

Difference Between Aneurysm and Blood Clot

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Key Difference - Aneurysm vs Blood Clot

A localized permanent [dilatation](#) of a blood vessel or the wall of the heart is called an aneurysm. A blood clot is a meshwork of [fibrin](#) fibers running in all directions and entrapping blood cells, [platelets](#) and [plasma](#). Therefore, it can be clearly understood that the key difference between blood clot and aneurysm lies in their positioning; **an aneurysm forms in a blood vessel or in the cardiac wall whereas a blood clot forms in the blood.**

What is Aneurysm?

An aneurysm is a localized permanent dilatation of a blood vessel or the wall of the heart. Aneurysms can be classified in three different ways based on three different criteria.

Major Types

Based on the Nature of the Vessel Wall

True Aneurysms: If the wall is intact, it is called a true aneurysm

e.g. - Atherosclerotic and syphilitic aneurysms

False Aneurysms: If there is a defect in the wall, leading to the formation of an extravascular [hematoma](#).

E.g. - ventricular rupture after a myocardial infarction.

Based on the Macroscopic Nature of Aneurysm

- Saccular
- Fusiform
- Cylindrical
- Serpentine

Based on the Location of Aneurysm

- Abdominal aortic aneurysm
- Thoracic aortic aneurysm
- Berry aneurysms in the brain

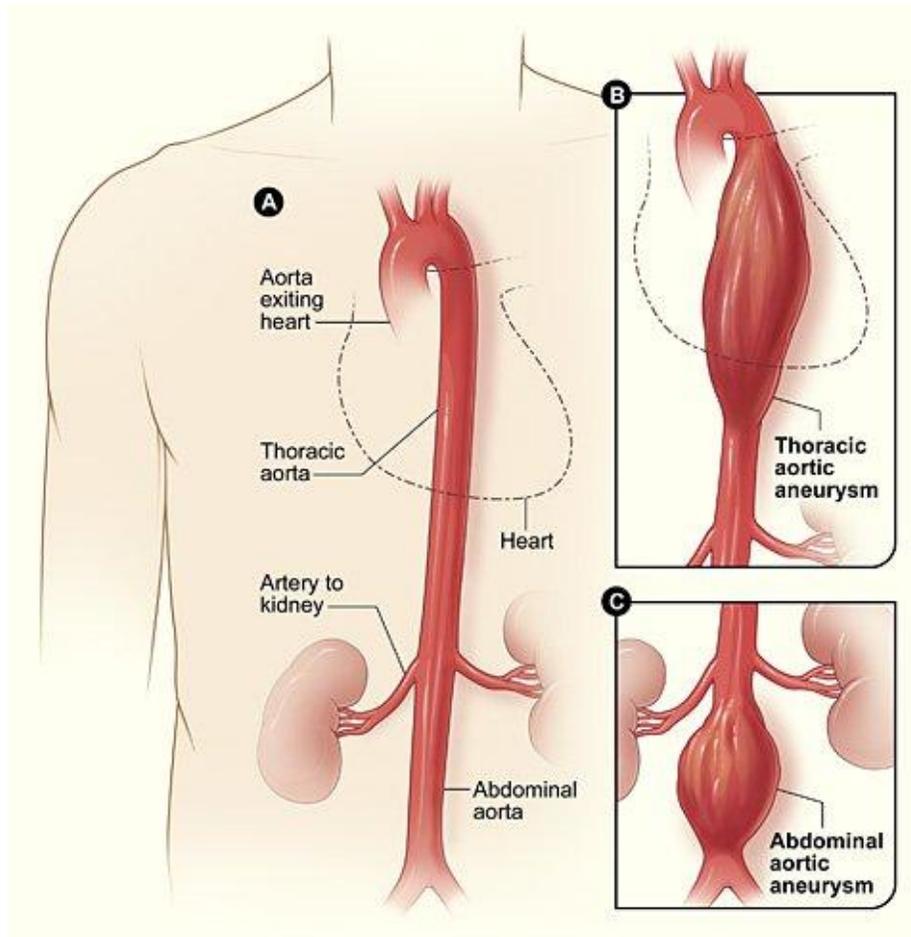


Figure 01: Aortic Aneurysm

Pathogenesis

Vascular wall is made up of connective tissues. Defects in these tissues can weaken the vascular wall. The poor intrinsic quality of the vascular connective tissues is one such defect. Alteration of the fine balance between the degradation and the regeneration of collagen fibers can also give rise to a weak vessel wall and this is mainly caused by inflammation. In some of the pathological conditions, the content of non-elastic and non-collagenous materials in the vessel wall drastically increases. This change in the composition of the connective tissues reduces the elasticity and the compliance of the vessel wall, ultimately giving rise to an aneurysm. The two main causes of aortic aneurysms are [hypertension](#) and [atherosclerosis](#).

What is a Blood Clot?

A blood clot is a meshwork of fibrin fibers running in all directions and entrapping blood cells, platelets and plasma. [Clotting](#) is a physiological mechanism which is initiated in response to a rupture of a blood vessel or damage to the blood itself. These stimuli activate a cascade of chemicals to form a substance called prothrombin activator. Prothrombin activator then catalyzes the conversion of prothrombin to thrombin. Finally, thrombin, which acts as an enzyme, catalyzes the formation of fibrin fibers from fibrinogen and these fibrin fibers entangle with each other, forming a fibrin mesh which we call the clot.

