Endovascular Perforation Method

The **endovascular perforation method** is a technique used primarily in experimental and clinical settings for controlled arterial perforation. It is commonly employed in preclinical research, vascular interventions, and certain neurosurgical procedures.

1. Definition and Applications The **endovascular perforation method** refers to the intentional creation of a vessel wall perforation via an endovascular approach. It is mainly used in: - **Experimental models of subarachnoid hemorrhage (SAH):** Used in animal studies to induce SAH by perforating the intracranial arteries. - **Endovascular interventions:** Controlled perforation techniques may be utilized in challenging cases where access to occluded vessels is needed. - **Neurovascular procedures:** In cases of iatrogenic perforation during coiling or stent placement, management strategies for vessel perforation are essential.

2. Techniques and Tools The method generally involves the use of: - **Microcatheters and microwires** (0.010–0.014 inches) to advance into small-caliber vessels. - **Balloon-assisted or stent-assisted techniques** to control flow during or after perforation. - **Radiofrequency (RF) or laser-assisted perforation** for precise control in experimental setups. - **Guidewires** for controlled penetration of arterial walls.

3. Clinical Significance - **Subarachnoid Hemorrhage Models:** In animal models, the perforation method is used to mimic aneurysmal rupture, providing insights into the pathophysiology and treatment of SAH. - **Iatrogenic Perforations:** In interventional neurovascular procedures, vessel perforation can lead to hemorrhagic complications, necessitating rapid hemostasis using **coils, stent-assisted occlusion, or glue embolization**.

4. Management of Perforation If an unintended perforation occurs during an endovascular procedure, management includes: 1. **Immediate cessation of anticoagulation/antiplatelet agents.** 2. **Balloon inflation** to temporarily stop bleeding. 3. **Coil embolization** if the vessel is non-essential. 4. **Stent deployment** to seal the perforation. 5. **Reversal agents** for anticoagulation if needed.

5. Risks and Complications - **Hemorrhagic transformation** - **Distal ischemia due to vessel sacrifice** - **Reperfusion injury in experimental models**

The **endovascular perforation method** is a critical tool in vascular research and neurointerventional procedures, requiring careful technique and management strategies to mitigate risks.