

## Brief report

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# Clinical features and outcomes of aspiration pneumonia and non-aspiration pneumonia in octogenarians and nonagenarians admitted in a General Internal Medicine Unit

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### ABSTRACT

**Introduction.** Pneumonia is a common infectious disease and causes significant morbidity and mortality especially in elderly people. Aspiration as a cause of pneumonia is common in this population. The aim of our study was to describe the clinical features and outcomes of very old patients with aspiration pneumonia (AP) and comparing them with patients with non-AP.

**Material and methods.** In this prospective cohort study, we analyzed old patients ( $\geq 80$  years-old) with pneumonia admitted 2014 in the Department of General Internal Medicine.

**Results.** Seventy-six old patients with pneumonia were included in the study, and 46 (60.5%) met criteria of AP. Increasing levels of urea, creatinine and sodium and low estimated glomerular filtrate rate were more common among AP patients. In addition, severity of pneumonia scored by pneumonia severity index and CURB-65 score were significantly greater in AP than in non-AP patients. The 30-days mortality in AP was (44%) quite higher than in non-AP (32%). The only predictor of mortality was high level of sodium (odds ratio: 1.09; 95% confidence intervals: 1.00-1.18).

**Conclusions.** AP in octogenarian and nonagenarians showed higher levels of sodium and low estimated glomerular filtrate rate and higher severity of pneumonia and slightly higher mortality than non-AP.

**Key words:** pneumonia, aspiration pneumonia, octogenarian, nonagenarians, sodium, hyponatremia

### Características clínicas y evolución de la neumonía por aspiración en octogenarios y nonagenarios ingresados en una Unidad de Medicina Interna General

### RESUMEN

**Introducción.** La neumonía es una causa de elevada morbilidad y mortalidad en las personas de edad avanzada. La aspiración como una causa de neumonía es común en esta población. El objetivo del estudio fue describir las características clínicas y los resultados de los pacientes muy ancianos con neumonía por aspiración (NA) y su comparación con los pacientes con neumonía no aspirativa (NNA).

**Material y métodos.** En este estudio de cohorte prospectivo, se analizaron los pacientes ancianos ( $\geq 80$  años de edad) con neumonía ingresados en una Sección de Medicina Interna General.

**Resultados.** Setenta y seis pacientes ancianos con neumonía fueron incluidos en el estudio, y 46 (60,5%) cumplieron con los criterios de NA. El aumento de los niveles de urea, creatinina y sodio y la menor tasa de filtrado glomerular fueron más comunes entre los pacientes de NA. Además, la gravedad de la neumonía medido por índice de gravedad de la neumonía (PSI) y CURB-65 fueron significativamente mayores en NA que en los pacientes NNA. La mortalidad a los 30 días de las NA (44%) fue superior al de la NNA (32%). El único predictor de mortalidad fue la elevación de sodio (odds ratio: 1,09; intervalo de confianza del 95%: 1,00 a 1,18).

**Conclusiones.** Octogenarios y nonagenarios con NA presentaron niveles altos de sodio, un menor tasa de filtrado glomerular bajo y una mayor gravedad de la neumonía que la NNA, así como una mortalidad ligeramente superior.

**Palabras clave:** neumonía, neumonía por aspiración, octogenario, nonagenarios, sodio, hipernatremia

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## INTRODUCCIÓN

Pneumonia is a common infectious disease and causes significant morbidity and mortality especially in elderly people. Aspiration as a cause of pneumonia is common in this population, frequently related to neurologic diseases and dysphagia, health problems that increase with ageing<sup>1</sup>. Several recent studies reveal that aspiration pneumonia (AP) has a different clinical background, greater disease severity, and poorer prognosis than patients with non-AP<sup>2-5</sup>. Hayashi et al.<sup>2</sup> have reported 100 episodes of AP in patients aged > 15 years old and compared with 114 non-AP. The aim of our study was to describe the clinical features and outcomes of very old patients with AP and comparing them with patients with non-AP.

## MATERIAL AND METHODS

In this prospective cohort study, we analyzed old patients ( $\geq 80$  years-old) with community-acquired pneumonia (CAP) and healthcare-associated pneumonia (HCAP) admitted between January 2013 and May 2014 in the Department of Internal Medicine of the Hospital General Universitario Alicante, a 780-bed, an urban teaching hospital serving a large community and referral population in Alicante, Spain. A convenience sample selected was enrolled (all patients were attended by one of the authors, JMR). Patients were followed until death or one month after diagnosis. Diagnosis of pneumonia was established by radiographic evidence of pulmonary infiltration plus acute onset of symptoms of lower respiratory tract infection. Aspiration pneumonia was defined following the criteria of Hayashi et al.<sup>2</sup> The Institutional Ethics Committee of Hospital General Universitario de Alicante approved the study protocol.

