Prevence iatrogenních hypo/hypernatremií pomocí sodného protokolu v neurointenzivní péči

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2016

18th, Colours of Sepsis, Ostrava

DYSNATREMIE V NEUROINTENZIVNÍ PÉČI

1. **Akutní poškození mozku**

2. **Následek terapeutických postupů**

3. **Iatrogenní příčiny**

DYSNATREMIE V NEUROINTENZIVNÍ PÉČI

1. **Akutní poškození mozku**

2. **Následek terapeutických postupů**

3. **Iatrogenní příčiny**

Management hypo/hypernatremií

v neurointenzivní péči

DYSNATREMIE V NEUROINTENZIVNÍ PÉČI

Cíl neurointenzivní péče

Prevence iatrogenních dysnatremií

Sodný protokol

DYSNATREMIE V NEUROINTENZIVNÍ PÉČI

Sodný protokol

Prevence iatrogenních dysnatremií

Diagnostika & terapie

DYSNATREMIE V NEUROINTENZIVNÍ PÉČI

HYPONATREMIE & HYPERNATREMIE

Časté a vážné komplikace v neurointenzivní péči

Qureshi AI, Suri MF, Sung GY, Straw RN, Yahia AM, Saad M *et al. Prognostic significance of hypernatremia and hyponatremia among patients with aneurysmal subarachnoid hemorrhage. Neurosurgery 2002; 50: 749-55.*

Diringer MN, Zazulia AR. *Hyponatremia in neurologic patients: consequences and approaches to treatment. Neurologist 2006; 12: 117-26.*

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Aiyagari V, Deibert E, Diringer M. *Hypernatremia in the neurologic intensive care unit: how high is too high? J Crit Care 2006; 21: 163-72.*

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DYSNATREMIE V NEUROINTENZIVNÍ PÉČI

Hyponatremie

častější

Hypernatremie

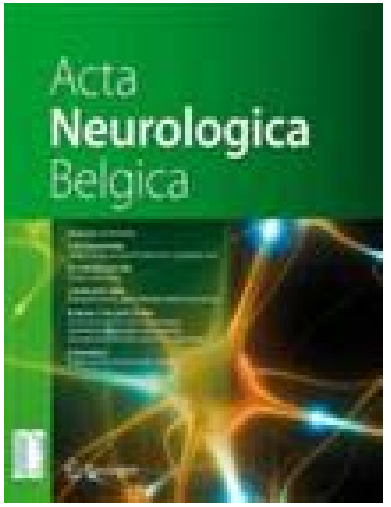
závažnější

Qureshi AI, Suri MF, Sung GY, Straw RN, Yahia AM, Saad M *et al. Prognostic significance of hypernatremia and hyponatremia among patients with aneurysmal subarachnoid hemorrhage. Neurosurgery 2002; 50: 749-55.*

Spatenkova V, Bradac O, Skrabalek P. *The impact of a Standardized Sodium Protocol on incidence and Outcome of Dysnatremias in Neurocirtical care.* J Neurol Surg A Cent Eur Neurosurg. 2015 Jul;76(4):279-90. doi: 10.1055/s-0034-1393927. Epub 2014 Dec 24.
PMID: 25539069

Acta Neurol Belg (2013) 113:139–145
DOI 10.1007/s13760-012-0137-7

ORIGINAL ARTICLE



Outcome and frequency of sodium disturbances in neurocritically ill patients

Vera Spatenkova · Ondrej Bradac · Pavel Skrabalek

Received: 22 August 2012 / Accepted: 13 September 2012 / Published online: 2 October 2012

Abstract Sodium disturbances are frequent and serious complications in neurocritically ill patients. Hyponatremia is more common than hypernatremia, which is, however, prognostically worse. The aim of this study was to analyse outcome and frequency of sodium disturbances in relation to measured serum osmolality in neurologic-neurosurgical critically ill patients. A 5-year retrospective collection of patients (pts) and laboratory data were made from the Laboratory Information System database in the Clinical Biochemistry Department. The criteria for patients' inclusion was acute brain disease and serum sodium ($SNa^?$) \ 135 mmol/l (hyponatremia) or $SNa^?$ [150 mmol/l (hypernatremia). Hypoosmolality was defined as measured serum osmolality (SOsm)\ 275 mmol/kg, hyperosmolality as SOsm [295 mmol/kg. We performed analysis of differences between hyponatremia and hypernatremia and subanalysis of differences between hypoosmolal hyponatremia and hypernatremia. From 1,440 pts with acute brain diseases there were 251 (17 %) pts with hyponatremia (mean $SNa^?$ 131.78 ± 2.89 mmol/l, SOsm 279.46 ± 11.84 mmol/kg) and 75 (5 %) pts with hypernatremia (mean $SNa^?$ 154.38 ± 3.76 mmol/l, SOsm 326.07 ± 15.93 mmol/kg). Hypoosmolal hyponatremia occurred in 50 (20 % of hyponatremic patients) pts (mean $SNa^?$ 129.62 ± 4.15 mmol/l; mean SOsm 267.35 ± 6.28 mmol/kg). Multiple logistic regression analysis showed that hypernatremia is a significant predictor of mortality during neurologic-neurosurgical intensive care unit (NNICU) stay (OR 5.3, p = 0.002) but not a predictor of bad outcome upon discharge from NNICU, defined as Glasgow Coma Scale 1–3. These results showed that hypernatremia occurred less frequently than all hyponatremias, but more often than hypoosmolal hyponatremia. Hypernatremia was shown to be a significant predictor of NNICU mortality compared to hyponatremia.

