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## Abstract

Adequate surgical exposure and preservation of normal sinonasal function remain key but often competing goals in endoscopic skull base surgery. This prospective study attempts to ascertain if preservation of the septal olfactory strip (SOS) and the posterior nasal artery vascular pedicle impacts the incidence of olfactory dysfunction and postoperative epistaxis.

## Introduction

Bilateral Nasoseptal Rescue Flaps serve to 1) preserve nasal mucosa while preventing olfactory impairment by preserving the septal olfactory strip, and 2) prevent arterial epistaxis by preserving the terminal branches of the sphenopalatine artery and posterior nasal artery which are the arterial pedicles for the nasoseptal flap. The first 3 incisions of the nasoseptal flap create the rescue flap: **1.** At the base of the sphenoid ostium, a horizontal incision is made with a long needle point Bovie. Care is taken not to cut the arterial pedicle which on average is 9 mm inferior to the ostium. (**Fig 1**) If the ostium can not be identified, the incision is made 5 mm superior to the insertion of the superior turbinate. **2.** At the level of the inferior plane of the middle turbinate, the horizontal incision is continued anteriorly along the septum to the anterior extent of the MT. **3.** A Hockey Stick extension is then continued anteriorly and superiorly. **Figs 2, 3** Mucoperiosteum flaps are elevated. A cottonoid is placed into a pocket between the base of the sphenoid and the pedicle to inferiorly displace the rescue flap and to protect its arterial pedicle. The vomer is removed and preserved for possible sellar reconstruction. The "A" Frame dissection is continued superiorly separating the leaves of the septal mucoperiosteum to the junction of the vomer and face of the sphenoid, planum. A wide sphenoidotomy is created preserving the mucosal surfaces and pushing the SOS superior and lateral out of the operative field. **Figs 4, A**

## Methods and Materials

A prospective analysis was performed in patients who underwent endoscopic endonasal skull base surgery between February 1, 2012 and October 2016. The study was divided into 2 groups, pre and post operative olfactory outcomes in the first 110 patients and post operative epistaxis outcome study in 466 patients. Incidence of postoperative hyposmia, anosmia were analyzed preoperatively (baseline) and within the first 3 months and up to one year post-surgery using the Brief University of Pennsylvania Smell Identification Test (B-UPSIT).

