Komplikationen und Spätfolgen nach Schlaganfall: Schlafstörungen

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Sleep and Stroke

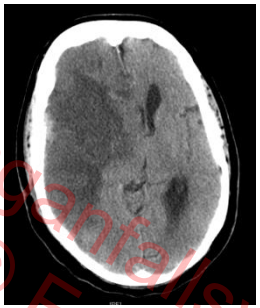
Claudio L. Bassetti

Chapter 88

Abstract

Sleep disorders and stroke are among the most common neurologic problems and can occur together by chance alone. In addition, each condition can cause the other or can arise from similar predisposing factors. Clinicians who treat patients with sleep disorders or stroke should be aware of this potential comorbidity and its clinical implications. Diagnosis and treatment of sleep-disordered breathing and sleep–wake disturbances in patients with stroke have an impact on the risk of stroke as well as on its short- and long-term evolution.

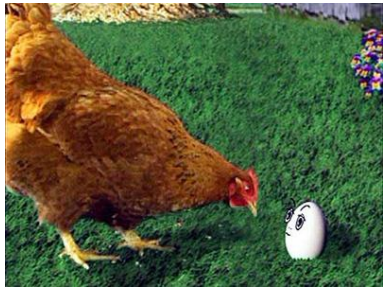
Principles & Practice of sleep medicine, 5th edition



Schlafstörung als Risikofaktor ⇒ Schlaganfall ⇒ Schlafstörung als Folge

?

- Schlafapnoe



- Schlafapnoe
- Restless-Legs
- Insomnie
- Hypersomnie
- Narkolepsie u.a.

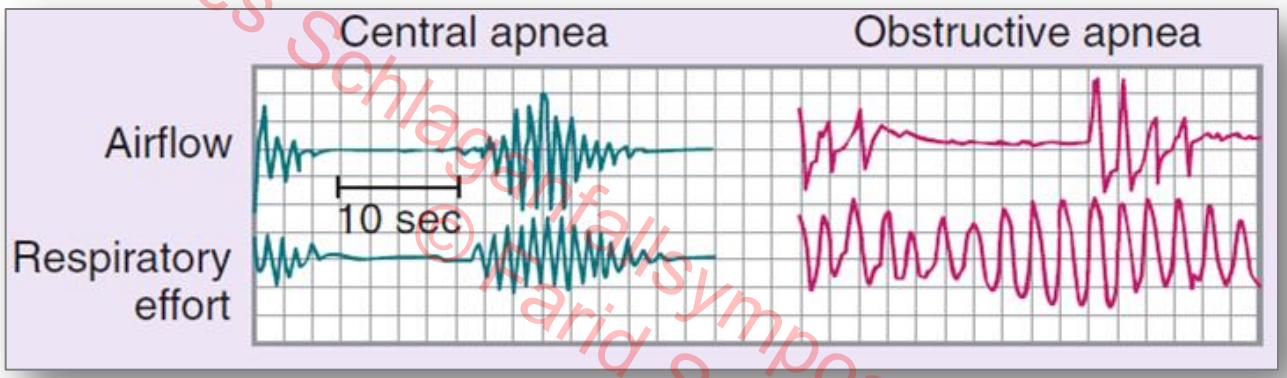
…die schlafbezogenen Atmungsstörungen lassen sich in drei Hauptformen unterteilen.

Table 60-1 ICSD-2 Sleep Disorder Categories and Individual Sleep Disorders—cont'd

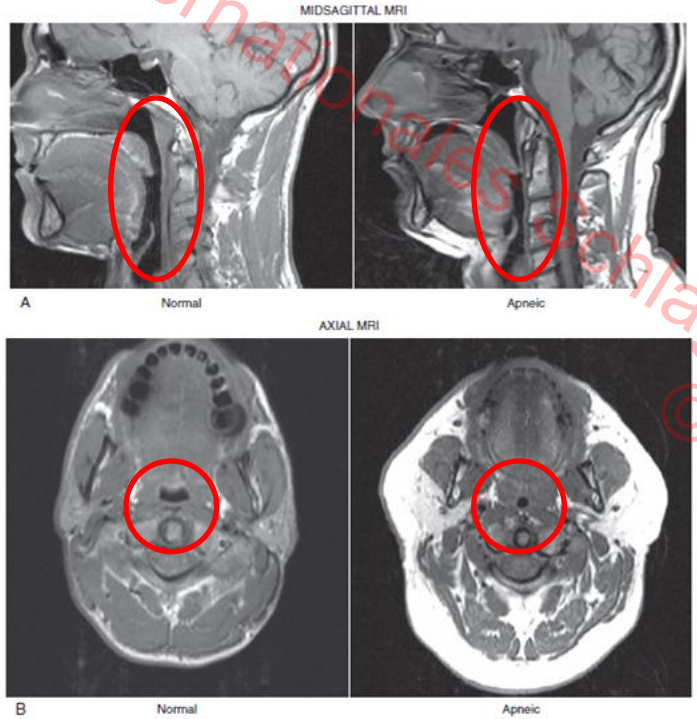
SLEEP DISORDERS	ICD-9-CM	ICD-10-CM
Sleep-Related Breathing Disorders		
Central Sleep Apnea Syndromes		
Primary central sleep apnea	327.21	G47.31
Central sleep apnea due to Cheyne Stokes breathing pattern	768.04	R06.3
Central sleep apnea due to high altitude periodic breathing	327.22	G47.32
Central sleep apnea due to a medical condition, not Cheyne-Stokes	327.27	G47.31
Central sleep apnea due to a drug or substance	327.29	F10-19
Primary sleep apnea of infancy	770.81	P28.3
Obstructive Sleep Apnea Syndromes		
Obstructive sleep apnea, adult	327.23	G47.33
Obstructive sleep apnea, pediatric	327.23	G47.33
Sleep-Related Hypoventilation and Hypoxemic Syndromes		
Sleep-related nonobstructive alveolar hypoventilation, idiopathic	327.24	G47.34
Congenital central alveolar hypoventilation syndrome	327.25	G47.35
Sleep-Related Hypoventilation and Hypoxemia Due to a Medical Condition		
Sleep-related hypoventilation or hypoxemia due to pulmonary parenchymal or vascular pathology	327.26	G47.36
Sleep-related hypoventilation or hypoxemia due to lower airways obstruction	327.26	G47.36
Sleep-related hypoventilation or hypoxemia due to neuromuscular or chest wall disorders	327.26	G47.36
Other Sleep-Related Breathing Disorder		
Sleep apnea or sleep-related breathing disorder, unspecified	320.20	G47.30