Keywords Hyponatremia · Hypernatremia · Neurointensive care · Outcome

Introduction

Sodium disturbances are frequent and serious complications in neurointensive care [1–6]. Both hyponatremia and hypernatremia cause brain injury, primary in patients without brain damage and secondary in patients with

The Impact of a Standardized Sodium Protocol on Incidence and Outcome of Dysnatremias in Neurocritical Care

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[3] Department of Clinical Biochemistry, Regional Hospital, Liberec, Czech Republic

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J Neurol Surg A

Abstract

Background Dysnatremias are common and prognostically serious in neurocritical care. We studied whether a standardized sodium protocol would improve our neurocritical care of dysnatremias.

Methods A 5-year prospective study of a standardized sodium protocol for 1,560 patients admitted with various brain diseases in an adult neurologic-neurosurgical intensive care unit (NNICU) was compared with a 5-year retrospective analysis of 1,440 patients without the sodium protocol. Hyponatremia was defined as serum sodium (SNa^+) < 135 mmol/L and hypernatremia $SNa^+ > 150$ mmol/L. The sodium protocol involved measuring SNa^+, serum, and urine osmolality, measured and calculated renal function parameters, fluid intake 40 mL/kg weight/day without hypotonic saline, thiazide, and desmopressin acetate in all normonatremic NNICU patients.

Results In the protocol study, hyponatremia occurred slightly less often (15.7 versus 16.3% of patients; $p = 0.684$), hypernatremia was significantly higher (respectively 8.5% versus 5.2% of patients; $p < 0.001$), and no differences were noted in hypo/hypernatremia ($p = 0.483$). There were no differences in the incidence of hypo-osmolal hyponatremia (respectively 3.5% versus 3.5% of patients; $p = 0.987$), cerebral salt wasting (CSW; respectively 1.7% versus 1.7% of patients; $p = 0.883$), syndrome of inappropriate secretion of antidiuretic hormone (SIADH; respectively 0.1% versus 0.3% of patients; $p = 0.152$), central diabetes insipidus (CDI; respectively 1.0% versus 0.6% of patients; $p = 0.149$). In hyponatremia there were no differences in the Glasgow Coma Scale (GCS) score upon onset of hyponatremia ($p = 0.294$), NNICU mortality (respectively 1.0% versus 0.4% patients; $p = 0.074$), and bad outcome upon discharge from NNICU (respectively 5.1% versus 6.5% of patients; $p = 0.101$), but in hypernatremia GCS score upon onset ($p < 0.001$), mortality (respectively 2.8% versus 1.0%; $p < 0.001$), and bad outcome from NNICU (respectively 6.7% versus 2.7% patients; $p < 0.001$) were significantly higher. Multivariate logistic regression analysis showed that hypernatremia, compared with hyponatremia, was a significant predictor of mortality during NNICU stay (respectively odds ratio [OR]: 1.14; $p = 0.003$ versus OR; 5.3; $p = 0.002$).

Conclusions The standard sodium protocol lowered the frequency of SIADH, which was encountered in only one patient over 5 years. However, it did not significantly reduce the incidence and improve the outcome of hyponatremia. Hypernatremia occurred more often and had a higher mortality and worse outcome than hyponatremia, but these patients were neurologically worse upon its onset. The prospective study confirmed that CSW, SIADH, and CDI were not common in our neurocritical care.

Keywords
- central diabetes insipidus
- CSW
- hypernatremia
- hyponatremia
- SIADH

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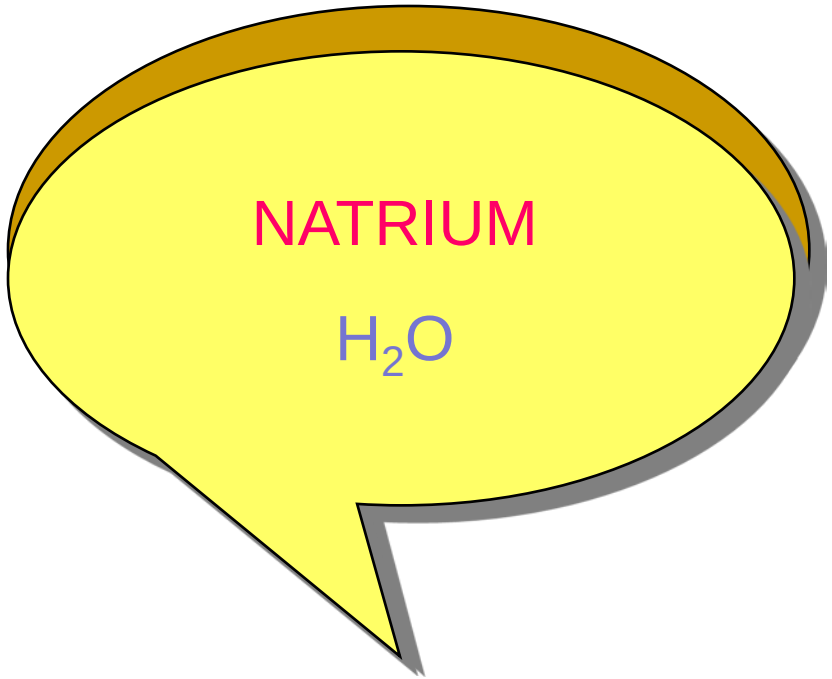
SEKUNDÁRNÍ POŠKOZENÍ MOZKU



V neurointenzivní péči
je nutné se jim věnovat a aktivně vyhledávat.

