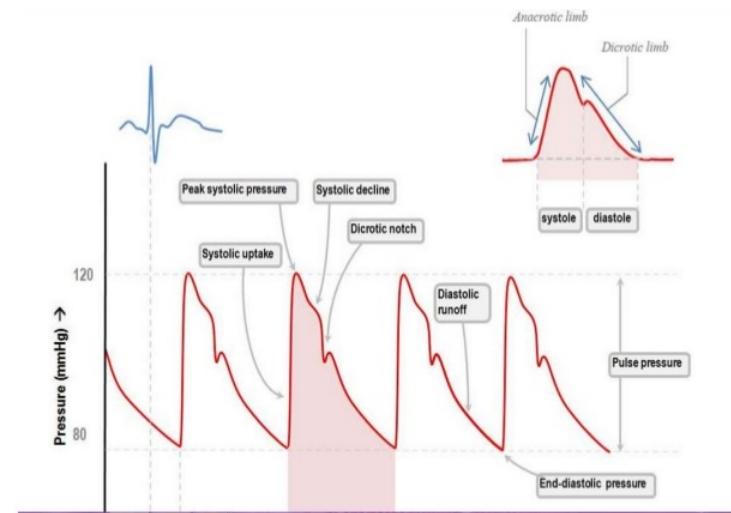
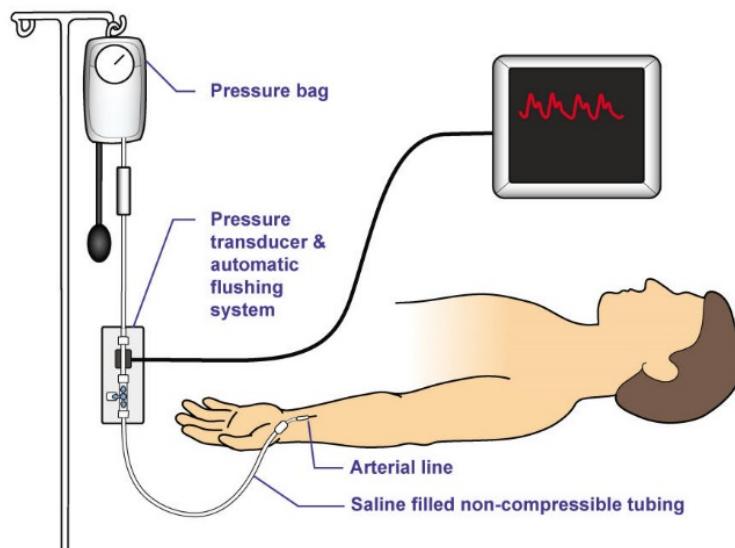


- The rate of renal adverse events was significantly higher in the intensive-treatment group than in the standard-treatment group (9.0% vs. 4.0%, $P = 0.002$).

❖ HEMATOMA EXPANSION: blood pressure control

Minerva Anestesiologica 2017 April;83(4):412-21
 DOI: 10.23736/S0375-9393.16.11696-7

PATHOLOGY	TARGETS	TIMING	MONITORING	TREATMENT
SAH	SBP <160 mmHg	immediately, until aneurysm is secured	invasive MAP	
ICH	SBP 140-160 mmHg	within 6 hrs	invasive MAP	nicardipine labetalol
AIS	SBP <180 mmHg	within 6 hrs, and for at least 24 hrs	non-invasive MAP invasive MAP	

