Therapeutic Embolization for the Treatment of Epistaxis: A Study of 20 Cases and a Review of the literature.

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Accepted for publication on January 30, 1997

ABSTRACT. Transcatheter arterial embolization (TAE) was employed to control the nasal bleeding in 20 patients. Four patients had organic diseases and the other 16 had intractable idiopathic epistaxis. The embolization was usually performed by the co-axial system using a microcatheter. The results of treatment of the four organic diseases was satisfactory. Among the 16 patients with intractable epistaxis extravasation was found in only two cases and all bleeding was stopped by TAE. One patient experienced recurrent bleeding four months following embolization and he required additional embolization. No neurological complications were noted, but one patient had severe mucositis with ulceration along the facial arterial territory caused by facial TAE using Gelfoam. Transarterial embolization of epistaxis is very safe and effective and the procedure should be considered as more aggresive therapy. However, transarterial embolization and transantral ligation have distinct advantages in different clinical situations. A good working relationship between the otolaryngologist and the interventional radiologist provides the greatest chance for success in controlling intractable epistaxis.

Key words: transarterial embolization — TAE — epistaxis — nasal bleeding

Epistaxis is usually a benign and self-limiting disease. Most epistaxis patients respond to simple treatment, but some with severe bleeding require more aggressive therapy.

The primary treatment for severe epistaxis has been anterior and posterior packing. This packing is painful and stressful for the patient and prolonged packing may be complicated by aspiration, sinus infection and hypoxia, which can lead to cardiac arrythmias and cerebral ischemia.[1,2]

When nasal packing fails to stop bleeding, further aggresive therapies are needed. After posterior nasal packing, the two most common therapies for intractable epistaxis are transantral ligation of the internal maxillary artery[3,4] and transarterial embolization of the distal internal maxillary artery with or without facial artery.[5-11] Both treatments have distinct advantages in different clinical situations.[4]

Multiple causes of epistaxis have been reported in different pathologic entities. Two major groups, a group with organic lesions as the source of bleeding[12-18] and a second idiopathic group have been identified.

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We present our experience with 20 patients treated with transarterial embolization. We also review the recent literature for the indications, advantages and complications of the procedure.

MATERIALS AND METHODS

Twenty patients underwent transcathter arterial embolization to control nasal bleeding. Four patients had organic diseases;

a nasopharyngeal cancer, a malignant melanoma, a Wegener's granuloma and an angiofibroma, respectively. Sixteen patients had idiopathic epistaxis, and all cases in this group experienced massive or prolonged nasal bleeding that did not respond to conservative or operative treatments.

The previous conservative therapies included anterior and posterior packing in 16 cases, and the previous operations included ligation or clipping of the maxillary arteries or anterior ethmoidal arteries in 9 cases.

The embolization was usually performed by the co-axial system using a microcatheter (Fas Tracker 18, Target Therapeutics INC., USA) with GT wire (Termo Co. Ltd., Japan). We checked the clinical existence of nasal bleeding after performing embolization to the maxillary arteries and removing the nasal package. If the nasal hemorrhage could not be controlled, we performed additional embolization to the facial arteries.

The embolic material was mostly Gelfoam (Pharmacia & Upjohn, USA) with or without platinum coils (Target Therapeutics INC., USA). After we experienced severe mucositis along the facial arterial area due to the facial arterial embolization using Gelfoam, we used microcoils alone as embolic material for the facial arterial embolization.

RESULTS

The treatment of the four patients with organic diseases was satisfactory. In particular, the nasopharyngeal cancer patient was cured of hypovolemic shock. Nasal bleeding was also controlled in the other three cases and no recurrent bleeding was noted (Table 1).

TABLE 1. Epistaxis patients with organic diseases

age sex	Diagnosis	Vessel(s) Embolized	Embolic material(s)	complication
Case 1 40y.o.M	Wegener's granuloma	Lt., Rt. IMA	Gelfoam, microcoils	none
Case 2 44y.o.F	malignant melanoma	Lt. IMA	Gelfoam	none
Case 3 62y.o.M	nasopharyngeal cancer	Rt. ICA	Gelfoam, metallic coils	nasal discomfort
Case 4 16y.o.M	juvenile angiofibroma	Rt. IMA	Gelfoam	none

ICA : internal carotid artery IMA : inferior maxillary artery

Of the 16 patients with intractable epistaxis, extravasation was found in 2 cases while the other 14 cases demonstrated no sure bleeding points on

angiographies. Nine patients who received ligation or clipping of the anterior ethmoidal and/or internal maxillary arteries also had satisfactory outcomes. All bleeding was stopped by the arterial embolization. One patient had recurrent bleeding four months following embolization and this patient required additional embolization. No neurological complications were noted in our series. Severe mucositis with ulceration along the facial arterial territory occurred in one patient who had undergone facial TAE using Gelfoam. Two embolizations were followed by mild headache but these complaints were resolved spontaneously within a week (Table 2).