Principles and Practice of Sleep Medicine, 5th ed., 2011

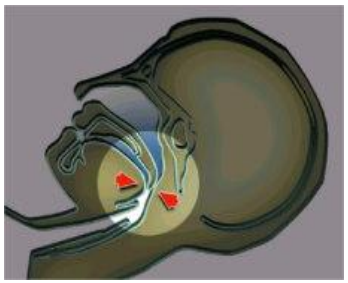
Unterscheidung: zentrale vs. obstruktive Schlafapnoe



Obstruktive Schlafapnoe; griechisch: ἄπνοια („ohne Atem“)



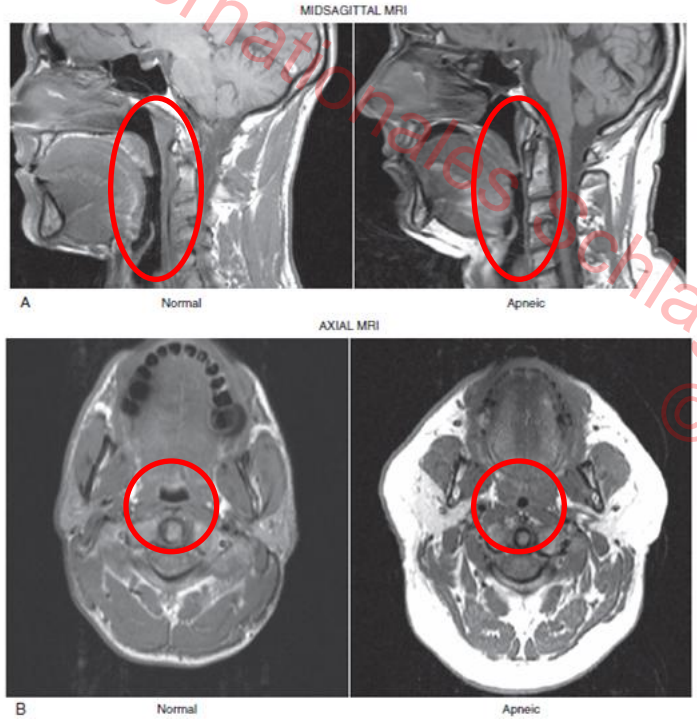
Principles and Practice of Sleep Medicine, 5th ed., 2011



- **schlafassoziierte obere Atemwegsobstruktion**
- **Def.: Apnoe/Hypopnoe (mind. 10s) ≥ 5 pro Stunde**
- **Schweregrade:**

mild	**AHI 5-15/h**
moderat	**AHI 15-30/h**
schwer	**AHI >30/h**

Obstruktive Schlafapnoe; griechisch: ἄπνοια („ohne Atem“)



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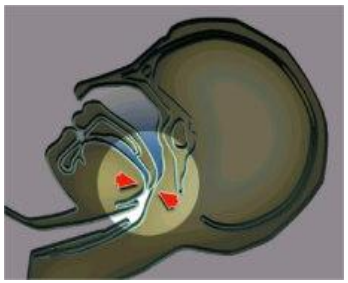
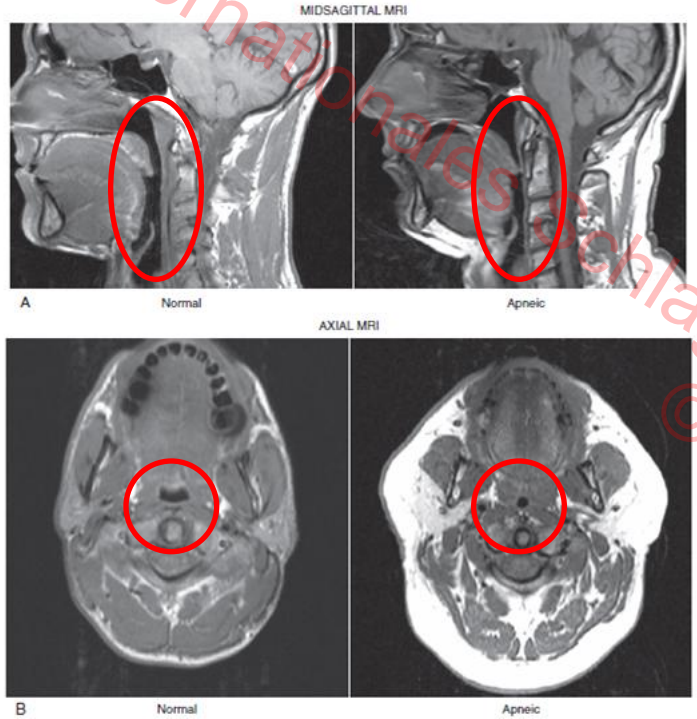


