Case Report

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Successful Endovascular Coiling for the Prevention of Rebleeding in Anterior Cerebral Artery Aneurysmal Subarachnoid Hemorrhage: A Case Report

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Abstract: Subarachnoid hemorrhage (SAH) becomes one type of strokes as a cause of high mortality in majority of patients, especially in elderly. The most common etiology of spontaneous SAH is the rupture of cerebral aneurysm (aSAH). In patient with aSAH, rebleeding event can increase the risk of mortality. It emphasizes the importance of definitive treatment for the ruptured aneurysm. This article reported elderly patient with diagnosis of aSAH caused by the rupture of left distal Anterior Cerebral Artery (ACA) that been successfully treated with endovascular coiling. After evaluation, this patient didn't show any significant clinical deterioration and there was no evidence in further examination that might be indicated the probability of a rebleeding event. Therefore, in our opinion, endovascular coiling procedure tends to be safe and effective, and is possible to be done in elderly patient with specific clinical and aneurysm characteristic, even though with all complicating factors that companied it. This report can be considered in treatment procedure for other patients with similar type of aSAH in the future.

Keywords: ACA; aneurysmal; coiling; rebleeding; subarachnoid haemorrhage

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Introduction

Subarachnoid haemorrhage (SAH), can be defined as the bleeding in the space between arachnoid and pia mater. SAH is classified into traumatic and spontaneous SAH. Spontaneous SAH (sSAH) is most commonly caused by the rupture of cerebral aneurysm or can be called by aneurysmal SAH (aSAH) (Sanicola *et al.*, 2023).

Cerebral aneurysmal is caused by the weakness of the artery wall that result in widening of the vascular locally. Hypertension is one of the risk factors of the forming of aneurysm (Ahmed et al., 2023). It is predicted as many as 7% and 16% of aneurysm formed in Anterior Cerebral Artery (ACA) and Middle Cerebral Artery (MCA), respectively (Göttsche *et al.*, 2022; Hanifa and Subandi, 2025). Approximately, 90% of the aneurysm is in saccular or berry type (Belavadi *et al.*, 2021).

Literature showed that the prevalence of SAH is tend to be rare, with incidence 500.000 patient per year in worldwide. Even though tend to be rare, the mortality

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of SAH is classified to be high (can reach 40%) (Chen *et al.*, 2025). Research with 2.634 patient with diagnosis of SAH found that the mortality rate of SAH is 13,5% and 16,1% after 3 months and 4 years, respectively, in patients that been already treated with clipping or coiling. In patients that been late to bring to the hospital, this rate can be reached as high as 10-15% (Park *et al.*, 2022). Also, female patients have the 1,24 times higher risk to experience aSAH than those of male patients (Sanicola *et al.*, 2023).

Patient with aSAH is at risk to experience rebleeding event, even in the early phase in the first 2-6 hours after the onset (Tang, Zhang and Zhou, 2014). Rebleeding can increase the fatality rate of aSAH up to 60% (Calviere *et al.*, 2022). The research showed that 14% cases of SAH were experiencing rebleeding caused by aneurysm (Dissanayake *et al.*, 2024). Rebleeding usually can be controlled by identify and control the risk factors of rebleeding that been identified in clinical of the patients (Tang, Zhang and Zhou, 2014).

Because of SAH caused by aneurysmal ruptured have a high mortality rate, mainly caused by rebleeding event, the guideline advised to treat the patient immediately after their arrival. Main treatment choice is addressed to maintaining the stability of the aneurysm and to stop the bleeding. Two of definitive treatment choice that is available to prevent the rebleeding event is neurosurgical clipping and endovascular coiling. Another therapy named flow diverter came lately is also considered effective to prevent rebleeding. According to the research, coiling showed safety rate that is higher for aSAH cased than that by clipping, with complication incidence rate after treatment that is also lower (Liyis, Surya and Tini, 2024).

This case report explained the success of therapy of endovascular coiling in preventing rebleeding event, in patient with aSAH that been caused by the rupture of aneurysm in Anterior Cerebral Artery (ACA) in left distal part, in General Hospital West Nusa Tenggara Province, that been treated with endovascular coiling, after 8 days of care post onset, with clinical evaluation and CT-angiography and Digital Substraction Angiography (DSA) after procedure.

