analesde**pediatría**

www.elsevier.es/anpediatr

BRIEF REPORT

Hospital admissions due to varicella in a tertiary hospital☆

K.P. Guzmán Laura[a,*], A. Periañez Vasco[a], M.D. Falcón Naira, B. Croche Santander[b]

[a] *Sección de Infectología Pediátrica e Inmunodeficiencias, Hospital Universitario Virgen del Rocío, Seville, Spain*
[b] *UGC Atención a la mujer y al niño, Servicio de Pediatría, Hospital de la Merced, Osuna, Seville, Spain*

Received 13 May 2013; accepted 1 October 2013

KEYWORDS
Varicella;
Morbidity;
Hospitalisation;
Varicella vaccine

Abstract
Introduction: Varicella (chickenpox) can cause serious complications and hospital admissions. Several countries included the varicella vaccine in their immunisation schedules.
Material and methods: A descriptive and retrospective study of hospitalisations due to varicella and its complications was conducted in a referral centre from 2005 to 2011.
Results: A total of 1192 children with varicella were seen in the emergency room, of which 99 (8.5%) required admission. The annual incidence of admissions due to varicella and varicella complications was, 19.4 and 15.3 cases per 100,000 children under 14 years, respectively. Complications were more common in children under 5 years (79.5%), and with no underlying disease (78.2%). Infection of skin and soft tissue was the most common complication (62%). The mean hospital stay was 4.5 days (SD 4).
Conclusions: Varicella causes high morbidity, and is more frequent in absolute terms in healthy children under 5 years of age. Therefore, routine vaccination recommended by the Immunisation Advisory Committee should be mandatory.

PALABRAS CLAVE
Varicela;
Morbilidad;
Hospitalización;
Vacuna antivaricela

Hospitalizaciones por varicela en un hospital de tercer nivel

Resumen
Introducción: La varicela puede generar hospitalizaciones y complicaciones graves. Varios países han incluido la vacuna antivaricelosa en sus calendarios vacunales.
Material y métodos: Estudio descriptivo retrospectivo de los pacientes ingresados por varicela y sus complicaciones en un centro de referencia entre 2005 y 2011.
Resultados: Consultaron por varicela en urgencias 1.192 niños, 99 (8,5%) precisaron ingreso. Incidencia anual de ingresos por varicela y varicela complicada: 19,4 y 15,3 casos por 100.000 menores de 14 años. Las complicaciones fueron más frecuentes en menores de 5 años (79,5%) y sin enfermedad de base (78,2%). La infección de piel y partes blandas fue la complicación más frecuente (62%). La estancia hospitalaria media ± desviación estándar fue de 4,5 ± 4 días.

☆ Please cite this article as: Guzmán Laura KP, Periañez Vasco A, Falcón Naira MD, Croche Santander B. Hospitalizaciones por varicela en un hospital de tercer nivel. An Pediatr (Barc). 2014;80:399-403.

* Corresponding author.
E-mail address: guzman_katty7@hotmail.com (K.P. Guzmán Laura).

2341-2879/
http://dx.doi.org/10.1016/j.anpede.2013.10.005

Conclusiones: La varicela produce una elevada morbilidad; esta es más frecuente en términos absolutos en niños sanos menores de 5 años. Por este motivo, la vacunación sistemática recomendada por el Comité Asesor de Vacunas debería ser mandatoria.

Introduction

Varicella is a highly contagious febrile exanthematous disease that is caused by primary infection with varicella-zoster virus. It is usually a self-limiting illness, although it can be associated with serious complications. In Spain there are about 170,000 cases per year, with 79.5% occurring in children under 15 years. An average of 1300 hospital admissions and 5 to 6 deaths are reported annually.[1]

The aim of this study is to determine the incidence of hospital admissions due to varicella and varicella complications in a tertiary referral hospital, as well as the clinical and epidemiological characteristics of these patients.

