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Transantral Ligation of the Maxillary Artery for Refractory Epistaxis A Case Report

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ABSTRACT

A case of severe arterial epistaxis treated by transantral ligation of the maxillary artery is reported. A 66-year-old woman had recurrent left sided epistaxis from the posterior nasal cavity which was difficult to control by conventional nasal packing methods. Selective angiography was performed to identify the arterial flow patterns and site of bleeding which was confirmed to be the descending palatine artery. Following radiographical examination, ligation and clipping of the maxillary artery and its branches was performed with transantral approach under general anesthesia. No further epistaxis occurred after the ligation. This surgical procedure seems to be relatively simple and highly effective in the management of refractory epistaxis.

Key words: *Epistaxis, Angiography, Maxillary artery ligation*

Epistaxis is a common disease well-known to otolaryngologists. Fortunately, in the majority of cases it arises in the anterior area of the nasal septum commonly known as Kisselbach's blood plexus. Consequently, most cases are easily accessible and treatable with local methods, such as anterior nasal packing or electrocoagulation. However, a patient with severe posterior epistaxis may pose a serious clinical problem, usually requiring hospitalization. A combined anterior-posterior nasal packing with gauze or balloons has been classically introduced. Although this packing method is effective in many cases, the procedure is extremely troublesome and uncomfortable for patients. In some cases with refractory bleeding, repeated or prolonged packing causes complete nasal obstruction, difficulty in swallowing, sore throat and occasionally eustachian tube dysfunction. As alternatives to conventional packing, specific arterial ligation or embolization have been applied[7,11,12,19].

Transantral ligation of the maxillary artery was first reported by Seiffert in 1928[9], and popularized by Chandler and Serrins in the 1960s[1]. The maxillary artery and its terminal branches supply the posterior and inferior parts of the nasal cavity, and ligation of these specific vessels may result in dramatic control of severe posterior epistaxis[2]. We here report a case of refractory posterior epistaxis successfully treated with this procedure.

CASE REPORT

A 66-year-old woman with a past history of hospitalization in September 1989 because of epistaxis, again had a spontaneous massive nose bleeding on the left side on March 26, 1990. She was admitted to a local hospital, and treated with administration of hemostyptic and depressor drugs; blood transfusion of several units of packed cells was applied during 3 days. The patient continued to bleed and was transferred to our department with a state of emergency on March 29. On admission, she was in a hypovolemic shock condition with her pulse rate more than 120 bpm and blood pressure less than 80 mm Hg. She had low hematocrit, hemoglobin and number of red blood cells readings (28.5 %, 9.3 g/dl and 2.88 million per ml respectively). The results of other coagulation studies and liver function tests were within normal limits. Anterior nasal packing was done, and the immediate task of controlling the hemorrhage was temporarily achieved. Body fluid replacement, as well as transfusion of 4 units packed erythrocytes was also accomplished. The bleeding site was near the posterior end of the left inferior nasal meatus, and seemed to originate in the descending palatine artery or its branches. In plain face radiographs, swollen and edematous mucosal linings appeared as a density, parallel with the bony wall of bilateral maxillary sinuses (Fig.1). A transfemoral digital subtraction angiography of the carotid arteries revealed that the left descending palatine artery, a distal branch of the maxillary artery, was defined as the site (Fig.2). The clinically predicted site of the bleeding correlated well with the angiographic view of arterial circulations. Neither extravasation with contrast material nor aberrant vessels, such as aneurysm or increased vascularity due to certain nasopharyngeal tumor, were detected.

