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CASE STUDY

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# Anatomical variation of the posterior septal artery leads to refractory epistaxis

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## Abstract

**Purpose:** To report a rare variant of the posterior septal artery (PSA), which supplies blood to the posterior mucosa of the contralateral nasal septum.

**Case report:** A 31-year-old female patient underwent suture removal 14 days after septoplasty and developed left-sided epistaxis 6 h after suture removal. To safely and effectively relieve the patient from epistaxis, the cauterization of the left PSA was performed under general anesthesia. However, 24 h after the first surgical hemostasis, the patient experienced epistaxis again in the right nasal cavity. We have reviewed the patient's sinus computed tomography again and found a rare variant of PSA, which is the right-sided PSA passing through a bony canal in the left-sided nasal septum.

**Discussion:** The variant of PSA well explained the failure of the first hemostatic surgery. Therefore, we again performed a cauterization of the right-sided PSA, after which the patient recovered and no further epistaxis occurred.

**Conclusion:** When cauterization of PSA is used to manage posterior epistaxis, it is necessary to pay attention to the possible variation in PSA.

KEYWORDS

cauterization, nasal endoscopy, posterior septal artery, refractory epistaxis, sphenopalatine artery

## INTRODUCTION

Approximately 5%–10% of nosebleeds originate from posterior sites on the lateral nasal wall or nasal septum, known as the posterior epistaxis.[1,2] Posterior epistaxis is traditionally thought to arise from branches of the sphenopalatine artery (SPA) and is often more difficult to control. Therefore, the typical surgical treatment of severe epistaxis involves the cauterization of branches of the SPA and has a high rate of success.[3] The SPA provides two terminal branches, including the posterior lateral nasal artery and the posterior septal artery (PSA), after which they enter the nasal cavity through the sphenopalatine foramen.[4] The PSA runs along the anterior wall (rostrum) of the sphenoid sinus to the posterior of the septum and represents the main artery for bleeding in the posterior of the septum.[5] Therefore, cauterization of the PSA is recommended for nosebleeds in the posterior of the septum.[1] However, there will also be anatomical variation in PSA,[4] which may cause management failure in patients with posterior epistaxis.

We encountered a rare variant of the PSA in the treatment of one case of refractory epistaxis, in which the mucosa in the posterior of the left-sided nasal septum also received blood supply from the contralateral (right-sided) PSA. This led to the failure of our first hemostatic surgery by cauterizing the left PSA.

## CASE REPORT

A 31-year-old female patient underwent suture removal 14 days after septoplasty (Figure 1) and developed left-sided epistaxis 6 h after suture removal. The patient was then admitted to the hospital for emergency treatment. Under nasal endoscopy, the site of bleeding was identified, which was located in the posterior portion of the left side of the nasal septum. The nasal bleeding was pulsatile and fast; therefore, the bleeding site was treated with local pressure by using spongia gelatinosa, after which the patient was hospitalized for observation.

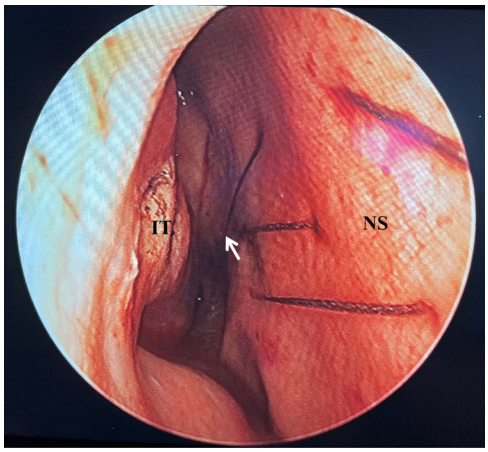


**FIGURE 1** A picture shows the nasal septum in a suture state at the end of the septoplasty. The white arrow indicates the bleeding point on the right side of the NS. IT, inferior turbinate; NS, nasal septum.

Unexpectedly, a right-sided nosebleed occurred 8 h after left-sided nasal packing. The bleeding originated from the needle eye of the nasal septal suture (the position indicated by the arrow in Figure 1), which is located in the corresponding site of the left bleeding point. Subsequently, the right nasal cavity was also administered local pressure treatment.

To safely and effectively relieve the patient from epistaxis, emergency endoscopic surgery under general anesthesia was performed, and the initial goal was only to perform cauterization of the bleeding site. During surgery, the bleeding was found to mainly originate from the left-sided nasal septum, but the local cauterization of the bleeding point could not stop the bleeding. Based on the arterial anatomy of the nasal cavity, we considered that epistaxis was originating from the left PSA, and cauterization of the left PSA was applied. The patient's nosebleed was stopped, which was likely due to a combination of factors such as blood pressure changes and cauterization of the left PSA.