Case presentation

Anamnesis:

The patient is a 67-year-old woman. Her family brought her to the emergency room of the General Hospital West Nusa Tenggara Province at 12:05 a.m. on February 11, 2026. She was referred from Praya Hospital after two days of treatment with a diagnosis of *Disorder of* Consciousness (DOC) caused by a suspected Cerebrovascular Accident (CVA) with onset on day two.

According to alloanamnesis, the patient had complained of a sudden, severe headache at 5:00 a.m. on February 9, 2026, while on her way to prayer. She was conscious but continued to complain about the headache. The family denied any other complaints, including vomiting, seizures, weakness, slurred speech, facial drooping, or choking while eating or drinking. The patient also had no history of trauma or fever. She was known to have high blood pressure for which she was not taking medication regularly. The family denied any history of stroke, diabetes, or other cardiovascular disease. Furthermore, the patient had not taken any other medications regularly recently. She worked as a farmer and spent most of her time at home. She was not an active smoker.

She was then taken to the community health centre, where her systolic blood pressure was found to be 240 mmHg. She was initially prescribed hypertension medication (the type of medication is unknown). However, due to increasing agitation, she was referred to Praya Hospital. After got the first treatment and done a head CT-scan, patient finally referred to General Hospital West Nusa Tenggara Province to get further treatment.

Upon arrival at the emergency room at the General Hospital West Nusa Tenggara Province, the patient was still conscious, able to open her eyes spontaneously, answer questions, and follow commands. When she was transferred to the room, she was drowsy. However, she was able to communicate coherently and follow commands.

Physical examination:

Vital signs revealed a Blood pressure was measured at 181/81 mmHg (after antihypertensive medication was administered at the referring hospital), temperature of 36.4°C, a pulse rate of 63 beats/minute, a respiratory rate of 13 breaths/minute, and an oxygen saturation of 97%. A comprehensive physical examination of the head, thorax, abdomen, and extremities was within normal limits.

A neurological examination revealed a GCS score of E4V5M6 (at the time of admission to the emergency department). Nuchal rigidity was positive. Other signs of meningeal irritation were negative. Pupil and light reflex examinations revealed no abnormalities. No facial nerve weakness was detected. Motor strength was within normal limits. Physiological and pathological reflexes were within normal limits.

Scoring calculations on initial admission to the emergency department revealed a Siriraj score of +4, a National Institutes of Health Stroke Scale (NIHSS) of 3, a Hunt and Hess II, and a Modified Fisher Scale of 2.

Classification of Hunt and Hess II is made based on the criteria that this patient had severe headache that made her screaming in the first attack, no abnormalities in mental status was found during examination. This classification can be differed from grade III above that already caused the changes in patient consciousness.

Classification of Modified Fisher Scale of 2 based on the result of examination of head CT scan with contrast that the SAH appeared with thinness of less than 1 mm and there was IVH found.

We performed supporting examinations including laboratory blood samples and radiology that needed.

Laboratory examination:

Based on laboratory examination of a venous blood sample, the haemoglobin value was 12.5 g/dL (normal), platelet count 197,800/µL (normal), urea 25 mg/dL (normal), creatinine 0.9 mg/dL (normal), random blood sugar 100 mg/dL (normal), and serum potassium 3.2 mmol/L (hypokalaemia). Other parameters were not relevant.

CT-scan:

The results of a non-contrast head CT scan that been done in Praya Hospital (February 11, 2026) showed hyperdense lesions indicating a SAH haemorrhage filling the right and left basal cisterns.



Figure 1. The result of head CT angiography (February, 12, 2026, 18:27)

CT-angiography:

The results of CT-angiography of blood vessels in the brain (February 12, 2026) showed SAH filling the bilateral frontotemporoparietal sulci, bilateral sylvian fissures, and interpedunculated cisternae (**Fig. 1**). Intra Cerebral Haemorrhage (ICH) was seen in the frontal region with an estimated volume of 7.6 cc. Intra Ventricular Haemorrhage (IVH) filled the entire ventricular system. In the patient, cerebral oedema was found. The aneurysms were found in the right Middle Cerebral Artery (MCA) at the bifurcation level with a neck width of 3 mm, a dome height of 3.73 mm, a dome width of 4.18 mm, and a dome direction to the posterior, and in the left distal Anterior Cerebral Artery (ACA) with a neck width of 1.51 mm, a dome height of 1.87, and a dome width of 1.54 mm with the dome directed anteriorly.