On May 2, the bleeding under control, she underwent transantral ligation and clipping of the left

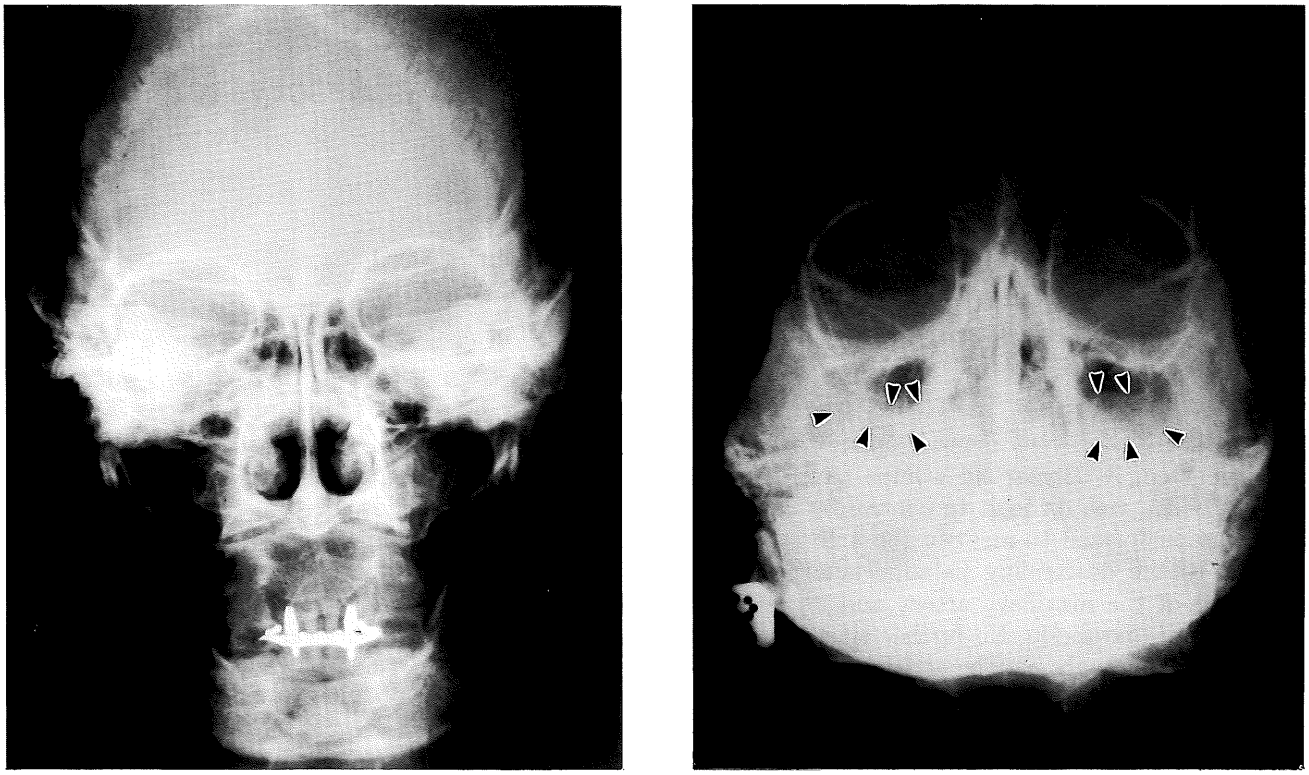

Fig. 1. Plain face radiographs of the patient one day after the recurrent epistaxis. Appearance of swollen and edematous mucosal linings of bilateral maxillary sinuses (arrowheads).

