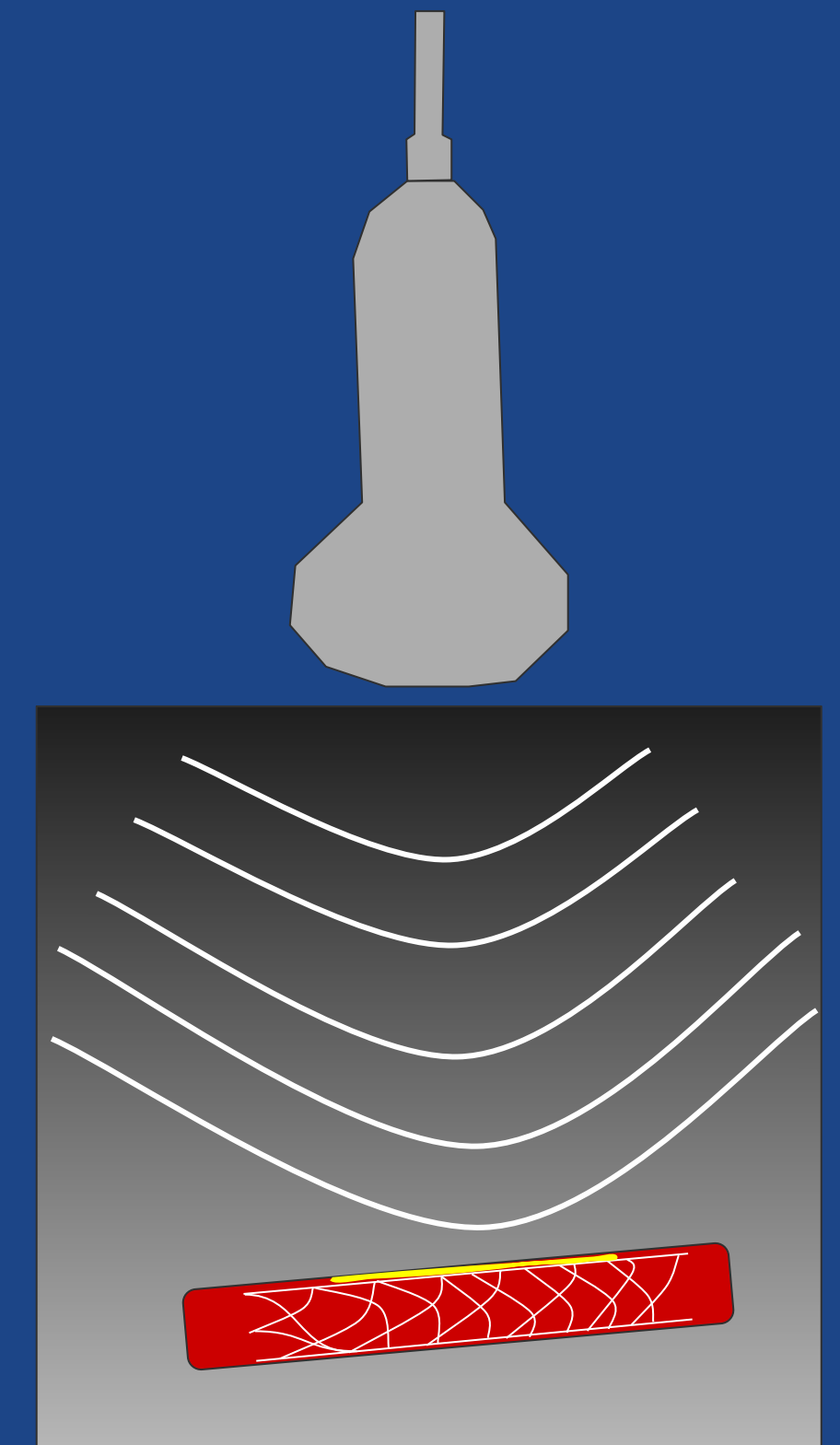


ULTRASOUND-GUIDED ENDOVASCULAR DEVICES: WHAT EVERY RADIOLOGIST SHOULD KNOW

INTRODUCTION AND OBJECTIVES

- Ultrasound has progressively underscored its importance in the study of endovascular devices due to technological advancements and enhanced resolution of equipment/transducers.
- Recognized as one of the premier follow-up methods, it ensures safety and convenience by being radiation-free and applicable at the bedside.
- The objective lies in showcasing the typical appearance of selected endovascular devices through this imaging modality, emphasizing the importance of recognizing both their normal and altered aspects. Furthermore, it underscores the relevance of the method in elective and emergency contexts.



