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## How frequent is varicella-associated pneumonia in children?

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## INTRODUCTION

Chickenpox is a very contagious disease caused by Varicella-zoster virus that mostly affects children in the course of epidemics.<sup>1</sup> According to a seroepidemiologic study performed in Spain, 90.9% of the population under 14 years of age was already immune.<sup>2</sup> Varicella is usually a benign disease in children, but the rate of complications increase in adulthood. Varicella pneumonitis is the most important complication in adults, occurring in 3.4-4.3 cases per 10,000 adult's chickenpox.<sup>3</sup> In spite of the high morbidity of varicella pneumonia in adults, cases in children are very scarce in the literature. In this study we analyse the incidence and characteristics of pneumonia associated to varicella infection in the Island of Mallorca (Spain).

## METHODS

We have studied the incidence and characteristics of pneumonia associated to varicella infection in Mallorca (Spain) during the years 1995 to 2005. The number of cases of varicella infection and hospitalizations for varicella complications in this period were obtained as previously described.<sup>4</sup> Clinical records of the children hospitalized for varicella and pneumonia were revised. Chest X-rays were evaluated by a paediatric pneumologist and radiologist.

Pneumonia was classified in three groups, depending of the radiological, clinical, microbiological and laboratory findings (table 1).<sup>5,6,7,8</sup> Bacterial pneumonia was defined as: a) suggestive chest X-rays and one or more clinical, microbiological or laboratory findings; b) non-suggestive radiological pattern but both clinical, laboratory and microbiological findings suggestive of bacterial pneumonia. Viral non-varicella pneumonia was defined as: a) suggestive radiological finding and one or more clinical, microbiological or laboratory findings; b) non-suggestive radiological viral but both clinical, laboratory and microbiological findings suggestive of viral pneumonia. Varicella pneumonitis was diagnosed when a typical radiological finding was observed within 7 days of the beginning of the varicella rash.

Statistical analysis was performed using Biostat 5.1.3 package software (AnalystSoft). Data distribution was given as median and range. Differences between groups were studied with Mann-Whitney U- test. Statistical significance was set in  $p < 0.05$ .

## RESULTS

A total of 213 children were admitted to the three public hospitals of the island with a diagnosis of varicella. 17/213 (8%) children were diagnosed of pneumonia. The rate of hospitalization for varicella complication due to pneumonia was 4.3 cases per 10,000 varicella infections; and 0.3 varicella pneumonitis per 10,000 varicella infections. The median age was 1.9 years (range 0-4 years), the median hospital stay was 11 days (range 2-101 days) and 10/17 (59%) were male.

Median time of fever and varicella rash to hospitalization was 3.1 and 4.5 days, respectively. 6/17 (35%) were admitted in the paediatric intensive care unit (1 for clinical sepsis, 3 for empyema, 1 for severe laryngitis and 1 for hypoxia). 4 patients presented with pleural effusion. Acyclovir was prescribed in 9/17 (53%) of children hospitalized for varicella complicated with pneumonia. Regardless of the etiological diagnosis, all patients received treatment with antibiotic.

After clinical, radiological, laboratory and microbiological studies, 9/17 (53%) of patients were considered to have bacterial pneumonia, 7/17 (41%) viral pneumonia and 1/17(6%) varicella pneumonitis (typical micronodular affectation of lung X rays). All patients were immunocompetent and were not receiving any chronic treatment. A microbiological diagnosis was obtained in 2/9 bacterial pneumonia (*S pyogenes* in two blood cultures). The child who developed varicella pneumonitis was a 12 months infant who was admitted after 4 days of fever and varicella rash. During his hospitalization *S. aureus* was isolated in the bloodstream. Viral isolation was obtained in 3/7 suspected viral pneumonia (2 cases of respiratory syncytial virus, and 1 case of adenovirus). Statistical differences ( $p<0.05$ ) in median age, time of fever and varicella rash to hospitalization were observed between suspected bacterial and viral pneumonia. The main clinical and outcome characteristics for each suspected etiology are summarized in *table 2*.

## DISCUSSION

In this study we have analysed varicella associated pneumonia, the most frequent complication of primary varicella infection. In children, previous studies have reported rates of pneumonia ranging from 7-25% of children hospitalized for varicella complications.<sup>9, 10</sup> In our study, varicella was the third most frequent cause of hospitalization for varicella (8%). Despite it is an important cause of complications in the course of varicella infection, few studies deal with varicella associated pneumonia in

children. Most cases of varicella associated pneumonia are reported in adult patients,<sup>11,12,13,14</sup> being varicella pneumonitis the most important cause of morbidity and mortality in adults' varicella.<sup>3</sup> This complication is associated with 30% of deaths for varicella complications in this group age.<sup>11</sup> However, it seems to be infrequent in children as suggested by the lack of reports. In our population study, we have found only 0.3 cases of varicella pneumonitis per 10,000 varicella infections.<sup>3</sup> This observation differs from that of Galil et al.<sup>3</sup> in adults where the rate of lower respiratory infection was 3.9 cases per 10,000 varicella cases. Also different from adults, we have observed that most of pulmonary complications of varicella in children seem to be produced by co-infections and not directly by varicella infection.