CT angiography has a sensitivity of 95% in detecting the location of aneurysm rupture. Meanwhile, DSA can provide a sensitivity of 98% (Mkhize, Mngomezulu, and Buthelezi, 2023).

DSA*:*

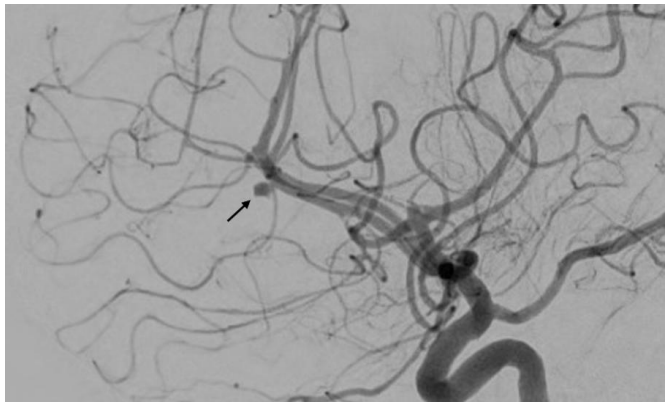


Figure 2. The result of head DSA examination for reconstruction before definitive treatment (February, 19, 2026, 14.39)

The results of the DSA examination conducted on February 19, 2026 (pre-coiling) showed an aneurysm in the left ACA segment A2 with a neck size of 1.51 mm, dome 1.87 mm, dome height 1.54 mm with the dome pointing anteriorly (**Fig. 2**). In the aneurysm, blood vessels were seen coming out of the neck. Combining the results of the previous CT-scan and CT-angiography in the form of bleeding in the frontal region, this indicates rupture and bleeding in the aneurysm in the left ACA. In addition, another aneurysm was also found in the left inferior MCA segment M2 with a neck measuring 1.04 mm, dome 1.29 mm, height 1.38 mm, dome pointing laterally. After that, an aneurysm was also seen in the left MCA bifurcation with a neck measuring 2.08 mm, height 1.07 mm, and dome 1.52 mm. In an aneurysm in

the MCA, no blood vessels are visible in the aneurysm dome.

Final diagnosis:

Based on anamnesis and physical examination data, taking into account the results of supporting examinations, the patient was diagnosed with stroke SAH et cause of aneurysm rupture in the left ACA, with Hunt and Hess II, Modified Fisher Scale 2, accompanied by ICH volume 7.6 cc, and bilateral lateral ventricular IVH, with hypertension (181/81 mmHg).

Care and therapy:

Patient received pharmacological and non-pharmacological therapy. Non-pharmacological therapy includes 30° head elevation.

Pharmacological therapy includes IVFD NaCl 0.9% 16 DPM, nicardipine drip 5 mg/hour with a target systolic blood pressure of 140 mmHg—titrated, omeprazole injections twice a day, ondansetron injections three times a day, tramadol injections 50 mg every eight hours. Blood pressure is controlled with oral antihypertensive medications, mannitol maintenance doses of six doses of 100 mg gradually reduced to four doses of 100 mg, tranexamic acid injections three times a day, nimodipine injections of six doses of 60 mg, potassium chloride injections of two doses of 600 mg, and citicoline tablets of 500 mg.

During hospitalization, the patient's condition did not experience significant changes. Headaches persisted. Blood pressure was controlled with antihypertensive medication. After 7 days of treatment, the patient was eligible and was scheduled for definitive endovascular coiling therapy. Prior to coiling, the patient underwent a DSA examination to reconfirm the location and characteristics of the aneurysm to be addressed during coiling.

Coiling procedure:

The endovascular coiling procedure was performed following the official guidelines of the Japanese Society on Surgery for Cerebral Stroke, 2012 edition. Prior to coiling, the patient underwent initial stabilization, particularly regarding blood pressure control (preferably <160 mmHg for systolic) and oral nimodipine administration to prevent cerebral ischemia (Treggiari et al., 2023).

