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Endoscopic endonasal ligation of the sphenopalatine artery*

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SUMMARY

Internal maxillary artery ligation for persistent posterior epistaxis is traditionally performed via the transantral approach. Although usually effective in controlling the bleeding it carries significant risks, including damage to the infraorbital nerve, damage to dentition and oro-antral fistula formation.

The alternative procedure of endoscopic ligation of the sphenopalatine artery at its exit from the sphenopalatine foramen avoids the morbidity associated with the transantral approach. The technique we describe involves the use of standard FESS instruments and a Ligge Clip applicator. This operation is well within the capability of the Otolaryngologist / Rhinologist experienced in endoscopic sinus surgery.

Key words: epistaxis, sphenopalatine artery, endoscopic surgery.

INTRODUCTION

Epistaxis is the commonest nasal emergency requiring hospital admission (Small and Maran, 1984). Its prevalence in the population is around 10 to 12% (Shaheen, 1987). However only about 10% of these patients seek medical attention. Of these 1 to 2% require surgical intervention. The majority of the cases are controlled adequately by chemical or thermal cautery, or by nasal packing. When the above measures fail ligation or embolisation of the feeding vessels is required. Trans-antral ligation of the internal maxillary artery was first described by Alfred Seiffert in 1928 and later popularised by Chandler and Serrins in 1965. The failure rate following this procedure is around 0.5-15% (Winstead, 1996). Complications associated with this procedure include facial swelling, facial numbness, oro-antral fistula and desensitisation of the teeth. Ligation of the sphenopalatine artery utilising a middle meatal antrostomy and an operating microscope was first described by Prades in 1976. The approach was originally used to gain access to the pterygopalatine fossa for dividing the vidian nerve. In 1996 our own group described an endoscopic dual port technique to approach the sphenopalatine artery in the pterygopalatine fossa (White, 1996). In this approach the posterior wall of the maxillary sinus was viewed through a canine fossa antroscope, and the posterior wall osteotomised endonasally through a wide middle meatal antrostomy. We have since modified this to avoid canine fossa puncture, by using an endonasal approach, wherein the sphenopalatine artery is ligated at its exit from the sphenopalatine foramen. The aim of this paper is to offer a detailed description and case review of the new endonasal ligation technique.

METHOD

The indication for this procedure is same as for the trans-antral approach, namely, persistent posterior epistaxis uncontrolled by the usual conservative measures such as cautery and nasal packing. All patients should have been adequately resuscitated and must be haemodynamically stable. The procedure is performed under general anaesthesia. Preoperatively, neurosurgical pledgets soaked in 1:1000 adrenaline are placed in the spheno-ethmoidal recess, in the middle meatus and in the inferior meatus. After 10 minutes the pledgets are removed and 2ml of 2% lignocaine with 1:80,000 adrenaline is injected into the uncinate process using a 27 gauge needle fitted to a standard dental syringe. All imaging is acheived using a 4 mm zero degree telescope.

A standard infundibulotomy and bulla resection as described by Stammberger (1986) is performed to create a wide endonasal port for instrumentation. A middle meatal antrostomy is then fashioned including removal of the posterior fontanelle back to the level of the posterior wall of the antrum (Figure 1). A preoperative CT scan is therefore a necessary prerequisite for surgery. The antrostomy facilitates a reliable exposure of the structures of the postero-lateral wall of the nose, helps to identify any collateral branches such as the accessory nasal artery and by removal of the posterior fontanelle creates additional space for

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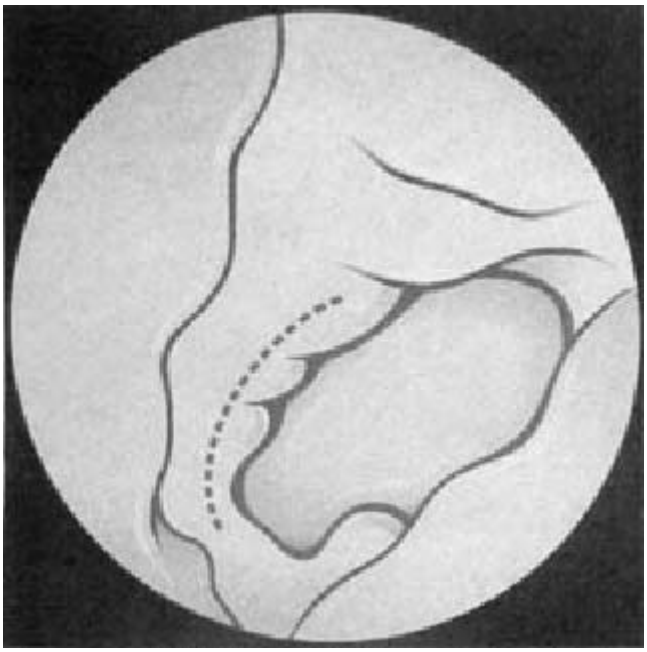

Figure 1. Depicts the necessary wide left middle meatal antrostomy and the dotted line indicates the area where the mucoperiosteal elevation will begin.

instrumentation. Using a freer elevator along the posterior edge of the antrostomy, a plane is developed between the bone of the postero-lateral wall and the overlying mucoperiosteum. In this way mucosal tunnels are created along the postero-lateral nasal wall above and below the sphenopalatine foramen.