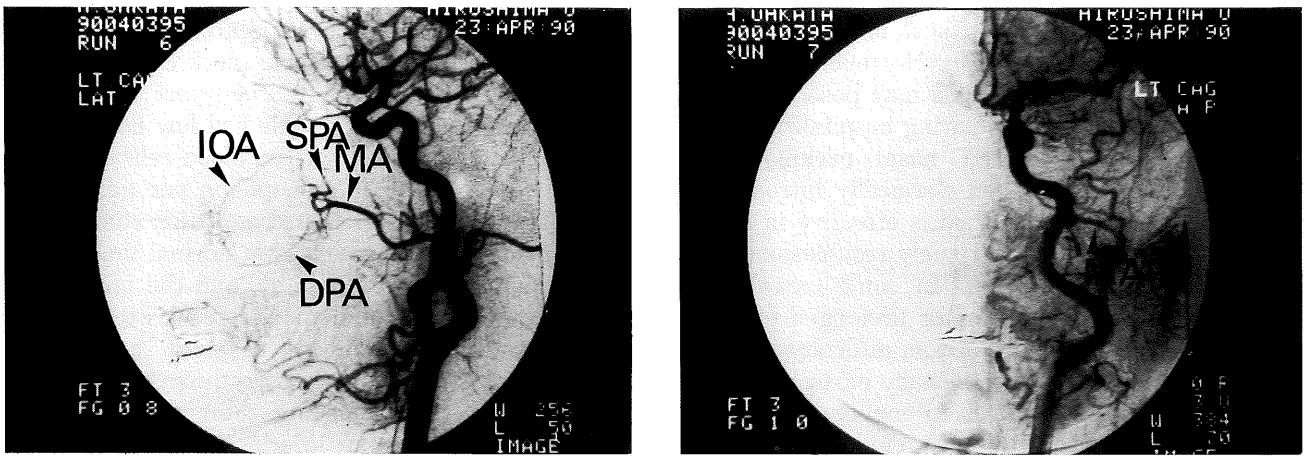

Fig. 2. Digital subtraction angiogram of the left carotid artery. Appearance of the maxillary artery (MA) and its branches are demonstrated. The descending palatine artery (DPA) was postulated as bleeding site. SPA: sphenopalatine artery, IOA: infraorbital artery.

maxillary artery under general anesthesia. A three-centimeter incision was made in the gingivo-buccal sulcus and the periosteum and soft tissues were elevated. The anterior face of the left maxilla was exposed upward to a point just below the infraorbital rim. The anterior wall of the antrum was opened and enlarged to the desired size to permit exploration. The mucous membrane of the maxillary antrum was found to be edematous and polypous. There was no fluid collection in the antrum. After removal of the posterior wall membrane, the thin bone was cracked and flaked off. With the aid of the Zeiss operating microscope, the connective fibroadipose tissue of the pterygomaxillary fossa was dissected, and the third portion of the maxillary artery was identified as it transversed through the fossa. Care was taken to avoid injuring the artery. The three named branches were also carefully exposed and identified. These arteries were then ligated and clipped securely with one or more 3-0 silk and Sugita's surgical clips (Fig.3). After ligation, the mucosal flap over the posterior wall was