Materials and methods

It is a descriptive retrospective study based on the electronic histories of children under 14 years admitted for varicella infections between March 2005 and March 2011 in the Hospital Universitario Virgen del Rocío in Seville, a tertiary referral centre with a base referral population of 85,000 children.

We excluded inpatients diagnosed with varicella after hospital admission for a different reason, and two newborns who had been given hyperimmune globulin for prophylaxis.

We collected data on epidemiological and clinical variables and on the development of complications, which we grouped into skin and soft tissue, haematologic, neurologic, renal, respiratory, musculoskeletal, bacteraemia, sepsis, and toxic shock categories.

We calculated the percentage of emergency visits due to varicella that required hospital admission, as well as the annual incidence of complicated varicella. We determined the clinical and epidemiological characteristics of these patients. The data were analysed using SPSS 15 software.

Results

In the study period, 1192 children presented to the emergency department with varicella, 99 (8.5%) of whom required admission. The mean age ± standard deviation at admission time was 3.7 ± 2.6 years; 75.3% were under 5 years of age (n = 75) and 13% were under one year (n = 13) (Fig. 1). Of all admissions, 56 were male (1:1.3 male:female ratio).

Eight patients were admitted because they were at risk of developing severe illness (two newborns, three children with nephrotic syndrome, one kidney transplant recipient, one patient with acute lymphoblastic leukaemia and one with familial Mediterranean fever). Thirteen were hospitalised due to severe disease manifestations (florid exanthema, fever or weakness).

One hundred complications were described in 78 patients. The annual incidence of admissions due to varicella and complicated varicella was 19.4 (95% CI, 10-28.8) and 15.3 (95% CI, 7-23.6) cases per 100,000 children under 14 years of age, respectively. Skin and soft tissue infections constituted the most frequent complication (62%), followed by haematologic (10%) and neurologic (9%) complications. There were three cases of bacteraemia, three cases of sepsis and one of streptococcal toxic shock syndrome (Table 1).

Out of all patients with complications, 62 (79.5%) were younger than 5 years and 17 (21.8%) had underlying diseases, being asthma and atopic dermatitis the most prevalent (Table 2).

A bacterial pathogen was isolated in 12 (15.6%) of these cases: *Staphylococcus aureus* (*S. aureus*) was found in 6 cases, *Streptococcus pyogenes* (*S. pyogenes*) in 3, both these bacteria in 2 and *Pseudomonas aeruginosa* in one case. They were isolated from 6 skin lesion swabs, 5 blood cultures and one skin abscess.

Treatment was given to 85.8% (n = 85) of the admitted patients: 61% (n = 52) received antibiotic therapy, 18.8% (n = 16) aciclovir, 10.6% (n = 9) both and 9.4% (n = 8) other treatments. Skin abscesses were drained in four patients, and peritoneal dialysis was required in one.

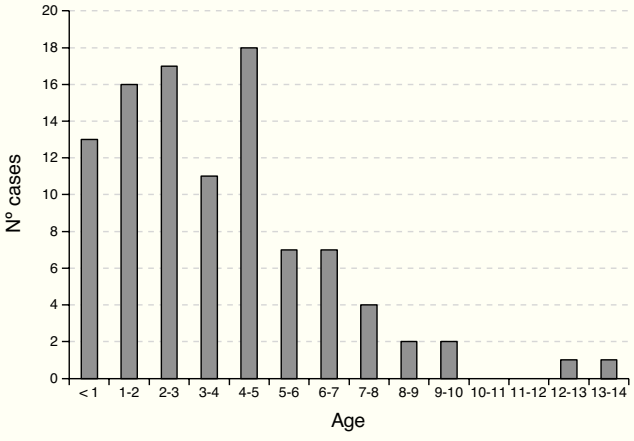

Figure 1 Distribution by age of 99 varicella cases in children under 14 years who required admission to the Hospital Universitario Virgen del Rocío (Seville) during the period 2005-2011.

Table 1 Type of varicella complication: percentage out of all complicated cases and percentage out of total complications.

