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Endoscopic ligation or diathermy of the sphenopalatine artery in persistent epistaxis

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Abstract

Conventional methods of arterial ligation in persistent epistaxis often involve significant surgical morbidity, as well as failure due to arterial anastomosis.

We have performed endoscopic intranasal end ligation or diathermy of 11 sphenopalatine arteries in 10 patients with no complications and with no further episodes of epistaxis, with an average follow-up period of nine months.

Key words: Epistaxis; Endoscopy, surgery

Introduction

Management pathways in the treatment of epistaxis dictate that the patient is resuscitated and attempts made to isolate the source of haemorrhage. If the bleeding point is not obvious via direct and endoscopic rhinoscopy and is not controllable with chemical or electric cautery, anterior and/or posterior nasal packing is inserted and the patient admitted to hospital.

It is important to note that nasal packing itself causes considerable discomfort while in place, and may cause mucosal trauma and necrosis. The obstruction of the nasal airway has also been shown to cause hypoxia that may be life-threatening (Elwany *et al.*, 1986). Pneumatic nasal balloons may displace into the nasopharynx and cause respiratory obstruction (McGarry and Aitken, 1991).

Patients that continue to bleed despite the described conservative methods are considered for arterial ligation. This is said to be necessary in two to eight per cent of cases (Hallborg, 1952; Federspil, 1971).

Federspil (1971) considered that arterial ligation should be considered early in the management of protracted epistaxis, as it carries equal or less risk to the patient than prolonged bleeding and repeated packing.

Wurman *et al.* (1988) described posterior nasal cautery using a combination suction and electrocautery probe with endoscopic control. This was performed under topical or locally injected local anaesthesia. They reported the cessation of bleeding in 12 of 15 cases.

Anatomical and physiological principles dictate that the most appropriate management is to ligate the maxillary artery, as it is the most distal major feeding vessel to the nose. Shaheen (1967) showed that the maxillary artery supplies virtually all the nasal cavity except the cribriform plate area. He also noted that the third part of the maxillary artery is a much larger vessel than the anterior ethmoidal artery, which was actually absent unilaterally in 14 per cent and bilaterally in 2.5 per cent of his cadaveric dissections. However, the failure rate for this procedure is put at between 10–13 per cent (Pearson *et al.*, 1969; Rosengale *et al.*, 1973; McDonald and Pearson, 1980). The main reason for this is the extensive intranasal vascular network of anastomosis. Pearson *et al.* (1969) emphasized the extensive links between the internal and external carotid arteries ipsilaterally and contralaterally.

The maxillary artery may anastomose with the ethmoid arteries at the crista galli, or with ophthalmic arteries. It may also receive blood from the intracranial circulation via vessels around the foramen rotundum and pterygoid canal, as well as the middle meningeal artery. Anastomosis with the contralateral external carotid system can occur via the infraorbital, posterior superior alveolar, greater and lesser palatine and pharyngeal arteries. Proximally, superficial temporal, facial and occipital branches often cross the midline. In addition, the ascending pharyngeal branch of the external carotid can anastomose with the pharyngeal branches of the maxillary artery.

Endoscopic ligation of the sphenopalatine artery causes interruption of the nasal vasculature at a

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TABLE I

Predisposing factor	Number of patients
Hypertension	6
Aspirin	2
Post-septoplasty	2
Diabetes mellitus	1
Nil	1

(One hypertensive patient was also on aspirin therapy, and another hypertensive patient had undergone septoplasty 10 days prior to ligation.)

point distal enough to prevent direct, retrograde and anastomotic blood flow from ipsilateral and contralateral carotid systems. Limited endoscopic exposure as we describe has very little potential for intraorbital or intracranial complications, and does not require any additional endoscopic equipment over and above a standard FESS set.

Materials and methods

Ten consecutive patients (seven male and three female) have undergone endoscopic ligation of 11 sphenopalatine arteries (five left and six right) over a 26-month period. Predisposing factors are illustrated in Table I.

All had continued to suffer epistaxis despite endoscopic cautery of detectable bleeding points, insertion of Merocel® nasal packs, and in six of the 10 patients' posterior balloons.

