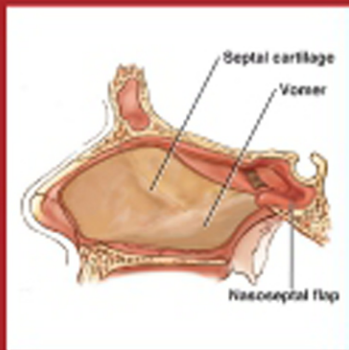


ATLAS OF
Endoscopic
Sinus and
Skull Base
Surgery

SECOND EDITION



ALEXANDER G. **CHIU**

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To my beautiful wife, Michelle, and my sweet, sweet boys, Nicolas and Aidan.

Alexander G. Chiu, MD

To my coauthors—Alex and Nithin—thank you so much for your friendship, guidance, and making this second edition comprise all the advancements we wanted to have in the first. To all the colleagues and trainees that make academic rhinology such an exciting, satisfying field—thank you for your interest and dedication. To my family—Amy, Sam, and Zoe—time with you is always better than time at work!

James N. Palmer, MD

This book is dedicated first and foremost to the three lovely ladies in my life: my daughters, Aryana and Maya, and my wonderful wife, Jyoti. Without their unconditional love and support, I would not have been able to spend the time needed for teaching the field I love day in and day out. I also want to dedicate this book to my amazing parents, Usha and Vijay, as they continue to cheer me on through my life endeavors both in and outside of work. Thank you all for helping me make this edition better than the first!

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PREFACE

The field of sinus and skull base surgery continues to evolve in popularity, techniques, and practice. The way we think and learn has evolved as well. Podcasts, online videos, and the ability to access education at any time or place has become an expectation for many learners. On this edition of *Atlas of Endoscopic Sinus and Skull Base Surgery*, the editors and authors spent a great deal

of time creating a multimedia experience to deliver educational content. Our learners can read, listen, and/or watch content. And the surgical videos are all narrated in stepwise fashion. We hope you enjoy the book and are on your way to becoming an expert in endoscopic sinus and skull base surgery!

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Septoplasty

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INTRODUCTION

- The nasal septum plays a key role in the form and function of the nose, nasal cavity, and paranasal sinuses.¹
- Septal deformities are common and occur in nearly 77% to 90% of the general population worldwide.^{2,3}
- Even small deviations in key areas have been shown to adversely affect nasal airflow, delivery of nasal medications, mucociliary clearance, and the external appearance of the nose.⁴⁻⁶
- Improving nasal airflow continues to be the primary goal of nasal septal surgery. Other indications include epistaxis, sinusitis, obstructive sleep apnea, and headaches.⁵
- This chapter focuses on three commonly used septoplasty techniques: traditional septoplasty performed with a headlight; septoplasty addressing caudal deformities; and endoscopic septoplasty, both for diffuse deflections and the directed endoscopic septoplasty approach, to address focal septal deviations (spurs).

ANATOMY⁷⁻⁹

- The nasal septum is a mucosa-covered bony and cartilaginous structure located in the rough midline of the nose, which separates the right nostril from the left nostril (Fig. 1.1).
- The nasal septum is situated in a sagittal plane extending from the skull base superiorly to the hard palate inferiorly and the nasal tip anteriorly to the sphenoid sinus and nasopharynx posteriorly.
- The bony portion of the septum includes the perpendicular plate of the ethmoid bone, the vomer, and the maxillary crest, which has contributions from the maxillary and palatine bones. The quadrangular cartilage forms the caudal portion of the septum.

- At the junction of the osseous and cartilaginous portions of the septum, the perichondrium and periosteum are not contiguous. Between the two layers are dense decussating fibers.
- The nasal septum forms the medial wall of each nasal cavity and contributes to the internal and external nasal valves.

PREOPERATIVE CONSIDERATIONS

- Patient history is important in establishing an operative plan. Preoperative history taking should elicit information regarding subjective nasal airway obstruction, prior trauma, epistaxis, nasal decongestant use, and drug use.
- Adequate mucosal decongestion and vasoconstriction are essential in reducing intraoperative bleeding and optimizing visualization during the procedure.
- Endoscopic examination prior to surgery is a valuable adjunct to anterior rhinoscopy to completely examine the nasal septum and allow accurate identification of the location and severity of a septal deviation.¹⁰
- Choice of septoplasty technique should be based on the nature and location of the deformity; patient history, including prior septoplasty; and surgeon skill and preference.¹¹

RADIOGRAPHIC CONSIDERATIONS^{4,12}

- Radiographic evaluation is not necessary to diagnose a septal deviation prior to surgery but is often available when septoplasty is performed in conjunction with other rhinologic procedures.⁴
- When available, coronal computed tomographic (CT) scan of the sinuses is the preferred study to evaluate the course of the nasal septum (Fig. 1.2).