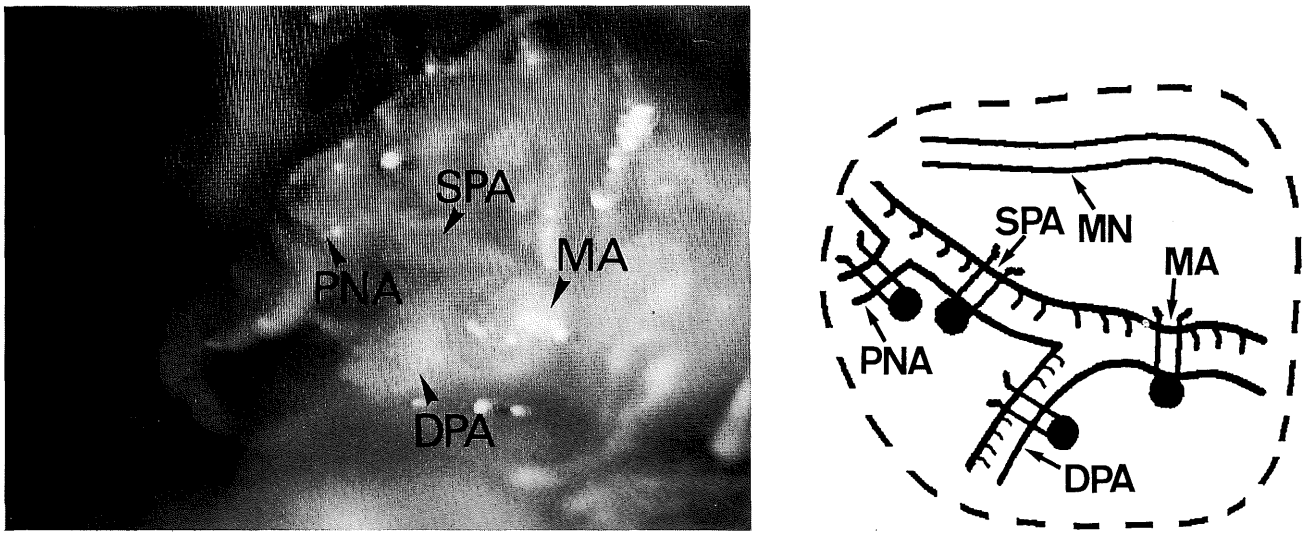

Fig. 3. Operative exposure of the left maxillary artery in the pterygomaxillary fossa. As shown in diagram, four clips were placed to ligate the arterial vessels that can supply the posterior nasal cavity. MA: maxillary artery, DPA: descending palatine artery, SPA: sphenopalatine artery, PNA: posterior nasal artery, MN: maxillary nerve.

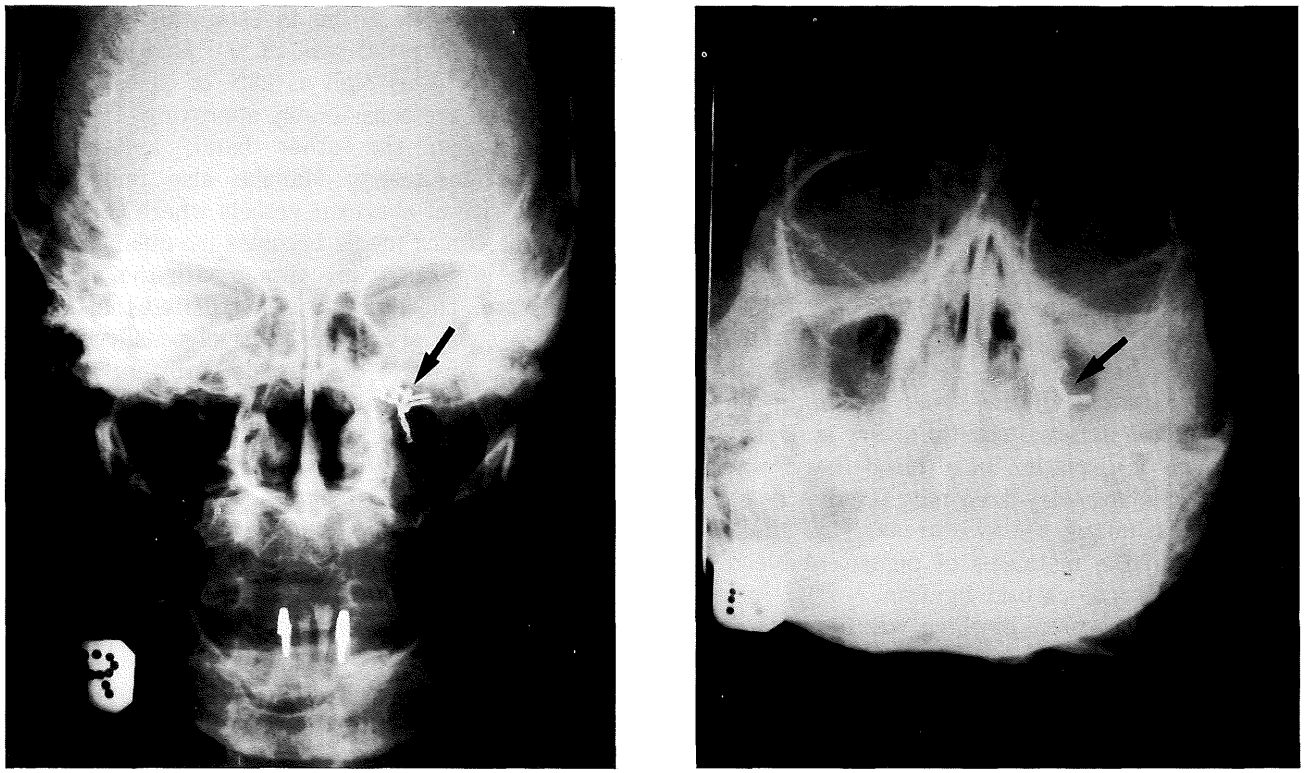

Fig. 4. Plain face radiograph of the patient taken after the operation. The properly applied clips (arrow) are shown.

returned and covered with antibiotic-impregnated absorbable gelatin sponge.