TABLE 2. Intractable epistaxis patients

Case	basal disease	ligation or clipping vessel(s)	vessel(s) embolized	Embolic material(s)	complication
5	HT	Lt. Ethmoidal a.	Lt. IMA	Gelfoam, microcoils	(−)
6	(−)	Lt. Ethmoidal a. Lt. Facial a.	Lt. IMA	Gelfoam	(−)
7	HT	Lt. & Rt. IMA	1st. Lt. IMA 2nd. Lt. IMA Lt. Facial a.	Gelfoam Gelfoam, microcoils Gelfoam	(−)
8	HT	Lt. IMA	Lt. & Rt. IMA	Gelfoam	headache
9	(−)	Rt. Ethmoidal a.	Lt. IMA	Gelfoam	headache
10	(−)	Rt. Ethmoidal a.	Rt. IMA	Gelfoam,	(−)
11	(−)	Rt. IMA	Lt. & Rt. IMA	Gelfoam	(−)
12	(−)	(−)	Lt. & Rt. IMA Rt. Facial a.	Gelfoam Gelfoam	(−)
13	HT	Rt. IMA	Lt. & Rt. IMA	Gelfoam, microcoils	(−)
14	(−)	(−)	Lt. IMA Lt. Facial a.	Gelfoam Gelfeam	severe muctsitis
15	(−)	(−)	Lt. IMA	Gelfoam	(−)
16	(−)	(−)	Lt. IMA Lt. Facial a.	Gelfoam microcoils	(−)
17	DM	Rt. Ethmoidal a.	Rt. IMA Rt. Facial a.	Gelfoam, microcoils microcoils	(−)
18	(−)	(−)	Rt. IMA	Gelfoam, microcoils	(−)
19	(−)	(−)	Lt. IMA Lt. Facial a.	Gelfoam, microcoils microcoils	(−)
20	Lymphoma(−)		Lt. & Rt. IMA	Gelfoam, microcoils	(−)

HT : hypertension DM : diabetes mellitus IMA : inferior maxillary artery

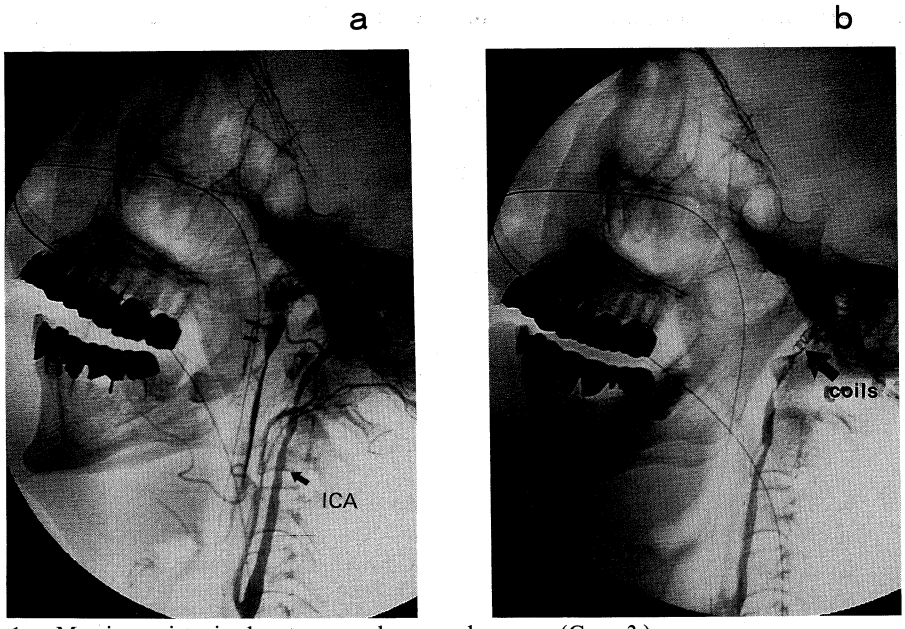

Fig 1. Massive epistaxis due to nasopharyngeal cancer (Case 3.)

Pre-TAE internal carotid angiography shows the massive extravasation (arrow, Fig 1 a).

Post-TAE using metallic coils and Gelfoam common carotid arteriography reveals no extravasation (Fig 1 b). The procedure time was less than one hour. The shock was cured and he lived for 10 months with no further epistaxis.