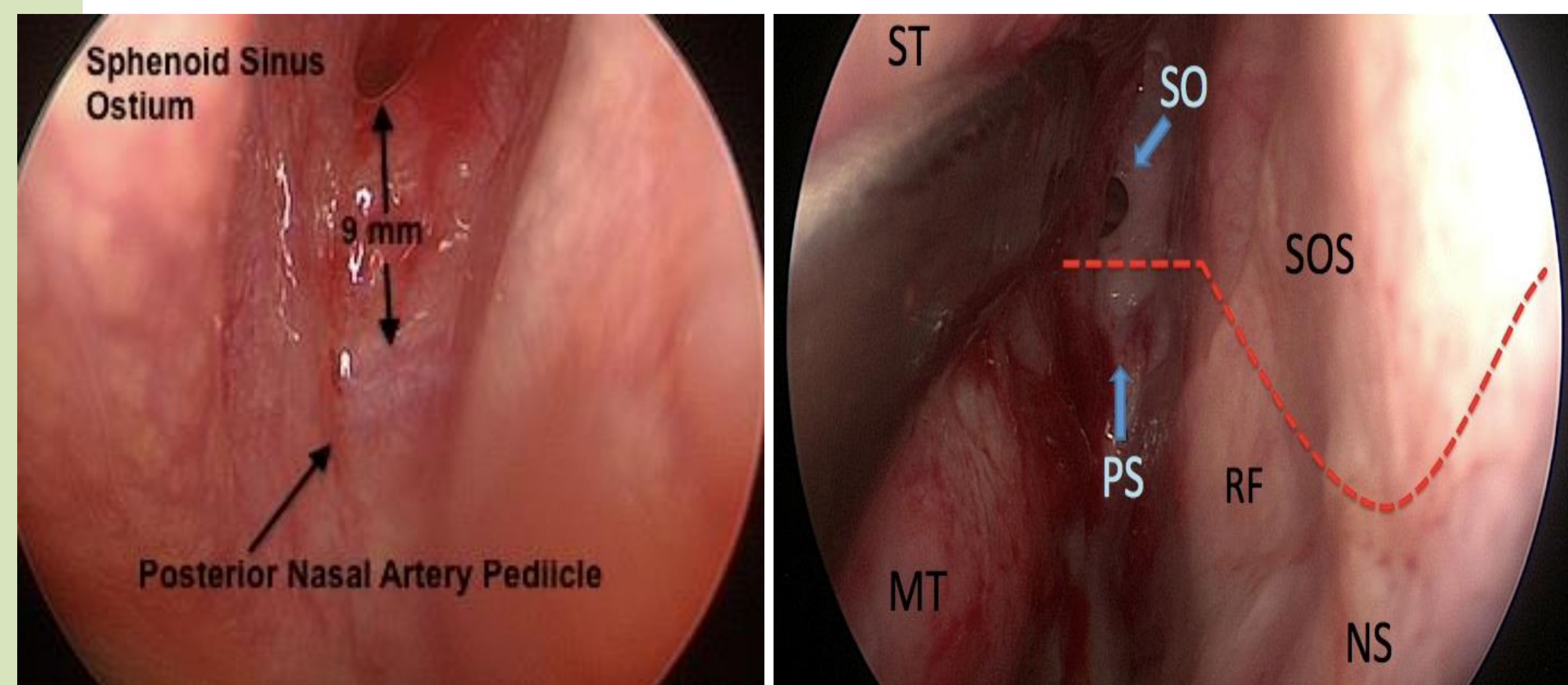
## Results

In the olfactory outcome study, 110 patients completed the pre- and postoperative B-UPSIT. Seventy-eight patients required extended approaches. Bilateral nasoseptal rescue flaps were elevated in all patients with 21 patients having planned pedicle nasoseptal or middle turbinate flaps. After excluding 9 patients with severely abnormal preoperative olfactory function, olfaction analysis in 101 patients, demonstrated preservation of normal function in eighty-six (86%) patients, improvement from mild-moderate impairment to normal in ten (10%), and new mild hyposmia in 5 patients (5.0%), with no patients experiencing postoperative anosmia.