Blood Clot Diagram

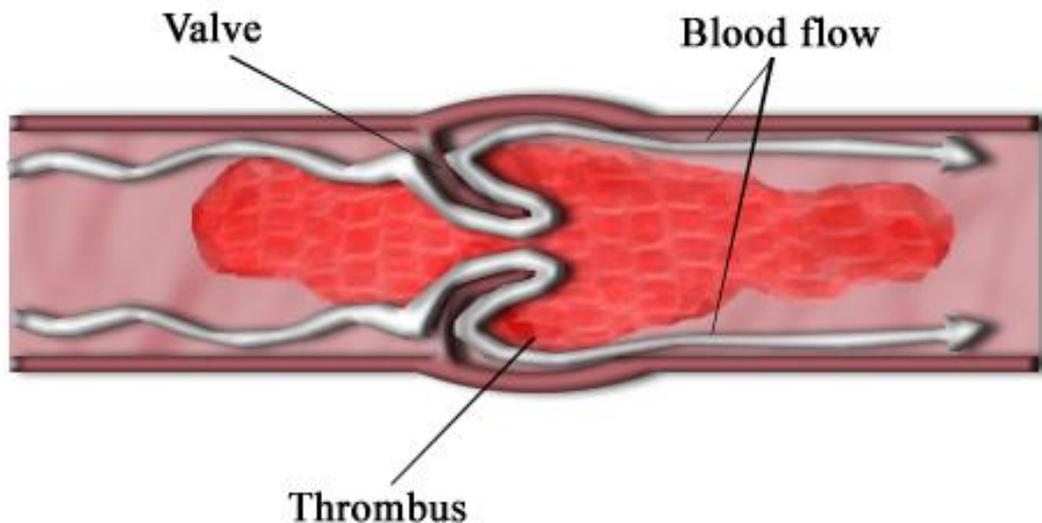


Figure 02: Blood Clot

As previously mentioned, the activation of a cascade of chemicals is required for the formation of the prothrombin activator. This particular activation of chemicals can happen via two major pathways.

- **Intrinsic Pathway** – it is the intrinsic pathway that is activated when there is a blood trauma.

- **Extrinsic Pathway** - extrinsic pathway gets activated when the traumatized vascular wall or the extravascular tissues come into contact with the blood.

The human vascular system employs several strategies in order to prevent the formation of blood clots in the vascular system under the normal conditions.

- Endothelial Surface Factors

The smoothness of the endothelial surface helps in preventing the contact activation of the intrinsic pathway. There is a coat of glycocalyx on the [endothelium](#) which repels clotting factors and platelets, thereby preventing the formation of a clot. The presence of thrombomodulin, which is a chemical found on the endothelium assists to counter the clotting mechanism. Thrombomodulin binds with thrombin and stops the activation of fibrinogen.

- Anti-thrombin action of fibrin and antithrombin iii.
- Action of Heparin
- Lysis of blood clots by plasminogen

From these countermeasures that our body has, it is evident that the human body doesn't want to have any blood clots inside it under normal conditions. But blood clots can form inside the body evading all these protective mechanisms.

Conditions like trauma, atherosclerosis, and infection can roughen the endothelial surface, thereby activating the clotting pathway.

Any pathology that leads to the narrowing of a blood vessel also has a tendency to form clots because the narrowing of the vessel slows down the blood flow through it and consequently more procoagulants are accumulated at the site, making a favorable environment for the formation of blood clots.

What are the similarities between Aneurysm and Blood Clot?

- The only similarity between aneurysm and blood clot is that both happen inside the circulatory system.

What is the difference between Aneurysm and Blood Clot?

Aneurysm vs Blood Clot	
Aneurysm is a permanent dilatation of a blood vessel or the wall of the heart.	Blood clot is a meshwork of fibrin fibers running in all directions and entrapping blood cells, platelets and plasma.
Nature	
Aneurysm is always a pathological event.	Blood clot is a result of a physiological process which becomes pathological only on some occasions.
Location	
Aneurysms are formed in blood vessels or the walls of the heart.	Although blood clots adhere to the walls of blood vessels and heart, they are originally formed in the blood.
Clotting Factors	
There is no involvement of clotting factors.	The presence of clotting factors is a must for blood clots.
Time Duration	
It takes a long time for an aneurysm to be formed in a vessel wall.	Formation of a blood clot takes a relatively shorter time.

Summary - Aneurysm vs Blood Clot

The disorders discussed here are two common disease conditions that are seen in the clinical setup. The key difference between blood clot and aneurysm is their location; an aneurysm is formed in a vessel wall or in the wall of the heart while a blood clot is originally formed in the blood. Fine details like the duration of the symptoms can be helpful in making a tentative diagnosis but it is difficult to make a definitive diagnosis without doing further investigations.

Reference:

1. Hall, John E., and Arthur C. Guyton. Guyton and Hall textbook of medical physiology. 12th ed. Philadelphia, PA: Elsevier, 2016. Print.
2. Kumar, Vinay, Stanley Leonard Robbins, Ramzi S. Cotran, Abul K. Abbas, and Nelson Fausto. Robbins and Cotran pathologic basis of disease. 9th ed. Philadelphia, Pa: Elsevier Saunders, 2010. Print.

Image Courtesy:

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APA: Difference Between Aneurysm and Blood Clot. (2017, June 26). Retrieved (date), from <http://www.differencebetween.com/difference-between-aneurysm-and-vs-blood-clot/>

MLA: " Difference Between Aneurysm and Blood Clot." Difference Between.Com. 26 June 2017. Web.

Chicago: "Difference Between Aneurysm and Blood Clot." Difference Between.Com. <http://www.differencebetween.com/difference-between-aneurysm-and-vs-blood-clot/> (accessed [date]).



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