EVALUATION OF ENDOVASCULAR DEVICES

IMPORTANCE AND APPLICATION OF DEVICES

- Utilization and application in various pathologies, such as:
 - Extracranial Carotid Disease;
 - Peripheral Arterial Disease;
 - Aortoiliac Disease;
 - Obstructive / Aneurysmal Diseases of Visceral Vessels;
 - Compressive Syndromes / Venous Obstruction.

EVALUATION METHOD OF ENDOVASCULAR DEVICES

- Always scan the entire device during the ultrasound examination, assessing its accommodation to the vessel wall.
- It is important to perform scans in both longitudinal and transverse sections of the vessel to study the relationship with the device. Analysis should also include both B-mode and Doppler modes.
- Pay attention to the arrival and departure vessels along the course of the device.

ENDOVASCULAR DEVICES - CAROTID STENT

INDICATION

- Primarily used in cases of atherosclerotic plaques causing hemodynamically significant stenosis in patients with surgical conditions.

EVALUATION

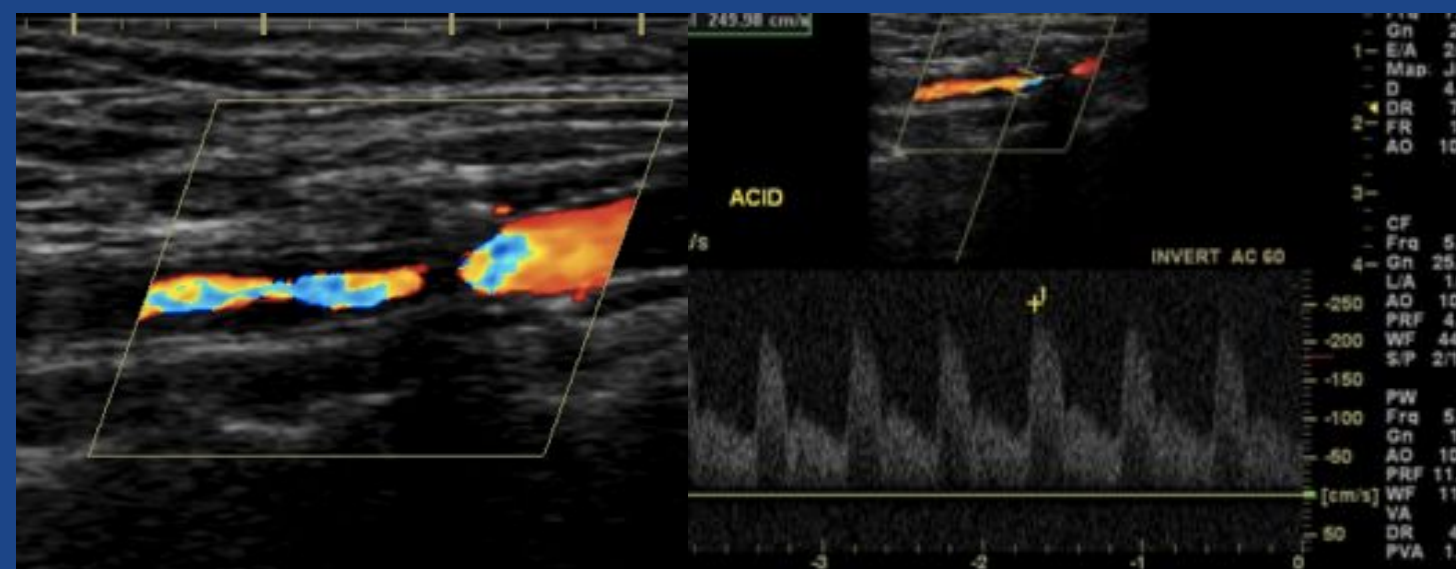
- It's important to note that the flow velocity in the artery with a stent is higher.