The vascular pedicle of the sphenopalatine artery at its exit from the foramen prevents the two tunnels from joining and thus is readily identified. The artery is then mobilised, clipped with

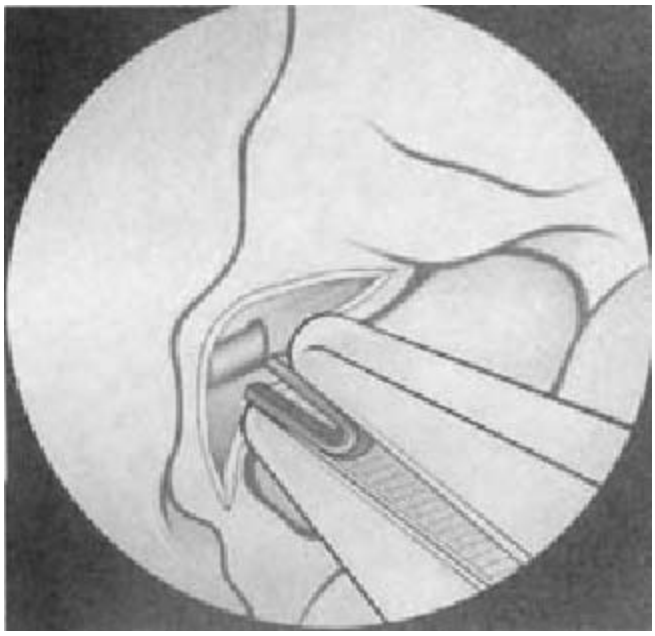

Figure 2. Depicts the left sphenopalatine artery separating the upper and lower mucosal tunnels. The artery is about to be clipped using a Ligge Clip Applicator.

LIGGE CLIPS (medium size LT200) using a standard LIGGE CLIP APPLICATOR (*5"/ LC225-Ethicon, UK*) (Figure 2) and then divided with Belluci scissors. To reduce the risk of adhesions a 0.5mm silastic splint is placed in the middle meatus and retained by a single 3/o Nylon transfixion suture through the anterior septum. This is left in place for 7 days.

RESULTS

Six procedures were performed using the endonasal technique between June 1996 and January 1998. There were five males and one female. Their ages ranged between 23 and 77 years with a mean age of 59.5 years. One case was performed electively while five others were performed as emergencies. Those patients that were admitted as an emergency had initially required anterior and/or posterior nasal packing. Four patients had left sided epistaxis and two patients had right sided epistaxis. All patients underwent a middle meatal antrostomy and selective endoscopic ligation of the sphenopalatine artery as in the technique described above. In five patients the sphenopalatine artery emerged as a single trunk from the foramen. One patient had an accessory nasal artery in addition to the main trunk. This was evident as a separate vascular pedicle within the mucosal tunnel anterior and inferior to the main artery. The mean preoperative stay prior to the procedure was 1.6 days and the mean postoperative stay was 1.6 days. None of the patients required any postoperative nasal packing. One patient suffering from hereditary haemorrhagic telengectasia had a minor epistaxis three days later. This was managed sucessfully with nasal cautery. The remaining five patients did not require any further hospital admission for epistaxis. Complications such as facial edema, facial paraesthesia, facial discomfort, infraorbital anaesthesia, oro-antral fistula were not observed in any of our patients.

DISCUSSION

Electrocautery and nasal packing form the first line of management in the control of posterior epistaxis. Vascular ligation of the internal maxillary artery and/or anterior ethmoidal artery is considered when these measures fail. Ligation of the internal maxillary artery through a transantral approach is not without significant morbidity.

Complications associated with this approach include facial swelling, and/or numbness of the face, teeth, and gums and less commonly oro-antral fistula, epiphora, dental discoloration or root fractures and sinusitis. The failure rate for arrest of haemorrhage following transantral ligation is around 0.5-15%, (Winstead, 1996), and is believed to be due to the reconstitution of flow through collaterals (Breda et al, 1988). By clipping the sphenopalatine artery at its exit from the foramen, selective ligation of the dominant vessel is achieved. Since the feeding vessel is clipped as proximal to the nasal cavity as possible, the chance for the development of collaterals is reduced. Metson et al, reviewed 100 cases of maxillary artery ligation and pointed out that one of the reasons for unsuccessful ligation was due to the

blood flow through partially occluded clips. To eradicate this risk our practice is to both clip and divide the vessel. The need for dividing the vessel between clips is therefore emphasised.

In the endoscopic techniques of described by Budrovich, (1992) and Sharp, (1997) the sphenopalatine artery was approached directly through an incision at the posterior edge of the middle meatus, apparently without attempt to dissect out and mobilise the artery. It seems that ligation is sometimes not possible using this technique, and haemostasis at times may only be achievable using diathermy.

Approaching the artery at this point without a formal dissection of the sphenopalatine foramen also raises the risks of ligating the vessel medial to the inferior turbinate branch (Padgham et al, 1991), or missing an accessory nasal artery when present (Montgomery, 1978). Creation of a middle meatal antrostomy, followed by the double mucosal tunnel technique we advocate, gives reliable exposure of the sphenopalatine artery using well defined landmarks, and reduces the risk of missing any collateral vessels. Other surgeons have noted a lack of defined landmarks for the sphenopalatine foramen (Bolger et al, 1999). The creation of a middle meatal antrostomy and posterior mucosal tunnels facilitates a reliable surgical approach to the foramen (Snyderman et al, 1999) without traumatising the artery.

The principal advantages of the above procedure are that any morbidity associated with the Caldwell-Luc approach is avoided and vessel ligation is achieved at a point closer to the area of haemorrhage. The middle meatal antrostomy and mucosal tunnel technique ensures that additional branches of the internal maxillary artery such as an accessory nasal artery feeding the nasal cavity are also ligated. The procedure is technically straightforward for a surgeon with good endoscopic sinus surgery skills, and requires no postoperative packing.

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