

CLINICAL NOTE

Reemergence of measles in vaccinated patients: report of 6 cases and proposals for prevention

Eugènia Agut-Busquet¹, Emili Gené Tous², Gemma Navarro³, Araceli González⁴

A 2014 measles outbreak in Catalonia affected 131 persons. We describe a series of 6 cases diagnosed in our emergency department. All the patients were under 31 years of age and complained of flu-like symptoms, including high fever and rash. Five had been properly vaccinated and one was a health care worker. A firm diagnosis of measles need not be made in the emergency department, but a high level of suspicion is important for ruling out complications, isolating the patient, and protecting health care staff at high risk for exposure. We found that 6% of the staff of our emergency department had a low level of immunity to measles. Given our findings, we suggest that preventive treatment is necessary when health care staff have been exposed to measles and their vaccination status is unknown.

Keywords: Measles. Emergency health services. Vaccination.

Reemergencia del sarampión en pacientes vacunados: descripción de seis casos y propuesta para su prevención

En el contexto de un brote de sarampión en Cataluña en 2014 que afectó a 131 personas, se presenta una serie de seis pacientes que fueron diagnosticados en nuestro servicio de urgencias (SU). Todos los pacientes eran menores de 31 años y consultaron por síndrome gripal con fiebre alta y exantema. Cinco de ellos habían sido correctamente vacunados y uno era personal sanitario. El diagnóstico de certeza en urgencias no es imprescindible, pero es importante su sospecha para descartar sus complicaciones, y para proceder al aislamiento del enfermo y a la protección del personal sanitario. El personal sanitario es un grupo de elevado riesgo de exposición. Se ha constatado que un 6% de los profesionales de nuestro SU presentó un mal estado inmunitario frente al sarampión. Ante estos resultados, planteamos la necesidad de realizar profilaxis postexposición en los profesionales en los que se desconozca el estado vacunal.

Palabras clave: Sarampión. Servicio de urgencias. Vacuna.

Authors affiliation:

¹Servicio de Dermatología, Parc Taulí Sabadell, Hospital Universitari, Sabadell, Barcelona, Spain.

²Servicio de Urgencias, Parc Taulí Sabadell, Hospital Universitari, Sabadell, Barcelona.

³Departament de Medicina Universitat Internacional de Catalunya, Institut Universitari Parc Taulí, Universitat Autònoma de Barcelona, Spain.

⁴Unitat d'Epidemiologia i Avaluació. Parc Taulí Sabadell. Hospital Universitari. Institut Universitari Parc Taulí. Universitat Autònoma de Barcelona, Spain.

Corresponding author:

Emili Gené Tous
Servicio de Urgencias
Parc Taulí Sabadell
Parc Taulí 1
08208 Sabadell, Spain

E-mail:
egene@tauli.cat

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Introduction

Measles is a mandatory notification disease, highly contagious and preventable through vaccination. In 2000, the World Health Organization (WHO) estimated that 5% of all deaths of children under 5 years was attributable to measles and its complications. WHO currently targets a 95% reduction in deaths by 2015 and immunization coverage rate of 95% by 2020¹. In Spain, due to the introduction of vaccination in 1983, measles has become very rare, although in the last ten years outbreaks have appeared in relation to poor vaccination of certain social groups and imported cases from abroad. From January to May 2014, 131 cases were detected in Catalonia, 6 which were treated in our hospital emergency department (ED). The aim of this paper is to describe the clinical characteristics of these patients, discuss the reasons why well vaccinated people were affected and propose a protocol to ensure good primary prevention against measles among ED health personnel.

Clinical cases

Six patients with no remarkable known medical history, aged 2 months to 31 years, consulted the ED between February and April 2014 for flu syndrome and rash. As epidemiological history, one had an aunt hospitalized for measles-related pneumonia and the other was a professional working in our ED. Five of these six patients had received two vaccine doses. Six had malaise, fever higher than 38.5°C and rash during 24-48 hours before. Characteristically, the rash had begun on the face, then spread to the trunk, and ultimately affected the upper and lower extremities, but not palms and soles (except in one patient). The systemic symptoms and physical and analytical findings are summarized in Table 1. Serology was performed in the ED; five patients presented positive measles IgM and two presented weak conversion to IgG. No patient had complications and all were discharged with instructions on physical isolation and scheduled for outpatient monitoring.