- **Häufigkeit:**

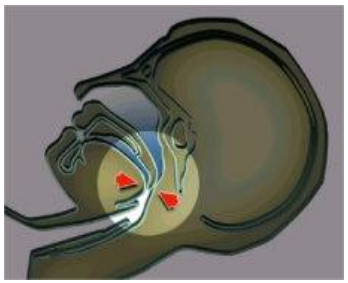
Alter	*Frauen*	*Männer*
30-39	*6 %*	*17 %*
40-49	*9 %*	*25 %*
50-59	*16 %*	*31 %*

Young et al., N Eng J Med 1993

Obstruktive Schlafapnoe; griechisch: ἄπνοια („ohne Atem“)



Principles and Practice of Sleep Medicine, 5th ed., 2011

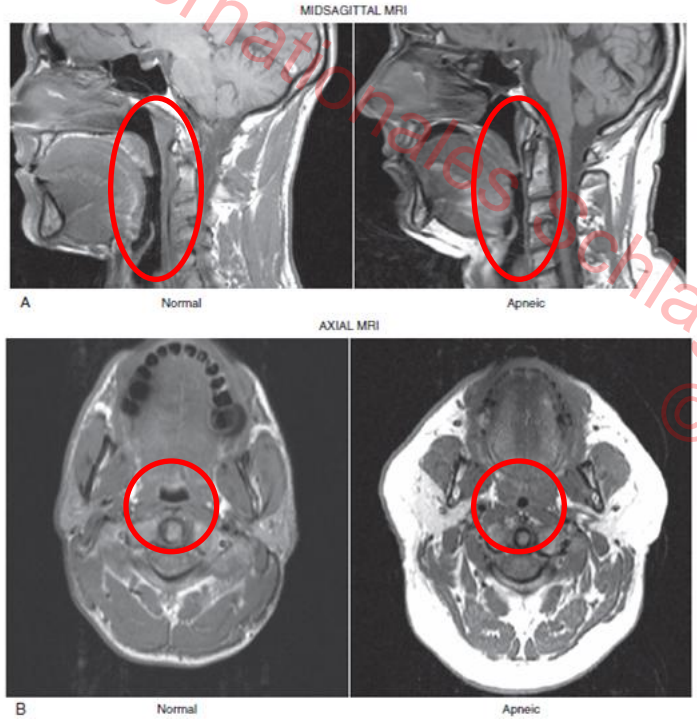


- **Symptome:**

Tagesmüdigkeit
Sekundenschlaf
Kopfschmerzen
Pseudo-Demenz
Pseudo-Depression

Schnarchen
Nykturie
Insomnie
Palpitationen
unregelmäßige Atmung

Obstruktive Schlafapnoe; griechisch: ἄπνοια („ohne Atem“)



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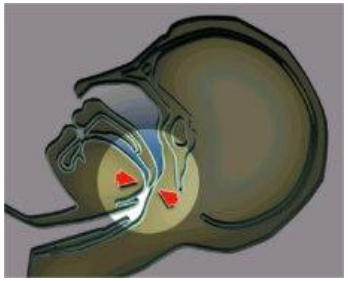


Therapie:

- **Gewichtsabnahme**

- **CPAP**

- **Protrusionsschienen**

Association of Sleep-Disordered Breathing, Sleep Apnea, and Hypertension in a Large Community-Based Study

3-fach erhöhtes Risiko für Hypertonie

Nieto et al. JAMA 2000

Association of Nocturnal Arrhythmias with Sleep-disordered Breathing

The Sleep Heart Health Study

Reena Mehra, Emelia J. Benjamin, Eyal Shahar, Daniel J. Gottlieb, Rawan Nawabit, H. Lester Kirchner, Jayakumar Sahadevan, and Susan Redline

