

47. DVT causing stroke; PFO

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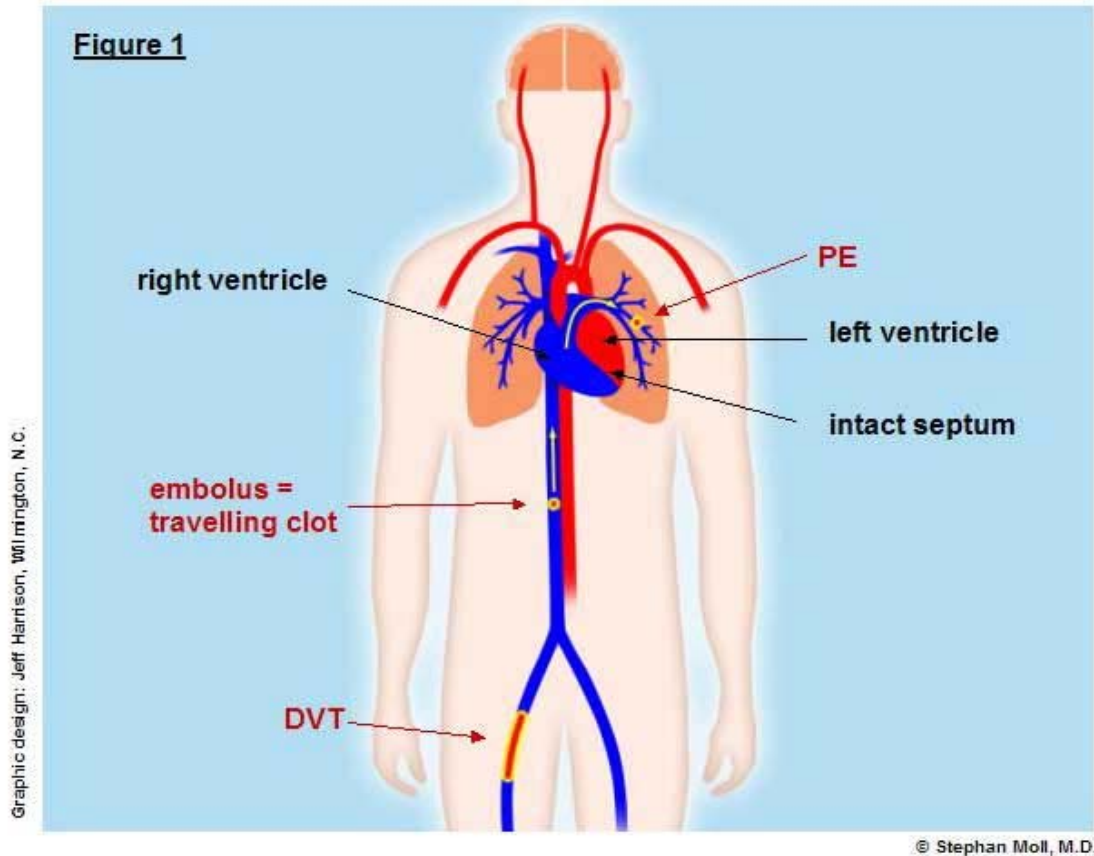
Q1 "I have had a deep vein thrombosis in my leg. I am always afraid that a piece will break off and travel to my brain and cause me to have a stroke. How often does that happen?"

A1: A DVT typically does not lead to a stroke. However, rarely this does happen in the patient who has a "hole in the heart" (= patent foramen ovale = PFO).