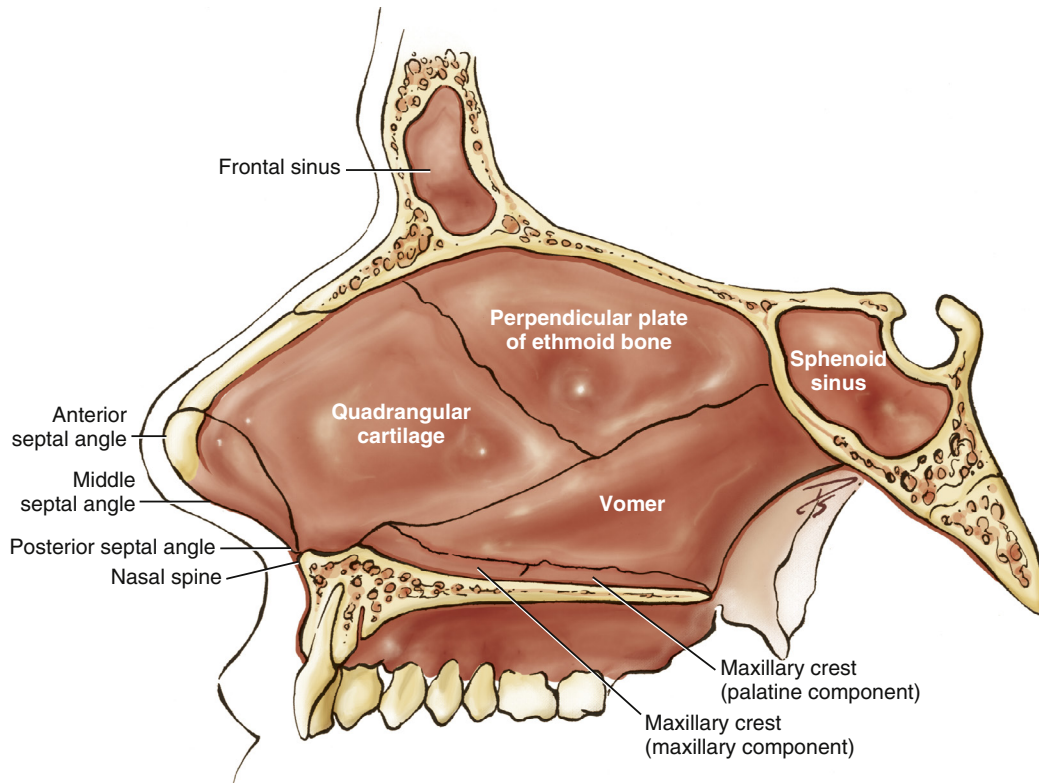


Fig. 1.1. Drawing of the nasal septum in the sagittal view.



Fig. 1.2. Coronal computed tomographic scan of the sinuses demonstrating a large posterior septal deformity.

- The coronal CT scan may assist in identifying posterior deflections not visualized on anterior rhinoscopy or other sources of nasal obstruction, such as a concha bullosa.
- Despite its value, a CT scan may not accurately demonstrate the degree of septal deviation evident on physical examination.

INSTRUMENTATION (FIG. 1.3)

- Nasal specula of multiple lengths
- Bayonet forceps
- Scalpel with a No. 15 or No. 15C blade

- Small curved, sharp-pointed scissors
- Cottle elevator
- Freer elevator
- Takahashi forceps
- Open and closed double-action rongeur (Jansen-Middleton type)
- 0-degree endoscope with lens cleaner (endoscopic technique)
- Suction Freer elevator (endoscopic technique)

PEARLS AND POTENTIAL PITFALLS

- Establishing the proper subperichondrial plane before elevating the mucoperichondrial flap is essential to ensure a bloodless dissection and minimize the risk of tearing the mucosa.
- Bare cartilage is identified by its pearly white appearance and somewhat gritty feel.
- Septal perforations are an uncommon complication following septoplasty. The risk is increased when bilateral opposing mucosal tears occur during flap elevation¹³⁻¹⁵
- It is important to maintain a generous L-strut of at least 15 mm along the dorsal and caudal margins of the quadrangular cartilage to avoid long-term nasal tip and dorsal deformities (Fig. 1.4).¹³⁻¹⁵
- Care should be taken when addressing deviation of the ethmoid bone perpendicular plate, as aggressive