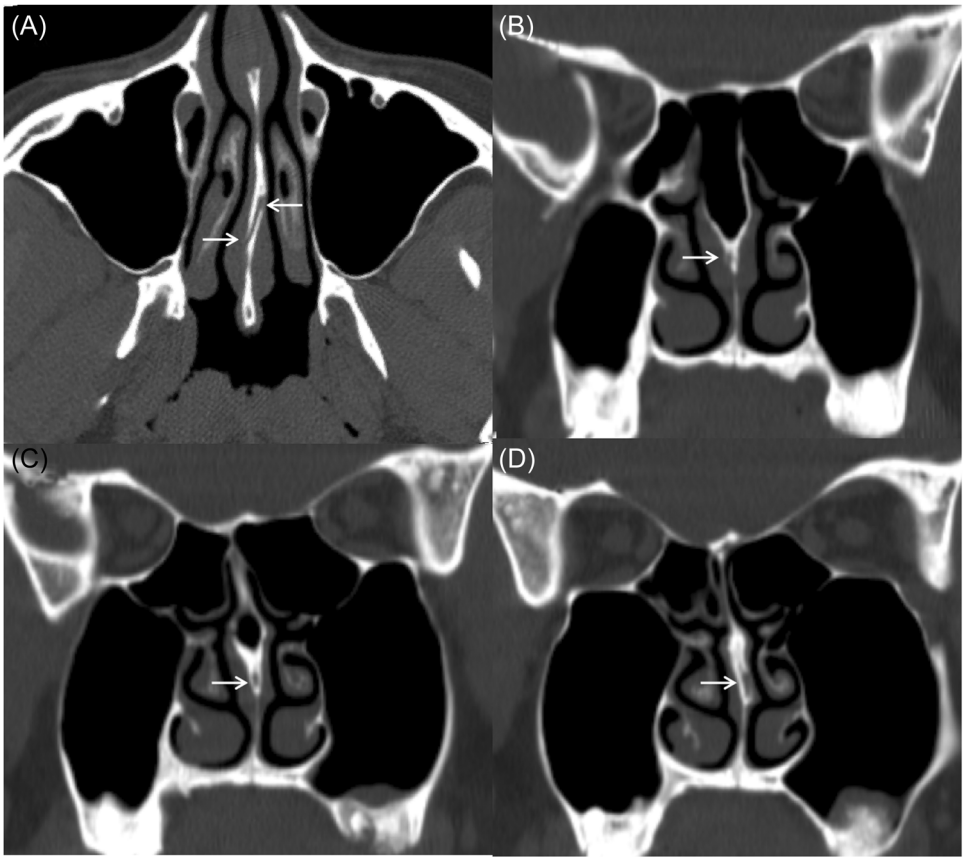


**FIGURE 2** CT shows the anatomical variation of the PSA. The right PSA passed through a bony canal in the posterior of the nasal septum to the left side (the white arrows indicated in A). The arrow in (A–D) indicates the PSA traveling process. The exit point of PSA at the left side of the nasal septum is located behind the nasal septal spur (D). CT, computed tomography; PSA, posterior septal artery.

However, 24 h after the first endoscopic surgical hemostasis, the patient experienced epistaxis again in the right nasal cavity. The bleeding point was still localized at the needle eye of the nasal septal suture (the arrow in Figure 1).

To explore the cause of the right-sided nosebleed, we carefully reviewed the patient's sinus CT again and surprisingly found a rare variant of PSA (Figure 2), which well explained the failure of the previous surgeries. Therefore, we again performed endoscopic hemostasis surgery under general anesthesia with cauterization of the right-sided PSA, after which the patient recovered and no further epistaxis occurred.

The anatomical variant that was observed in this case involved the right-sided PSA passing through a bony canal in the nasal septum, reaching and supplying the posterior of the left-sided septum (Figure 2).

## DISCUSSION

The PSA mainly supplies blood to the posterior of the nasal septum and is also the main vessel responsible for posterior epistaxis.[4,5] Therefore, PSA is a simple and reliably located target for the surgical management of epistaxis arising from its vascular territory.[1] However, there are still many anatomical variations in SPA, including its course, branches, and anastomosis.[6,7] The present case shows that the anatomical variation of PSA in the course and the supply region will lead to the failure of hemostasis by cauterizing the ipsilateral PSA. At present, there are few studies on PSA variation,[6,7] and it cannot be ruled out that the incidence of PSA variation may be high. There may also be different types of variation, such as the possibility that one side of the nasal septum receives PSA supplies from both sides. Therefore, when cauterization of PSA is used to manage posterior epistaxis, it is necessary to pay attention to the possible variation in PSA.

In addition, endovascular arterial embolization is also a common treatment for refractory epistaxis, but this treatment is also dependent on the anatomy of the nasal artery supply.[3] Therefore, it is necessary to pay attention to the possibility of PSA variation before interventional embolization. The contralateral supply of PSA will result in ipsilateral posterior epistaxis that cannot be stopped after ipsilateral PSA embolism.

Finally, this anatomical variation in PSA may also affect the blood supply to the pedicled nasoseptal flap (PNSF), which is the main material for skull base reconstruction after endoscopic transnasal approaches. The effectiveness of PNSF involves the preservation of the vascular pedicle, which is mainly provided by the PSA.[1,5] The anatomical variation of PSA (which simultaneously supplies the contralateral septal mucosa) will cause the feeding artery from the contralateral side to be severed during harvesting of a vascularized pedicle nasoseptal flap, thus resulting in no vascular pedicle within the harvested mucosal flap.

### AUTHOR CONTRIBUTIONS

Jin-Feng Liu wrote the main manuscript text. Dong-Jiao An and Zu-Fei Li prepared Figures 1–2. All authors reviewed the manuscript.

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The authors have nothing to report.

### CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

### DATA AVAILABILITY STATEMENT

The authors have nothing to report.

### ETHICS STATEMENT

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

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