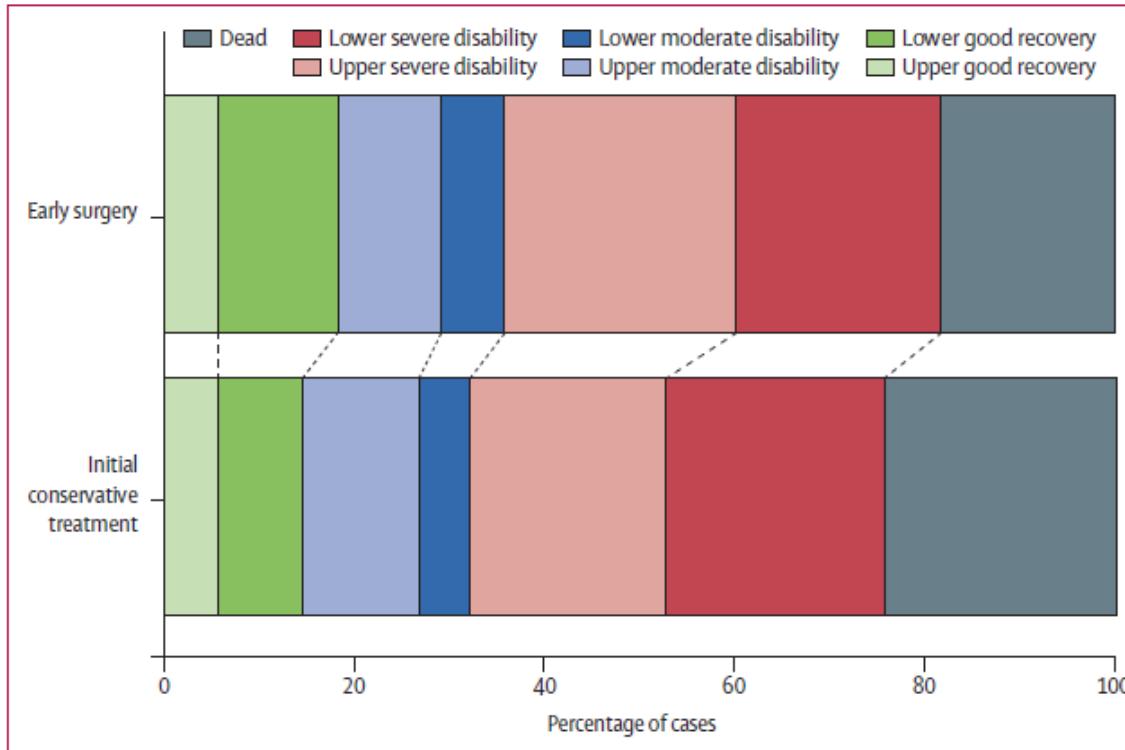


❖ HEMATOMA SIZE & LOCATION: “early” surgery

Early surgery versus initial conservative treatment in patients with spontaneous supratentorial lobar intracerebral haematomas (STICH II): a randomised trial

Lancet 2013; 382: 397-408

A David Mendelow, Barbara A Gregson, Elise N Rowan, Gordon D Murray, Anil Ghokar, Patrick M Mitchell, for the STICH II Investigators

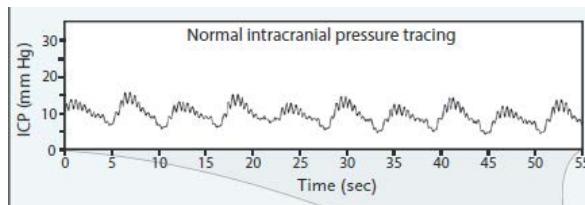
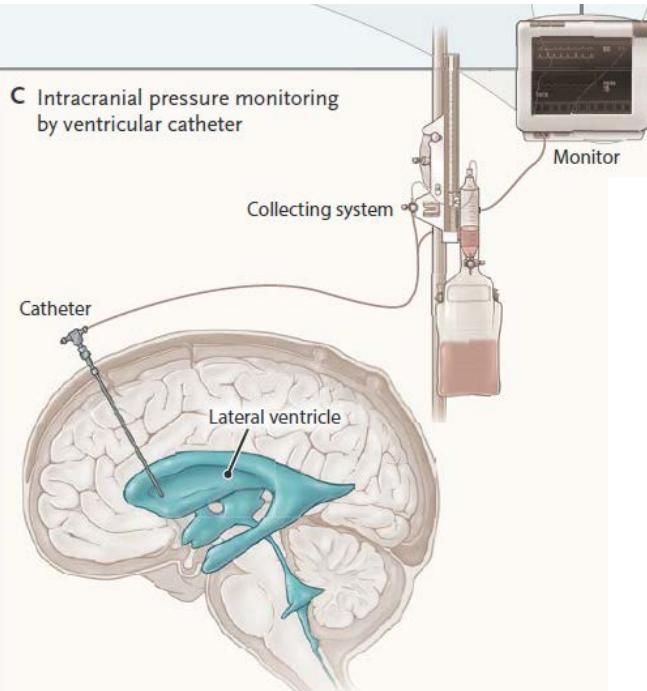