Hyponatremie

Hypernatremie

Poruchy efektivní osmolality

NATRIUM

Hlavní extracelulární kationt

Největší podíl na efektivní osmolalitě ECT

Kazda A. Vnitřní prostředí. In: Zima T. Laboratorní diagnostika. Galén, 2002, 265-96.

NATRIUM

Změna v ECT

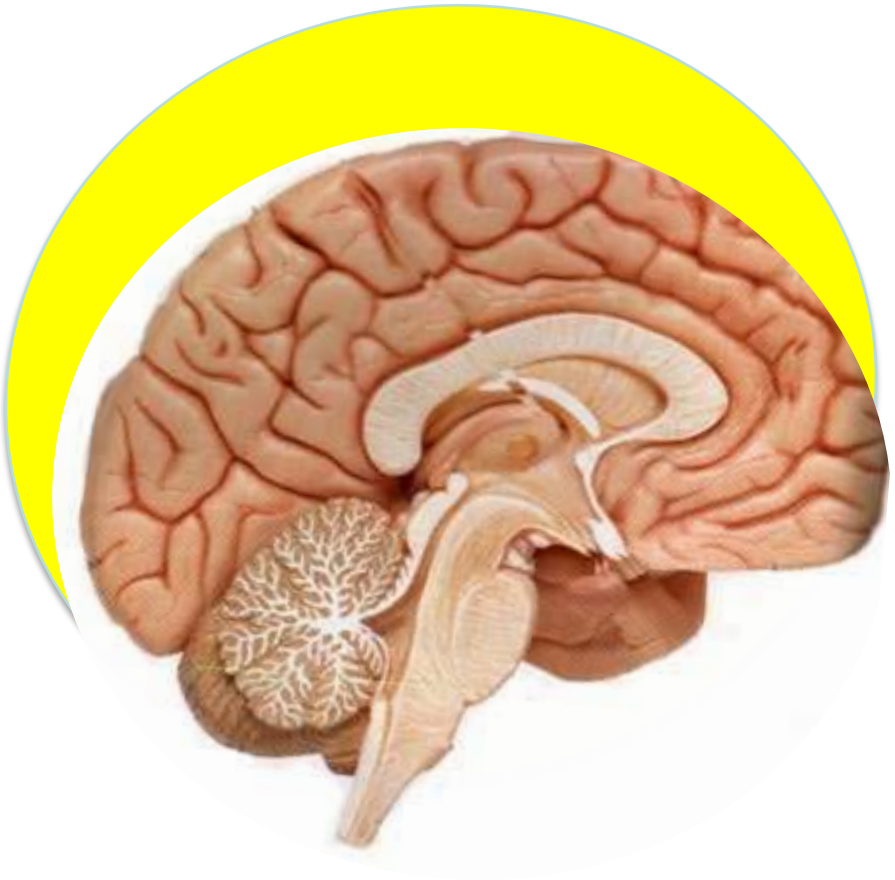
vytváří osmotický gradient mezi ECT a ICT

vyrovnáván přesunem vody

edém nebo dehydratace buněk

Kazda A. Vnitřní prostředí. In: Zima T. Laboratorní diagnostika. Galén, 2002, 265-96.