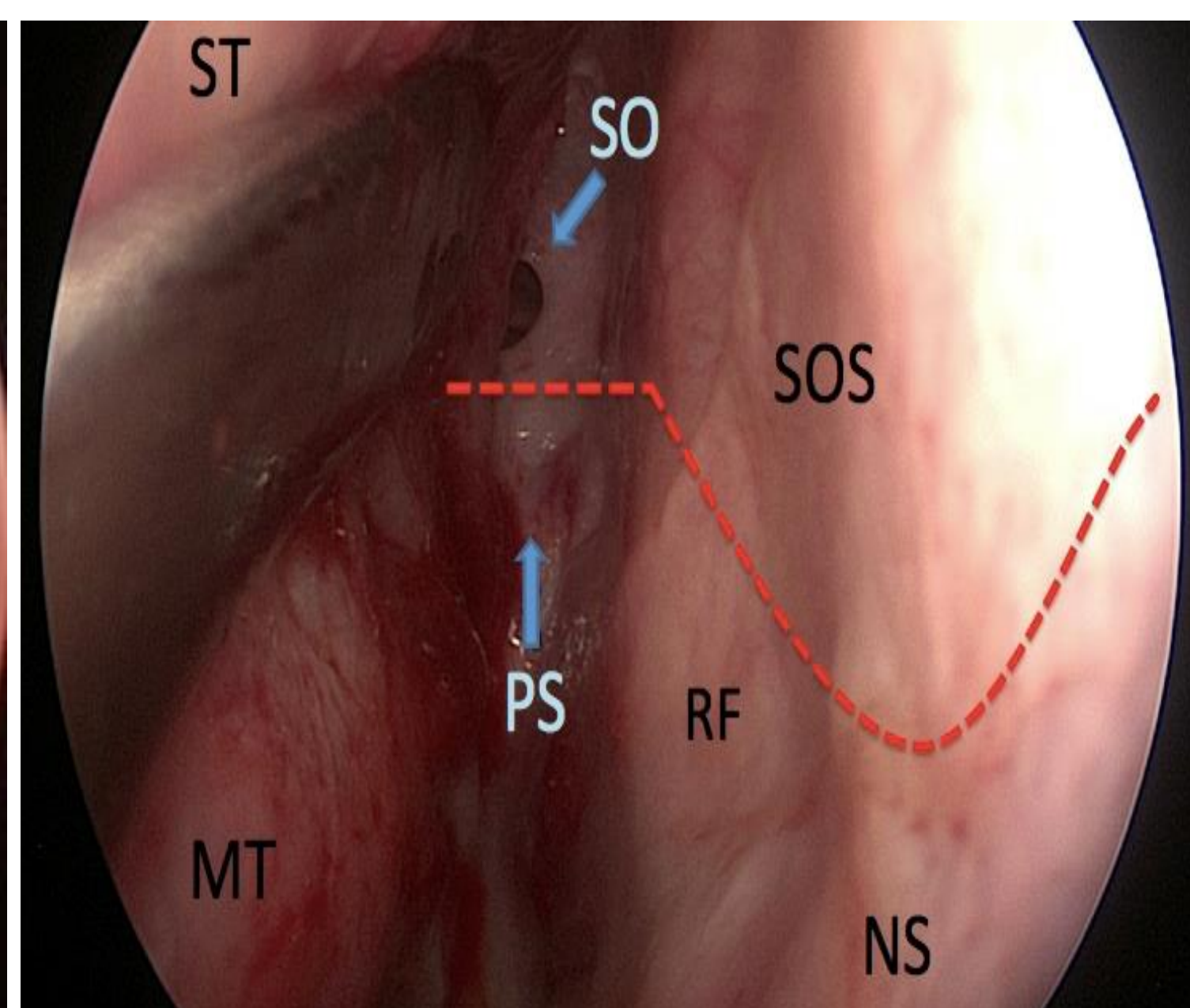
We previously reported epistaxis avoidance in a technical note. This update includes an additional 305 patients with a total of 466 patients where the vascular pedicles were preserved in all patients having bilateral mucosal preserving rescue flap procedures. No postoperative occurrences of major/arterial epistaxis were encountered. One patient had anterior epistaxis unrelated to the rescue flap procedure and one patient had a self limited episode of epistaxis treated at an outside emergency room of uncertain etiology.