After the ligation procedure, the patient had no problems or deficits. Radiograph and angiography taken after the operation clearly demonstrate the location of four properly applied clips. The left maxillary artery was occluded, and most of its distal branches including the actively bled artery (i.e. descending palatine artery) failed their opacity (Figs.4, 5). The patient was discharged on June 7, free of disease and has not had further bleeding for 6 months after the surgery.

DISCUSSION

The arterial distribution in the human nasal cavity has been customarily subdivided into two areas:

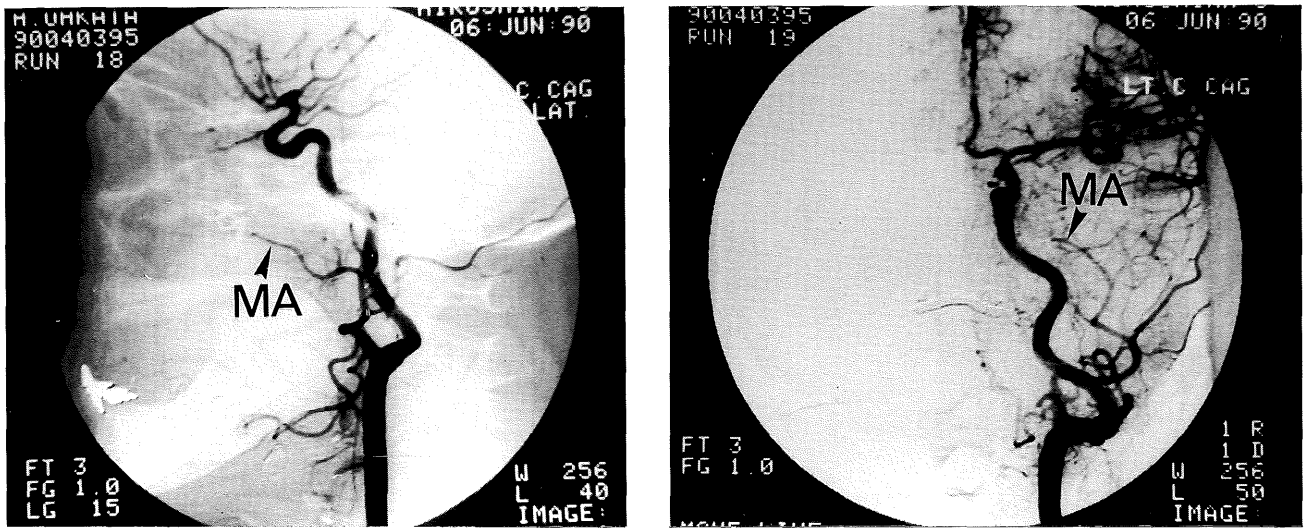

Fig. 5. Digital subtraction angiography of the left carotid artery taken after the operation. The left maxillary artery is totally occluded and its branches also fail to opacify. MA: maxillary artery.

external and internal carotid artery areas. There are blood supplies derived from the external carotid artery through the maxillary and the facial arteries, and from the internal carotid artery through the anterior and posterior ethmoidal arteries. It was reported that the middle turbinate on the lateral wall with a corresponding imaginary line of demarcation at the same level on the nasal septum might be the landmark dividing line[15]. This alleged discrimination has been useful to enable clinical otolaryngologists identify and select the specific vessel from which the nose bleeding arises. Shaheen[10] demonstrated the patterns of the arterial circulation and the artero-arterial anastomoses between the internal and external carotid circulations in the nose. When the blood pressure of the external carotid artery is depressed by occlusion, a displacement of blood flow from the upper ethmoidal artery area may occur across the anastomoses linking the two areas. This situation could explain the instances of persistent bleeding after the external carotid ligation.