NITROLEBNÍ PROSTOR

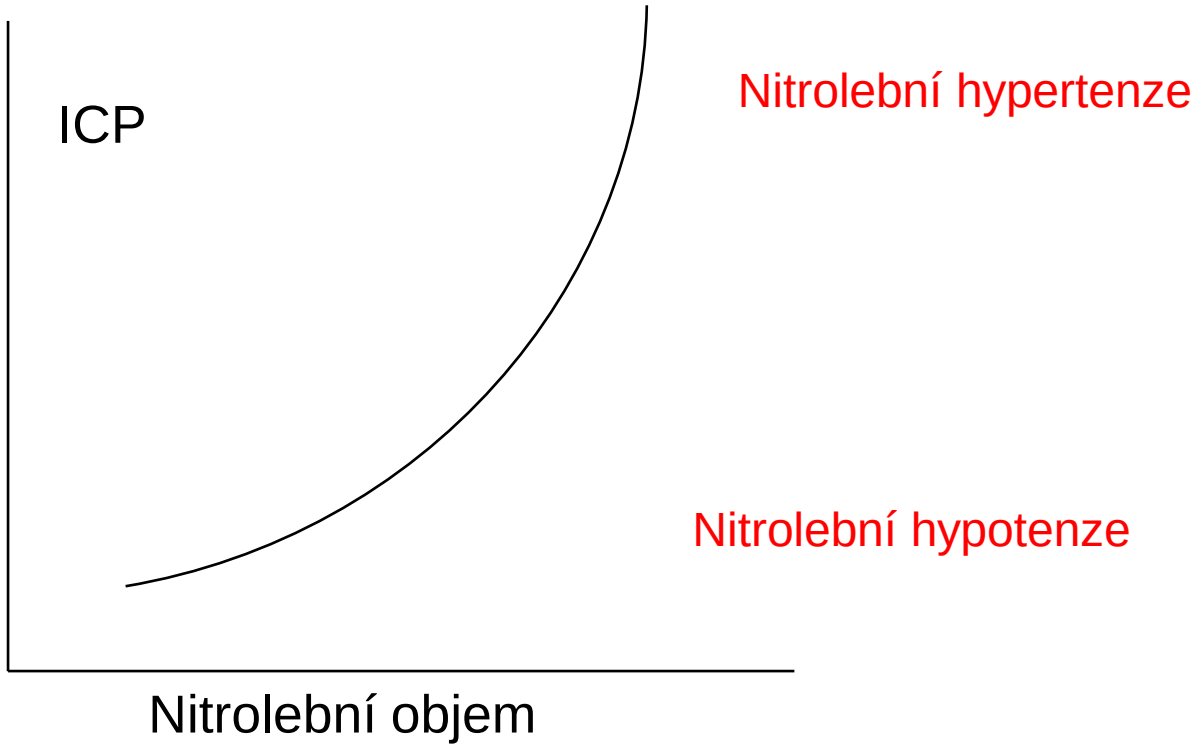


Uzavřený nitrolební prostor limituje nárůst objemu

Monroova – Kellieho doktrína

V uzavřeném prostoru intrakrania

V mozku + V krve + V likvoru = konst.



Alexander Monro – skotský anatom a chirurg, George Kellie – skotský anatom

Management hypo/hypernatremií

v neurointenzivní péči

Sodný protokol má svá specifika v neurointenzivní péči.

SPATENKOVA V. Protokol diagnostiky a léčby hyponatremie a hypernatremie v neurointenzivní péči. **Cesk Slov Neurol N** 2015;78:34-37

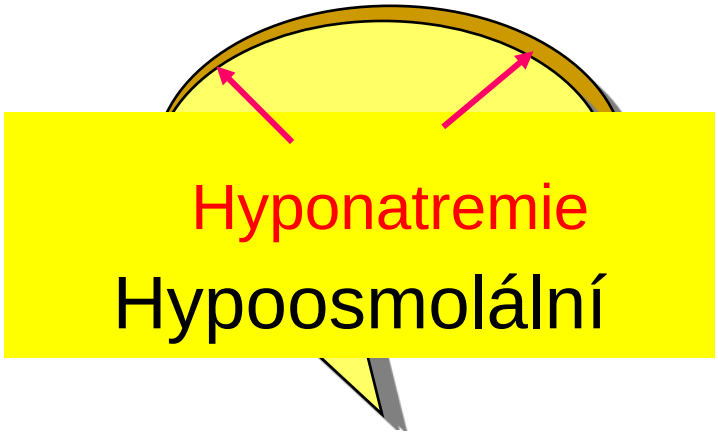
HYPONATREMIE V NEUROINTENZIVNÍ PÉČI

HYPONATREMIE

Hyponatremie

SNa	< 135	mmol/l
Lehká	130 – 134	mmol/l
Střední	129 – 125	mmol/l
Těžká	< 125	mmol/l

NEUROLOGICKÉ PŘÍZNAKY



Edém mozku

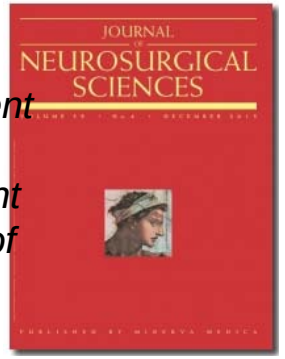
Nitrolební hypertenze

EFEKTIVNĚ OSMOLÁLNÍ DYSNATREMIE

Dysnatraemia is frequently a poor prognostic indicator in patients with acute subarachnoid hemorrhage having targeted sodium management

Spatenkova V. [1], Bradac O. [2], de Lacy P. [3], Skrabalek P. [4], Suchomel P. [5]

[1] Neurocenter, Neurointensive Care Unit, Regional Hospital, Liberec, Czech Republic; [2] Department of Neurosurgery, Central Military Hospital, Charles University, Prague, Czech Republic; [3] Department of Neurosurgery, Royal Hallamshire Hospital, Sheffield, United Kingdom; [4] Department of Clinical Biochemistry, Regional Hospital, Liberec, Czech Republic; [5] Neurocenter, Department of Neurosurgery, Regional Hospital, Liberec, Czech Republic



BACKGROUND: Dysnatraemias are common and carry a risk of poor prognosis in acute subarachnoid hemorrhage (SAH) patients. The aim of this study was to determine the frequency and outcome of dysnatraemias in 344 SAH patients treated by a targeted sodium management regimen. METHODS: We performed a 10-year observational dysnatraemia study. Hyponatraemia was defined as serum sodium (SNa) below 135 mmol/l, hypernatraemia SNa above 150 mmol/l. RESULTS: Dysnatraemia occurred in 35.8% patients (pts); this was more frequently hyponatraemia (19.8%) with a mean SNa 132.23±2.09 mmol/l, (16.0% mild, 3.2% moderate, 0.6% severe). Hypernatraemia occurred less commonly in 11.9%, p<0.001 with a mean SNa 154.21±3.72 mmol/l, (6.1% mild, 2.9% moderate, 2.9% severe). In 4.8% of pts there were episodes of both dysnatraemias. The incidence of hypo-osmolar hyponatraemia was 6.4%, Cerebral salt wasting (CSW) 3.5%, syndrome of inappropriate secretion of antidiuretic hormone (SIADH) 0.3% and Central diabetes insipidus 1.7%. The hypernatraemic pts had a higher inpatient mortality rate (p=0.001) and a worse overall outcome (p<0.001) than those hyponatraemic or normotraemic patients. Multivariate logistic regression showed that hypernatraemia was an independent risk factor for increased inpatient mortality and poor outcome in patients with SAH. CONCLUSIONS: Our 10-year targeted sodium management regimen in acute SAH patients showed that dysnatraemias were frequent, predominantly hyponatraemia of which the more usual causes were CSW and not SIADH. Hypernatraemia was shown to be an independent risk factor for inpatient mortality and poor outcome.

