COVID-19 Vaccines and Blood Clots

Why have European countries paused their Astrazeneca rollout?

Vaccines are amazing, life-saving innovations, and the COVID-19 vaccines are no different. As with any medical procedure, there are potential drawbacks to using them, but we know from massive pieces of scientific research that the COVID-19 vaccines are both safe and effective.

And yet, as you have probably heard on the news, for one specific vaccine most of Europe has stopped their rollout. Rather than giving millions of people the Astrazeneca/Oxford (AZ) vaccine against COVID-19, a dozen countries have decided to stop vaccinating due to fears of side-effects.

Pictured: Ducks. Not a known side-effect of vaccination, but they are definitely cute. Source: Pexels

So I thought I would explain what’s happening, and why you probably don’t need to worry even if you’ve had the AZ vaccine.

How It All Works

The basic idea of vaccine rollouts is simple. You exclude common and dangerous side-effects in clinical trials, and identify all the common and moderate ones as well like headaches and pain at the vaccine site. However, even with mammoth studies, with 10,000s of people in them, it’s impossible to exclude things that happen really rarely. If a side-effect only happens to 1 in 200,000 people who get the vaccine, you’d need a clinical trial including literally millions of individuals to be certain to catch it in the numbers.

This raises an issue — we give vaccines at a population level, after all. Something that happens to 1 in 200,000 people might sound incredibly rare, and it is, but it will also happen dozens of times if you vaccinate 80 million people. And remember, it is vitally important to most of Europe that they vaccinate as many people as quickly as possible, given the vast COVID-19 outbreaks across the continent.

COVID-19 in Europe is doing better, but still not great

So, we do something clever. We set up monitoring systems that look at people in the general population who have been given the vaccine. That way, we can see if there are any signals of risk in the enormous group of people who get the vaccine after it is licensed for the general public.

What’s happened to the AZ vaccine is that some countries have seen a very small but potentially significant increased risk of a rare type of blood clots in their monitoring data, and so have temporarily paused their vaccine rollouts to investigate it further.

Is this a good decision? Well, that depends on quite a few things.

Pausing Rollouts

The first question is pretty obvious — what is the signal of risk that has caused the worry in Germany, Norway, Spain, and elsewhere?

According to the regulatory agencies of the countries involved, it comes down to a rare but serious type of blood clot in the brain called venous sinus thrombosis. These have mostly been in quite young people (aged 20–55) which is part of the reason that there is a cause for concern. The German public health agency has published their findings, showing that there were a total of 7 of these blood clots in the vaccinated population of 1.6 million people aged 20–55 when they would’ve expected only 1 by chance.

Pictured: Stock photos for “chance” turn out to be a lot of dice. Source:

Now, for the real question. What does this mean?

Well, it’s probably useful to work out the rate here. If it is true that all 7 clots were caused by the vaccine, with 1.6 million immunizations, then that works out to a rate of roughly 1 clot per 230,000 jabs or 0.00044%. While the relative risk increase here sounds scary, that means that this equates to an absolute risk increase for people who have been vaccinated of 0.00038%, which is not quite as huge as the headlines are suggesting.

We can also compare this to the risk of COVID-19. Even 20-year-olds are not immune to the disease, and while their risk of death is much lower than the elderly, it comes out to about 1 death per 16,000 infections. So if the vaccine really is causing these blood clots, which can be fatal, then the risk of dying from COVID-19 for a 20-year-old is about 15 times higher than the risk of having a clot. Again, because both of the risks are very small, the absolute difference is also tiny, at about 0.004%.

Note the if. This is very much an open question. Remember, adverse event reporting systems are only there to identify the signal of risk, not whether one thing definitely causes another. That’s what the investigation that is currently ongoing is meant to do.

Moreover, it’s actually quite unlikely that the vaccine is causing these blood clots. Why? Well, the data from Germany comes from 1.6 million people, which sounds like a lot, but they are not the only country giving the AZ vaccine. The United Kingdom has given more than 10 million doses of AZ, and the reporting system shows no such increased risk. If you trawl through the MHRA reports — the UK medical regulator — you’ll see that there were 3 cases of this specific type of clot post-vaccine in people in the UK, which is actually less than you’d expect simply by chance. If you combine the UK and German numbers, suddenly there’s no increased risk of blood clost at all!

Bottom Line

What does this all mean to you, the person getting the vaccine?

Well, firstly, these risks are tiny at an individual level. Even if this association turns out to be true — which is entirely possible — you are at a greater risk of drowning in a bathtub or being struck by lightning than having a blood clot induced by the AZ vaccine based on evidence to date. Yes, the risk of blood clots may be important at a population scale, but that is very different to ordinary people like you and me.

On the other hand, the risk of death from COVID-19, even for a young, healthy 20-year-old, is not inconsiderable. If you’re 50, the risk is very concerning. We shown this time and again, including in my own research — COVID-19 is a very nasty disease.

The decision to halt the AZ vaccine rollout in European countries is, of course, up to them, but it is a bit confusing. While there may be some signal of risk, that signal is pretty small and certainly not worse than getting the disease itself.

What would I do if offered the AZ vaccine? I can’t speak for other people, and obviously risk and benefit is something we all have to think about for ourselves, but as a hospital worker in Australia I’m scheduled to get the AZ vaccine some time in the next two months.