4-fach erhöhtes Risiko für Vorhofflimmern

Am J Respir Crit Care Med 2006

THE LANCET

Association of sleep apnoea with myocardial infarction in men

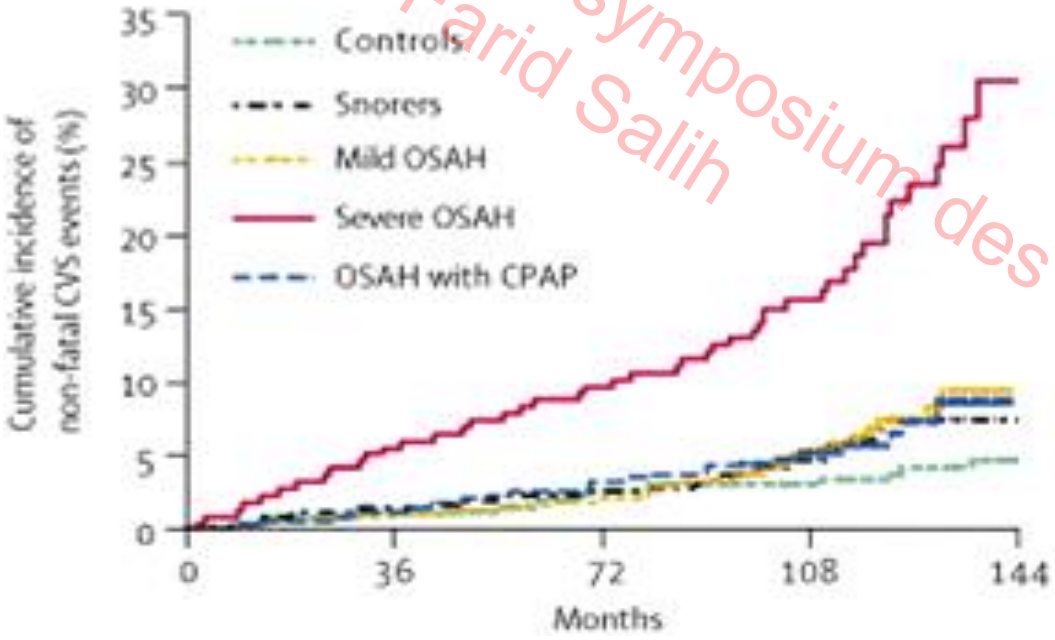
Schlafapnoe ist Prädiktor für Herzinfarkt

Hung et al., 1990

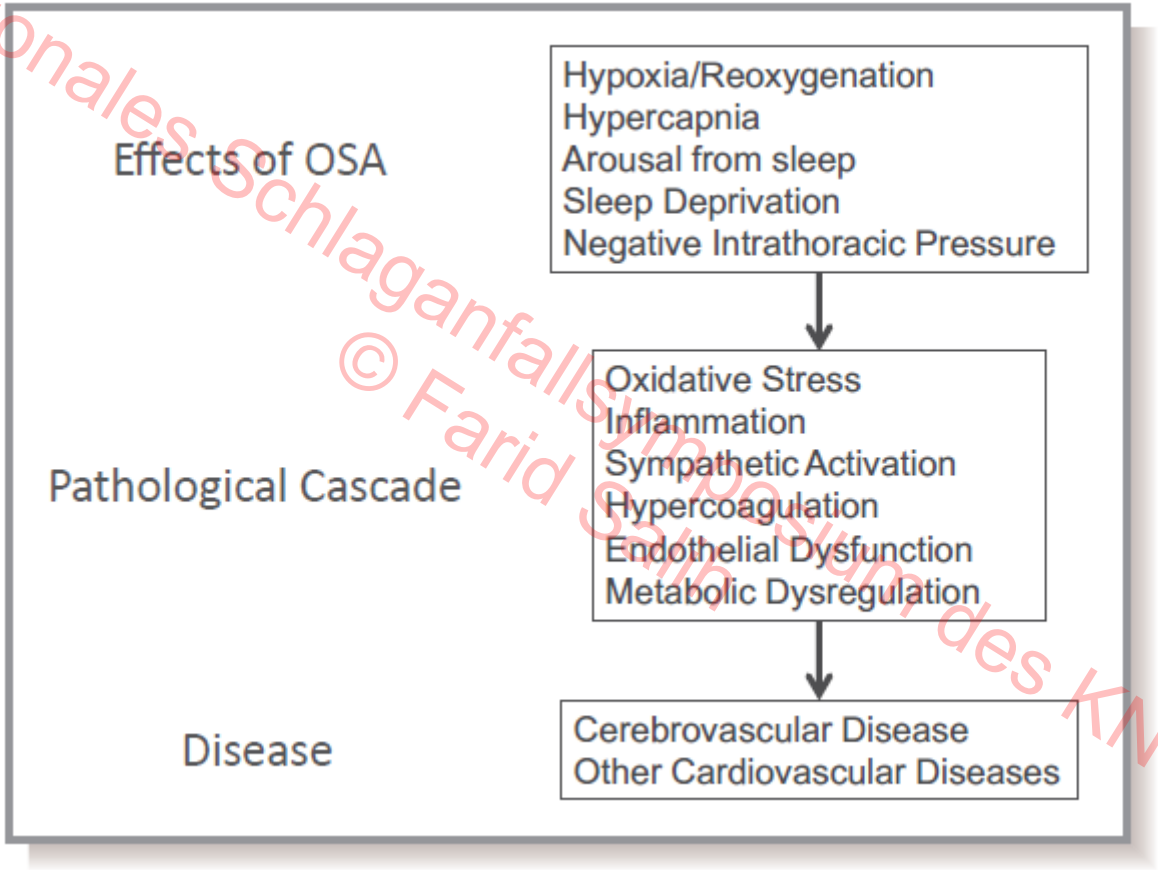
THE LANCET 2005, Vol. 365 (9464):1046-53

Long-term cardiovascular outcomes in men with obstructive sleep apnoea-hypopnoea with or without treatment with continuous positive airway pressure: an observational study

Jose M Marin, Santiago J Carrizo, Eugenio Vicente, Alvar G N Agusti



Pathophysiologie



Cerebrovascular Consequences of Obstructive Sleep Apnea

David J. Durgan, PhD; Robert M. Bryan, Jr, PhD

J Am Heart Assoc. 2012

Schlafapnoe und Schlaganfall: was ist gesichert?

- Patienten mit Hirninfarkt oder TIA haben 3-4mal so häufig Schlafapnoe

Dyken et al., Stroke 1996; Bassetti & Aldrich, Sleep 1999

⇓

Bei wievielen Patienten bestand die Schlafapnoe vorher? Welche Relevanz hat sie?