OSMOLALITA

Měřená serová osmolality (SOsm)

Osmometr

HYPONATREMIE V NEUROINTENZIVNÍ PÉČI

1. krok v diagnostice hyponatrémií

Hodnota měřené sérové osmolality

HYPONATREMIE V NEUROINTENZIVNÍ PÉČI

1. **Akutní poškození mozku**
   CSWS, SIADH

2. **Následek terapeutických postupů**
   Thiazidy

3. **Iatrogenní příčiny**
   Hypotonický roztok
   Iatrogenní SIADH (normonatremie a desmopressin)

HYPONATREMIE V NEUROINTENZIVNÍ PÉČI

1. **Akutní poškození mozku**
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2. **Následek terapeutických postupů**
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   Hypotonický roztok
   Iatrogenní SIADH (normonatremie a desmopressin)

HYPONATREMIE V NEUROINTENZIVNÍ PÉČI

Diagnostický management

fyziologická odpověď organismu

ADH – ledviny

PORUCHY EFEKTIVNÍ OSMOLALITY U AKUTNÍHO POŠKODZENÍ MOZKU

diagnóza

renální funkční parametry

***Lolin Y, Jackowski A**. Hyponatraemia in neurosurgical patients: diagnosis using derived parameters of sodium and water homeostasis. Br J Neurosurg 1992; 6: 457-66.*

***Shoker AS**. Application of the clearance concept to hyponatremic and hypernatremic disorders: a phenomenological analysis. Clin Chem 1994; 40: 1220-7.*

***Kazda A**. Vnitřní prostředí. In: Zima T. Laboratorní diagnostika. Galén, 2002, 265-96.*

***Kazda A, Balik M.** Osmolální dysbalance v intenzivní péči a možnosti jejich monitorováni. Klin Biochem Metab 1995; 4: 223-7.*

***Kazda A, Balik M, Jabor A**. Efektivní osmolalita a její poruchy. Anesteziologie a neodkladná péče 1999; 4: 142-6.*

***Jabor A**. Voda, ionty a modelování poruch vnitřního prostředí. STAPRO, Pardubice, 1999.*

***Jabor A**. Hodnocení poruch osmolality s využitím efektivní osmolální clearance, clearance sodíku, clearance bezelektrolytové vody a modelu extracelulárního a intracelulárního prostoru. Klin Biochem Metab 1997; 4: 241-2.*

***Jabor A, Kazda A**. Výukové možnosti u poruch metabolismu vody a iontů. Anesteziologie a neodkladná péče 1999; 4: 157-61.*

***Jabor A**. Clearance bezelektrolytové vody u selhávajících ledvin, při hypernatrémii a hyponatrémii. Klin Biochem Metab 1997; 4: 248-50.*

Assessment of axis ADH-kidneys

Hypoosmolality, hypotonicity – serum osmolality < 280 mmol/kg

EWC > 0,116 ml/s (10 l/day)……normal response ADH-kidneys
EWC 0,006 – 0,116 ml/s……impaired response ADH-kidneys
EWC < 0,006 ml/s (0,5 l/day)……abnormal response ADH-kidneys

SIADH

Hyperosmolality, hypertonicity – serum osmolality > 295 mmol/kg

EWC < 0,005 ml/s (0,4 l/day)……normal response ADH-kidneys
EWC ≥ 0,005 ml/s……abnormal response ADH-kidneys

***Shoker AS**. Application of the clearance concept to hyponatremic and hypernatremic disorders: a phenomenological analysis. Clin Chem 1994; 40: 1220-7.*

Kazuistika

CASE REPORT KAZUISTIKA

Polyurie v neurointenzivní péči – kazuistika

Polyuria in Neurocritical Care – a Case Report

V. Špatenková1, P. Škrabálek2 Krajská nemocnice Liberec, a.s.:

1 Neurocentrum, Neurointenzivní jednotka

2 Oddělení klinické biochemie

Cesk Slov Neurol N 2014; 77/110(5): 647–647

- 34-letá pacientka
- Akutní subarachnoidální krvácení z ruptury aneurysmatu na arteria carotis interna (coiling)
- WFNS (World Federation of Neurological Surgeons) skóre I, Fisher skóre 2

CASE REPORT KAZUISTIKA

Polyurie v neurointenzivní péči – kazuistika

Polyuria in Neurocritical Care – a Case Report

V. Špatenková1, P. Škrabálek2 Krajská nemocnice Liberec, a.s.:

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Cesk Slov Neurol N 2014; 77/110(5): 647–647

Den NJIP	SNa mmol/l	SOsm mmol/kg	Diuréza ml/den	EWC ml/s	Desmopressin
1.	138	294			
3.	135	286	4 500	0.016	10 ug/den
4.	130	265			