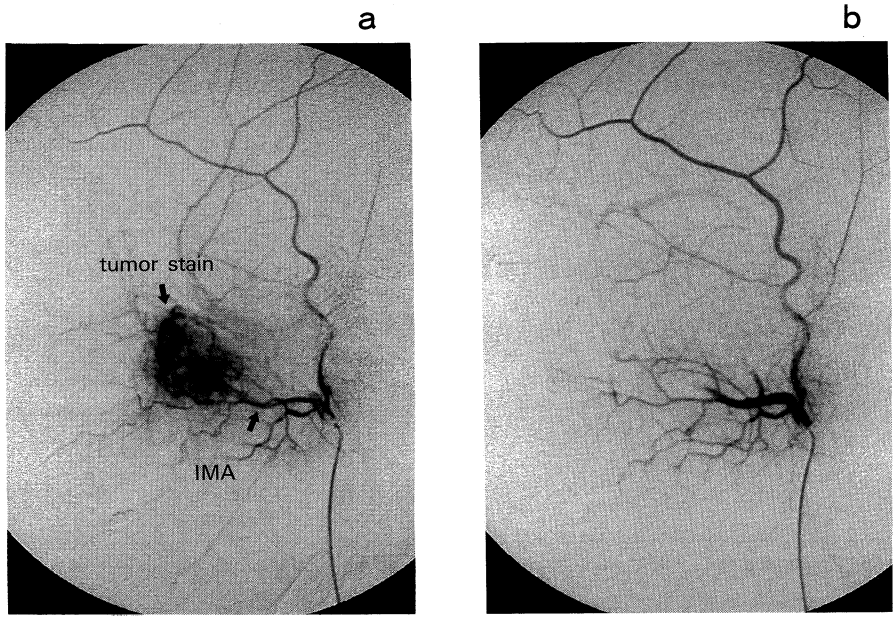

Fig 2. Juvenile angiofibroma (Case 4.)

The DSA shows a hypervascular tumor (arrow) in the left internal maxillary arterial territory (Fig 2 a). We performed TAE using Gelfoam (Fig 2 b). A day later, the operation was done and the operative bleeding loss was only 700 cc.