After removal of these dressings under normotensive general anaesthesia, 1 cm Merocel® neurosurgical patties soaked in 1:1000 adrenaline are placed into the middle meatus.

Subsequently, approximately 1 ml of two per cent lignocaine with 1:80 000 adrenaline is injected submucosally into the lateral wall of the posterior middle meatus, inferior to the horizontal ground lamella of the middle turbinate. Two patients required a limited endoscopic submucosal septal resection at this stage to allow adequate access to the middle meatus. After gentle medialization of the middle turbinate with a Freers dissector, a vertical incision of approximately 1.5 cm is made in the mucosa posteroinferior to the bulla ethmoidalis (Figure 1). A small mucoperiosteal flap is then elevated off the posterior fontanelle of the medial maxillary wall and off the palatine bone. This flap is then raised posterosuperiorly, until the sphenopalatine foramen is encountered. The foramen may be anteroinferior or posterosuperior to the posterior aspect of the lateral attachment of the middle turbinate. This is of little importance practically, as the posterior attachment may be elevated with the mucoperiosteal flap should it prove necessary. Once the anterior bony margins of the foramen are identified, the artery is seen as it passes medially tethering the mucosa to the foramen via a sleeve of fibrous tissue (Figure 2). The artery is then diathermied or a metal clip applied. A 1 cm^2 Merocel® neurosurgical patty soaked in 1:1000 adrenaline was placed over the flap in the middle meatus following surgery, and removed on the first post-operative day.

Results

The age range was between 17 and 79 (average 53.5) years, and in-patient stay averaged 3.4 days prior to surgery.

The procedure took an average of 57 minutes per artery (range 40–78 minutes). In every case, no intra- or post-operative complications were recorded and in particular, there were no intracranial or intraorbital sequelae.

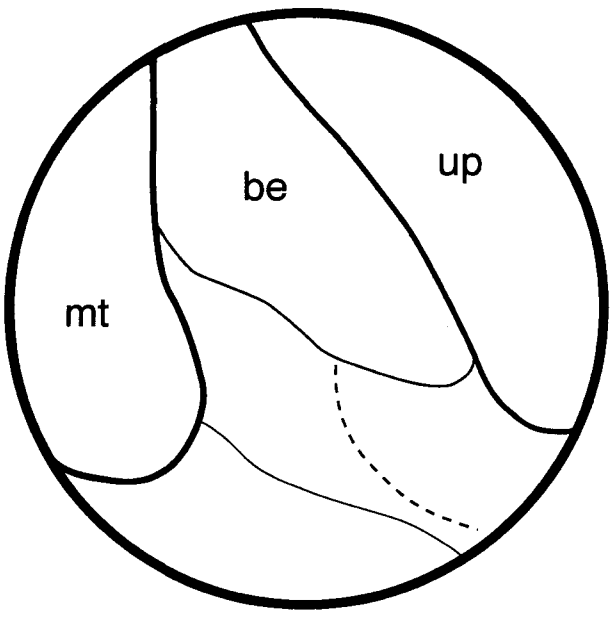

FIG. 1

UP = Uncinate process; BE = Bulla ethmoidalis; MT = Middle turbinate; ---------- = Line of incision.

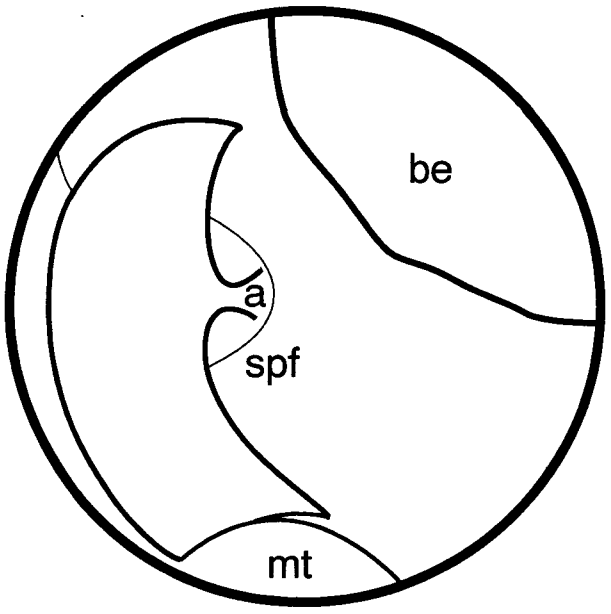

FIG. 2

BE = Bulla ethmoidalis; MT = Middle turbinate; SPF = Sphenopalatine foramen; A = Sphenopalatine artery.