	P	P	S	P	P
M					
GLU.	5,6	5,7	-	6,0	6,3 +
pBNP	-	371 +	-	-	-
rály					
Na..	123 --	124 --	-	124 --	126 --
K...	4,4	4,3	-	4,2	4,3
Cl..	96 -	95 -	-	95 -	98
Ca..	2,23	-	-	-	-
Mg..	1,00	-	-	-	-
P...	1,32	-	-	-	-
OSMV	255---	-	-	-	-
OSME	252!!!	254!!!	-	254!!!	258!!!
BBS.	31,4 --	33,3 --	-	33,2 --	32,3 --
AGAP	7,6 --	-	-	-	-
OSM.	262 --	265 -	-	264 --	270 -
dCP	2,41	-	-	-	-
dCAl	8,21	-	-	-	-
dUA	0,69---	-	-	-	-
dCl.	109,3	-	-	-	-
SIDa	35,11 --	-	-	-	-
SIDe	34,42 --	-	-	-	-
AGPc	10,6	-	-	-	-
Ogap	7	-	-	-	-
met.					
UREA	3,3	-	-	-	-
KREA	48	-	-	-	-
GFR	1,821	-	-	-	-
.					
ALB.	29,1 -	-	-	-	-
CRP.	2,5	-	-	-	-
KREV	Arterial	-	-	-	-
TAKT	36,8	-	-	-	-
FIO2	0,210	-	-	-	-
HB..	9,5---	-	-	-	-
PH..	7,428	-	-	-	-
PCO2	4,88	-	-	-	-
SBC.	24,5	-	-	-	-
SBE.	0,0	-	-	-	-
PO2.	9,66	-	-	-	-
SO2.	0,950	-	-	-	-
ABE.	0,1	-	-	-	-
TCO2	24,9	-	-	-	-
AKTB	23,8	-	-	-	-
VO2.	5,6---	-	-	-	-
AaDO	3,78	-	-	-	-
OXHB	0,938 -	-	-	-	-
MeHB	0,004	-	-	-	-
COHB	0,009 +	-	-	-	-
p50	3,33	-	-	-	-
px	3,74 --	-	-	-	-
SHUN	8,1 +	-	-	-	-

Nález pokračuje na dalším listu

MOC												
Odpady												
fU_NVYP	7,60 --	-	-	-	-	-	*				10,0-30,0	g
U_OBJ.	3870 ++	-	-	-	-	-			*		1000-1500	ml
U_CAS.	24	-	-	-	-	-						hod.
U_UREA	67	-	-	-	-	-						mmol/l
fU_UREA	259 -	-	-	-	-	-	*				330 - 580	mmol
U_KREA	1,966	-	-	-	-	-						mmol/l
fU_KREA	7,608	-	-	-	-	-		*			4,50-18,0	mmol
U_Na..	203	-	-	-	-	-						mmol/l
fU_Na..	786!!!	-	-	-	-	-				*	100 - 260	mmol
U_K...	28,3	-	-	-	-	-						mmol/l
fU_K...	109,5 +	-	-	-	-	-			*		40,0-90,0	mmol
U_Cl..	217	-	-	-	-	-		*			120 - 260	mmol/l
fU_Cl..	840!!!	-	-	-	-	-				*	120 - 260	mmol
U_Ca..	5,73	-	-	-	-	-						mmol/l
fU_Ca..	22,18!!!	-	-	-	-	-				*	2,50-7,50	mmol
U_P...	4,01	-	-	-	-	-						mmol/l
fU_P...	15,52	-	-	-	-	-		*			15,0-90,0	mmol
U_Mg..	10,40	-	-	-	-	-						mmol/l
fU_Mg..	40,25!!!	-	-	-	-	-				*	1,20-8,20	mmol
U_OSM.	544	501	-	544	490	627		*			50 - 796	mmol/kg
U_OSMo	575	-	-	-	-	-						mmol/kg
fU_OSM.	2225+++	-	-	-	-	-			*		430 -1150	mmol/d
q_OSMq	2,076	1,891	-	2,061	1,815	2,255						-
Clearenc												
Pt_VYSK	166	-	-	-	-	-						cm
Pt_VAHA	82	-	-	-	-	-						kg
Pt_POVR	1,90	-	-	-	-	-						m2
Pt_BMI.	29,76 +	-	-	-	-	-			*		18,5-25,0	kg/m2
C_KREA	1,670	-	-	-	-	-		*			1,15-2,00	ml/s
C_Na..	0,074!!!	-	-	-	-	-				*	,008-,016	ml/s
C_K...	0,288 +	-	-	-	-	-			*		,083-0,25	ml/s
C_UREA	0,828	-	-	-	-	-		*			,683-1,65	ml/s
C_OSM.	0,098 ++	-	-	-	-	-			*		,005-0,05	ml/s
C_H2O.	-0,053 --	-	-	-	-	-	*				-,02--0,0	ml/s
C_Elek	0,081!!!	-	-	-	-	-				*	,011-,023	ml/s
C_EWC	-0,037 --	-	-	-	-	-	*				-0,0-,006	ml/s
C_RESO	0,973 --	-	-	-	-	-	*				0,99-1,00	jedn.
Fe_Na..	0,040 +	-	-	-	-	-			*		,004-,012	1
Fe_K...	0,157	-	-	-	-	-		*			0,04-0,19	1
Fe_OSM.	0,054 +	-	-	-	-	-			*		0,01-,035	1
Fe_H2O.	0,027 +	-	-	-	-	-			*		0,01-0,02	1
C_KT/V	20,71	-	-	-	-	-						-

Renální funkční parametry součástí biochemického souboru z OKB

HYPERNATREMIE V NEUROINTENZIVNÍ PÉČI

HYPERNATREMIE

Hypernatremie

SNa	> 145	mmol/l
Lehká	151 – 155	mmol/l
Střední	156 – 160	mmol/l
Těžká	> 160	mmol/l

J Crit Care. 2006 Jun;21(2):163-72.