Table 1. Symptoms, physical examination and laboratory findings and number of doses of vaccine received by the patients

	Cases						Total
	1	2	3	4	5	6	
Symptoms							
Rash	✓	✓	✓	✓	✓	✓	100%
Fever >38.5°C	✓	✓	✓	✓	✓	✓	100%
Cough	✓	X	X	X	X	✓	33%
Diarrhea	X	X	X	X	X	✓	17%
Conjunctivitis	✓	✓	X	X	X	✓	50%
Physical examination							
Lymphadenopathy	✓	✓	X	✓	✓	X	67%
Hepatosplenomegaly	✓	X	X	X	X	✓	33%
Enanthema	X	✓	X	✓	X	X	33%
Lab tests							
Leukopenia	✓	✓	✓	✓	✓	✓	100%
Hepatic biochemical alterations	X	✓	X	X	X	✓	33%
Number of vaccine doses							
1 dose	X	X	✓	X	X	X	17%
2 doses	✓	✓	X	✓	✓	X	67%
Unknown	X	X	X	X	X	✓	17%

*The number of doses of the vaccine in all cases was obtained from patient vaccination records.

Discussion

Measles is transmitted by *Morbillivirus paramyxoviridae*. This virus has a very high basic reproduction number, 12 to 18, and an attack rate of 75%, properties that make it highly contagious². Vaccination is the only effective preventive measure.

The first anti-measles vaccine was introduced in 1963³. But it was not until 1983 that this was finally included in the Spanish vaccination program along with vaccines against rubella and mumps. Since measles antibodies of vaccinated mothers transmitted to their children are nonexistent in 99% of children at 6 months, cases of measles in children under 18 months were observed. For this reason, the first dose was advanced to 12 months⁴.

Since 1983, cases decreased drastically and measles was considered virtually eradicated in Spain in 2000. However, due to importation of cases from abroad and lack of vaccination among certain social groups, isolated outbreaks were detected⁵⁻⁷.

This phenomenon can be explained by the term "herd immunity". When more than 95% of people are well vaccinated against a particular pathogen, people who have not been vaccinated are not infected because the virus does not circulate in this population. If the rate of vaccinated members of the community decreases, there will be bad "herd immunity" and unvaccinated people will be susceptible to infection.

Since 2006, measles has been reported in persons who had received two vaccine doses, raising doubt about whether the vaccine confers an effective immune response for the rest of life⁸. This fact can be understood by the term "booster effect" due to lack of measles virus circulation during the years that the critical community size of vaccinated people was sufficient, and there was a lack of vaccine booster effect, so that with

time, measles antibodies become less protective and the virus can infect previously vaccinated people.

The confluence of these two factors explain why unvaccinated people can become infected, but also those theoretically well vaccinated, and raises the need for screening to detect those with an ineffective immune response^{9,10}.

Interestingly, these previously vaccinated patients have a particular type of measles with a longer incubation period (14 to 21 days) and less intense prodromal and rash phases, so this form of measles has been dubbed "modified". The differential diagnosis is made with specific entities depending on whether the patient is in the prodromal or rash phase, and a good anamnesis that rigorously collects epidemiological history is crucial. In the prodromal phase Koplik spots, appearing 48 hours before rash, are diagnostic of measles¹¹, but their diagnostic value is limited by transience and absence in 25% of patients. The definitive diagnosis is obtained by serology, with quadrupling of measles IgM and IgG antibodies between the acute and the convalescence phase¹². Typically, anti-IgM antibodies start being detected three days after the appearance of the rash and may be undetectable the day of occurrence and from 30 days later. Anti-IgG antibodies are usually not detectable until seven days after the onset of rash and usually peak at fourteen days.

Since measles treatment is purely symptomatic, diagnosis in the ED is not essential. Still, suspicion is vitally important to rule out complications and to ensure isolation of the patient and protection for health personnel attending them by wearing personal protective clothing against respiratory disease transmission (gloves, disposable gown and surgical mask EN14683).

Following the infection of one of our ED professionals in this outbreak, 497 professionals of our hospital underwent serological determination of antibodies against measles, mumps and rubella (MMR). It was found that 6% of these professionals had poor immune response to measles (negative measles antibody IgG; <1). In order to prevent infection in our staff and to avoid transmission to patients attended, a protocol of vaccination was established with two doses of MMR vaccine (the second, 4 weeks after the first, with effectiveness tested at 6 weeks) for those never vaccinated and a single dose for those previously vaccinated but presenting a poor immune response^{13,14}.

In conclusion, we would warn that measles may be seen again in the differential diagnosis of rash disease, even in well-vaccinated individuals. Suspicion in the ED should be addressed to rule out complications and prevent the spread of disease to others and ourselves. Re-vaccination with a third booster dose may sometimes be necessary.

Conflict of interest

The authors declare no conflict of interest in relation to this article.

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