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There was no further bleeding in all cases, and patients were discharged 24 hours after removal of the patty from the nose.

All patients have subsequently been followed up via telephone on average for nine months (range two to 22 months) following surgery. No patient has had further epistaxis requiring medical attention.

Discussion

Traditional methods of arterial ligation may cause significant morbidity. The transantral approach to the maxillary artery may cause damage to the nasolacrimal duct or infraorbital nerve, and thus cheek anaesthesia. There may be damage to dental roots and teeth may die, and there is a risk of oroantral fistula. In the often elderly patients undergoing this procedure, they are unable to wear their dentures post-operatively and may require them to be permanently altered.

Clipping of the ethmoidal vessels may be complicated by optic nerve or orbital damage, and this may be acute if the anterior ethmoidal vessel is torn and an orbital haematoma forms. The cervical dissection required to approach the external carotid artery may cause damage to the hypoglossal nerve and the vagus nerve in the carotid sheath.

As stated, there are also significant failure rates with such procedures. Pearson *et al.* (1969) investigated the reasons for failure of maxillary artery ligation. They suggested that in order to prevent direct, retrograde and anastomotic blood flow, clips needed to be placed (a) on the maxillary artery proximal to the origin of the descending palatine artery, (b) on the maxillary artery as distal as possible, behind the orbital process of the palatine bone, and (c) on the descending palatine artery as distal as possible.

Metson and Lane (1988) concurred, but also identified that 40 per cent of failures in their patient group were due to failure of the surgeon to identify the vessels correctly in the pterygopalatine fossa. Additionally, they found that the clips were not correctly closed in 13 per cent of cases. They advocated complete removal of fat during dissection in the fossa via total removal of the posterior antral wall, and suggested that the ethmoid arteries should be ligated concurrently.

Premachandra and Sergeant (1993) postulated that a cause of surgical failure was that one maxillary artery was dominant. In their cadaveric dissections, over 50 per cent had one artery greater than one and a half times the diameter of the contralateral side. This means that if only the non-dominant artery is ligated, cross circulation may cause rebleeding. They suggested ligation of both maxillary arteries if an artery of 4 mm or less is encountered on the affected side.

Prades (1980) introduced microsurgical ligature of the sphenopalatine artery, recognizing it to be the major landmark in the approach to the pterygopalatine fossa (via the sphenopalatine foramen) to reach the vidian nerve. Sulsenti *et al.* (1987) utilized Prades' bivalved speculum and the operating microscope to ligate the sphenopalatine artery in the middle meatus under local anaesthesia. This rhinomicrosurgical technique was further described by Budrovich and Saetti (1992), who also described three cases in which an endoscopic approach to the sphenopalatine artery in the superior meatus was used.

Since the widespread popularization of the rigid Hopkins rod, endoscopic expertise has become more widespread. White (1996) described endoscopic ligation of the sphenopalatine artery via canine fossa antroscopy and posterior antral wall osteotomy via instruments placed through a separate endoscopic middle meatal antrostomy. He alluded to the fact that the artery was difficult to isolate on the medial side of the sphenopalatine foramen – we have not found this to be the case. Our technique does not involve such extensive dissection as the other methods of arterial ligation mentioned. The surgical access to the middle meatus described is less traumatic and easier to carry out than previous endoscopic approaches to the superior meatus or via transantral means.

The consequent reduction in surgical and anaesthetic time as compared to more traditional methods of arterial ligation is thus allied to a drop in the potential for surgical morbidity. These factors are especially important in a patient group that is often elderly, frail and with multiple intercurrent medical problems.

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