Association of Sleep-disordered Breathing and the Occurrence of Stroke

Michael Arzt, Terry Young, Laurel Finn, James B. Skatrud, and T. Douglas Bradley

- **prospektive Analyse zur Inzidenz eines erstmaligen Schlaganfalls (Dauer: 4 Jahre, n=1475)**

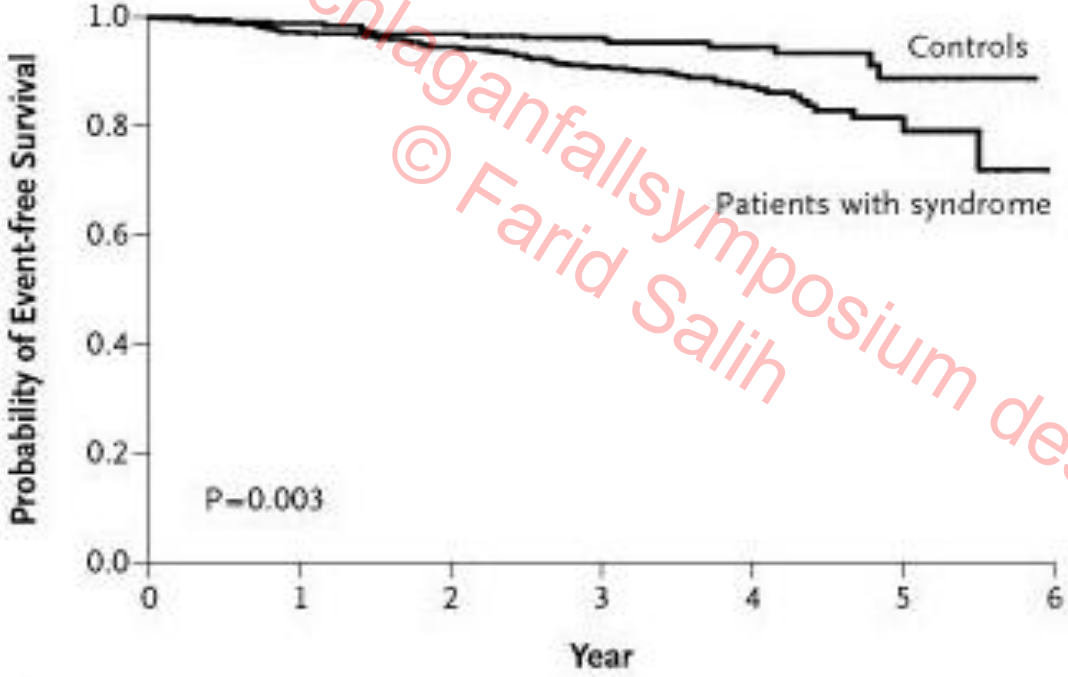
AHI (*events/h*)	OR (95% *CI*), adjusted for age, sex	p Value	OR (95% *CI*), adjusted for age, sex, and BMI	p Value
< 5*	1.0		1.0	
≥ 5 to < 20	0.35 (0.05–2.69)	0.31	0.29 (0.04–2.36)	0.25
≥ 20	4.48 (1.31–15.33)	0.02	3.08 (0.74–12.81)	0.12

Wisconsin Sleep Cohort Study: *Am J Respir Crit Care Med (2005);172:1447-51*

The NEW ENGLAND JOURNAL of MEDICINE

Obstructive Sleep Apnea as a Risk Factor for Stroke and Death

Yaggi et al. (2005), Vol. 353 (19):2034-41



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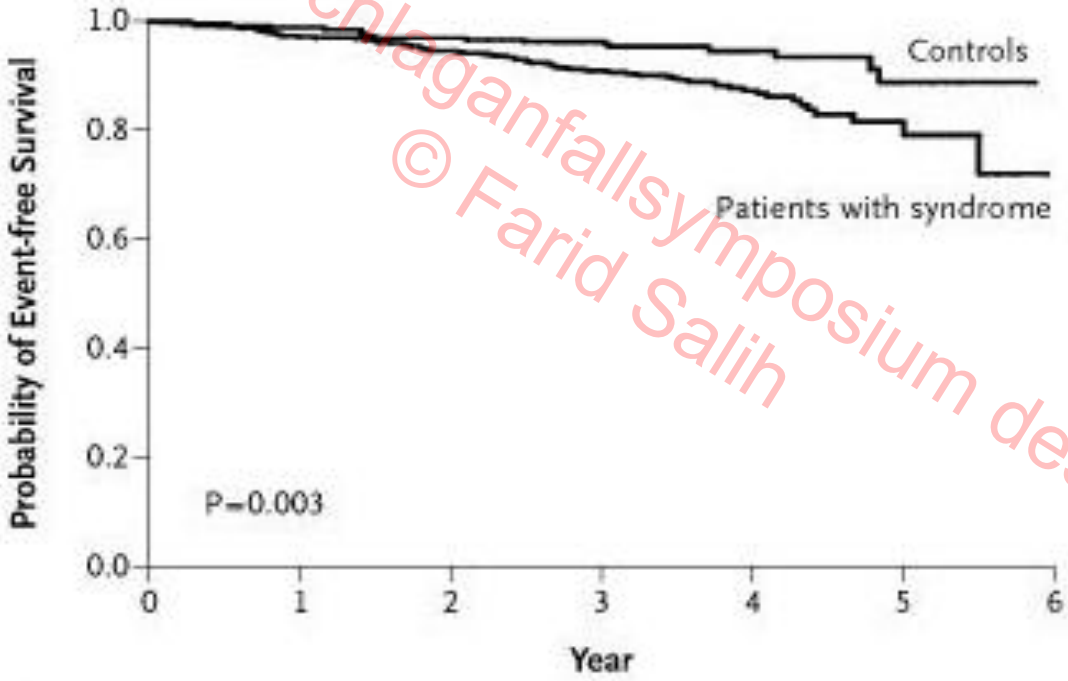