Hypernatremia in the neurologic intensive care unit: how high is too high?

Aiyagari V, Deibert E, Diringer MN.

Source

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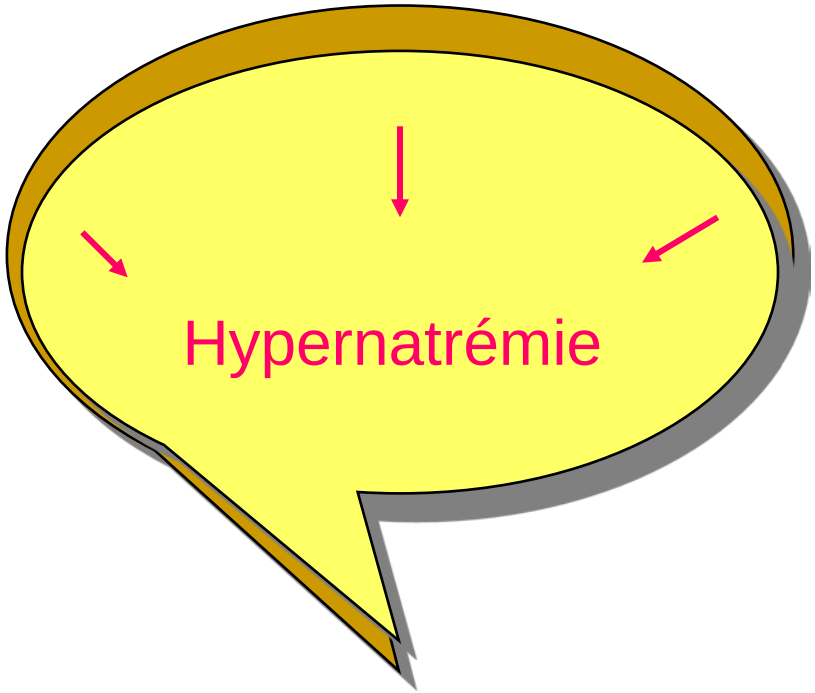
Abstract

Hypernatremia is associated with increased mortality in hospitalized patients and in medical/surgical intensive care units. This relationship has not been studied in neurologic/neurosurgical intensive care units (NNICUs), where hypernatremia is often a component of treatment of cerebral edema. We performed a retrospective analysis of prospectively collected data in patients admitted to the NNICU over a 6.5-year period. Hypernatremia (serum sodium >150 mEq/L) was seen in 339 patients (7.9%) and was more common (24.3%) in patients who were treated with mannitol. Hypernatremic patients had a lower median admission Glasgow Coma Scale score (8 vs 14, P < .001), higher initial Acute Physiology and Chronic Health Evaluation II probability of death (34.9% vs 19.1%, P < .001), higher incidence of mechanical ventilation (80.5% vs 41.1.5%, P < .001), higher mortality (30.1% vs 10.2%, P < .001), and higher incidence of renal failure (10.3% vs 0.9%, P < .001). Mortality increased with increasing hypernatremia; however, only severe hypernatremia (serum sodium >160 mEq/L) was independently associated with increased mortality. Other factors independently associated with mortality were age, mechanical ventilation, initial Acute Physiology and Chronic Health Evaluation II probability of death or low admission Glasgow Coma Scale score, and a diagnosis of cerebrovascular disease. **In conclusion,** hypernatremia is common in the NNICU, more so in patients treated with mannitol. In this population, severe (but not mild or moderate) hypernatremia is independently associated with increased mortality.

HYPERNATREMIE V NEUROINTENZIVNÍ PÉČI



Dehydratace mozku

Nitrolební hypotenze

EFEKTIVNĚ OSMOLÁLNÍ DYSNATREMIE

HYPERNATREMIE V NEUROINTENZIVNÍ PÉČI

1. **Akutní poškození mozku**
   Centrální diabetes insipidus (CDI)

2. **Následek terapeutických postupů**
   Osmoterapie – Manitol, NaCl, Furosemid

3. **Iatrogenní příčiny**
   Zvýšený příjem soli, profuzní pocení

HYPERNATREMIE V NEUROINTENZIVNÍ PÉČI

- **Centrální diabetes insipidus**

  Není nejčastěji se vyskytující hypernatrémie

- Multifaktoriální

  osmoterapie, manitol, renální selhán

Wong MF, Chin NM, Lew TW. Diabetes insipidus in neurosurgical patients. Ann Acad Med Singapure 1998; 27: 340-3.