Complications	% complicated cases[a]	% complications[b]
Skin and soft tissues	*48.4%*	*62%*
Cellulitis	19.5%	35%
Bacterial skin superinfection	16.3%	21%
Abscess	3.1%	4%
Streptococcal scarlet fever	0.7%	1%
Fasciitis	0.7%	1%
Haematologic	*7.8%*	*10%*
Thrombocytopaenia	5.4%	7%
Purpura fulminans	1.5%	2%
Idiopathic thrombocytopaenic purpura	0.7%	1%
Neurologic	*7%*	*9%*
Cerebellitis	3.1%	4%
Meningoencephalitis	1.5%	2%
Meningitis	0.7%	1%
Encephalitis	0.7%	1%
Febrile seizure	0.7%	1%
Renal	*3.1%*	*4%*
Acute renal failure	2.3%	3%
Nephrotic syndrome	0.7%	1%
Respiratory	*3.1%*	*4%*
Pneumonia	2.3%	3%
Laryngitis	0.7%	1%
Musculoskeletal	*3.1%*	*4%*
Arthritis	1.5%	2%
Synovitis	0.7%	1%
Myositis	0.7%	1%
Bacteraemia	*2.3%*	*3%*
Sepsis	*2.3%*	*3%*
Toxic shock syndrome	*0.7%*	*1%*
Total	*100%*	*100%*

[a] Percentage out of 78 complicated cases.
[b] Percentage out of 100 complications found in 78 patients.

The mean hospital stay was 4.5 ± 4 days. Four children were admitted to the Intensive Care Unit due to sepsis (2 cases), acute kidney failure requiring peritoneal dialysis (one case) and acute meningoencephalitis (one case). None of the patients died.

Table 2 Admissions for complicated varicella by underlying condition (n = 17).

Underlying condition	Number of cases (%)
Asthma	6 (35.3)
Atopic dermatitis	6 (35.3)
Atopic dermatitis and asthma	3 (17.6)
Kidney transplant	1 (5.8)
Acute lymphoblastic leukaemia	1 (5.8)

Discussion and conclusions

Varicella is associated with high morbidity and serious complications that require hospitalisation. We found that 8.5% of children seen in the emergency department for varicella required admission, which is similar to the range of 2.7 to 11.6% reported in other studies[2-5] (Table 3).

The annual incidence of hospital admissions for varicella and varicella complications in our study also matched previous reports (23.1 admissions / 100,000 children under 15 years of age for varicella and 7.7-12.9 / 100,000 for varicella complications).[6-8]

This study did not include patients with complications who received outpatient care or those who were admitted to a secondary care centre in the referral area, and this restricted our ability to determine the real magnitude of the problem.

As in other studies, complications mainly occurred in children under 5 years with no history of immunodeficiency or chronic disease. In relative terms, complicated varicella is more common in immunocompromised patients, newborns, adolescents and adults. However, the absolute number of hospital admissions and deaths is greater in immunocompetent children under 10 years of age, as the disease has a higher incidence rate in this group of patients.[1,4,5,9]

The most frequent complication was skin and soft tissue infection, with an increasing trend in the past few years. In some cases, this complication led to sepsis, toxin-mediated syndrome, arthritis, myositis or necrotising fasciitis. The two main isolated microorganisms were *S. pyogenes* and *S. aureus*. These results were consistent with findings described in the literature.[10,11]

Haematologic complications were the second most frequent type of complication. The literature describes that thrombocytopenia develops in one out of every 25,000 of varicella cases diagnosed each year. The aetiologic mechanism seems to be an autoimmune phenomenon caused by molecular mimicry between platelets and the varicella zoster virus.[12] Neurologic complications were ranked third, with cerebellitis and meningoencephalitis being most common. There were no cases of Reye syndrome. Respiratory complications were not very common in our series (3 cases of pneumonia and one of laryngitis), probably because they are managed on an outpatient basis. However, one boy with *S. aureus* pneumonia required ventilatory support and admission to the ICU.

