NEUTROPHIL-TO-LYMPHOCYTE RATIO PREDICTS POST-STROKE PNEUMONIA IN ACUTE ISCHEMIC STROKE

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BACKGROUND

Pneumonia is a common complication after acute ischemic stroke (AIS). It occurs in 1-33% of patients¹ and has been associated with increased mortality and poor functional outcome². More recently, elevated Neutrophil-to-Lymphocyte ratio (NLR) has been linked to poor outcome after AIS³.

OBJECTIVE

Our goal was to investigate the predictive value of NLR and other demographic, clinical and laboratory measures for post-stroke pneumonia (PSP) in the first week after AIS.

METHODS

Stroke Database
UZ Brussel
4999 patients

Exclusion criteria

- Hemorrhagic stroke
- Stroke mimics
- Unclear time of onset
- Routine blood sampling >24h after onset of symptoms
- Previous hematologic/inflammatory/autoimmune disorder
- Infections preceding stroke
- Use of antibiotics >24h before admission
- Use of immunosuppressants

Electronic record system

- Demographics: age, gender
- Clinical info: history, medication, stroke severity (NIHSS), systolic blood pressure (BP), diastolic BP, mean arterial pressure, level of consciousness, dysphagia, dysarthria, tube feeding prior to pneumonia
- Laboratory value: absolute neutrophil count, absolute lymphocyte count, absolute platelet count and CRP on admission

192 eligible patients

Pneumonia modified CDC diagnostic criteria

At least one of the former and one of the latter criteria fulfilled:

- (1) Abnormal respiratory examination, pulmonary infiltrates on chest x-rays
- (2) Productive cough with purulent sputum, microbiological cultures from lower respiratory tract or blood cultures, leukocytosis, elevation of CRP

No PSP (n=162)

PSP (n=30)

RESULTS

Baseline characteristics of study population (n=192)*

Variables	Pneumonia (n=30)	No pneumonia (n=162)	p-value
NIHSS	17 (11-21)	7 (3-14)	<0.001
NIHSS item 1.a			0.001
Score 0	21 (70.0)	150 (92.6)	
Score 1	6 (20.0)	9 (5.6)	
Score 2	3 (10.0)	3 (1.9)	
NIHSS item 10			<0.001
Score 0	3 (10.0)	65 (40.6)	
Score 1	8 (26.7)	70 (40.3)	
Score 2	19 (63.3)	25 (15.6)	
Dysphagia	25 (83.3)	58 (35.8)	<0.001
Tube feeding	18 (60.0)	23 (14.2)	<0.001
ACE-Inhibitors	13 (43.3)	37 (22.8)	0.019
Diuretics	11 (36.7)	32 (19.8)	0.041
ALC (/mm ³)	1516.2 ± 606.2	2175.1 ± 974.6	<0.001
ANC (/mm ³)	7719.6 ± 2765.4	5566.7 ± 2410.8	<0.001
CRP	7.0 (1.8-13.1)	3.0 (1.3-6.5)	0.020
NLR	5.1 (2.7-9.6)	2.6 (1.4-4.9)	<0.001

*only significant results are shown

ROC curve analysis for NLR

cut-off for NLR = 4.3 with sensitivity = 70% and specificity = 79% AUC = 0.78 (p<0.001)

Multiple logistic regression analysis

Variables	OR	95% CI	p-value
NIHSS item 10 score 1	1.08	0.23-5.15	0.925
NIHSS item 10 score 2	10.56	2.30-48.41	0.002
Dysphagia	6.31	1.90-20.95	0.003
NLR ≥ 4.3	11.88	3.83-36.88	<0.001
Gender	5.06	1.55-16.47	0.007

CONCLUSION

Our results suggest that NLR, dysphagia, severe dysarthria and male gender are independent predictors of PSP in the first week after AIS.

LITERATURE

- ¹ Emsley et al. Acute ischaemic stroke and infection: recent and emerging concepts. *Lancet Neurol* 7, 341-353, doi:10.1016/S1474-4422(08)70061-9 (2008)
- ² Aslanyan, S. et al. Pneumonia and urinary tract infection after acute ischaemic stroke: a tertiary analysis of the GAIN International trial. *Eur J Neurol* 11, 49-53 (2004)
- ³ Fang et al. Higher neutrophil counts and neutrophil-to-lymphocyte ratio predict prognostic outcomes in patients after non-atrial fibrillation-caused ischemic stroke. *Biomed J* 40, 154-162, doi:10.1016/j.bj.2017.03.002 (2017).