## Conclusions

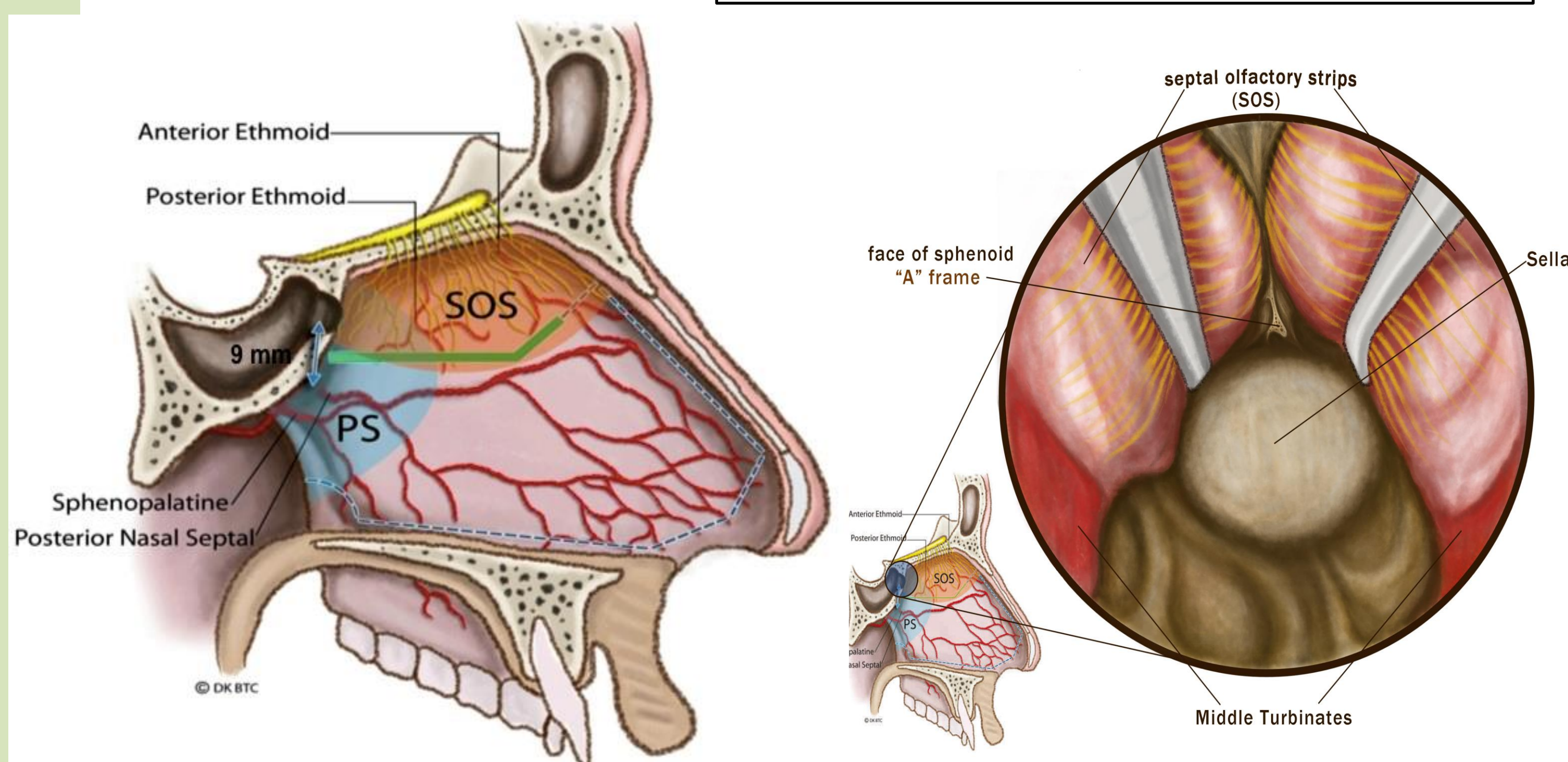
Mucosal preserving bilateral rescue flaps with Septal olfactory strip (SOS) preservation is effective in preserving olfactory function, while not hindering surgical exposure. In addition the "rescue flap" technique appears to reduce the risk of major arterial posterior post-operative epistaxis, and allows the possibility of harvesting the nasoseptal flap in the future if needed, by preserving the posterior nasal septal pedicle bilaterally. In our series of 466 patients, we have not experienced any major epistaxis which has been reported to occur in up to 12% of EESS procedures with significant morbidity and reported mortality.