The mean hospital stay in our study was consistent with literature reports, which range from 2.9-7.7 days.[6,7,13] The economic and social burden of varicella is considerable and

Table 3 Spanish studies on varicella-related hospital admissions in children and percentage of cases in the main complication categories.

Author	Year	N	No UC (%)	Skin (%)	Neurologic (%)	Pneumonia (%)	Sepsis (%)	Admissions[a] (%)
Riaza Gomez et al.[2]	1993-1997	84	72.6	34.9	193	14.4	-	2.7
Pérez Solís et al.[3]	1990-2000	65	62	24.6	30.8	9.2	-	3.9
Moraga-Llop et al.[9]	1999	83	-	37	19	18	1	-
Balboa Vega et al.[4]	1990-2003	153	71.9	16.8	16	9.6	-	11.6
Pérez Yarza et al.[7]	1993-2002	71	-	23	12	18	1	-
Piqueras Arenas et al.[5]	2001-2004	101	89.1	50	19.7	19.7	1.5	8.6
Guzmán Laura et al.	2005-2011	99	78.2	62	9	3	3	8.5

N: number of patients; UC: underlying condition.
[a] Percentage of admissions out of all varicella cases seen in the paediatric emergency department.

rises sharply in patients requiring hospitalisation or with complications.[14]

Varicella vaccine was approved in Spain only for use in high-risk patients in 1997, and for at-risk individuals between 10 and 14 years of age in 2005. A single dose provides 85% and 100% protection against developing any form of varicella and complicated varicella, respectively. Two doses are needed to interrupt disease transmission. The autonomous communities of Madrid (2006), Navarre (2007), and Ceuta and Melilla (2008) have scheduled routine immunisation at 15 months of age, with Navarre adding a second dose at age 3 years.[15] In Madrid there was a 66% decrease in varicella cases between 2006 and 2009, along with a 50% decrease in varicella-related admissions. The decrease was mainly in children 0-4 years of age, but was also found in older children and young adults due to the herd immunity effect.[16] In Navarre, the incidence of varicella cases and hospital admission rates decreased by 93 and 73%, respectively[17]. In the United States, the incidence rate of varicella cases has decreased by 90% and the mortality rate by 66% since the implementation of universal immunisation (1995), especially in the vaccination target group (children 1-4 years of age).[18]

The Advisory Committee on Vaccines of the Spanish Association of Paediatrics recommends universal varicella vaccination, with a first dose at 12-15 months of age, preferably at 12 months, and a second dose at 2-3 years of age, preferably at 2.[19] The current strategy in Andalusia and most other Spanish autonomous communities consists of vaccinating susceptible children at 10-14 years of age, as recommended by the Consejo Interterritorial del Sistema Nacional de Salud (Interterritorial Council of the National Health Service). While this schedule can prevent the severe forms that occur from that age onwards, it does not prevent the majority of cases, complications and hospital admissions, which have a higher absolute frequency in early childhood.[20] The varicella vaccine meets efficacy, efficiency and safety criteria. Thus, in our opinion, routine vaccination should be mandatory.

Conflicts of interest

The authors declare having no conflicts of interest.

