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CASE STUDY

Neuro-exoscopic clipping of ruptured basilar apex aneurysm: a step-by-step video

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This article presents a step-by-step video demonstrating neuro-exoscopic clipping of a ruptured basilar apex aneurysm in a 68-year-old female. The neuro-exoscope provided enhanced visualization and improved surgeon ergonomics, facilitating precise clip placement. Despite intraoperative rupture, immediate control was achieved. The case underscores the advantages of the exoscope in managing complex posterior circulation aneurysms, offering a viable alternative to endovascular treatment. Key surgical nuances and postoperative considerations are discussed to aid neurosurgeons in refining their approach.

Keywords: exoscopic aneurysm clipping, ruptured basilar tip aneurysm, basilar tip aneurysm, video article, open neuro-vascular surgery, intra-operative rupture of basilar aneurysm

Introduction

Basilar apex aneurysms account for approximately 5–8% of all intracranial aneurysms and nearly half of all posterior circulation aneurysms. Given the increased risk of rupture and poorer outcomes compared to anterior circulation aneurysms, timely intervention is critical. We present a case of a ruptured basilar apex artery aneurysm successfully clipped under a neuro-exoscope, highlighting the advantages and challenges associated with this approach (1).

Case presentation

A 68-year-old female presented with a sudden loss of consciousness and had a glasgow coma scale (GCS) score of E1VETM2. A computerised tomography (CT) cerebral angiogram confirmed a ruptured basilar apex aneurysm, leading to neuro-exoscopic clipping. The sequence of surgical steps is outlined below. Postoperatively, the patient was on elective ventilation, experienced blood pressure fluctuations, and unfortunately expired on postoperative day (POD) 4.

Surgical steps:

1. **Patient Positioning**

The patient is positioned supine oblique on the operating table.

The head of the bed is elevated approximately 30° above heart level.

The head is rotated 35–45° away from the surgical side, ensuring the vertex stays parallel to the floor.

The zygoma body is positioned as the highest point.

2. **Skin Incision & Soft Tissue Dissection**

A pterional incision was carefully made while preserving the superficial temporal artery.

The scalp flap was elevated and reflected anteriorly, maintaining a plane above the superficial temporal fascia.

The temporalis muscle was detached from the pterion and frontozygomatic process and retracted posteroinferiorly.

3. **Craniotomy & Skull Base Preparation**

A pterional craniotomy was performed to ensure adequate exposure.

The sphenoid ridge and anterior skull base were drilled down to create a flattened surface.

Following sphenoid drilling, an extradural anterior clinoidectomy was carried out.

The dura was opened in a C-shape, with its base aligned along the Sylvian fissure.

4. **Sylvian Fissure Dissection (Video 1)**

Sylvian vein drainage was assessed at the pretemporal dura to determine the optimal dissection approach.

The patient had a Type 4 Sylvian fissure with a Type 2a Sylvian vein system.

A wide Sylvian dissection was performed using the anterior temporal approach.

Following Sylvian dissection, the optico-carotid and carotid-oculomotor triangles were carefully dissected and expanded.

Sharp microsurgical dissection was performed under high magnification, following an "outside-in, inside-out" technique.

The basilar artery trunk was identified and found to be entirely atherosclerotic.

5. **Aneurysm Exposure & Clipping**

The arachnoid membrane was incised between the temporal uncus and anterior choroidal artery.

The temporal uncus was retracted posteriorly, exposing the

- Retrocarotid triangle
- Oculomotor nerve
- Ipsilateral P2 and Pcom, as well as bilateral P1 segments of the posterior cerebral artery (PCA) and superior cerebellar artery (SCA).

An intraoperative aneurysm rupture occurred after applying the temporary clip but was controlled within seconds.

The aneurysm neck and adjacent perforating arteries were carefully identified. The aneurysm was secured with a permanent clip, ensuring preservation of perforating arteries.

6. **Final Assessment & Closure**

Microdoppler and indocyanine green angiography were utilized to evaluate:

Patency of the PCAs and perforating arteries.

Complete obliteration of the aneurysm.

The dura was securely closed, followed by a standard wound closure.

VIDEO 1 | 0:08-History; 0:49-Anterior clinoidectomy, meningo-orbital band; 4:23-clipping, followed by intraoperative rupture; 5:07-second clip, hemostasis; 5:14-post op CT.
https://youtu.be/8znHoHyL8SY

Discussion

Basilar apex aneurysms pose significant challenges due to their deep-seated location and proximity to critical neurovascular structures. While endovascular coiling is a preferred option for many posterior circulation aneurysms, microsurgical clipping remains a viable alternative, particularly in cases where coil embolization is unfavorable due to aneurysm morphology or broad neck configurations.

The neuro-exoscope provides enhanced depth perception, superior illumination, and improved surgeon comfort compared to the traditional microscope. Its wide field of view facilitates precise microdissection and clip placement, minimizing the risk of injury to adjacent perforators. Additionally, the exoscope's ergonomic design reduces surgeon fatigue, potentially improving surgical outcomes.

Lawton et al. reported that 77% of basilar apex aneurysms were treated via an orbitozygomatic-pterional transsylvian approach. The surgical mortality rate was 9%, with a 5% incidence of permanent neurological morbidity. Good outcomes (Glasgow Outcome Scale 4 or 5) were achieved in 84% of cases, improving from 79% in the first half of the series to 90% in the latter half, while mortality decreased from 21% to 4% (2).

Hernesniemi et al. highlighted the subtemporal approach as a straightforward and effective technique for treating basilar apex aneurysms, regardless of their size, location, or projection, without requiring posterior clinoidectomy or petrosectomy (3).

Sanai et al. reported a 97% complete occlusion rate, 57% favorable discharge outcomes, and a 10.5% mortality rate in a study of 96 patients who underwent surgery primarily through pterional and orbitozygomatic approaches (4).

Similarly, Krisht et al. treated 50 complex basilar apex aneurysms using transzygomatic and pretemporal transcavernous approaches, achieving 98% complete occlusion, 88% good outcomes, and a 2% mortality rate (5).

References

1. Acha Sánchez JL, Bocanegra-Becerra JE, Contreras Montenegro L, Cueva M, Bellido A, Contreras S, et al. Microsurgery for basilar apex aneurysms: a case series. *J Surg Case Rep* (2024). 2024(11):rjae720. doi: 10.1093/jscr/rjae720

2. Lawton MT. Basilar apex aneurysms: surgical results and perspectives from an initial experience. *Neurosurgery*. (2002) 50(1):1–10. doi: 10.1097/00006123-200201000-00002
3. Hernesniemi J, Ishii K, Niemelä M, Fujiki M, Shen H. Subtemporal approach to basilar bifurcation aneurysms: advanced technique and clinical experience. *Acta Neurochir Suppl* (2005) 94:31–8.
4. Sanai N, Tarapore P, Lee AC, Lawton MT. The current role of microsurgery for posterior circulation aneurysms: a selective approach in the endovascular era. *Neurosurgery*. (2008) 62:1236–49.
5. Krisht AF, Krayenbühl N, Sercl D, Bikmaz K, Kadri PAS. Results of microsurgical clipping of 50 high complexity basilar apex aneurysms. *Neurosurgery*. (2007) 60:242–50.