Guiding manoeuvre been done with diagnostic wire into the Left Common Carotid Artery (LCCA) and catheter tip was positioned in petrous segment of Left Internal Carotid Artery (LICA). After that, with roadmap technique, Vasco microcatheter manoeuvre was done and Hybrid microwire was placed into saccus of aneurysm in ACA distal. Aneurysm coiling was done with framing Optima Coil System supersoft 3 x 4 mm.

Final angiogram in LICA was done and we can see the coil filled in the saccus of aneurysm, no neck remnant was seen, no dome residual was seen. Distal circulation of either ACA or MCA was good.

Follow-up examination:

A DSA examination performed post-coiling on the same day showed that in the Left Internal Carotid Artery (LICA), the coil appeared to fill the aneurysm sac, there was no neck remnant, no residual dome (Raymond Roy Class 1), and the distal circulation of the ACA and MCA was good.

After coiling procedure, the CT-scan was re-conducted to assess clinical changes on February, 20, 2026. The CT-scan revealed minimal SAH haemorrhage filling the left frontotemporoparietal sulci and the right sylvian fissure (**Fig. 3**). An ICH haemorrhage was also found in the frontal region with an estimated volume of 3.4 cc. IVH was also seen filling the bilateral lateral ventricles. The patient also had cerebral oedema, as in the previous examination. The coiling device was observed in the frontal midline region at the site of the ACA aneurysm.

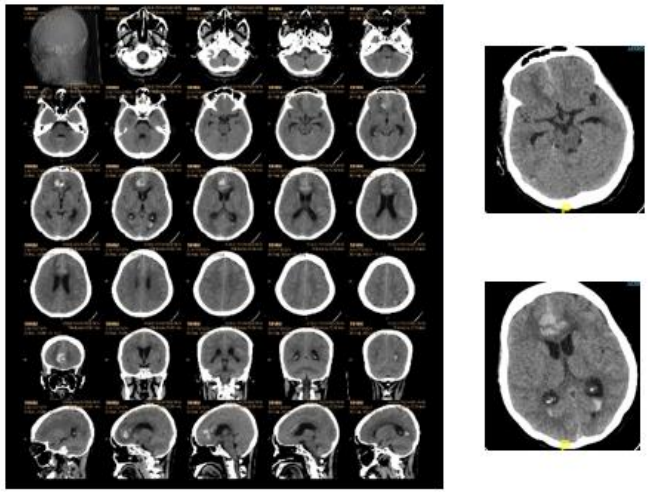


Figure 3. Result of examination of head CT-scan non-contrast (February, 20, 2026)

Post coiling impression:

The absence of worsening symptoms in the patient, such as headache, seizures, decreased consciousness, and bleeding, both during and after coiling, indicates that the procedure was performed safely and without any side effects. Furthermore, the coiling procedure did not increase the volume of ICH bleeding.

Condition after coiling:

After receiving coiling, the patient continued her care in the SCU. She underwent observation and additional care for several days before being discharged and continued as an outpatient on February 24, 2026. She was in good condition before discharge, and she had no further headaches.

Discussion

This case report explained the success of therapy of endovascular coiling in elderly female 67-year-old patient with SAH stroke et cause by ruptured of saccular aneurysm in Anterior Cerebral Artery (ACA) in left distal segment A2 part, with size of neck 1,51 mm, size of dome 1,87 mm, height of dome 1,54 mm with dome leading to anterior, accompanied by ICH with volume of 7.6 cc, and IVH in bilateral lateral ventricle, finally with cerebral oedema.

The aneurysm that occurred in this patient is quite unique. The prevalence of aneurysms in the distal ACA is rare. According to the literature, the prevalence is only 1.5 to 9% of all aneurysms that can occur (Şekerci et al., 2011).

One of the priorities in the management of aSAH is preventing rebleeding. Rebleeding often occurs in the first 24 hours after onset. Factors such as elevated systolic blood pressure (especially >160 mmHg), a high Hunt-Hess grade, and with a history of coagulopathy increase the risk of rebleeding in the aneurysm (Busl et al., 2025). This emphasizes the importance of treating the aneurysm immediately after onset.