Tisdall M, Crocker M, Watkiss J, Smith J, Smith M*. Disturbances of sodium in critically ill adult neurologic patients: a clinical review. J Neurosurg Anesthesiol 2006; 18: 57-63.*

Aiyagari V, Deibert E, Diringer M. *Hypernatremia in the neurologic intensive care unit: how high is too high? J Crit Care 2006; 21: 163-72.*

Neuroendocrinology Letters Volume 32 No. 6 2011

Central diabetes insipidus is not a common and prognostically worse type of hypernatremia in neurointensive care

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NNICU. **RESULTS:** We found cDI in 8 pts (mean SNa^+ 154.8 ± 5.4 mmol/l). Most pts (67) were classified as "non cDI" hypernatremias (mean SNa^+ 154.3 ± 3.6 mmol/l). There were no differences in serum sodium (p=0.682), serum osmolality (p=0.476) between the two groups, however patients with cDI indicated low urine osmolality (p=0.001) and positive EWC (p=0.049). We did not find any differences in GCS score on onset of hypernatremia (p=0.395), incidence of cerebral complications (p=0.705), GOS score upon discharge from NNICU (p=0.61) and mortality in NNICU (p=0.638). More patients in the "non cDI" group received antiedematic therapy (p=0.028) and diuretic furosemide (p=0.026). Multivariate logistic regression analysis showed that independent predictors of NNICU mortality was the highest level of serum sodium (Odds ratio, OR 1.13, per 1 mmol/l increase in maximal hypernatremia during NNICU stay, 95% confidence interval, CI 1.01–1.26, p=0.027), and GCS on admission of less than 9 (OR 2.61, 95% CI 1.41–5.44, p=0.003). **CONCLUSIONS:** Central diabetes insipidus is not a frequent type of hypernatremia in neurointensive care. Prognosis is connected with serum sodium level, not with type of hypernatremia.

Závěr

DYSNATREMIE V NEUROINTENZIVNÍ PÉČI

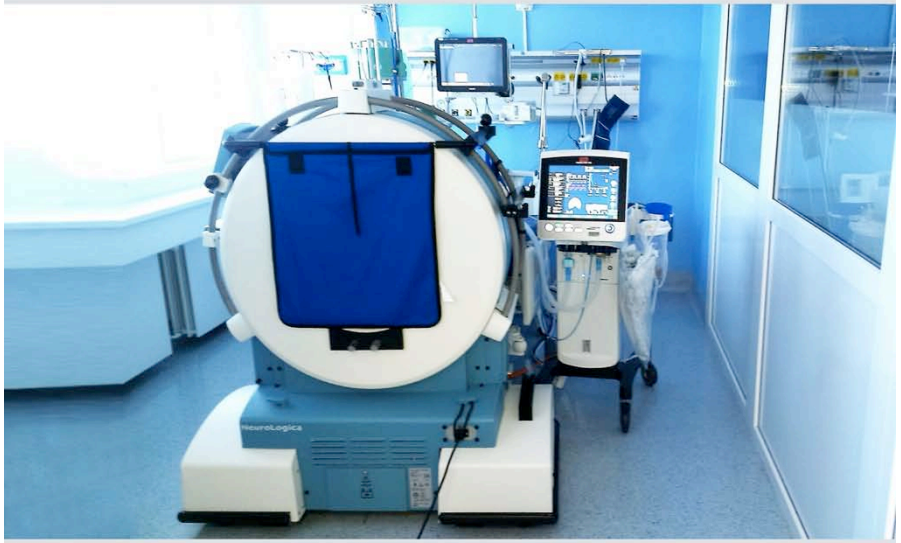
- Sodný management má své místo v neurointenzivní péči. Dysnatremiím je nutné se v neurointenzivní péči věnovat a aktivně vyhledávat.

- Cílem neurointenzivní péče je prevence hypo/hypernatremií z iatrogenních příčin.

- Sodný protokol má svá specifika v neurointenzivní péči.

NOVĚ ZALOŽENÁ SEKCE ČSIM

NCSIM NEUROINTENZIVNÍ SEKCE ČESKÉ SPOLEČNOSTI INTENZIVNÍ MEDICÍNY



VÁŽENÉ KOLEGYNĚ, VÁŽENÍ KOLEGOVÉ,

je mi velkým potěšením informovat Vás o založení Neurointenzivní sekce ČSIM (NČSIM) a přizvat Vás ke spolupráci na jejím rozšíření a rozvoji. Péče o pacienty s onemocněním nervového systému vyžaduje specializované vybavení a má také specifické postupy a priority. V současné době jsme svědky rapidního, celosvětového rozvoje neurointenzivní péče a tento trend lze v naší zemi sledovat, udržet a případně k němu přispět pouze skrze fungující společenství odborníků. Cílem Neurointenzivní sekce je poskytnout pevnou platformu pro takovou spolupráci.

Prvním cílem sekce je registrace lékařů a pracovišť poskytujících neurointenzivní péči, dále připravujeme organizaci odborných akcí, formulaci doporučených postupů a spolupráci více pracovišť na výzkumných projektech. Samozřejmostí je navázání oficiální spolupráce s mezinárodní společností NCS (Neurocritical Care Society) a Neurointenzivní sekcí ESICM (European Society of Intensive Care Medicine). Bližší informace naleznete na našich webových stránkách: www.ncsim.cz.

MUDr. Věra Špatenková, PhD.
Předsedkyně výboru NČSIM - Neurocentrum, Neurointenzivní jednotka, Liberec

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Děkuji za pozornost