Our study has several limitations. First, it is a retrospective study with its drawbacks and bias. Second, we obtained the prevalence of varicella pneumonia using the total children population and the estimated rate of varicella infection in our children population based on varicella notifications from the primary care sentinel centres. Lastly, the lack of standards to differentiate viral from bacterial pneumonia makes it difficult to validate the accuracy of our classification.



Table 1. Used criteria for defining the etiology of pneumonia

	<i>Chest X-rays</i>	<i>Laboratory</i>	<i>Microbiological</i>	<i>Clinically</i>
<b>Bacterial</b>	-Lobar Alveolar infiltrates. -Pleural fluid.	CRP > 12mg/dl	-Blood culture. -Pleural effusion culture. -Direct pneumonic focus culture.	Fever >39°C
<b>Viral</b>	-Bilateral interstitial infiltrates.	CRP < 2mg/dl	-Culture or antigen detection in nasopharyngeal aspirates. -Antibody seroconversion.	Fever < 39°C
<b>Varicella</b>	-Reticular/nodular infiltrates	-	-	-

Table 2. Clinical characteristics and outcome of the patients hospitalized with pneumonia and varicella infection.

<b>Diagnosis</b>	<b>Median age (years)</b>	<b>Median time from rash to admission (d)</b>	<b>Median time of fever to admission (d)</b>	<b>% patient with T<sup>a</sup> &gt;39°C</b>	<b>Median stay (days)</b>	<b>Oxygen need (%)</b>	<b>Admission in intensive care (%)</b>
Bacterial pneumonia	2.6 (1.3-4.4)	5.9 (0-8)	4.1 (0-12)	89%	15 (4-101)	3/9 (33%)	4/9 (44%)
Viral pneumonia	1.2 (0.2-3.1)	2.4 (0-5)	2.2 (0-5)	78%	9.5 (2-18)	2/7 (29%)	2/7 (29%)
Varicella pneumonia	1.4	4	4	100%	13	1/1	0



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## References

- 1 American Academy of Pediatrics. Varicella-zoster infections. In: Pickering LK, Baker CJ, Long SS, McMillan JA, eds. Red Book: 2006 Report of the Committee on Infectious Diseases. 27th ed. Elk Grove Village, IL: American Academy of Pediatrics; 2006:711–725.
- 2 Amela C, Pachón I. Estudio seroepidemiológico de las enfermedades vacunables en España. Madrid: Instituto de Salud Carlos III, 2000. In [Http://www.isciii.es/htdocs/centros/epidemiologia/pdf/SEROEPIDEMIOLOGICO.pdf](http://www.isciii.es/htdocs/centros/epidemiologia/pdf/SEROEPIDEMIOLOGICO.pdf)
- 3 Galil K, Brown C, Lin F, Seward J. Hospitalizations for varicella in the United States, 1988 to 1999. *Pediatr Infect Dis J*. 2002 ;21(10):931-5.
- 4 Hervás D, Osona B, Masip C, Yeste S, Figuerola, Hervás J. Risk of varicella complications in children treated with inhaled steroids. *Pediatr Infect Dis J* 2008;27:1113-4.
- 5 Virkki R, Juven T, Rikalainen H, Svedström E, Mertsola J, Ruuskanen O. Differentiation of bacterial and viral pneumonia in children. *Thorax* 2002;57:438–441.
- 6 Zenteno A D, Girardi B G, Fuentes O L, Pérez H MA, González V R, Abara E S, Díaz G JP, Kogan A R, Maggiolo M J, Parietti B M, Pavón T D, Rubilar O L. Utility of chest x-ray like approach to etiology of community acquired pneumonia in children. *Rev Chil Infect* 2008;25:17-21.
- 7 Marcus N, Mor M, Amir L, Mimouni M, Waisman Y. Validity of the quick-read C-reactive protein test in the prediction of bacterial pneumonia in the pediatric emergency department. *Eur J Emerg Med*. 2008;15:158-61.
- 8 Moreno L, Krishnan JA, Duran P, Ferrero F. Development and validation of a clinical prediction rule to distinguish bacterial from viral pneumonia in children. *Pediatr Pulmonol*. 2006;41:331-7.
- 9 Rivest P, Bédard L, Valiquette L, Mills E, Lebel MH, Lavoie G, Carsley J. Severe complications associated with varicella: Province of Quebec, April 1994 to March 1996. *Can J Infect Dis* 2001 ;12:21-6.
- 10 Piqueras Arenas AI, Otero Reigada MC, Pérez-Tamarit D, Asensi Botet F, Diosdado Ortín N, Santos Durantez M. Hospitalizations for varicella in the Hospital Infantil La Fe, Valencia, Spain, 2001-2004. *An Pediatr (Barc)* 2005;63:120-4.
- 11 Schlossberg D, Littman M. Varicella Pneumonia. *Arch Intern Med* 1988;148:1630-1632.
- 12 Huncharck M, Klassen H. Acyclovir in Varicella pneumonia in healthy adults. *Respiration* 1993;60: 254-255.
- 13 de la Peña L, Izaguirre D, Aguirrebengoa K, Grande C, Montejo M. Neumonía por varicela en el adulto: estudio de 22 casos. *Enferm Infecc Microbiol Clin* 2000;18:493-495.
- 14 Rodríguez JC, Domínguez MJ, Miñambres E, Tejerina E, Holanda MS, González C, Quesada A. Neumonía varicelosa en adultos: 30 casos. *An Med Interna (Madrid)* 2003;20:612-616.