⇒ **Relatives Risiko von 5.16 für isolierten Endpunkt „Schlaganfall und TIA“**

Campampangan et al., Neurologist 2010

Am J Respir Crit Care Med Vol 182. pp 269–277, 2010

Obstructive Sleep Apnea–Hypopnea and Incident Stroke

The Sleep Heart Health Study

Susan Redline[1], Gayane Yenokyan[2], Daniel J. Gottlieb[3,4], Eyal Shahar[5], George T. O'Connor[3], Helaine E. Resnick[6,7], Marie Diener-West[2], Mark H. Sanders[8], Philip A. Wolf[3], Estella M. Geraghty[9], Tauqeer Ali[9], Michael Lebowitz[11], and Naresh M. Punjabi[12]

Methods: Baseline polysomnography was performed between 1995 and 1998 in a longitudinal cohort study. The primary exposure was the obstructive apnea–hypopnea index (OAHI) and outcome was incident ischemic stroke.

Am J Respir Crit Care Med Vol 182. pp 269–277, 2010

Obstructive Sleep Apnea–Hypopnea and Incident Stroke

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TABLE 4. RESULTS OF COX PROPORTIONAL HAZARD MODEL REGRESSION HAZARD OF DEVELOPING INCIDENT ISCHEMIC STROKE AMONG MEN

	Hazard Ratio (95% CI)		
		Adjusted	
Covariate	Unadjusted	Age Adjusted	Fully Adjusted*
OAHI			
IV quartile (19.13 to 164.5)	3.91 (1.55–9.86)	3.05 (1.21–7.72)	2.86 (1.10–7.39)
III quartile (9.50 to <19.13)	2.35 (0.89–6.20)	1.97 (0.74–5.21)	1.86 (0.70–4.95)
II quartile (4.05 to <9.50)	1.96 (0.71–5.40)	1.86 (0.68–5.13)	1.86 (0.67–5.12)
I quartile (0 to <4.05)	1.0	1.0	1.0
P value for test of linear trend for AHI	0.0004	0.006	0.016

Definition of abbreviations: AHI = apnea–hypopnea index; CI = confidence interval; OAHI = obstructive AHI.
Total n = 2,462.
* Adjusted for age, body mass index, smoking status, systolic blood pressure, use of antihypertensive medications, diabetes status, and race.

Am J Respir Crit Care Med Vol 182. pp 269–277, 2010

Obstructive Sleep Apnea–Hypopnea and Incident Stroke

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Conclusions: The strong adjusted association between ischemic stroke and OAHI in community-dwelling men with mild to moderate sleep apnea suggests that this is an appropriate target for future stroke prevention trials.

NEW RESEARCH

SCIENTIFIC INVESTIGATIONS

JCSM
Journal of Clinical Sleep Medicine

Frequency of Sleep Apnea in Stroke and TIA Patients: A Meta-analysis

Karin G. Johnson, M.D.[1]; Douglas C. Johnson, M.D.[2]
[1]Baystate Medical Center, Springfield, MA; [2]Massachusetts General Hospital, Boston, MA

- 29 Studien mit n= 2343 Patienten
- Apnoe-Hypopnoe-Index >5/h bei 72%, >20/h bei 38%
- Männer (65%) häufiger betroffen als Frauen (48%)
- meist obstruktive Schlafapnoe (93%)

Schlafapnoe nach Schlaganfall unabhängig von Topographie

Stroke

American Heart Association | American Stroke Association

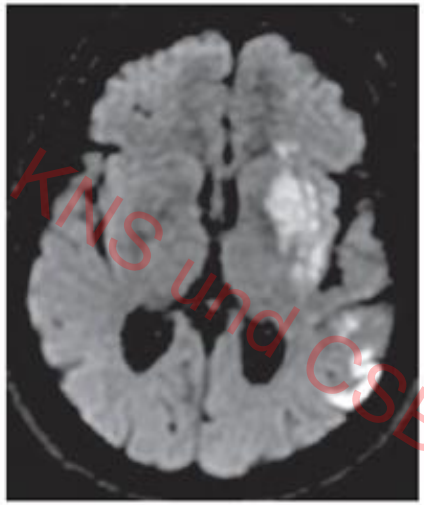
Sleep-Disordered Breathing in Patients With Acute Supra- and Infratentorial Strokes

A Prospective Study of 39 Patients

Claudio Bassetti, MD; Michael S. Aldrich, MD; Douglas Quint, MD

From the Departments of Neurology (C.B., M.S.A.) and Neuroradiology (D.Q.), University of Michigan Hospitals, Ann Arbor, Mich.