Interpretation The STICH II results confirm that early surgery does not increase the rate of death or disability at 6 months and might have a small but clinically relevant survival advantage for patients with spontaneous superficial intracerebral haemorrhage without intraventricular haemorrhage.

Surgical Treatment of ICH: Recommendations

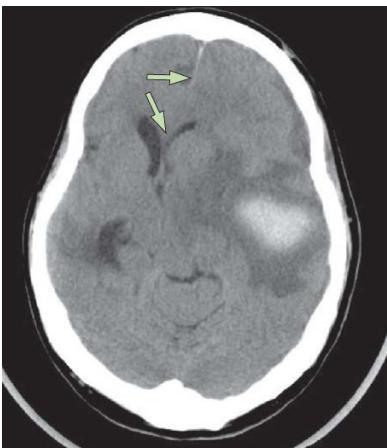
1. Patients with cerebellar hemorrhage who are deteriorating neurologically or who have brainstem compression and/or hydrocephalus from ventricular obstruction should undergo surgical removal of the hemorrhage as soon as possible (*Class I; Level of Evidence B*). Initial treatment of these patients with ventricular drainage rather than surgical evacuation is not recommended (*Class III; Level of Evidence C*). (Unchanged from the previous guideline)
2. For most patients with supratentorial ICH, the usefulness of surgery is not well established (*Class IIb; Level of Evidence A*). (Revised from the previous guideline) Specific exceptions and potential subgroup considerations are outlined below in recommendations 3 through 6.
3. A policy of early hematoma evacuation is not clearly beneficial compared with hematoma evacuation when patients deteriorate (*Class IIb; Level of Evidence A*). (New recommendation)

❖ MASS EFFECT: ICP monitoring & therapy



ICP Monitoring and Treatment: Recommendations

Ventricular drainage as treatment for hydrocephalus is reasonable, especially in patients with decreased level of consciousness (*Class IIa; Level of Evidence B*). (Revised from the previous guideline)



Patients with a GCS score of ≤ 8 , those with clinical evidence of transtentorial herniation, or those with significant IVH or hydrocephalus might be considered for ICP monitoring and treatment. A CPP of 50 to 70 mm Hg may be reasonable to maintain depending on the status of cerebral autoregulation (*Class IIb; Level of Evidence C*). (Unchanged from the previous guideline)