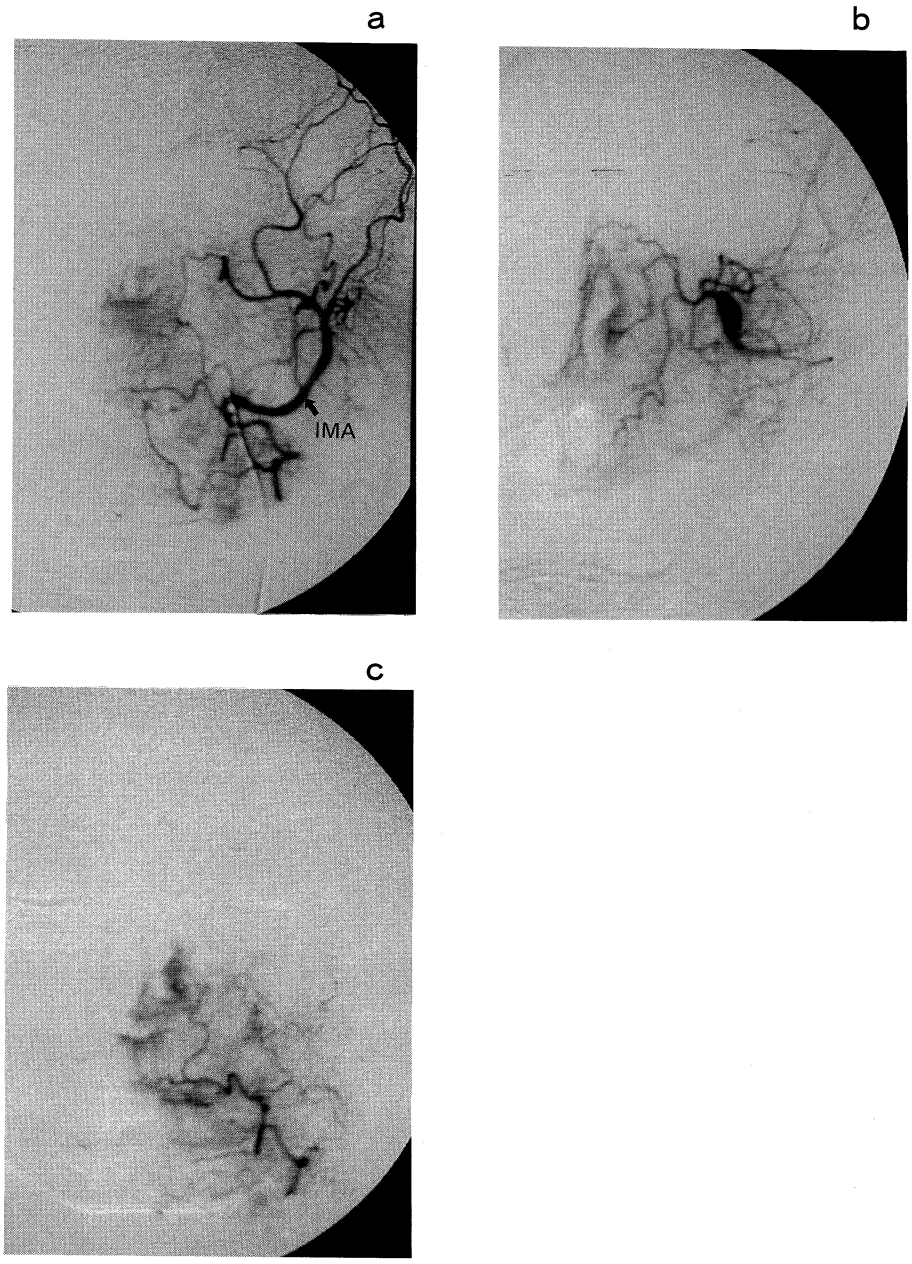

Fig 3. Intractable epistaxis (Case 7.)

A 78-year-old male with intractable epistaxis who underwent clipping of bilateral internal maxillary arteries, but who experienced the new episode of left nasal bleeding. We carried out TAE to the left internal maxillary artery using Gelfoam, and the bleeding was immediately controlled (Fig 3 a). However, four months later, recurrent epistaxis occurred at the same site. Left maxillary arteriography showed no evidence of hemorrhage (Fig 3 b) and rich collateral circulation from the facial artery to the nasal area (Fig 3 c). Then we performed TAE to the facial artery, and the epistaxis was well controlled for three years.

