

Endovascular Treatment for Traumatic Ear Bleeding Associated With Acute Epidural Hematoma

—Case Report—

Kouichi MISAKI, Naoki MURAMATSU, and Hisashi NITTA

Department of Neurosurgery, Komatsu Municipal Hospital, Komatsu, Ishikawa

Abstract

A 44-year-old woman presented with intractable ear bleeding after head trauma. Computed tomography showed a longitudinal petrosal bone fracture and a mastoid air cell hematoma with a small acute epidural hematoma. Conservative therapy for more than 12 hours failed to stop the bleeding, so we planned endovascular treatment rather than open surgery. Angiography of the external carotid artery demonstrated continuous extravasation of contrast material from the middle meningeal artery near the fracture line in the temporal bone. Intravascular embolization was performed using polyvinyl alcohol particles and gelatin sponge pieces, resulting in immediate successful hemostasis. Endovascular management should be considered for the treatment of intractable traumatic ear bleeding.

Key words: ear bleeding, head injury, endovascular treatment

Introduction

Traumatic ear bleeding resulting from cutaneous injury of the external ear canal or tympanic membrane laceration can usually be managed by conservative treatment.^{1,2,4)} Severe intractable traumatic nasal and oral hemorrhage, and acute epidural hematoma (AEDH) are generally treated by open surgery, including direct vessel ligation.^{3,5)} Recent advances allow direct endovascular treatment, but few reports have described surgical or endovascular intervention to achieve hemostasis of traumatic ear bleeding.

We describe a case of intractable ear bleeding despite 12 hours of conservative treatment, in which intravascular embolization of the affected vessels achieved rapid hemostasis.

Case Report

A 44-year-old woman with ear bleeding presented to the emergency department after falling down stairs. Her neurological status was intact with the exception of hearing disturbance on the right. Radiography and computed tomography (CT) showed a longitudinal fracture in the petrosal bone that ex-

tended to the squamous part of the temporal bone, and blood accumulation in the mastoid air cell and a small AEDH (Fig. 1). Hematological examination found no evidence of coagulopathy or bleeding tendency. The external auditory canal was packed with sanitary cotton and a pressure bandage applied over the ear for more than 12 hours, but the bleeding did

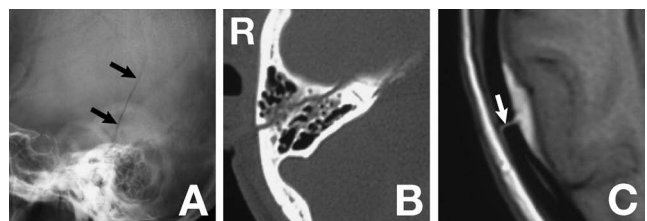


Fig. 1 (A) Radiograph showing a fracture line (arrows) in the temporal bone. (B) Computed tomography scan demonstrating a longitudinal fracture in the petrosal bone and a hematoma in the mastoid air cells. (C) Posttreatment T₂-weighted magnetic resonance image revealing the epidural hematoma, and the fracture line (arrow) in the temporal bone adjacent to the hematoma.

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Author's present address: K. Misaki, M.D., Department of Neurosurgery, Graduate School of Medical Science, Kanazawa University, Kanazawa, Ishikawa, Japan.

not show any improvement.

Repeat CT showed no further development of the AEDH. We planned endovascular treatment rather than open surgery to achieve hemostasis of the persistent ear bleeding. Angiography was performed using a coaxial system consisting of a 6-French introducing catheter in the external carotid artery with a 4-French catheter. Right external carotid angiography demonstrated continuous extravasation from the middle meningeal artery (MMA) near the fracture line in the temporal bone (Fig. 2A). After a

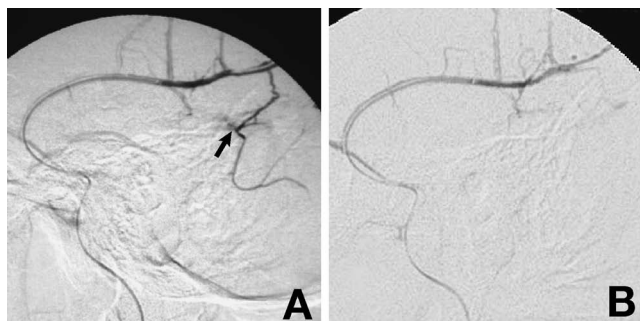


Fig. 2 Selective angiograms of the middle meningeal artery showing extravasation of contrast medium from the peripheral branch of the artery (A, arrow), which had disappeared at the end of intravascular embolization (B).