❖ MASS EFFECT: ICP monitoring & therapy

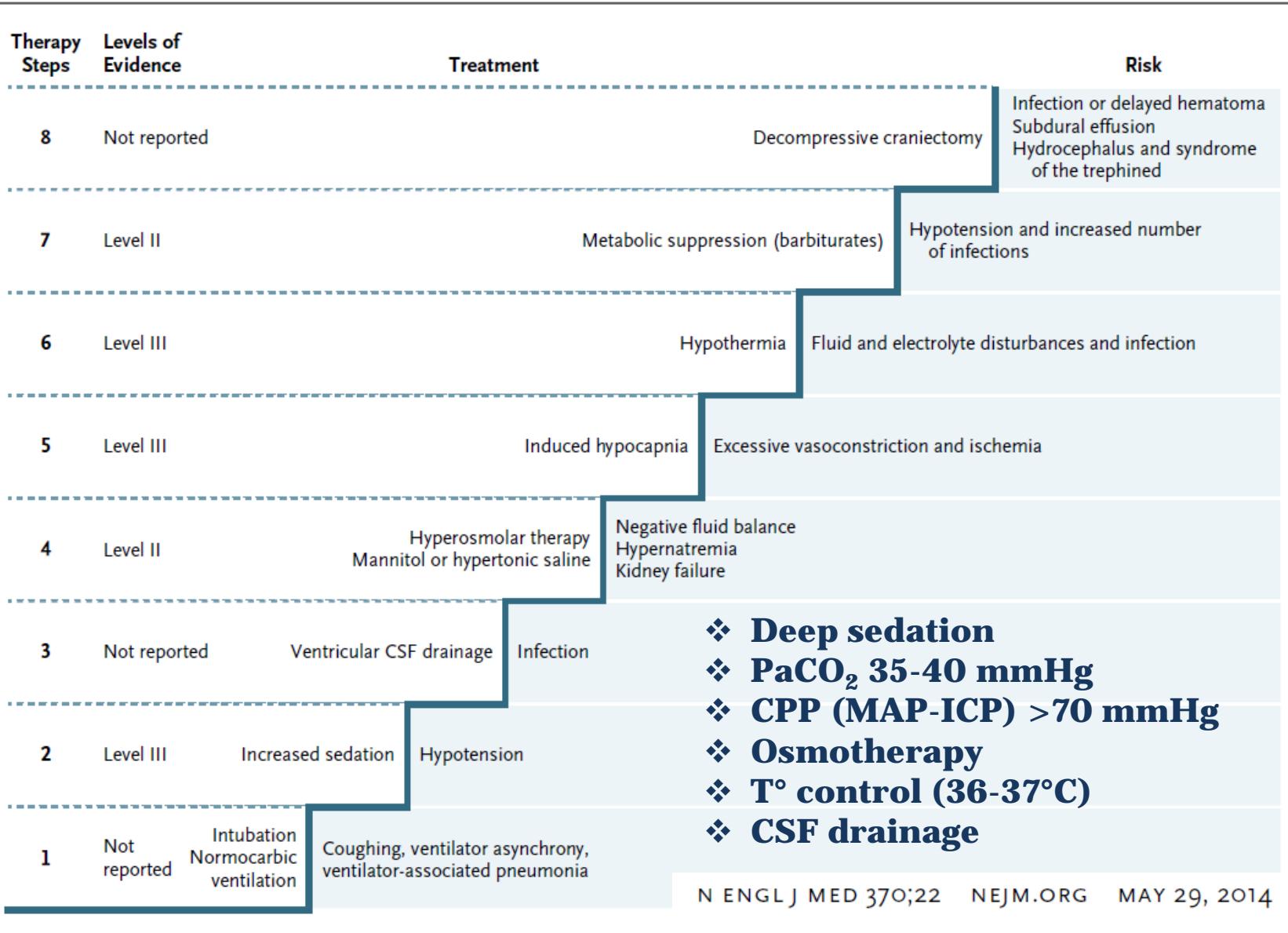
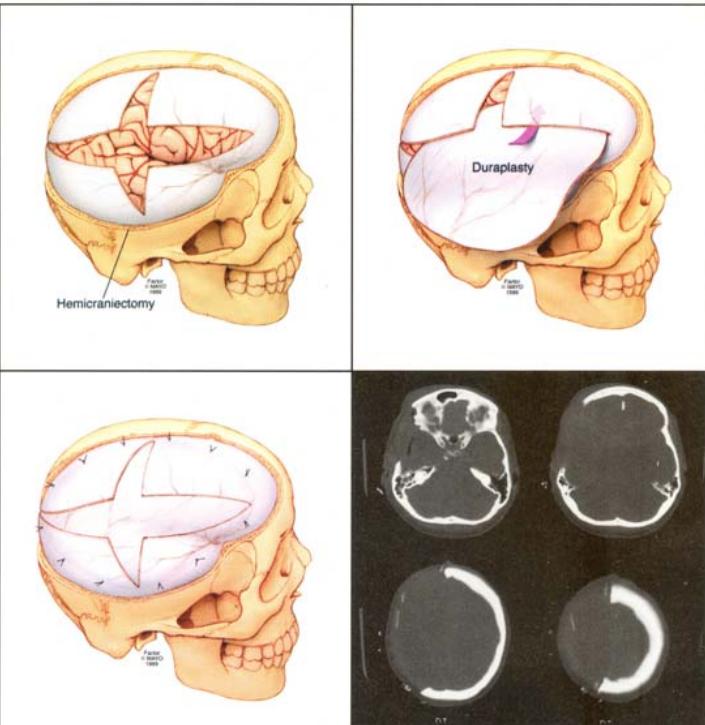


Figure 3. Staircase Approach to the Treatment of Increased Intracranial Pressure.

