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How Nixon's Blood Clot Moved Through His Body

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The blood clot that lodged in former President Nixon's right lung arrived there just as if it were a piece of debris carried along by a fast-moving stream.

It formed in Mr. Nixon's left thigh — at the same time or just after the beginning of the inflammation that characterizes phlebitis. Most of the clot remained in his leg — probably in the deep femoral vein under the muscles where the area of inflammation is.

But just as rushing water in a stream can break off a piece of debris and carry it downstream, the fast-moving blood (which circulates through the entire body in ten to twelve seconds) tore off a piece of the clot.

According to medical experts here, the piece of clot — described by Mr. Nixon's physician, Dr. John C. Lungren, as the size of a dime — tumbled along the ever-widening veins from the thigh to the heart.

Also like a piece of debris in a stream, the clot probably stopped along the way as it lodged against the side of the vein or got caught temporarily in one of its branches.

It was small enough to get through the heart and into the pulmonary artery — leading from the heart to the lung — without getting caught and permanently clogging that all-important blood vessel.

To block the pulmonary artery, the clot would have to be the size of a big Kesishian, assistant professor of surgery at George Washington University Medical Center and a specialist in blood vessel surgery.

And if the clot had been big enough to block that artery, Mr. Nixon would have

died almost immediately; the main pathway of blood through the body would have been clogged at a point where there is no alternate route.

A smaller clot, however, passes through the pulmonary artery and through the ever-narrowing arteries deeper in the lung until finally it can go no further; the clot becomes wedged into the artery, completely clogging it.

That causes the death of some lung tissue, called a pulmonary infarction by doctors. But the amount of Mr. Nixon's lung that was killed was not enough to restrict his breathing. Lungren said the former President did not even feel pain from the infarction. The doctor also did not report other signs of an infarction: a sudden drop in blood pressure and the coughing up of blood.

Nevertheless, experts here said that small infarctions in the lung are potentially fatal. For reasons not known to medical science, patients have died from clots that destroyed small amounts of lung tissue. The most dangerous time is the first 24 hours after the clot gets to the lung.

Researchers theorize that the dead area of lung causes changes in the circulation of blood that triggers a series of irregular, potentially fatal, events in the heart.

These can include the wild, irregular beating of the heart known as arrhythmia; fast heart beats known as tachycardia, or shock. Some scientists think that the dead lung tissue may release a chemical that acts as the trigger.

The danger that Lungren cited, then, is that another piece of the clot in the thigh

will break off and either will be large enough to block the entire pulmonary artery or will trigger the irregular heart action.

Most doctors believe that the clot in Mr. Nixon's lung presents no further danger to him because it will remain where it is lodged and will probably not break apart.

The anti-coagulants that he is receiving will not dissolve either the clot in his lung or the one in his thigh. But the medicine will prevent further clotting and stop the existing clots from growing.

Once a clot stops growing, it will generally attach itself to the wall of the blood vessel and become a string, threadlike substance, showing little evidence that it ever existed.

If more clots break off, his doctors may want surgery that would prevent them from traveling to the lung.

This could take one of three forms: tying off the interior vena cava (a major vein from the leg to the heart) above the area of inflammation, which would force the body to find alternate pathways to carry blood from the leg to the heart: clipping the interior Vena cava so that blood could flow through but clots would be stopped, or inserting an umbrella-like device through the jugular vein (in the neck) into the vena cava to screen out clots.