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Technical Notes & Surgical Techniques

Techniques of intracranial aneurysm wall biopsy☆

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ABSTRACT

Current treatment modalities for the treatment of intracranial aneurysms including surgical clipping and endovascular coiling are invasive and have some treatment risks. Since not all aneurysms rupture, it is critical to detect rupture prone aneurysms. Molecular and cellular analysis of aneurysm tissue may provide understanding about pathobiology of aneurysm rupture and to develop imaging techniques to detect rupture prone aneurysms. For more than 15-years we have collected samples to identify pathological processes in the aneurysm wall itself predisposing to rupture. This has opened a new field of research leading to novel findings and multiple scientific publications. Surgical techniques of sampling the aneurysm dome have never been demonstrated so therefore many neurosurgeons are reluctant to take biopsies for research. Now we demonstrate with an intraoperative video the techniques of sampling the aneurysm dome after clipping an incidental right-sided 5-mm unruptured MCA aneurysm in a 58-year-old hypertensive male with past long history of smoking through lateral supraorbital approach. A focused opening of the Sylvian fissure was performed and the aneurysm was clipped using standard techniques. After placement of a titanium clip, ICG and Doppler were performed to ensure patency of both M2 vessels and the aneurysm was punctured. The aneurysm dome was then held in place with the suction and cut with microscissors for research purposes. Another titanium clip was placed (Video 1). The clinical course was uneventful. This technical note will help young neurosurgeons to contribute actively in aneurysm research also potentially to find non-invasive methods to prevent aneurysms from rupture.

1. Introduction

Ruptured intracranial aneurysm (ICA) leading to subarachnoid hemorrhage (SAH) is a devastating diseases killing around 50% of patients. Current treatment modalities including clipping and coiling are invasive and have some treatment risks. Since not all aneurysms rupture, it is critical to detect rupture prone aneurysms. State of the art research shows that Inflammation plays critical role in formation and rupture of intracranial aneurysms as well after the SAH [1–5,7]. Multiple publications have reported a critical role of inflammation and inflammatory cells in rupture of intracranial aneurysms [6,8–10,12–18]. Molecular and cellular analysis of aneurysm tissue may provide better understanding about pathobiology of aneurysm rupture and to develop imaging techniques to detect rupture prone aneurysms [11,16,17]. Sampling of aneurysm tissue during microsurgical clipping is the key to perform molecular and pathological investigations. Surgical technique of sampling the aneurysm dome has never been demonstrated. Due to lack of demonstrative publications many neurosurgeons are reluctant to take biopsy for research in addition to the preference of endovascular therapy in many centres making aneurysm wall biopsies practically almost impossible.

2. Methods

Using intraoperative video material, we demonstrate the technique of sampling the aneurysm after clipping in a case of a hypertensive 58-year-old man who has smoked previously for decades and harboring incidental right middle cerebral artery aneurysm. We performed surgical clipping and aneurysm biopsy through lateral supraorbital approach using OPMI PENTERO 900 microscope (Car-Zeiz, Germany) using standard instruments.

3. Results and discussion

To expose the MCA aneurysm, a focused opening of sylvian fissure was performed and aneurysm dome was dissected from the surrounded tissue. The aneurysm was clipped using standard tools. After placement of clip we performed Doppler US and video ICG to ensure patency of

*Abbreviation:*ICA, Intracranial aneurysm

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both M2 vessels. Then the aneurysm was punctured using a 23G needle. Microscope was then focused on the aneurysm dome which was held with the suction at very low pressure and half of the dome was cut with micro-scissors. The suction was then removed and the aneurysm dome was held with long micro tweezer and cut further to complete the biopsy (Video 1).

This video demonstration showing technique of sampling will help young neurosurgeons to contribute actively to take more aneurysm biopsies and contribute in aneurysm research. Hence our article may help to enhance aneurysm wall research and open novel directions of research.

Supplementary data to this article can be found online at https://doi.org/10.1016/j.inat.2019.01.022.

Disclosures

The authors have no conflict of interest and have nothing to disclose.

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