Surgical Treatment of ICH: Recommendations



4. Supratentorial hematoma evacuation in deteriorating patients might be considered as a life-saving measure (*Class IIb; Level of Evidence C*). (New recommendation)
5. DC with or without hematoma evacuation might reduce mortality for patients with supratentorial ICH who are in a coma, have large hematomas with significant midline shift, or have elevated ICP refractory to medical management (*Class IIb; Level of Evidence C*). (New recommendation)

Stroke. 2015;46:2032-2060

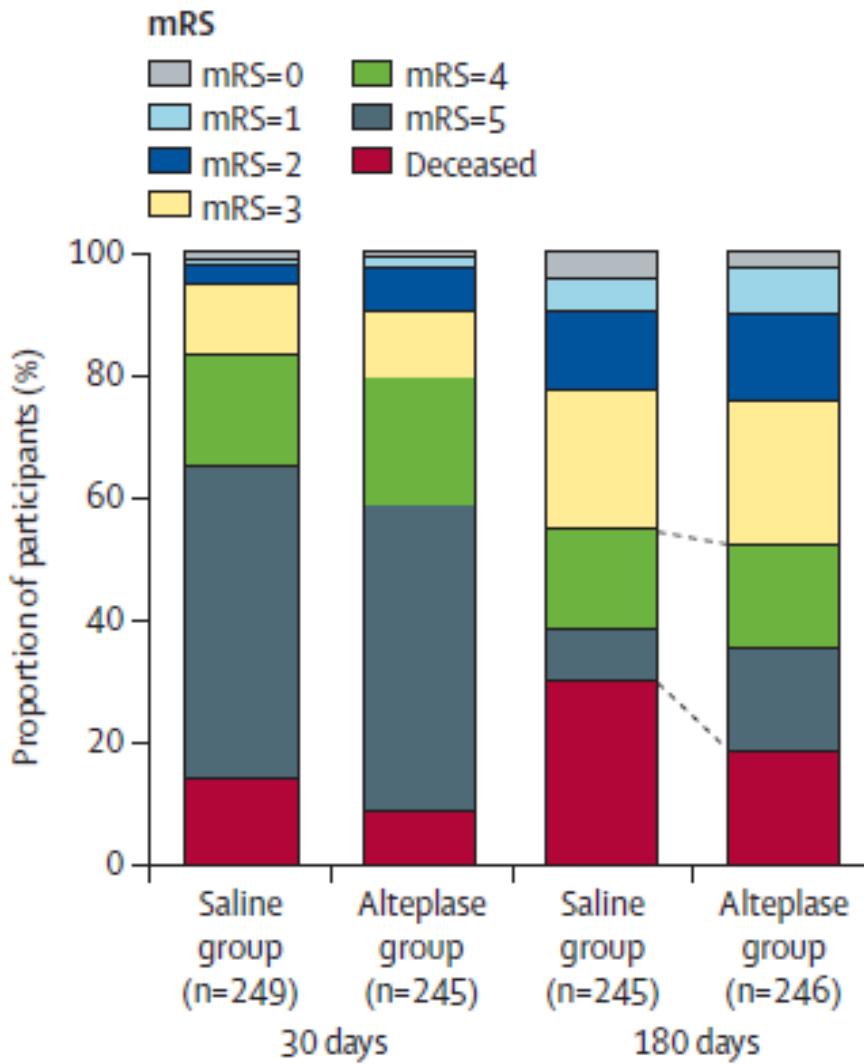
❖ INTRAVENTRICULAR HEMORRHAGE

Thrombolytic removal of intraventricular haemorrhage in treatment of severe stroke: results of the randomised, multicentre, multiregion, placebo-controlled CLEAR III trial