	Normal	OSA	OSA+CSB	CSB
Supratentorial stroke (28 patients)				
Right hemisphere (n=12)	4	4	2	2
Left hemisphere (n=15)	5	6	3	1
Bilateral (n=1)	0	0	1	0
	Normal=9 patients		Abnormal=19 patients	
	(32%)		(68%)	
Infratentorial stroke (n=11)				
Midbrain (n=1)	0	0	1	0
Pons (n=6)	3	1	0	1
Medulla (n=3)	0	3	0	0
Cerebellum (n=1)	1	0	0	0
	Normal=4 patients		Abnormal=7 patients[1]	
	(36%)		(64%)	



Aaronson et al. BMC Neurology 2014, 14:36
http://www.biomedcentral.com/1471-2377/14/36

BMC Neurology

STUDY PROTOCOL Open Access

The effect of obstructive sleep apnea and treatment with continuous positive airway pressure on stroke rehabilitation: rationale, design and methods of the TOROS study

Justine A Aaronson[1,3,5*], Coen AM van Bennekom[1], Winni F Hofman[3], Tijs van Bezeij[1], Joost G van den Aardweg[4], Erny Groet[1], Wytske A Kylstra[1] and Ben A Schmand[2,3]

Abstract

Background: Obstructive sleep apnea is a common sleep disorder in stroke patients. Obstructive sleep apnea is associated with stroke severity and poor functional outcome. Continuous positive airway pressure seems to improve functional recovery in stroke rehabilitation. To date, the effect of continuous positive airway pressure on cognitive functioning in stroke patients is not well established. The current study will investigate the effectiveness of continuous positive airway pressure on both cognitive and functional outcomes in stroke patients with obstructive sleep apnea.

Methods/Design: A randomized controlled trial will be conducted on the neurorehabilitation unit of Heliomare, a rehabilitation center in the Netherlands. Seventy stroke patients with obstructive sleep apnea will be randomly allocated to an intervention or control group (n = 2×35). The intervention will consist of four weeks of continuous positive airway pressure treatment. Patients allocated to the control group will receive four weeks of treatment as usual. Outcomes will be assessed at baseline, immediately after the intervention and at two-month follow-up. In a supplementary study, these 70 patients with obstructive sleep apnea will be compared to 70 stroke patients without obstructive sleep apnea with respect to cognitive and functional status at rehabilitation admission. Additionally, the societal participation of both groups will be assessed at six months and one year after inclusion.

Discussion: This study will provide novel information on the effects of obstructive sleep apnea and its treatment with continuous positive airway pressure on rehabilitation outcomes after stroke.

Trial registration: Trial registration number: Dutch Trial Register NTR3412

Keywords: Stroke, Rehabilitation outcome, Obstructive sleep apnea, CPAP, Randomized controlled trial, Cognition, Functional status

Aaronson et al. BMC Neurology 2014, 14:36
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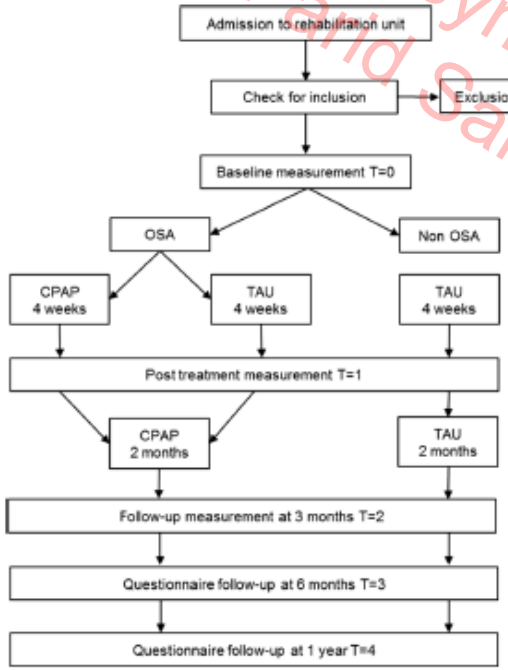


Figure 1 Flowchart of the TOROS study. OSA: obstructive sleep apnea; CPAP: continuous positive airway pressure; TAU: treatment as usual.

Schlafapnoe-Screening

Screening für schlafbezogene Atmungsstörungen (SBAS)
bei Patienten mit zerebro-vaskulären Erkrankungen in der Akutphase

Patienten mit TIA/Ischämie/Blutung ohne Demenz < 75Lj.

↓

arterieller Hypertonus, Vorhofflimmern

↙ ↘

ja → **screening**

nein →

- anamnestische Hinweise
  für schlafbezogene Atmungsstörung
  (Unterbrechung der Atmung im Schlaf, erhöhte Tagesmüdigkeit)

oder

- hohes Risiko (zwei Katergorien positiv) im "Berlin questionnaire"

oder

- gehäufter (>15/h) Abfall (>4%) der SO_2 im Monotoring

↓

screening

„Post-stroke restless legs syndrome“

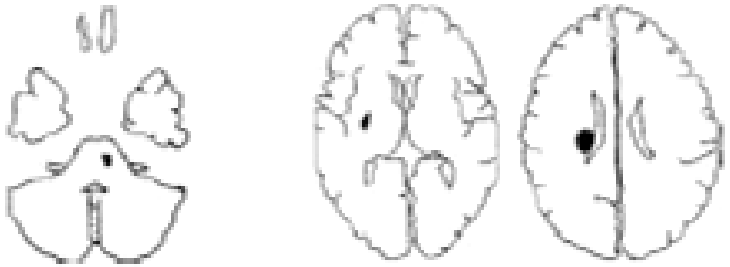
Movement Disorders
Vol. 24, No. 1, 2009, pp. 77–84