	DEGREE OF STENOSIS	PEAK SYSTOLIC VELOCITY - PSV (cm/s)
WITHOUT STENT	> 50%	125
	> 70%	230
WITH STENT	> 50%	220
	> 80%	340

COMPLICATIONS

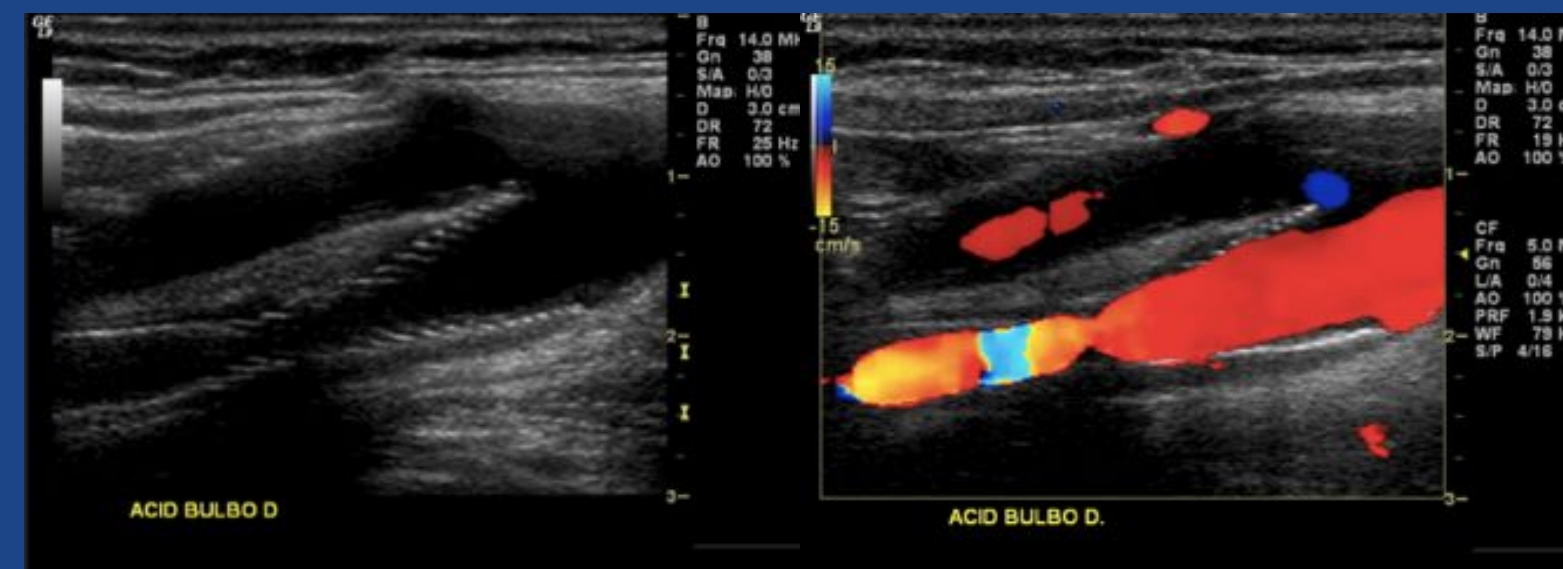
ESTENOSE

Flow constriction within the vessel, resulting in a significant increase in flow velocity and causing repercussions in the patient. Example:



STENT DEFORMITY

Alteration in the stent's conformation within the vessel, leading to turbulent flow inside without necessarily increasing its velocity. Example:



OCCLUSION

Complete occlusion of the stent lumen, with no flow passing through the vessel. A rare but serious complication. Example:



ENDOVASCULAR DEVICES - AORTIC ENDOPROSTHESIS

INDICATION

- Commonly used in cases of aortic aneurysms.