We summarized and compared characteristics of patients at admission, and clinical outcomes between AP and non-AP using the Mann Whitney U-test or chi-square test in accordance with continuous and nominal variables, respectively.

## RESULTS

Seventy-six old patients with pneumonia were included in the study, and 46 (60.5%) met criteria of AP. Clinical characteristics of each group (AP / non-AP) are resumed in table 1. Patients with AP were mainly males with dementia and with high dependence level (Barthel index). Increasing levels of urea, creatinine and sodium and low estimated glomerular filtrate rate were more common among AP patients. In addition, severity of pneumonia scored by pneumonia severity index (PSI) and CURB-65 score were significantly greater in AP than in non-AP patients.

The 30-days mortality in AP was 44% (IC 95%: 30.9-58.2%), quite higher than in non-AP 32% (IC 95%: 18.5-49.8) ( $p=0.12$ ). Patients with AP required longer hospital stay (media:  $12.1 \pm 7.5$  vs  $8.7 \pm 5.6$  days;  $p=0.04$ ). Risk factors of mortality associated to pneumonia of any cause in all the studied population are presented in table 2. Mortality was associated with

severe pneumonia (PSI class V and CURB-65  $\geq 3$ ), and higher levels of urea, creatinine, and sodium in the blood. To analyze risk factors of mortality between AP and non-AP patients, we performed a multivariate regression analysis with forced entry methods excluding AP. The only predictor of mortality was high level of sodium (OR: 1.09; 95% CI: 1.00-1.18). Odds ratio of severe pneumonia defined as PSI class V was: 4.06 (CI95%: 0.88-18.5). When, we included AP in the multivariate model, high level of sodium remained as the only factor associated to mortality (OR: 1.10; 95% CI: 1.04-1.19).

## DISCUSSION

This study shows that AP have different outcomes, prognosis and mortality rates than non-AP in octogenarians and nonagenarians patients with pneumonia who required hospital admission. Mortality of AP was higher than non-AP but not significantly, probably because the sample size studies was small. The mortality of pneumonia was associated with higher level of sodium in the blood in these patients and after including AP in the equation, the levels of sodium showed a higher association to mortality. Sodium is important factor associated with the mortality in elderly by itself as has seen in this study<sup>6</sup>.

In conclusion, AP in octogenarian and nonagenarians patients has different outcomes than non-AP with slightly higher mortality. Sodium serum levels superior to normal values are associated to mortality in this subset of patients, so this fact has to be in account in the treatment of these patients.

## REFERENCES

1. Simonetti AF, Viasus D, Garcia-Vidal C, Carratalà J. Management of community-acquired pneumonia in older adults. *Ther Adv Infect Dis* 2014; 2:3-16.
2. Hayashi M, Iwasaki T, Yamazaki Y, Takayasu H, Tateno H, Tazawa S, et al. Clinical features and outcomes of aspiration pneumonia compared with non-aspiration pneumonia: a retrospective cohort study. *J Infect Chemother* 2014;20:436-42.
3. Komiya K, Ishii H, Umeki K, Mizunoe S, Okada F, Johkoh T, et al. Impact of aspiration pneumonia in patients with community-acquired pneumonia and healthcare-associated pneumonia: a multicenter retrospective cohort study. *Respirology* 2013;18:514-21.
4. Teramoto S, Fukuchi Y, Sasaki H, Sato K, Sekizawa, Matsue K, et al. High incidence of aspiration pneumonia in community- and hospital-acquired pneumonia in hospitalized patients: a multicenter, prospective study in Japan. *J Am Geriatr Soc* 2008;56:577e9.
5. Garcia-Vidal C, Viasus D, Roset A, Adamuz J, Verdaguier R, Dorca J, et al. Low incidence of multidrug-resistant organisms in patients with healthcare-associated pneumonia requiring hospitalization. *Clin Microbiol Infect* 2011; 17: 1659-65.
6. Shah MK, Workeneh B, Taffet GE. Hyponatremia in the geriatric population. *Clin Interv Aging* 2014; 9:1987-92.