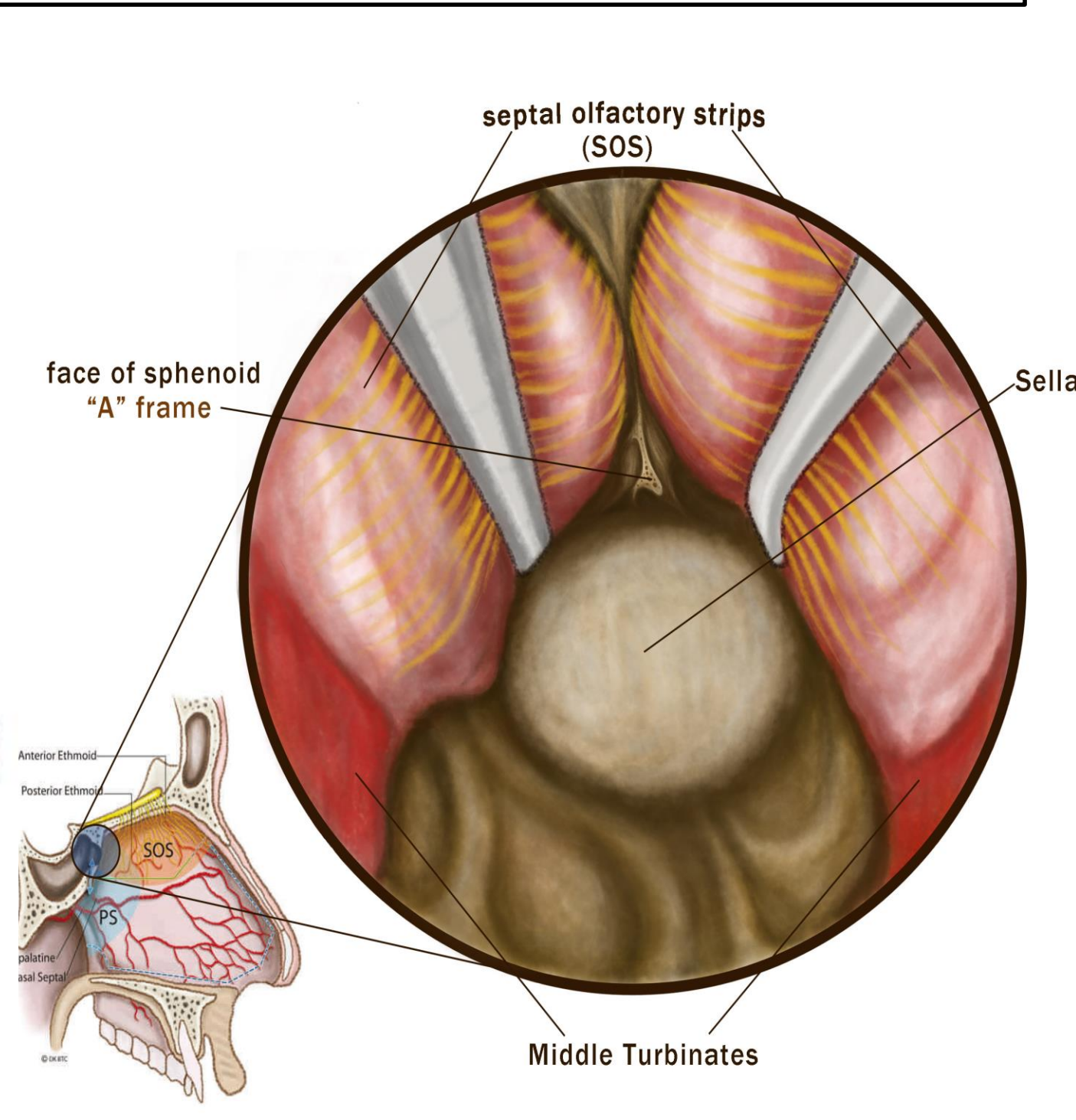
**Figure 1:** 9 mm space between the sphenoid ostium and posterior nasal artery pedicle



