Endoscopic ligation of the sphenopalatine artery as a primary management of severe posterior epistaxis in patients with coagulopathy

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Abstract
We describe our experience with endoscopic ligation of the sphenopalatine artery in the treatment of severe posterior epistaxis in 2 patients with coagulopathy. Conservative treatment had failed in both cases. The key elements of this procedure are the identification of the branches of the sphenopalatine artery via an endoscopic endonasal approach and the application of two titanium clips under direct vision. This procedure was successful in both patients, and we recommend it in selected cases.

Introduction
Severe epistaxis, which usually originates in the posterior area of the nasal cavity, often requires urgent and intensive care.1 The condition is more complex and difficult in patients with coagulopathy.

Coagulopathy is both acquired and hereditary. It can be a sequel of anticoagulant use, liver disease, hemophilia, autoimmunity, and vitamin K deficiency.2 Coagulopathy accounts for a significant proportion of severe posterior bleeds; Monte et al reported that one-third of patients with severe posterior bleeds had been taking aspirin or warfarin.3 During episodes of epistaxis, patients with coagulopathy may continue to bleed despite conservative measures such as posterior nasal packing.

Ligation of the sphenopalatine artery interrupts the nasal vasculature at a point distal enough to prevent direct, retrograde, and anastomotic blood flow from the ipsilateral and contralateral carotid systems (figure).4 We describe our experience with endoscopic ligation of the sphenopalatine artery in the treatment of severe posterior epistaxis in 2 coagulopathic patients who had previously failed to respond to conservative management.

Case reports
Surgical technique. Our surgical technique was similar in both cases. The nose was decongested with 1:1,000 epinephrine on cotton pledgets. Lidocaine 1% with 1:100,000 units of epinephrine was then injected into the mucosa overlying the uncinate process, middle turbinate, and lateral nasal wall.

The uncinate process was excised endoscopically, and the ostium of the maxillary sinus was visualized. The ostium was widened posteriorly into the posterior fontanelle. At the junction of the fontanelle and the bone, the mucosa was taken down by blunt Freer elevator dissection. The sphenopalatine artery was identified as it exited from the sphenopalatine foramen. Two medium-size titanium ligature clips were used to ligate the artery. The area was then inspected for bleeding, and no significant amount was observed. Merocel nasal packs were placed overnight, and both patients were closely monitored postoperatively. No recurrence was observed in either case, and the packs were removed without complication on the first postoperative day.

Patient 1. Our first patient was a 36-year-old black woman whose medical history was remarkable for sickle cell anemia, hypertension, end-stage renal disease, and end-stage liver disease. She had initially been admitted for the treatment of pain secondary to a sickle cell crisis, and she subsequently developed sepsis. Insertion of a nasogastric tube had caused severe posterior epistaxis, and the otolaryngology service was consulted.

The patient was coagulopathic; her prothrombin time (PT) was 24.4 seconds, her partial thromboplastin time (PTT) was 43.9 seconds, and her International Normalized Ratio (INR) was 4.19. After repeated conservative nasal packing measures failed to stop the bleeding, we
performed left sphenopalatine artery ligation. The bleeding stopped completely.

**Patient 2.** The second patient was a 44-year-old black woman whose medical history was significant for alcohol abuse and hepatitis C infection. She had initially presented to another hospital for treatment of left epistaxis, but she had failed to respond to packing, and she was referred to our otolaryngology service.

Examination revealed the presence of a left posterior nasoseptal capillary hemangioma. The patient was coagulopathic; her PT was 12.4 seconds, her PTT was 37.3 seconds, and her INR was 1.34. The bleeding failed to respond to multiple treatment measures, including (1) excision of the hemangioma followed by nasal packing and (2) radiologic embolization of the internal maxillary artery. We then performed left sphenopalatine artery ligation, and the bleeding ceased.

**Discussion**

Traditionally, the management of refractory epistaxis has followed a sequential pattern. The various steps include anterior and posterior nasal packing, direct cauterization, external carotid artery ligation, selective maxillary artery embolization, transantral maxillary artery ligation, anterior ethmoid artery ligation, and septoplasty. Yet none of these treatments is ideal.

**Packing.** In refractory epistaxis, the failure rate of posterior nasal packing, including packing with the use of a balloon tamponade, has been reported to be as high as 52%. Part of the reason is that the prominence of the middle and inferior turbinates often hinders the application of direct pressure over bleeding sites deep in the nasal vault. Nasal packing has other disadvantages, as well: (1) it is associated with considerable discomfort and mucosal injury, (2) it often requires prolonged hospitalization, and (3) prolonged packing has been implicated in the development of serious side effects, including hypoxia, bacteremia, and even myocardial infarction.

**Cautery.** Even when the source of bleeding is identifiable, local cautery can worsen it. Cautery might also create an area of sloughing mucosa that may bleed persistently.

**Traditional surgery.** Traditional surgical procedures for intractable epistaxis have their drawbacks as well in terms of morbidity and other disadvantages. For example, performing external carotid artery ligation risks damage to the hypoglossal and vagus nerves. Moreover, percutaneous embolization of the maxillary artery requires the expertise of an interventional radiologist, which is not always available. Regardless, embolization has been associated with serious neurologic complications, including hemiplegia, ophthalmoplegia, and facial paralysis.

**Sphenopalatine artery ligation.** Microsurgical ligation of the sphenopalatine artery was introduced by Prades in the 1970s. In 1987, Sulsenti et al reported their use of Prades’s bivalved speculum and operating microscope to ligate the sphenopalatine artery in the middle meatus.

As the introduction of Hopkins rigid endoscopes popularized endoscopic sinus surgery, attention was directed toward endoscopic approaches for the sphenopalatine vessels. In 1992, Budrovich and Saetti were the first to report an endoscopic approach to ligation of the sphenopalatine artery. In 1996, Winstead described a transnasal microscopic approach to the sphenopalatine vessels at the sphenopalatine foramen.

In 1997, Sharp et al elevated a mucosal flap over the sphenopalatine foramen and then used a transnasal endoscopic approach to apply either diathermy or clips to the sphenopalatine vessels in 10 patients with intractable epistaxis; they reported no treatment failures. Similarly, Pritikin et al applied bipolar diathermy and hemostatic clips to the sphenopalatine vessels via a transnasal endoscopic route in 10 patients with intractable epistaxis, and they also reported a success rate of 100%.

**Cost-effectiveness.** Shorter hospital stays after early surgical intervention have been associated with sphenopalatine artery procedures.

Srinivasan et al compared transnasal endoscopic sphenopalatine artery diathermy with conventional approaches, including septoplasty, nasal packing, and external carotid artery ligation. They found that the sphenopalatine artery diathermy group experienced a shorter hospital stay on average, and they experienced no surgery-related complications.

Monte et al reported a comparison of patients who underwent a surgical procedure with those who underwent more conservative management such as posterior packing. The patients who had undergone surgery were hospitalized an average of 5.8 days, and their mean hospital bill was $5,485; in contrast, those who had been managed