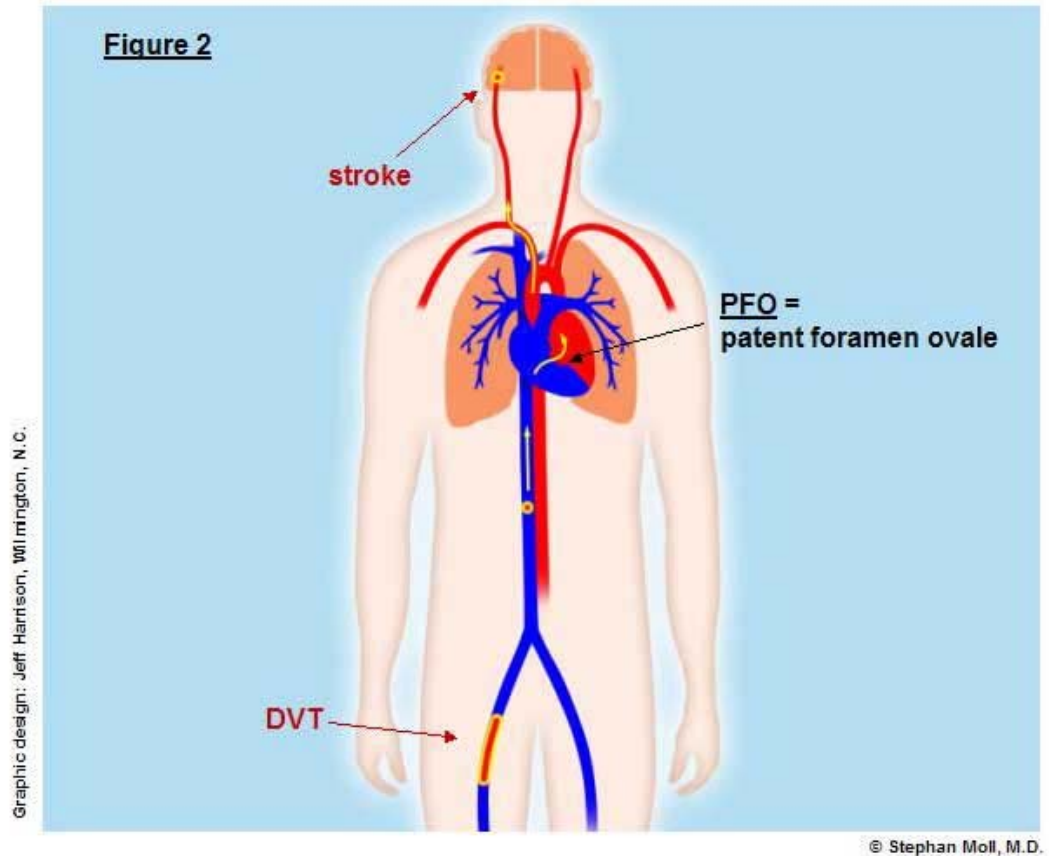
Q2: "My 30 year old son had a stroke and has a PFO. It was not found on the regular echo, but was found when they did a transesophageal echocardiogram. The docs felt that the PFO and FVLeiden both were probably what caused his stroke. They could find no other reason."

A2: In unexplained stroke search for a PFO is indicated. The best, most sensitive test is a transesophageal echocardiogram (=TEE) with bubble study. If a PFO is found, a Doppler ultrasound of the legs should be done to look for deep vein thrombosis. While factor V Leiden does not typically lead to arterial clots, such as stroke, it can on occasion cause stroke when a clot travels from a leg DVT through a PFO into the brain.

When a patient has an acute deep vein thrombosis (DVT), pieces of the clot can break off and travel in the bloodstream. Such a traveling clot (=embolus) is transported through the right chamber of the heart (see figure 1) into the lung vessels (=pulmonary arteries). Since the pulmonary arteries taper down towards the periphery of the lung, the clot eventually gets lodged in the smaller pulmonary arteries. This is called a pulmonary embolism (PE). A small PE can be without symptoms and go unnoticed. A larger PE can lead to shortness of breath, chest pain, cough, or blood-tinged sputum. There is no way that this clot can reach the brain (to cause a stroke) or the coronary arteries (to cause a heart attack), since the clots always get stuck in the lung vessels (pulmonary arteries) first. Therefore, patients with deep vein thrombosis or pulmonary embolism do not have reasons to be concerned about strokes or heart attacks due to breaking off of clots.



Some people have a "hole in the heart", a so-called "patent foramen ovale" (PFO). This is a connection between the right and the left chamber (atrium) of the heart (figure 2). We are all born with it - the unborn needs this connection for proper blood circulation. In most people the hole closes in the weeks after birth. In approximately 10 % of people it stays open, equally in men and women [Chest, 1995;107:1504-9. "The incidence of patent foramen ovale in 1,000 consecutive patients"]. The PFO usually does not cause symptoms, because it is only small. However, when a traveling blood clot comes into the right heart chamber, it may cross through the PFO from the right to the left heart chamber (figure 2). From there the bloodstream can carry it to the brain (causing a stroke); this is referred to as "paradoxical stroke" or paradoxical thromboembolism". The clot can also be carried into the coronary arteries (causing a heart attack), or the arteries of legs or arms (causing a peripheral arterial thromboembolism). Such paradoxical embolism is not common. However, accurate data as to how often this occurs in patients who have a DVT do not exist.



Search for a PFO is typically done when working up the cause of an unexplained stroke. A PFO is diagnosed by an echo study of the heart (= cardiac echo); the hole can often be seen on the echo. However, sometimes it can not be seen and then a "bubble study" is needed, during which agitated (bubbly) normal saline is injected into an arm vein; if a PFO is present the bubbly normal saline can be seen on the echo passing from the right side of the heart to the left. An echo performed with a tube that a patient swallows (= transesophageal echo or TEE) is more sensitive in picking up small PFOs than an echo done through the chest wall (= trans-thoracic echo or TTE). Thus, if one wants to rule out a PFO, one can get a TTE first; however, if it does not show a PFO, one should get a TEE with bubble study.