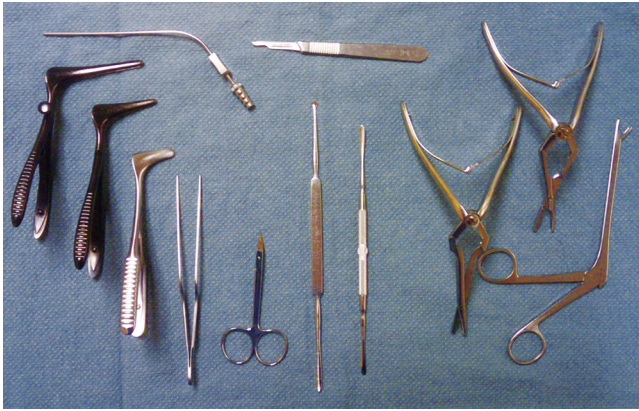


Fig. 1.3. Photograph of suggested instruments for septoplasty.

manipulation can violate the anterior skull base and cause a cerebrospinal fluid leak.¹³⁻¹⁵

SURGICAL PROCEDURES

Traditional Septoplasty^{5,7,11}

- After adequate nasal decongestion is achieved using a topical agent, inject local anesthetic with a vasoconstrictor (1% lidocaine with 1:100,000 epinephrine) into the septal mucosa. Allow approximately 15 minutes for the anesthetic to take full effect.

Step 1: Initial Incision

- Retract the columella to the opposite side using a small nasal speculum, columellar retractor, or large two-prong hook and expose the caudal margin of the septum.
- Use a No. 15 blade or No. 15C blade to make a hemitransfixion incision along the caudal margin of the septum extending from the anterior septal angle to the posterior septal angle.
- A modified Killian incision may be used when more posterior deflections are being addressed or when less exposure is necessary (Fig. 1.5).

Step 2: Elevation of Mucoperichondrial Flaps

- Use a No. 15 blade, sharp-pointed scissors, or Cottle elevator to incise the perichondrium at or adjacent to the caudal septum.
- Perform a submucoperichondrial dissection along the inferior portion of the septum.
- Flap elevation should extend to encompass all areas of deflection, including bony spurs.
- A mucoperichondrial flap is then raised on the contralateral side of the septum beginning at the caudal margin if a hemitransfixion incision was used.

- If a modified Killian incision was used, gain access to the opposite side by incising the cartilage just anterior to the deflected portion.

Step 3: Removal of Offending Cartilage and Bone

- Using a No. 15 blade or sharp elevator, excise and remove the offending (deflected) portion of cartilage—again, maintaining a generous L-strut.
- A portion of the resected cartilage may be morselized or otherwise straightened and replaced into the septal pocket before the incision is closed.
- Any bony spurs can now be excised using controlled osteotomies.
- A double-action rongeur works well for areas of the perpendicular plate of the ethmoid or vomer.
- A septal chisel may be used for abnormalities of the maxillary crest.

Step 4: Closure of the Septal Pocket and Incision

- It is important to close the septal pocket to prevent the development of a septal hematoma postoperatively. Multiple methods have been described to accomplish this.
 - A running or interrupted quilting stitch can be placed using absorbable suture, such as 4-0 plain gut on a straight needle.
 - Internal silastic splints are often used in addition to further stabilize the septum and prevent fluid accumulation.
 - Additional nasal packing is often unnecessary.
- Close the hemitransfixion or Killian incision in a single layer using absorbable suture.

Caudal Septal Deformities^{5,7,11,16}

Step 1: Initial Incision and Elevation of Mucoperichondrial Flaps

- Complete Steps 1 and 2 as described earlier for traditional septoplasty.

Step 2: Reduction of Cartilage Memory

- Use a No. 15 blade to score the deflected cartilage on the concave side.
- The direction of scoring should be vertical or along the axis of the deflection.

Step 3: Swinging Door/Doorstop Techniques

- Use a Cottle elevator to elevate the quadrangular cartilage out of the maxillary crest groove inferiorly.
- Using a knife, excise the inferior strip of cartilage that had been resting in the maxillary crest groove.
 - This should allow the remaining cartilage, attached only superiorly, to swing freely to the midline, where it can be secured caudally to the nasal spine with absorbable suture. Use a figure eight