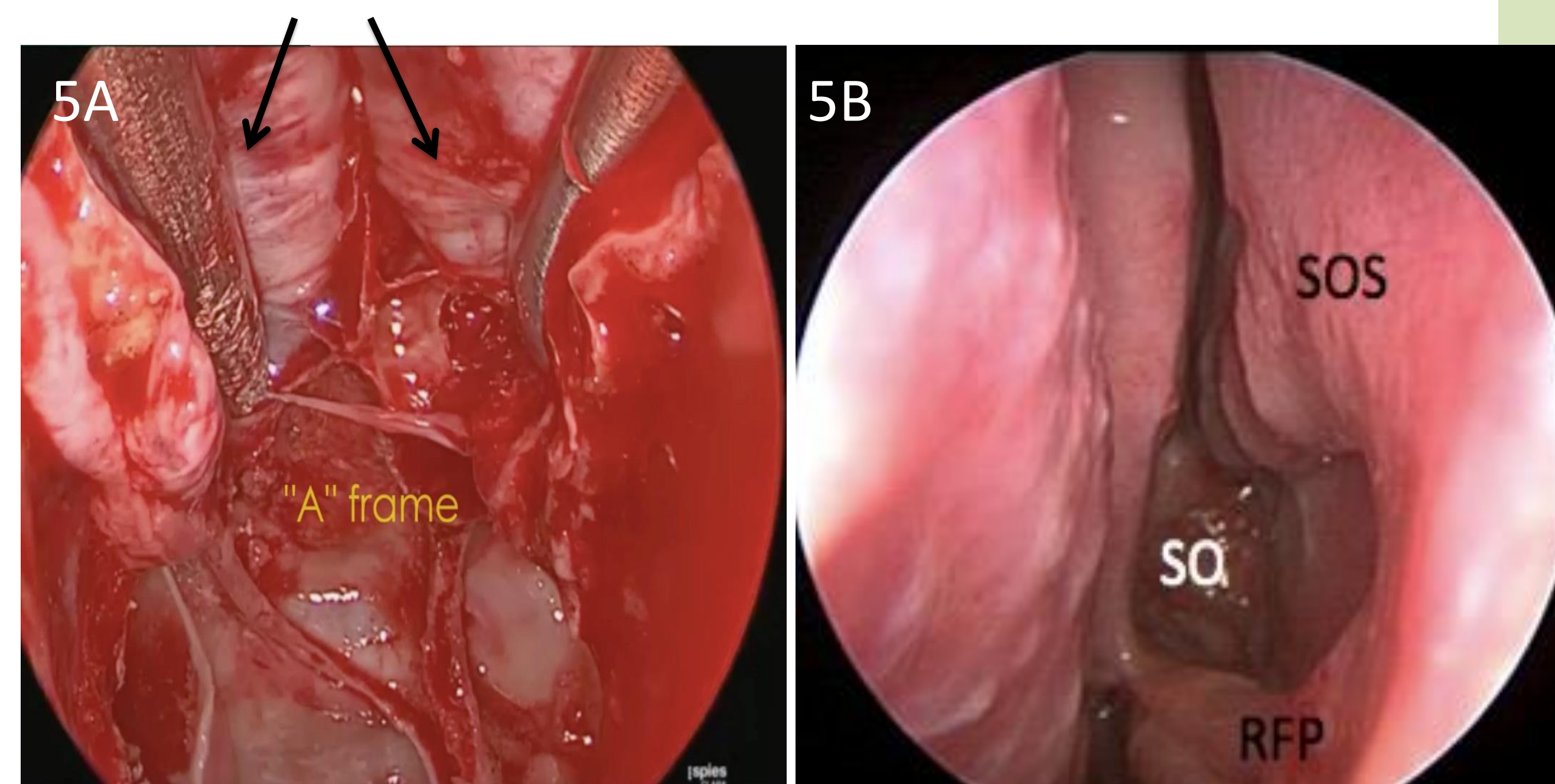
**Figure 2: Rescue Flap (RF) Incisions**  
SO: Sphenoid Ostium, NS: Nasal Septum  
MT: Middle Turbinate ST: Superior Turbinate  
SOS: Septal Olfactory Strip



**Figure 3:** Rescue Flap Incision - GREEN Line; Dotted Line - full Nasoseptal Flap Incision.



**Figure 4: "A" Frame:** Superior midline exposure to the planum, separating two leaves of SOS laterally, wide sphenoidotomy



**Figure 5A :** Intra-op view of "A" frame separation of SOS (arrows);  
**Figure 5B:** Postop endoscopic view of Neo-Sphenoid, Rescue Flap pedicle, (RFP), SOS, sphenoidotomy (SO)

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## Procedure Video at:



[Rescue Flap Video](#)

## References

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