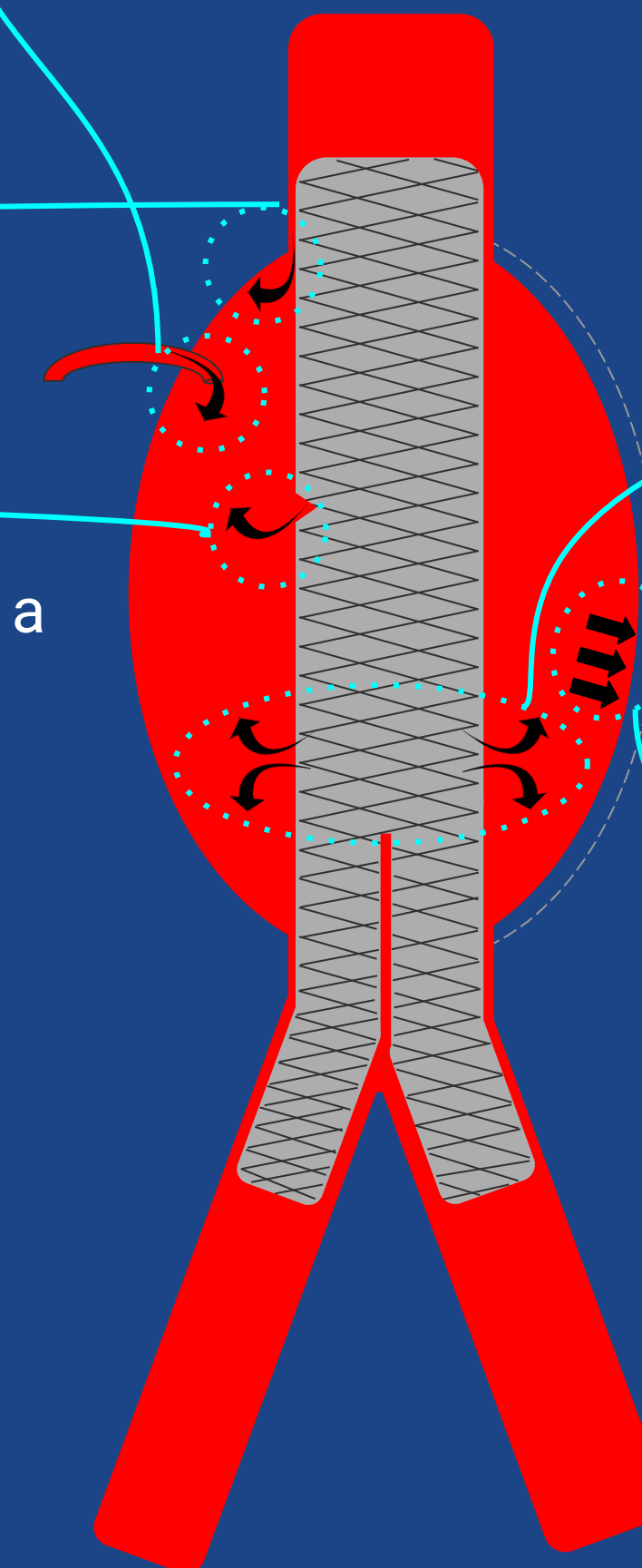
EVALUATION

- Main complication and focus of attention during the ultrasound examination is Endoleak (leakage of flow into the aneurysm sac), which can be classified into different types, as shown:

TYPE II: Perfusion of the aneurysm sac through arterial branches arising from the excluded aortic segment.



