Looking for the nexus between COVID, vaccines and thrombosis: anti-PEG antibodies

Juan F. Gastón Añaños, Elisa M.ª Sahún García; hospital pharmacists

SUMMARY

An explanatory mechanism for the thrombotic disorders detected after the administration of the COVID AZD1222 vaccine with recombinant adenovirus vectors is postulated:

"Platelet activation by adenoviruses, mediated by anti-PEG antibodies generated by the polysorbates themselves included in the vaccine, or generated in a previous administration of polysorbates or PEG to the vaccinated individual".

It is an immune interference whose biochemical basis is the chemical similarity between polysorbates and PEG with the repetitive structures on the surface of viruses, which causes cross-reactions between anti-PEG antibodies and viruses.

This same mechanism could govern the disseminated intravascular coagulation (DIC) observed in severe cases of COVID-19, due to the spike protein of coronaviruses.

Key words: COVID-19, polysorbates, polyethylene glycols (PEG), anti-PEG antibodies, platelets, thrombosis, thrombocytopenia, disseminated intravascular coagulation (DIC), adenovirus, coronavirus, immune interference.

INTRODUCTION

Clotting-related problems appear in the theory that postulates the development of a consumption coagulopathy in COVID-19 (1), as well as in the thrombotic events and thrombocytopenia observed after the administration of the anti-COVID AZD1222 vaccine vectorized with adenovirus (2).

The possible immune interference between polysorbates and coronaviruses has already been raised in previous studies as an explanatory mechanism for severe COVID-19, linking it to anti-PEG antibodies and their favoring effect on coronavirus endocytosis (3).

In this work, the possible interference between polysorbates and adenoviruses is analyzed.

IATROGENIC THROMBOCYTOPENIA: BACKGROUND

Thrombocytopenia is an adverse effect described for several medications that contain polysorbate in their composition, such as influenza vaccines, Infliximab, Rituximab, Adalimumab, although its mechanism remains unclear.

In the case of the influenza vaccine, the adverse effect is classified in its technical data sheet

as rare, with an occurrence rate of between 1/1000 and 1/100 (4). In other words, for an annual vaccinated population of about 6 million people in Spain, this would mean the appearance of between 6.000 and 60.000 thrombocytopenias.

AZD1222 VACCINE COMPOSITION

In addition to the chimpanzee adenovirus encoding the SARS-CoV-2 spike glycoprotein (ChAdOx1-S), the vaccine contains in its composition L-histidine, L-histidine hydrochloride monohydrate, magnesium chloride hexahydrate, polysorbate 80 (E 433), ethanol, sucrose, sodium chloride, disodium edetate (dihydrate) and water for injections (5).

IMMUNE INTERFERENCE COAGULOPATHY HYPOTHESIS

Polysorbates and PEG are structurally closely related and induce the same anti-PEG antibodies against their main chain, formed by repeating groups of a polyether nature. The immune system reacts to these substances in a similar way to viruses, generating anti-PEG antibodies through the independent T-cell pathway (3).

Like other viruses, coronaviruses and adenoviruses have repetitive chemical structures on their surface: spike proteins in the case of coronaviruses, and hexon proteins in adenoviruses, of icosahedral geometry. These repetitive structures can be recognized by anti-PEG antibodies.

After the intramuscular injection of the AZD1222 vaccine, the adenovirus and the rest of the components of the vaccine will reach the bloodstream and will spread through the body until reaching small vessels and capillaries, contacting both vascular endothelial cells and blood cells, such as erythrocytes and platelets.

Viruses can interact directly with a large number of platelet surface receptors. Thus, adenoviruses can bind to platelets through GPIIb / III receptors (6), and pre-activate them (2).

By themselves, the anti-PEG antibodies generated do not attack or bind to human tissues (7), but the formation of immune complexes by cross-reaction with the injected adenoviruses, and their binding to circulating platelets through the Fc fragment of the receptor IgG IIb (FcγRIIA), can cause platelet activation (6) and initiate coagulation in capillaries and small vessels, with the consequent risk of thrombotic events.

On the other hand, platelets are also capable of binding to coronaviruses through the Toll-like receptors TLR7 and TLR9 (6), and by the C-lectin type DC-SIGN (8). Therefore, the same mechanism of cross-reaction could be present in the disseminated intravascular coagulation seen in severe COVID, and be the cause of a subsequent cytokine storm, and not its consequence, since clotting disorders and storms of cytokines feed back (1).

CONCLUSIONS

Thrombotic processes after "COVID vaccines" and disseminated intravascular coagulation of COVID-19 may be due to cross-reactions of anti-PEG antibodies with adenoviruses and coronaviruses present in the bloodstream, resulting in platelet activation.

The origin of these anti-PEG antibodies is in contact with PEG or polysorbates, mainly through the administration of drugs that include them in their composition, such as influenza and anti-COVID vaccines, among others.

Given that the binding of C-lectin receptors with coronaviruses takes place by the spike protein (9), the strategy of the COVID vaccines that promotes the endogenous synthesis of the spike protein may involve serious coagulatory adverse effects, which are already being observed.

In the same way, adenovirus vectors would increase the risk of coagulopathy, their use being more counterproductive than what has been recently warned (10).

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