3-French microcatheter was introduced to the responsible branch of the MMA, intravascular embolization was performed using polyvinyl alcohol particles (250–350 μm in diameter) and gelatin sponge pieces. After angiography confirmed no extravasation (Fig. 2B), hemostasis of the ear bleeding was confirmed by visual ear inspection. Perforation of the tympanic membrane was also observed. She was discharged from the hospital several days later in excellent condition.

Discussion

In the present case, the ear bleeding originated from the injured MMA. The epidural hemorrhage from the injured MMA may have drained into the middle ear cavity through the fracture in the bone of the pyramid, and then entered the external auditory canal through the perforated tympanic membrane. Continuous drainage of the epidural hematoma into the external auditory canal prevented any manifestations of the AEDH.

Endovascular treatment has been described for traumatic epistaxis, oral hemorrhage, and AEDH.^{3,5,6)} To our knowledge, no reports of the endovascular treatment for traumatic ear bleeding have been published. Table 1 shows a summary of the endovascular therapies for these lesions. Intravascular embolization was performed in the tribu-

Table 1 Cases of endovascular treatment for traumatic head injury

Series	Age (yrs)/ Sex	Cause	Injuries	Embolization		Outcome
				Arteries	Materials	
Nishijima et al. (1993) ³⁾	22/M	fall	epistaxis, oral hemorrhage	IMA	PVA, gelfoam	GR
	53/M	traffic accident	AEDH	MMA	gelfoam, microcoil	GR
	32/M	—	AEDH	MMA	PB, MFC	GR
	18/M	—	AEDH	MMA	PB, MFC	GR
	62/M	—	AEDH	MMA	PB, MFC	GR
Suzuki et al. (2004) ⁶⁾	28/M	—	AEDH	MMA	PB, MFC	GR
	54/M	traffic accident	AEDH	MMA	PB, MFC	GR
	34/M	—	AEDH	MMA	PB, MFC	GR
	33/F	traffic accident	AEDH	MMA	PB, MFC	GR
	18/M	—	AEDH	MMA	PB, MFC	GR
Shiomi et al. (2005) ⁵⁾	60/M	—	AEDH	MMA	PB, MFC	GR
	—	—	epistaxis, oral hemorrhage	—	PVA	death
	—	—	epistaxis, oral hemorrhage	—	PVA	death
	—	—	epistaxis, oral hemorrhage	—	PVA	death
	54/M	traffic accident	epistaxis, oral hemorrhage	IMA, LA, FA, STA	PVA	death
20/M	traffic accident	epistaxis, oral hemorrhage	LA, MMA	PVA	GR	
Present case	44/F	fall	ear bleeding, AEDH	MMA	PVA, gelfoam	GR

AEDH: acute epidural hematoma, FA: facial artery, GR: good recovery, IMA: internal maxillary artery, LA: lingual artery, MFC: microfibrillary collagen, MMA: middle meningeal artery, PB: platinum ball, PVA: polyvinyl alcohol, STA: superficial temporal artery, —: data unavailable for review.

taries of the external carotid artery in all cases. Epidural extravasation of contrast medium on head CT indicates hematoma growth and the necessity for endovascular embolization of the MMA in the treatment of AEDH.⁶⁾ In the case of ear bleeding with AEDH, epidural extravasation of contrast medium revealed by CT is also considered to indicate immediate surgical or endovascular intervention. CT with contrast medium should be performed if traumatic ear bleeding shows no improvement under oppression of the external ear canal.

In the case of endovascular embolization of MMA, careful attention should be paid to prevent embolization of ophthalmic artery and anastomotic vessels supplying the cranial nerves. The embolization site in our case was so distal that the risk of embolism was very small. Although hemostasis was achieved by the polyvinyl alcohol alone,⁵⁾ we additionally used gelfoam. Gelfoam allows recanalization 1 to 3 weeks after embolization, but is convenient for traumatic bleeding because the hemostatic process achieves complete cure of the bleeding point before the recanalization.³⁾ Endovascular therapy is less invasive and can be performed quickly compared with surgical intervention, so should be considered for trauma patients with persistent ear bleeding.

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Address reprint requests to: Kouichi Misaki, M.D., Department of Neurosurgery, Graduate School of Medical Science, Kanazawa University, 13-1 Takara-machi, Kanazawa, Ishikawa 920-8641, Japan.
e-mail: misakikouichi@vega.ocn.ne.jp