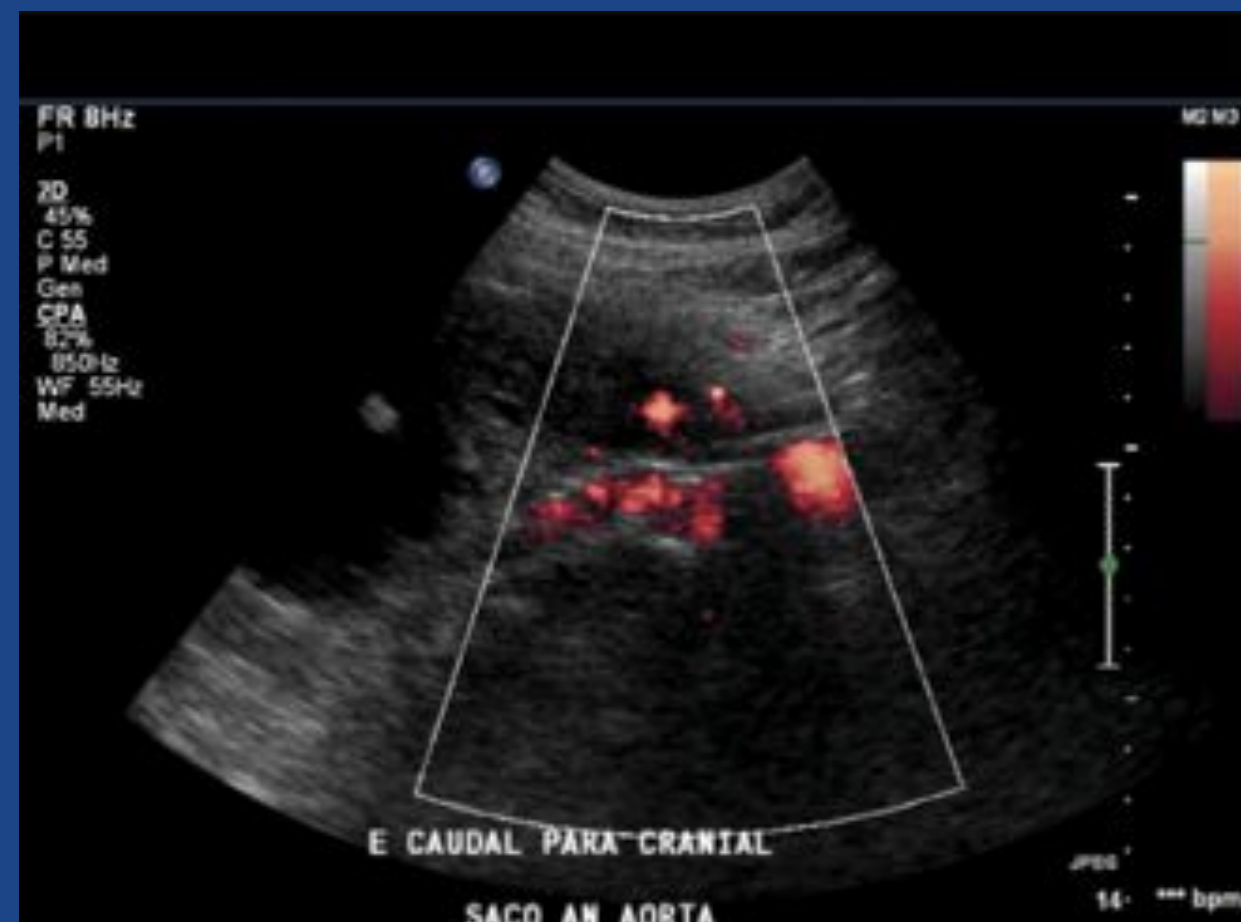
TYPE III: Perfusion of the aneurysm sac due to a mechanical problem with the endoprosthesis (rupture).



TYPE IV: Perfusion of the aneurysm sac due to graft fabric porosity (rarely seen nowadays).

TYPE V: Continuous enlargement of the sac without identifiable internal leakage.

TYPE I: Perfusion of the aneurysm sac through the ends, due to incomplete/ineffective sealing at the stent graft fixation sites.



ENDOVASCULAR DEVICES

LOWER LIMBS

AORTIC STENT

COCKETT SYNDROME (VENOUS STENT)

INFERIOR VENA CAVA FILTER

The use of stents/endoprotheses is common for both obstructive vascular disease (most commonly caused by atherosclerosis) and aneurysm treatment. The most frequently used location is the femoropopliteal segment. Ultrasound provides adequate access for device analysis, allowing the examination of associated complications and flow analysis.

Mainly used for correcting aortic dissection, requires careful analysis and may present complications, as exemplified below with flow escape into the false lumen.

Compression of the left common iliac vein by the right common iliac artery. Can cause swelling and pain in the left lower limb, along with the appearance of collateral veins. Ultrasound has challenging direct visualization of the iliac vessels but can indirectly identify the pathology by the absence of variability in the flow of the left common femoral vein with respiratory movements or by detecting collateral vessels.

A device placed in the inferior vena cava, designed to mechanically capture venous emboli, acting as mechanical prophylaxis against pulmonary embolism. Ultrasound confirms the filter's position, analyzes the flow through the vein, and investigates associated thromboses or other complications.

