INTRODUCTION
Approximately 60% of the population will be affected by epistaxis at some point in time, with 6% requiring professional medical attention. The etiology of epistaxis is typically idiopathic, but it may also result from neoplasm, trauma, medication use, or iatrogenic causes. Emergency management of epistaxis may include the use of local pressure and vasoconstrictors, chemical or electric cautery, hemostatic agents, nasal packing, embolization, and surgical arterial ligation. There is no definitive protocol for the management of epistaxis, although various protocols have been proposed in the literature. Most would agree that in a more controlled setting, it is preferable to attempt to identify the site of bleeding and apply a focused treatment to that area.

As approaches to surgical ligation of the arterial supply of the nasal cavity have undergone evolution from external carotid ligation to minimally invasive approaches, surgical management of epistaxis has become more cost effective than embolization and may be less risky. We propose a simple variation of the endoscopic sphenopalatine artery ligation that may be used to manage epistaxis arising from the nasal septum and floor.

Key Words: Epistaxis, sphenopalatine artery, nasal septal artery, posterior nasal artery, posterior septal artery.

ANATOMY
Approximately 5% to 10% of epistaxis is estimated to arise from the posterior nasal cavity, an area supplied by the sphenopalatine artery. Thornton and colleagues examined 36 patients with posterior epistaxis in whom a bleeding source could be identified, and found that 29/36 originated from the lateral nasal wall and 7/36 from the nasal septum. As the terminal branch of the internal maxillary artery, the SPA exits the pterygopalatine fossa through the sphenopalatine foramen (SPF). The location of the SPF is traditionally described as above and behind the posterior aspect of middle turbinate within the superior meatus. Wareing et al. proposed a classification system in which class I was described as opening solely into the superior meatus (35%), class II as spanning the ethmoidal crest with opening of the SPF into both the superior and middle meati (56%), and class III as two separate openings into both the superior and middle meati. There is variety in both the number of branches and site of branching, either proximal or distal to the SPF. Simmen et al. showed that >97% of SPAs had more than one branch and 64% had three or more branches prior to entering the nasal cavity. Despite its wide anatomic variability, two branches are consistently identified: the nasal septal branch and the posterior lateral nasal artery. The Hadad-Bassagasteguy nasoseptal flap has become widely used in endoscopic skull base reconstruction, and relies on the

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consistent presence and location of the nasal septal branch as it courses distally across the anterior face of the sphenoid. Based on growing experience with this reconstructive technique, we have found the nasal septal artery to be a simple reliably located target for surgical management of epistaxis arising from its vascular territory. The artery can be found coursing along the anteroinferior wall of the sphenoid sinus just above the choanal arch, and supplies large portions of the nasal septum and floor. The nasal septal artery and surrounding vascular plexus are consistently seen in a submucosal plane in this location, which occurs just proximal to the point at which two to three variable branches are given off to the septum and nasal floor. Given that SPA branching occurs within or near the SPF, the lateral nasal wall and turbinates will have a distinct blood supply (posterior lateral nasal artery) and would not be affected by ligation of the nasal septal branch.

CASE ILLUSTRATION AND SURGICAL TECHNIQUE

A 67-year-old male with a history of recurrent right-sided epistaxis was evaluated for procedural intervention after having undergone several nasal packing procedures performed in urgent care settings. His medical history was notable for cardiovascular disease requiring daily antiplatelet therapy. Endoscopic examination confirmed a bleeding source from the right mid-septum, and topical cautery with silver nitrate applied in the clinic offered only temporary benefit. Given that the lateral nasal wall was unaffected, the decision was made to proceed with focused cautery to the bleeding area and ligation of the nasal septal branch of the SPA under general anesthesia in the operating room. At 6 months follow-up, the patient described sustained subjective improvements in epistaxis frequency and severity.

Under local or general anesthesia, the nasal cavity is prepared with cottonoids soaked in 0.05% oxymetazoline or 4% cocaine. Under endoscopic visualization, the affected area of the nasal septum or floor is injected with 1% lidocaine with 1:100,000 epinephrine, as is the choanal arch just below the visualized posterior nasal artery (Fig. 1). A spinal needle can facilitate this injection. Bipolar diathermy using bayonet forceps may be used to cauterize the affected area of the septum or floor and ligate the artery. The artery and its surrounding vascular plexus are identified, and the area between the superior turbinate and septum just above the choanal arch is generously cauterized (Fig. 2). Cautery can be used to expose and thoroughly coagulate the course of the vessel if there is a concern for recanalization with simple diathermy. Topical hemostatic dressings may be applied according to surgeon preference. The procedure requires no more than a few minutes in total and little bleeding is encountered.

DISCUSSION

A variety of techniques have been used for control of epistaxis unresponsive to local application of pressure, topical vasoconstrictors, or cautery. Anterior or posterior packing is most often used. However, failure rates up to 52%, as well as patient discomfort, synechia formation, periorbital cellulitis, sinusitis, toxic shock syndrome, and hypoxia may be associated with this practice. A study by Vis and Van den Berge found that up to 98% of patients could be treated successfully by cauterization without the need for packing, even in serious posterior epistaxis. Angiographic embolization has a success
rate of 71% to 95%; however, major complications of this procedure may include cerebrovascular accident, hemiplegia, ophthalmoplegia, facial nerve palsy, and soft tissue necrosis. A review by Soyka et al. found the best results with surgical treatment, with a 3% failure rate compared to 33% to 40% for packing. A variety of surgical techniques exist for ligation of vessels responsible for epistaxis. Ligation of the external carotid artery has been historically described for cases of refractory epistaxis, but even then there were frequent treatment failures thought to result from collateral blood supply. Transantral ligation of the internal maxillary artery was described in 1965 by Chandler and Serrins, with reported failure rates of 10% to 15%. This technique also has complications related to the use of the Caldwell-Luc approach, such as sinusitis, facial pain, oronasal fistula, and paresthesias.

Budrovich and Satetti described endoscopic ligation of the SPA in 1992. It has been proposed as a more ideal surgical treatment, as it ligates a major arterial supply to the nasal cavity at a distal point, and therefore minimizes the risk of refractory bleeding from collateral circulation. The surgical technique involves making an incision over the posterior fontanelle and raising a submucosal flap back toward the SPF. The artery and its branches are identified posterior to the ethmoidal crest and ligated with clips, diathermy, or a combination of the two. Surgical exposure may be widened, with some recommending the routine use of maxillary antrostomy and uncinectomy, whereas others recommend against it. A literature review by Kumar showed 92% to 100% success with endoscopic SPA ligation. Failures of this technique are attributed to the failure to identify all branches of the SPA, or the significant dissection that may be required in a patient with suboptimal coagulation properties. As such, a more directed therapy to the nasal septal artery, which requires minimal dissection, may be of value in cases of epistaxis arising from the nasal septum or floor.

CONCLUSION

This technique provides an alternative to SPA ligation for epistaxis arising from the vascular territory of the nasal septal artery, which may be combined with focused cautery of the bleeding area. The benefits of this procedure include: rapid procedure time, minimal surgical exposure, ability to perform in the clinic or at the patient’s bedside, and possibly even treating patients without discontinuing anticoagulation.

BIBLIOGRAPHY