- **Population:** non-traumatic intracerebral haemorrhage volume less than 30 mL, intraventricular haemorrhage obstructing the 3rd or 4th ventricles, and no underlying pathology
 - randomly assigned (1:1), to receive up to 12 doses, 8 h apart of 1 mg of alteplase or 0.9% saline via EVD



❖ INTRAVENTRICULAR HEMORRHAGE



Surgical Treatment of ICH: Recommendations

6. The effectiveness of minimally invasive clot evacuation with stereotactic or endoscopic aspiration with or without thrombolytic usage is uncertain (*Class IIb; Level of Evidence B*). (Revised from the previous guideline)

Seizures and Antiseizure Drugs: Recommendations



1. Clinical seizures should be treated with antiseizure drugs (*Class I; Level of Evidence A*). (Unchanged from the previous guideline)
2. Patients with a change in mental status who are found to have electrographic seizures on EEG should be treated with antiseizure drugs (*Class I; Level of Evidence C*). (Unchanged from the previous guideline)
3. Continuous EEG monitoring is probably indicated in ICH patients with depressed mental status that is out of proportion to the degree of brain injury (*Class IIa; Level of Evidence C*). (Revised from the previous guideline)
4. Prophylactic antiseizure medication is not recommended (*Class III; Level of Evidence B*). (Unchanged from the previous guideline)