<b>Table 1</b>		<b>Characteristics of patients with aspiration and non-aspiration pneumonia</b>		
Variables	Aspiration pneumonia	Non-aspiration pneumonia	P-value	
No. of patients	45 (59.2)	31 (40.8)		
Sex, male	28 (71.8)	11 (28.2)	0.021	
Octogenarians	38 (62.3)	23 (37.7)	0.272	
Nonagenarians	7 (46.7)	8 (53.3)	0.272	
CAP	35 (55.6)	28 (44.4)	0.151	
HCAP	10 (76.9)	3 (23.1)		
Comorbidity				
Dementia	33 (100)	0 (0)	< 0.001	
COPD	13 (28.9)	5 (15.2)	0.152	
Congestive heart failure	29 (60.4)	19 (39.6)	0.020	
Chronic kidney disease	22 (75.9)	7 (24.1)	0.020	
Diabetes mellitus	16 (53.3)	14 (46.7)	0.413	
Charlson comorbidity index, mean $\pm$ SD	6.7 $\pm$ 3.2	5.8 $\pm$ 3.1	0.221	
Charlson comorbidity index			0.950	
0-2	6 (60)	4 (40)		
$\geq$ 3	39 (59.1)	27 (40.9)		
Barthel index, mean $\pm$ SD	14 $\pm$ 23	59 $\pm$ 32	<0.001	
Barthel index			<0.001	
0-20 points (severe dependence)	40 (74.1)	14 (25.9)		
>20 points	2 (14.3)	12 (85.7)		
PSI score, mean $\pm$ SD	150 $\pm$ 31	133 $\pm$ 33	0.035	
PSI classification			<0.02	
Class III-IV	15 (44.1)	19 (55.9)		
Class V	30 (71.4)	12 (28.6)		
CURB-65 score, mean $\pm$ SD	3.2 $\pm$ 0.7	2.4 $\pm$ 0.8	<0.001	
CURB-65 score			< 0.001	
1-2	8 (28.6)	20 (71.4)		
$\geq$ 3 (Severe pneumonia)	37 (77.1)	11 (22.9)		
White blood cell/ml, mean $\pm$ SD	15,132 $\pm$ 7,169	13,888 $\pm$ 6,525	0.451	
Urea, mg/dl, mean $\pm$ SD	97.8 $\pm$ 51.2	66.4 $\pm$ 48.	0.002	
Creatinine, mg/dl, mean $\pm$ SD	1.72 $\pm$ 0.91	1.33 $\pm$ 0.89	0.050	
Glomerular filtration rate, mL/min/1.73 m <sup>2</sup> , mean $\pm$ SD	48.0 $\pm$ 28.2	63.1 $\pm$ 35.6	0.022	
Sodium, mEq/l, mean $\pm$ SD	142.2 $\pm$ 10.1	135.7 $\pm$ 5.64	0.001	
C-reactive protein, mg/dl, mean $\pm$ SD	17 $\pm$ 12.1	16.3 $\pm$ 12.4	0.813	

CAP: community-acquired pneumonia, HCAP: healthcare-associated pneumonia, PSI: pneumonia severity index, SD: standard deviation. Data are presented as no. (%) unless specified.

	Non-survivors (n=30)	Survivors (n=46)	P-value	Non-Including aspiration pneumonia		Including aspiration pneumonia	
				OR (95% CI)	P-value	OR (95% CI)	P-value
PSI class V	25 (83.3)	17 (37)	<0.001	4.06 (0.88 - 18.5)	0.071	3.67 (0.69-19.33)	0.122
CURB-65, $\geq 3$ (Severe pneumonia)	27 (90)	21 (45.7)	<0.001	2.41 (0.45 - 12.7)	0.301	2.73 (0.54-25.8)	0.181
Urea, mg/dl, mean $\pm$ SD	109.6 $\pm$ 59.5	65.9 $\pm$ 32.2	0.001	1.00 (0.98-1.30)	0.361	1.01 (0.99-1.03)	0.271
Creatinine, mg/dl, mean $\pm$ SD	1.87 $\pm$ 1.04	1.34 $\pm$ 0.75	0.007	1.03 (0.734-3.08)	0.961	0.98 (0.32-2.98)	0.971
Sodium, mEq/l, mean $\pm$ SD	144.4 $\pm$ 10.8	136 $\pm$ 6.0	0.002	1.09 (1.00-1.18)	0.035	1.10 (1.04-1.19)	0.023
Aspiration pneumonia	20 (66.7)	25 (54.3)	0.281	-	.	3.43 (0.79-14.70)	0.092

PSI: pneumonia severity index, SD: standard deviation; OR: Odds Ratio; 95% of CI: 95% of confidence intervals  
Data are presented as no. (%) unless specified.