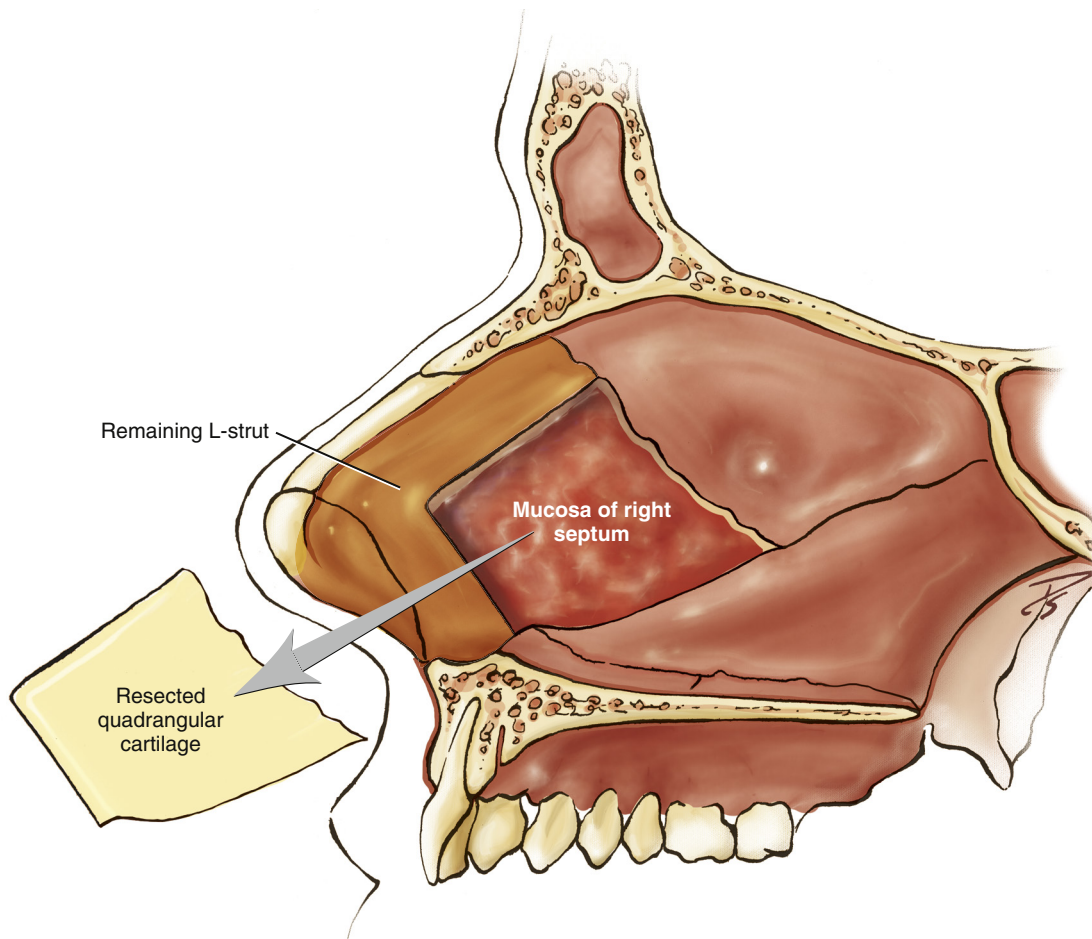


Fig. 1.4. Drawing of septal cartilage resection showing the remaining L-strut (orange shading).

of 3-0 polyglactin 910 (Vicryl) from septum to periosteum, overlying the anterior maxillary crest (Fig. 1.6).

- A modification of this technique (doorstop method) eliminates the step of excising a strip of cartilage.
 - After elevating the cartilage off of the maxillary crest, displace it to the side of the crest opposite the obstruction and suture it in place again.

Step 4: Closure of the Septal Pocket and Incision

- Complete Step 4 as described for traditional septoplasty.

Endoscopic Septoplasty^{9,7,11,17-19}

Step 1: Initial Incision and Initial Elevation of Mucoperichondrial Flaps

- Complete Step 1 as described earlier for traditional septoplasty using a headlight and speculum.

Step 2: Elevation of the Mucoperichondrial Flap

- Create a submucoperichondrial pocket with a Freer elevator or Cottle. Once a sufficient pocket is cre-

ated, continue the ipsilateral submucoperichondrial elevation using a suction Freer and 0-degree endoscope. Elevate past the bony cartilaginous junction.

- Next, a septotomy is made just anterior to the area of greatest deviation and contralateral flaps are elevated.

Step 3: Removal of Offending Cartilage and Bone

- Using a through-cutting instrument, a cut may be made above the deviated area of cartilage.
- Any deviated cartilage may now be safely removed.
- Any bony spurs can now be excised using controlled osteotomies, performed via the traditional approach.
- There is no need to preserve bone of the posterior septum.

Step 4: Closure of the Septal Pocket and Incision

- Closure is similar in technique to traditional septoplasty.
- If suturing with endoscopic assistance, counterpressure is often required with the endoscope to allow the needle to pass from one nasal cavity to the other.