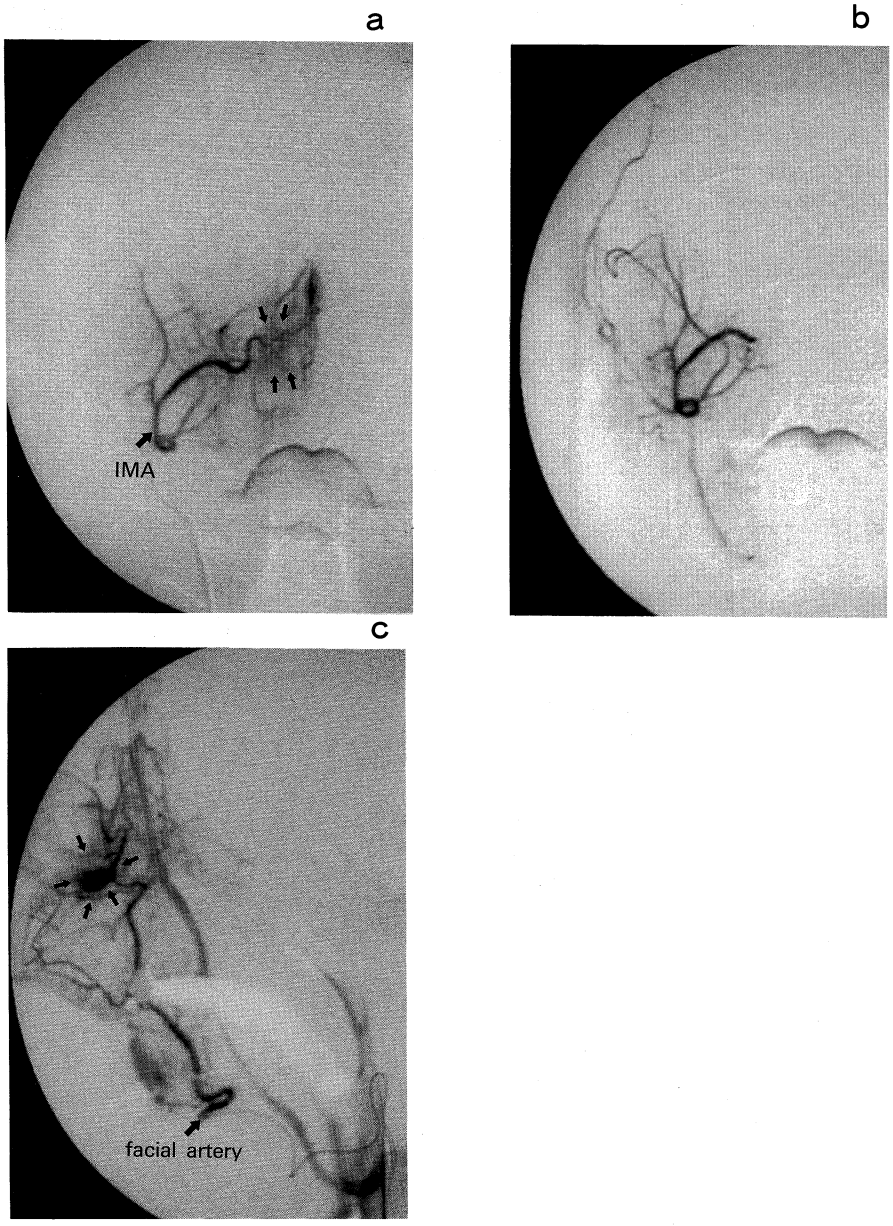

Fig 4. Intractable epistaxis (Case 12.)

A 43-year-old, male with intractable epistaxis. On angiography, a tortuous hypervascular lesion with pseudoaneurysms and staining (arrow) in the posterior septal branch of the sphenopalatine arterial area can be seen (Fig 4 a). We embolized the internal maxillary artery (Fig 4 b) and removed his nasal packing. Then massive bleeding occurred. So we performed left facial arteriography. The left facial arteriogrphy showed extravasation (arrow) at Kisslbach's area(Fig 4 c). We embolized the distal facial artery and the bleeding was well controlled. He had no recurrent episodes.

This case mainly involved anterior bleeding, but conservative therapy was not effective. We think that these cases show good indication for facial arterial TAE. In this case, we used Gelfoam as the embolic material, but we recommend the use of microcoils for facial TAE because of possible severe mucositis.

DISCUSSION

Awareness of the blood supply to the nasal cavity and the collateral circulation is important in attempting to control nasal bleeding. The blood supply to the nasal cavity is complex, originating from dual circulations. One is referred to as the internal carotid arterial territory and the other as the external carotid arterial territory. The sphenopalatine artery is the dominant artery, originating from the internal maxillary artery. The ethmoidal artery originates from the ophthalmic artery and supplies the superior parts of the septum. The terminal branches of the descending palatine artery originating from the internal maxillary artery supply the lower anterior portion of the nasal cavity. The superior labial artery, a branch of the facial artery, supplies the anterior portion of the septum and the nasal wall. This anterior inferior portion of the septum, the so-called Kisselbach's plexus, is an arterial junction area between the facial, nasopalatine and descending palatine arteries.[1)]

Therapeutic embolization of epistaxis was first described by Sokoloff[5)] and several studies followed.[1,2,4–18)] The anatomical collaterals have been described very well[1,2,6–11)], but embolization of the facial artery has been discussed by only a few authors.[8,10)] In this study, we achieved satisfactory results with facial arterial embolization using microcoils. Distal facial arterial coiling decreases the perfusion pressure and changes the physiologic hemostatic mechanism. Generally, the material used of embolization for epistaxis in many countries has been polyvinyl alcohol.[4,6,7,9–11)] However, polyvinyl alcohol is not commercially available in Japan.[18)] We used Gelfoam and microcoils as embolic materials for epistaxis. A review of the literature led us to conclude that transantral ligation of the maxillary artery and transarterial embolization are equally efficacious, with similar success rates, complication rates, and costs[4)].

Both transantral ligation and transarterial embolization have distinct advantages in different clinical situations. Transarterial embolization advantageous because it can be performed with the patient under local anesthesia and eliminates the risk of a general anesthetic required for transantral ligation. Arterial embolization has the advantages of a pretreatment angiogram and distal embolization. However, if the anterior and posterior ethomoidal arteries are isolated branches of the internal carotid system, they cannot be embolized and transantral ligation is indicated.[4,19)] Transarterial embolization for epistaxis is performed primarily at academic institutions and may not be available in the community. Otolaryngology and interventional radiology training programs are also based at academic institutions. Although interventional radiologists must be trained perform and advance this technique, otolaryngologist must also receive adequate training in transantral ligation because this may be the only technique available at nonacademic institutions. The otolaryngologist and interventional radiologist should have a good working relationship to provide the most effective treatment. We therefore recommend that the choice of treatment modality be based on the strengths of each procedure as they pertain to the specific needs of the individual patient.

We presented a part of this paper at The Sixth International Symposium of Interventional Radiology & New Vascular Imaging in Aomori city on April 24, 1996.

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