Definitive treatment for aneurysms can include neurosurgical clipping and endovascular coiling. The goal of coiling is to prevent rebleeding in the aneurysm. The criteria for coiling method are: 1) aneurysms with a narrow neck (less than 4-5 mm); 2) a generally small aneurysm (less than 15 mm); and 3) a dome/neck ratio >2 (Japanese Society on Surgery for Cerebral Stroke, 2012; Li, Zhang, and Yu, 2024). In this case, neck width of the aneurysm was 1.51 mm (considered as narrow) and with dome/neck ratio of 1,01. Meanwhile, *clipping* is generally performed on younger patients and those with aneurysms in the anterior circulation (Belavadi et al., 2021).

Endovascular coiling therapy is a minimally invasive procedure commonly used as the definitive treatment for aSAH (Ahmed et al., 2023). This is because rebleeding can occur in up to 1 in 3 patients within 1 week of initial onset (Lindgren et al., 2019). The primary principle of coiling involves the use of a metal coil inserted with a catheter into the aneurysm sac formation site to occlude the aneurysm lumen and prevent blood flow (Fu et al., 2021; Liyis, Surya, and Tini, 2024). Clipping, on the other hand, tends to be more invasive, with a metal clip placed at the base of the aneurysm, preceded by a craniotomy (Liyis, Surya, and Tini, 2024).

Due to the aneurysm's location in the distal left ACA, coiling can be challenging. Factors such as the location of the aneurysm being too distal (making it difficult to navigate the catheter to the aneurysm), small size (risk of rupture when the coil is inserted), difficulty of access (or tortuosity, because the path taken to the distal ACA tends to pass through many curves or bends), and the small size of the parent artery, become complications during coiling procedures, and must be considered by the person performing the procedure (Cagnazzo et al., 2018; Krzyżewski et al., 2019).

Several factors influence the choice of coiling or clipping therapy for patients with aSAH. Healthcare providers must consider the patient's age, the location and size of the aneurysm, and patient and family preferences, including treatment duration and hospital costs (Liyis, Surya, and Tini, 2024). In this patient with aSAH stroke, the incidence of aneurysm rebleeding can lead to clinical deterioration. The treatment provided, including pharmacological and non-pharmacological measures, has helped stabilize the patient's condition, particularly related to blood pressure control and intracranial pressure management. The therapy also includes endovascular coiling, which is directly intended to prevent aneurysm rebleeding.

Despite all the complications encountered in the patient, endovascular coiling is still performed with various considerations. In multiple aneurysms, the selection of the aneurysm to be coiled is based on the principle of treating the ruptured aneurysm first, followed by other unruptured aneurysms. Therefore, in this patient, it was decided to perform coiling on the left distal ACA aneurysm. The choice of coiling therapy in this patient was influenced by several considerations, including: a) the patient is elderly, so it was decided to choose a less invasive procedure because it does not involve craniotomy surgery; b) the characteristics of the aneurysm in the distal ACA, namely a neck size of 1.51 mm, dome 1.87 mm, dome height 1.54 mm; and c) epidemiologically, coiling procedures show better long-term clinical outcomes in patients with aSAH. This choice was also influenced by the availability of treatment facilities at the General Hospital West Nusa Tenggara Province.

After coiling is performed on a patient, a number of evaluations are necessary, including both clinical manifestations and radiological changes. Research indicates a number of complications that can occur in patients after the procedure, including basal ganglia stroke, cerebral arterial vasospasm, transient hemiparesis, and thrombosis at the coil insertion site (Cagnazzo et al., 2018). In this case, a CT-angiography

evaluation on the first day after the procedure revealed no ischemic areas or complaints of paresis. Furthermore, the patient requires regular outpatient monitoring for at least the first 3-24 months.