Poststroke Restless Legs Syndrome and Lesion location: Anatomical Considerations

Seung-Jae Lee, MD, Joong-Seok Kim, MD, PhD,* In-Uk Song, MD, Jae-Young An, MD, Yeong-In Kim, MD, and Kwang-Soo Lee, MD

n = 137

12.4% de novo RLS – Prävalenz



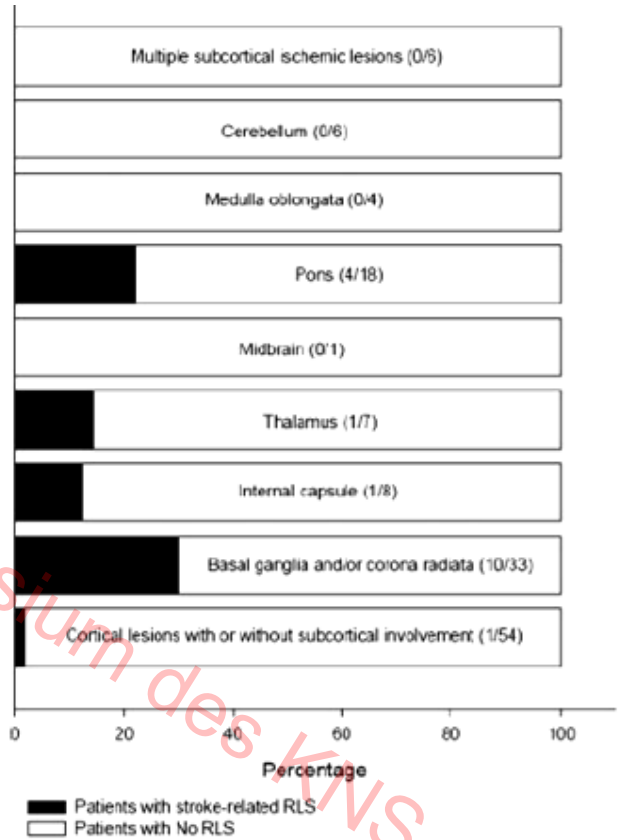


FIG. 1. Frequency of stroke-related RLS by lesion group. Parenthesis represents number of stroke-related RLS patients/total within the group.

Lee et al., 2008

„Post-stroke Insomnie“

n=277

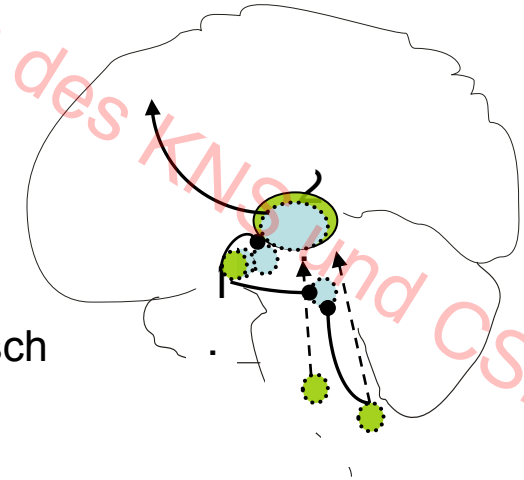
Prävalenz: 57%

post-stroke Insomnie: 18% mit unspezifischer Pathogenese

Leppävuori et al., 2002

läsionell bedingte post-stroke Insomnie

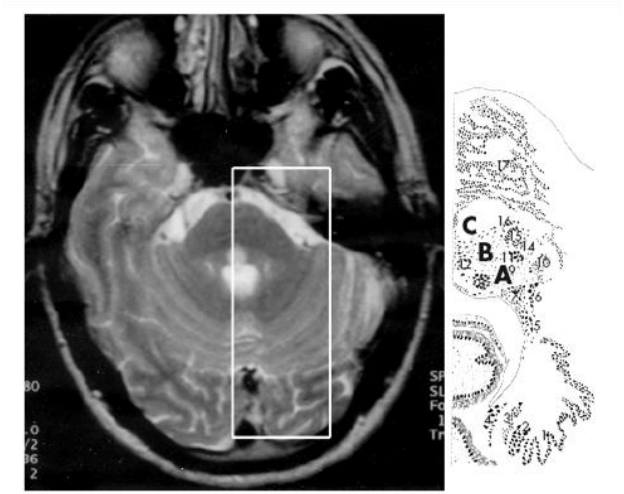
Pons, ponto-mesenzephaler Übergang, paramedian-thalamisch



REM-Schlafverhaltensstörung:

- **Grundlage ist gestörte Muskelatonie im REM-Schlaf (Traumschlaf)**

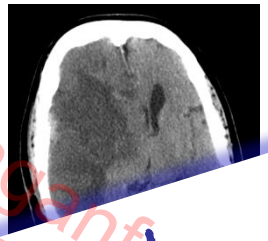
- **REM-Schlafverhaltensstörung bei umschriebenen Läsionen im pontinen Hirnstamm:**



Kimura et al. (Neurology 2000): **lakunärer Pons-Infarkt**

A Abducenskern, B Ncl. magnocellularis, C Ncl. dorsalis raphe

Schlafstörungen und Schlaganfall



Dran denken!

Schlafstö … all ⇒ Schlafstörung

als Risikof … als Folge

- Schlafapnoe

- Schlafapnoe
- Restless-Legs
- Insomnie
- Hypersomnie
- RBD u.a.