In our case, the nasal bleeding was found to arise from an artery near the posterior end of the left inferior meatus. Through the angiographical examination, the left descending palatine artery was identified as the bleeding site. Generally, posterior epistaxis is less frequent, but may become a more serious clinical problem usually requiring hospitalization . It is commonly postulated that most cases of posterior epistaxis have two arterial origins: the sphenopalatine artery and the descending palatine artery[13,16]. These arteries are both the terminal branches of the maxillary artery in the pterygopalatine fossa. The descending palatine artery descends in the greater palatine canal in company with the greater palatine nerve. Passing downward just near the posterior end of the inferior nasal chonca, it reaches the oral surface of the hard palate by way of the greater palatine foramen[17,18]. Recently Manabe[3] reported histological characterization of these vessels using vascular mold preparation and skull of the carcass. In his investigations, the bone defect of the internal wall of the palatine artery was found to be as high as 28% of cases. In this area, arteries are considerably approximating to the submucosa. On the other hand, as for the sphenopalatine artery, Manabe also found that there is a site of aberrant vessels where the thickness of the tunica media becomes irregular and the adventitia is directly in contact with the internal elastic plate. Therefore, it is postulated that blood vessels in these areas are relatively easily broken by external force to the vessels or by intravascular pressure. From this point of view, we can speculate that, in our case, there may also have existed some deformities in the bleeding vessel that caused the patient's affliction, even though she had no known past history of hypertension or atherosclerosis.

In 1928, Seiffert first described the transantral ligation method of the maxillary artery for the treatment of severe posterior epistaxis. In 1969, Person and co-workers[6] explored the anatomical basis of pterygopalatine fossa and ligation techniques in detail. They emphasized the importance of exposing the distal portion of the maxillary artery and application of three or four clips to the isolated terminal branches which supply the nose and nasopharynx. In 1973, Rosnagle et al[8] reported a survey of 60 cases of maxillary ligation. They also encountered six therapeutic failures, the causes of which were incorrect selection of vessel and inadequate ligation of the artery. They concluded that vessel ligation is an acceptable and effective means of controlling massive epistaxis, and correct localization of the bleeding site will be required for a higher success rate for the procedure.

Recently, Wang et al[13] reviewed 85 admissions for posterior epistaxis, and compared treatment with anterior-posterior nasal packs with surgical ligation. The failure rates, complication rates, and length of hospitalization all favored the treatment with surgical ligation, enough to warrant recommendation as the definitive treatment for posterior epistaxis[4,5,13,14].

On the other hand, embolization of branches of the external carotid artery has become another popular modality for the treatment of intractable nose bleeding[7]. This method has also been frequently applied in the treatment of highly vascular tumors or arteriovenous malformations. By angiography, this technique has the advantage of direct radiological localization of the bleeding site and immediate treatment after the diagnostic procedure. However, the failure may occur as a result of insufficient embolic material or the development of ipsilateral revascularization[11]. The contraindications of this technique include patients who have dangerous anastomoses with the internal carotid artery or patients with severe atheromatous disease. Cerebrovascular accidents caused by inadvertent embolization of the internal carotid artery and facial nerve palsy or trigeminal nerve paralysis caused by the obstruction of a site of reduced vascularity have also been reported as complications[12]. In our case, at the time of admission the bleeding vessel was directly identified as the descending palatine artery which is one of the major terminal branches of the maxillary artery. Since the nose bleeding had stopped until the angiographical examination was performed, we selected here a surgical and more reliable treatment procedure.

In this paper, a technique for the management of severe posterior epistaxis arising from branches of the descending palatine artery was reported. The ligation of the maxillary artery by transantral approach seems to be relatively simple, highly effective and impulsively recommended in refractory cases.

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