Guidelines list endovascular coiling and neurosurgical clipping as the two primary treatment options for post-subarachnoid haemorrhage stroke patients. Each therapy carries its own risk of complications. Besides being less invasive because it does not directly involve cerebral tissue, several literatures review the advantages of coiling over clipping (Ahmed et al., 2023). A study of 2,458 patients with anterior circulation aneurysms who received coiling therapy showed a risk ratio for poor outcome (measured by death or dependent outcome, compared to clipping) of 0.77 one year after coiling. Meanwhile, in patients with posterior circulation aneurysms, the risk ratio was 0.41 (Lindgren et al., 2019; Hoh et al., 2023). Other studies have shown that coiling procedures result in shorter hospital stays ($p < 0.001$) with an average reduction of 2.53 days compared to clipping. Furthermore, coiling procedures are safe with a low complication rate for aneurysms in the ACA (Nakagawa et al., 2021). Other studies have shown that the better clinical outcome rates for coiling compared to clipping can be maintained up to 10 years of follow-up (Hanifa and Subandi, 2025; Rossi et al., 2025). With all its advantages, coiling has successfully replaced clipping and become the first-line therapy for patients with aSAH. However, the implementation of coiling therapy still faces obstacles in various hospitals, especially those with limited facilities (Ahmed et al., 2023; Liyis, Surya, and Tini, 2024).

However, several studies remain controversial regarding the comparative effectiveness of coiling versus clipping. Compared with coiling, clipping has a lower overall rebleeding rate and a lower incidence of recurrence (Zhu et al., 2022). Clinical outcomes and patient deterioration, in addition to the treatment options they receive, are influenced by several factors, such as a higher initial modified Rankin Scale (mRS) score (Rossi et al., 2025).

The uniqueness of this case is also evident in the patient's discharge after 5 days of coiling. This emphasizes the safety of coiling for patients, especially elderly patients without other underlying conditions. The literature suggests that coiling is more recommended in elderly patients because it tends to cause less trauma and leads to faster healing (Rossi et al., 2025). Furthermore, even though coiling was only performed more than 7 days after onset (onset day 8), clinical improvement was achieved.

In fact, although safe enough to be used in most patients with aSAH stroke, coiling therapy still has complications to consider. These complications include rupture during the procedure, thromboembolic stroke, and post-procedural hydrocephalus. These complications should be discussed with the patient and/or family when selecting therapy (Ahn et al., 2017).

Once a ruptured aneurysm has been stabilized, all remaining aneurysms must be treated to prevent future rupture (Kim and Song, 2004). Coiling of other aneurysms, including those in the MCA, is not currently feasible due to various considerations. However, it is important for medical team to evaluate and plan the treatment of any remaining aneurysms. While awaiting further treatment, patients are being advised to prevent clinical deterioration with pharmacological therapies. Furthermore, future considerations include the use of flow diverters, if possible, in patients with aSAH with ruptured aneurysms in the distal ACA.

Several limitations of this case report should be considered. Although some patients diagnosed with SAH have similar clinical manifestations, each patient's treatment is individualized and therefore cannot be generalized to other patients (a single case). Furthermore, this case report does not compare the clinical improvement of patients who received coiling with other therapies, such as clipping. The patient's follow-up period was also limited (only 5 days before discharge). Finally, the patient's rebleeding prevention may have been a result of other measures, such as blood pressure control, rather than solely due to coiling.

Nevertheless, this case report is still noteworthy given the high incidence of death in patients with aSAH stroke and the diverse clinical presentations of these patients, which require different management approaches.

Conclusion

Subarachnoid hemorrhage (SAH) due to ruptured cerebral aneurysms has a high mortality rate if not treated promptly and adequately. One cause of mortality is rebleeding of the aneurysm. Two definitive therapies commonly used to prevent rebleeding are coiling and clipping. In the reported case, coiling was safely applied to a 67-year-old female patient diagnosed with SAH caused by a ruptured aneurysm in the distal left anterior cerebral artery (ACA). Despite various complicating factors, post-coiling digital subtraction angiography (DSA) and CT-angiography evaluations showed no rebleeding or expansion of the bleeding in the patient. Several studies also support the safety and effectiveness of coiling in preventing rebleeding of aneurysms in SAH, especially in elderly patients. In addition to being less invasive, coiling has been shown to result in lower complication rates and shorter hospital stays. However, each patient has their own clinical

characteristics. This case report is worth considering in selecting definitive therapy as soon as possible to reduce morbidity and mortality in patients with SAH due to aneurysm rupture.

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