References

1. Red Nacional de Vigilancia Epidemiológica en España. Informe sobre la situación de la varicela en España. Año 2007-2008 Servicio de Vigilancia Epidemiológica Centro Nacional de Epidemiología Instituto de Salud Carlos III.
2. Riaza Gomez M, Torre Espi M, Mencia Bartolomé S, Molina Cabañero JC, Tamariz-Martel Moreno MA. Complicaciones de la varicela en niños. An Esp Pediatr. 1999;50:259-62.
3. Pérez Solís D, Pardo de la Vega R, Prieto Espules S, Callejo Ortega A. Hospitalizaciones por varicela en niños. Bol Pediatr. 2001;41:175-81.
4. Balboa Vega MJ, Hidalgo Figueroa C, Palma Fuentes I, Romero Cachaza J, Alejo García-Mauricio A, González-Hachero J. Varicela: epidemiología y complicaciones. In: XC Reunión Científica de la Sociedad de Pediatría de Andalucía Occidental y Extremadura. Huelva. Vox Paediatrica. 2004;12:62-5.
5. Piqueras Arenas AI, Otero Reigada MC, Pérez-Tamarit D, Asensi Botet F, Diosdado Ortin N, Santos Duarte M. Hospitalizaciones por varicela en el Hospital Infantil La Fe (Valencia 2001-2004). An Pediatr(Barc). 2005;63:120-4.
6. Moraga FA, Dominguez A, Roca J, Jané M, Torner N, Salleras L. Paediatric complications of varicella requiring hospitalization. Vacunas. 2000;1:106-11.
7. Pérez-Yarza EG, Arrazn L, Alustiza J, Azkunaga B, Uriz J, Sarasua A, et al. Hospitalizaciones por complicaciones de la varicela en niños menores de 15 años. An Pediatr (Barc). 2003;59:229-33.
8. Guillén JM, Samaniego-Colmenero M de L, Hernández-Barrera V, Gil A. Varicella paediatric hospitalizations in Spain Epidemiol Infect. 2009;137:519-25.
9. Moraga Llop FA. Complicaciones de la varicela en el niño inmunocompetente. An Pediatr (Barc). 2003;59:18-26.
10. Aebi C, Ahmed A, Ramilo O. Bacterial complications of primary varicella in children. Clin Infec Dis. 1996;23:698-705.
11. Gupta AK, Bonajmah AA. Varicella related musculoskeletal complications in children. J Pediatric Orthop B. 2011;20:264-9.
12. Mayer JL, Beardsley DS. Varicella-associated thrombocytopenia: Autoantibodies against platelet surface glycoprotein V. Pediatr Res. 1996;40:615-9.
13. Cid Paris E, Rubio Jimenez ME, García Mazario MJ, Arriola Pereda G, Jiménez Bustos JM. Revisión de 5 años de las varicelas que requirieron ingreso en nuestro hospital. Rev Esp Pediatr. 2011;67:261-5.
14. Moraga-Llop FA, García-Miguel MJ, Giangaspro E, Roca J, Baquero Artiago F, Gómez-Campderá JA, et al. Costes de la hospitalización por varicela en niños inmunocompetentes. Vacunas Invest Pract. 2001;2(Suppl 1):20-4.

15. Moraga-Llop FA. Vacuna de la varicela: una nueva vacuna sistemática. BSCP Can Ped. 2001;25:133-52.
16. Comité Asesor de Vacunas de la Comunidad de Madrid, Servicio Madrileño de Salud. Informe sobre varicela en la Comunidad de Madrid, 2010 [accessed 9 Nov 2012]. Available at: http://www.madrid.org/cs/Satellite?blobcol=urldata&blobheader=application%2Fpdf&blobheadername1=Content-disposition&blobheadername2=cadena&blobheadervalue1=filename%3DCAV-CM+Informe+varicela+2010.pdf&blobheadervalue2=language%3Des%26site%3DPortalSalud&blobkey=id&blobtable=MungoBlobs&blobwhere=1271572829978&ssbinary=true
17. Cenoz MG, Catalán JC, Zamarbide FI, Berastequi MA, Gurrea AB. Impact of universal vaccination against chicken pox in Navarre, 2006-2010. An Sist Sanit Navar. 2011;34:193-202.
18. Nguyen HQ, Jumaan AO, Seward JF. Decline in mortality due to varicella after implementation of varicella vaccination in the United States. N Engl J Med. 2005;352:450-8.
19. Moreno Pérez D, Álvarez García FJ, Arístegui Fernández J, Barrio Corrales F, Cilleruelo Ortega M, Corretger Rauet JM. Calendario de vacunaciones de la Asociación Española de Pediatría: recomendaciones 2012. An Pediatr (Barc). 2012;76:e1-43.e23.
20. González-Hachero J. Situación general y problemática de la varicela en España. An Pediatr (Barc). 2003;59(Supl 1):2-8.