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Editorial

Pertussis Vaccine in COPD and Asthma: An Old Acquaintance Is Back

Vacuna de la tosferina en EPOC y asma: vuelve una vieja conocida

Whooping cough is a highly contagious disease, caused by bacterium *Bordetella pertussis* (BP), that presents vague symptoms due to which only 1% of cases can be diagnosed.[1] Although it is a pathology that mainly affects children, adults also can get it, though in their case its diagnosis is more difficult since it presents non-specific symptoms such as a prolonged cough or, a milder one, in those who were previously vaccinated in their childhood.[2] In addition, the number of cases is more frequent than reported and the proportion has been increasing. The adults aged 65–74 and ≥75 years old have a higher risk of pertussis-related hospitalizations than adults aged 45–64 years, up to 4–6 times higher.[3,4]

If we take into account that pertussis is a highly infectious disease that occurs with periodic outbreaks every 3–5 years and that neither natural immunity, which disappears at 4–20 years, nor the vaccination in childhood, which is effective within 4–12 years after the last dose, provide lifelong immunity, then the question arises whether vaccination in adults is necessary? In this sense, the recommendation could go beyond a booster dose at the age of 65 or earlier, since its immunogenicity and safety profile are good, a dTpa vaccination every 10 years would be advisable.[5] Despite the increase of the countries adhering to the strategy of a single booster dose, several states, including Belgium, Italy, Luxembourg, Norway, San Marino, the USA and Canada, have already opted for the vaccination every 10 years.

On the other hand, we find data that establish an efficacy rate of the vaccine of around 50% in adults, which is decreasing after 65 years.[6] Although it is true that it can decrease in old age, it still confers a level of protection that it is comparable, as it is often reported, to other vaccines, for example, against influenza. The same study also reflects the short protection conferred by the vaccine between 5 and 6 years,[6] so that the repetition of vaccination every 10 years could not ensure a full protection between doses. Furthermore, although the vaccine has been shown to be safe, it is known that the greater the number of doses of tetanus vaccine, the stronger Arthus-type in situ reactions are. Could these reactions make patients refuse dTpa vaccination?

In relation to chronic obstructive pulmonary disease (COPD), and in the absence of more exhaustive studies, we know that some researches have shown an increased risk of BP infection in patients with COPD, and that the probability of being hospitalized is also higher in these patients, regardless of the time of observation.[7,8] Moreover, the findings of a study evaluating severe BP infections in several states in the USA showed that 14.5% of patients aged 21–64 years and 26.8% of ≥65-year-old patients who were hospitalized for whooping cough also developed COPD, which means that the subjacent COPD may contribute to the clinical severity of pertussis infections.[9] However, the results of several studies have not been able to clearly associate the seroprevalence of BP with the severity of COPD, but colonization by BP could serve as a potential risk factor for its development. On the other hand, we can affirm that patients with whooping cough and COPD accumulate significantly more medical care costs than patients without COPD.[8]

Therefore, if we realize that COPD increases susceptibility to infectious agents that, in turn, can cause exacerbations in these patients, and that protection against whooping cough is not lifelong, unless a booster shot is given, we can postulate that COPD patients are especially prone to pertussis infections. Apart from this, it is also possible to pose a hypothesis on a type of vicious circle, where COPD could favour the onset of BP infection, and where the infection itself favours the progression of COPD. The pertussis booster shot would probably be the main tool to break this cycle.

The Center for Disease Control and Prevention (CDC) already suggests vaccination for adults every 10 years.[10] The most important COPD management guidelines, and the Spanish COPD Guide (GesEPOC) recommend evaluating vaccination with dTpa, and the Global Initiative for Chronic Obstructive Lung Disease (GOLD) guide also advises vaccination in adult patients with this pathology who were not vaccinated in adolescence.[11,12] In the future, and with more studies with solid results, these guidelines will have to rethink their recommendations and approach those of the CDC.

With regard to asthma the evidence is less solid and it also requires more prospective, multicenter studies with a sufficient sample size. Although some data suggest that they are patients at special risk for BP infection, the similarity of the symptoms of both diseases determines a high rate of infradiagnosis.[13] The relationship between BP and asthma also appears to be bidirectional. On the one hand, pertussis could favour the incidence and severity of asthma, and on the other, pre-existing asthma would favour the incidence and severity of pertussis.

Likewise, the possibility of some relationship between BP vaccination and the prevalence of asthma has been raised, although the results are not conclusive and may be disputed, given that the small sample sizes and low response rates could bias the results. Some authors report that the patients who are correctly vaccinated (tetanus, diphtheria, poliomyelitis, haemophilus influenzae type B, hepatitis B and pertussis [TDPHiHeP]) have lower level of such dis-

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eases as asthma, allergic rhinitis and atopic dermatitis after the first year of life.[14] Other reseachers point out that the sequence of administration of the doses of the DTP vaccine modifies the prevalence of asthma at the age of 7 years old, which is lower when the vaccine is delayed for some months. The decrease in the prevalence of asthma in children with delayed administration of 3 doses of DTP is 61%.[15]

The opposite view, that asthma can favour BP infection, has also been considered. Studies carried out in the adult population of the USA or Australia observed an increase in the prevalence of BP infection in asthmatics.[4,8] These results agree with those reported by other authors where the prevalence of asthma in patients hospitalized for pertussis is 26% in adults and 44% in adolescents, clearly higher than the prevalence of asthma in the US population of these ages, which is 8% and 10% respectively.[9]

Pertussis has also been associated with greater baseline severity of asthma in stable phase, in which asthmatics with BP have more symptoms and poorer lung function than the ones without BP.[16] Pertussis could also condition greater severity of asthma exacerbations, so it could lead to a longer duration of cough and more days of sleep disturbance.[17]

In summary, even though a more effective vaccine would be ideal, dTpa should be considered as an important intervention among public health strategies to prevent infectious respiratory morbidity in elderly people, so our recommendation is to use the vaccine against BP in patients with respiratory diseases at risk, such as COPD and asthma, in adulthood. In addition, it would be important to have more studies with robust results and that the main health guides and institutions include the vaccine in their recommendations and vaccination schedules.

Conflict of interest

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