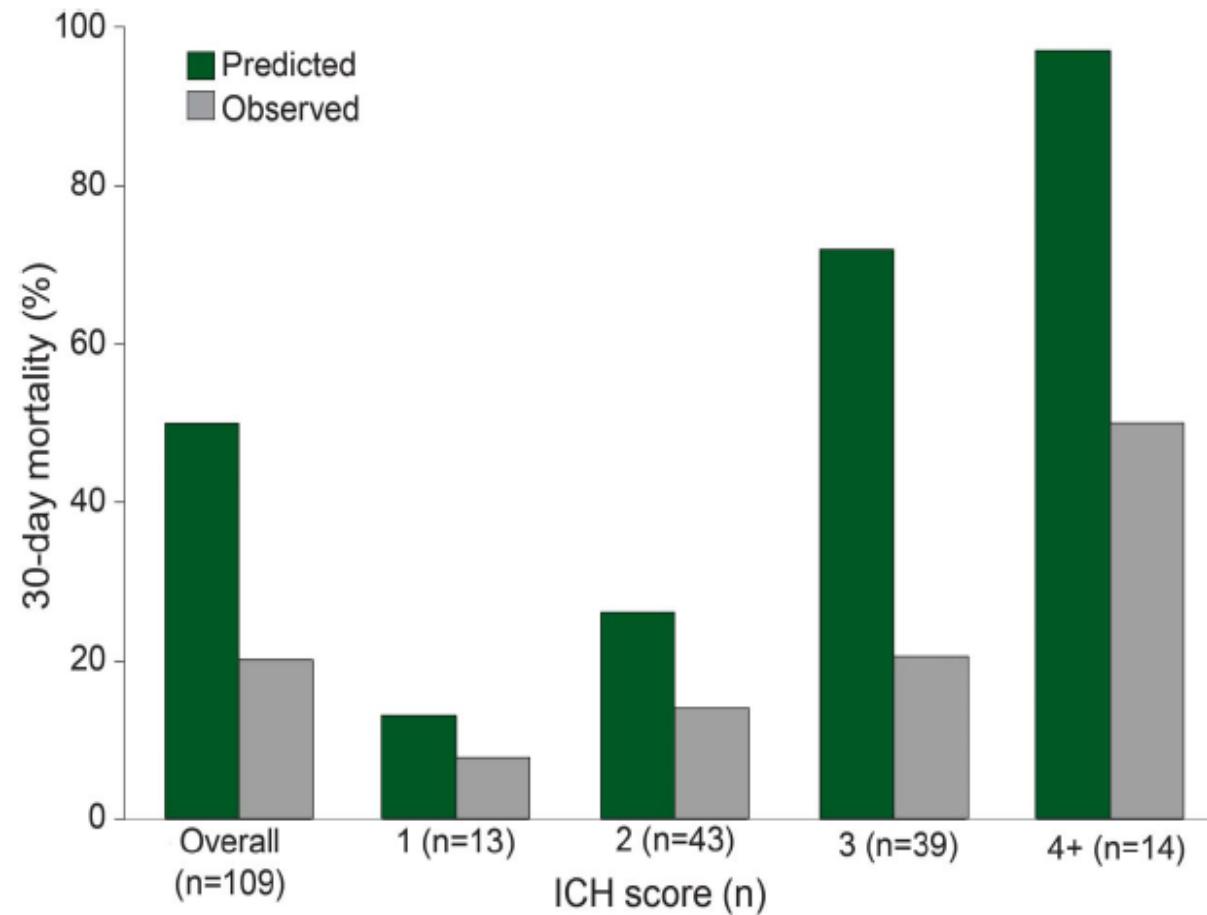
❖ + T° & glycemic control

Stroke. 2015;46:2032-2060

❖ PROGNOSIS

“Full medical support” i.e. no DNR/WLST in the first 5 days

Feature	Finding	Points
GCS	3-4	2
	5-12	1
	13-15	0
Age	>=80	1
	<80	0
Location	Infratentorial	1
	Supratentorial	0
ICH volume	>=30cc	1
	<30cc	0
Intraventricular Blood	Yes	1
	No	0
ICH SCORE		0-6 points



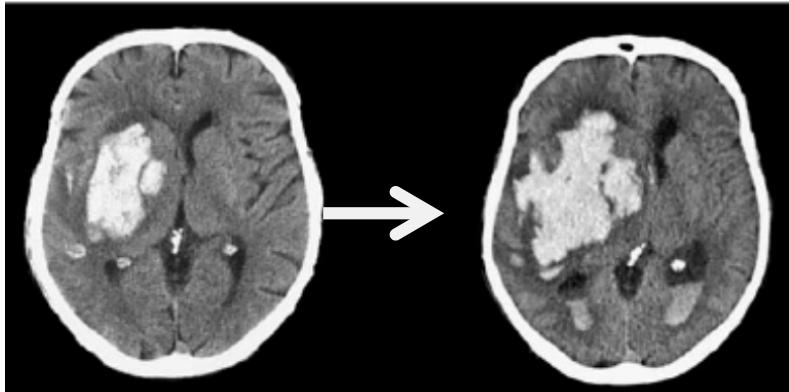
Morgenstern, L. B., et al. (2015). Full medical support for intracerebral hemorrhage. *Neurology*, 84(17), 1739–1744.

Modified Rankin scale (mRs) 1 yr

	%	
0 - No symptoms	10	
1 - No significant disability	11	
2 - Slight disability	3	35%
3 - Moderate disability	11	
4 - Moderately severe	15	
5 - Severe disability	11	65%
6 - Dead	38	

Our full treatment population vs. ICH score, p<0.0001, vs. Morgenstern et. al, p=0,15

Spina S Minerva Anestesiologica 2018



❖ HEMATOMA EXPANSION

- HEMOSTATIC AGENTS

- BLOOD PRESSURE CONTROL

❖ HEMATOMA SIZE & LOCATION

- SURGICAL REMOVAL

❖ INTRAVENTRICULAR HEMORRHAGE

- VENTRICULAR DRAINAGE +/- rt-PA

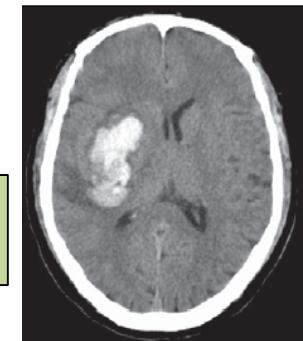


❖ HYDROCEPHALUS

- VENTRICULAR DRAINAGE

❖ SEIZURES

- EEG MONITORING
- ANTI-EPILEPTIC AGENTS



❖ OEDEMA

❖ MASS EFFECT

- ICP MONITORING & THERAPY
- DECOMPRESSIVE SURGERY

- TEMPERATURE & GLUCOSE CONTROL