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# Sinus Surgery: Functional Endoscopic of Sinus Surgery

**Dr. Akansha Varma***

Department of Sedationist BDS, MFDS, MSc, Oral Surgeon, Maulana Azad Dental College & Hospital

**Corresponding author:** Dr. Akansha Varma

varma.akansh@gmail.com

Department of Sedationist BDS, MFDS, MSc, Oral Surgeon, Maulana Azad Dental College & Hospital

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## Abstract

Through shared decision-making, physicians and patients can elect endoscopic sinus surgery (ESS) when maximal medical therapy fails in patients with chronic rhino sinusitis (CRS). In this study, we aim to explore the most important themes with regards to patients' perspectives on ESS. Our objective was to define the patient experience and ensure that we have congruent physician and patient goals for obtaining success. Healthcare providers use this surgery to treat chronic sinusitis, remove nasal polyps and treat other conditions that affect your sinuses. Most people have sinus surgery because they have severe sinus problems that medication hasn't helped. There are several types of sinus surgeries designed to be less invasive with shorter recovery times.

Healthcare providers use this surgery to treat chronic sinusitis, remove polyps from your sinuses and treat other conditions. Most people have sinus surgery because they have severe sinus problems that medication hasn't helped. Sinus surgery may involve removing infected sinus tissue, bone or polyps. There are several types of sinus surgeries designed to be less invasive so you can recover quickly.

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## Introduction

The late 21st century witnessed advancement in endoscopic sinus surgery (ESS), from technological evolutions in fiber-optic endoscopy to medical imaging and computer aided surgery. ESS has gained growing popularity with indications expanding beyond rhino sinusitis to include tumors, developmental malformations, skull base pathologies, orbital pathologies and management of facial fractures. Preoperative high-resolution computed tomography (HRCT) scan is essential in providing the surgical map for surgeon [1, 2]. In addition of being a diagnostic imaging technique, it gives valuable information about origin, nature and extension of the pathology to adjacent structures. Furthermore, areas with bone dehiscence that required attention can be identified preoperatively. Moreover, preoperative review of CT scan is crucial in order to understand nature and epicentre of the pathology along with the contributing factors in order to perform successful and complete surgery with low risk for complications [3]. Since the very beginning of this most prestigious field of medicine, surgeons all over the world have always tended to conceive and then implement perfect, ideal conditions in the OR. Improved conditions in surgical practice and considerably longer patient survival have been achieved since the time of Sir Joseph Lister, Bt., a British surgeon and pioneer of antiseptic surgery, through the use of numerous innovations in preoperative planning, intraoperative procedures and postoperative analysis of surgical procedures, in particular, the use of MIS. At the turn of the 20th and 21st century, a new developmental incentive in surgery emerged with the advent of 3D-visualization of anatomy and pathology and differential-color imaging of various tissues, consistent with transparency difference (pixels) on digital 2D-256-level-gray medical diagnostic [4].

Variable preoperative CT checklists were published in literature in order to standardize radiological reporting and assess surgical planning. However, those lists have rarely been utilized which is very likely due to complexity, deficiencies and low clinical applicability [5].

Sinusitis is the swelling of the nasal sinuses or passages. It is sometimes called a sinus infection. A person with sinusitis may have the following symptoms:

1. Pressure around the nose, eyes, or forehead
2. A stuffy nose

3. Thick and discoloured nasal drainage
4. A cough
5. Head congestion and headaches
6. Bad-tasting post-nasal drip
7. Blocked ears or changes in hearing

### Types of sinus surgeries

There are several types of sinus surgeries:

**Functional endoscopic sinus surgery (FESS):** This is the most common type of sinus surgery. This surgery widens the drainage passages between your nose and your sinuses, removing bone or infected tissue so mucus trapped in your sinuses can get out. Healthcare providers use endoscopes to see inside of your nose and sinuses and guide the surgery. Endoscopes are thin tubes with lights on the end. Healthcare providers may use an image-guided system to do FESS [5]. In image-guided surgery, healthcare providers use computed tomography (CT) scans to "see" the inside of your sinuses.

**Balloon sinuplasty:** Balloon sinuplasty is a minimally invasive treatment for sinusitis. Healthcare providers use an endoscope and catheter to guide a small balloon into your nose. They inflate the balloon to increase the passageway to your sinuses [6].

**Caldwell Luc surgery:** Healthcare providers may do this surgery when approaches that are more traditional haven't resolved your sinus issues. In this surgery, providers make a new opening from your maxillary sinus the sinus cavity behind your cheek to your nose so mucus can drain from your sinus cavities [7].

## Discussion

Literature review showed four relevant published checklists; three in constructed forms and one within a text. Surgery planning, radiology reporting template and resident education were within objectives. Martinez Del Pero and Philpott proposed a preoperative CT checklist to evaluate paranasal sinuses [8]. Anatomical structures were reviewed in coronal, axial and sagittal cuts to include: Frontal sinus, nasal septum, anterior ethmoid artery, uncinate process attachment, concha bullosa, Haller cells, hypoplastic maxillary sinus, ethmoid bulla, Keros classification, dehiscence of lamina papyracea, frontal recess, Onodi cells, superior turbinate attachment to sphenoid face, dehiscence of carotid artery and height of ethmoidal cells. The checklist did not consider description of the pathology or the complete boundaries of the sinuses [9].

S Vaid, et al. published a radiological-reporting form for preoperative CT in consideration of sinonasal surgical approach. Anatomical structures and surgical relevance were explained and illustrated with figures. These included septum, middle turbinate, uncinate process, ostiomeatal complex, maxillary sinus, frontal sinus drainage pathway, frontal peak, Agger nasi cell, frontoethmoidal cells, frontal sinus, anterior ethmoid cells, bulla ethmoidalis, supraorbital cells, basal lamella, posterior ethmoid sinus, sphenoid sinus, anterior skull base, anterior ethmoidal artery, lamina papyracea, bony margins of sinuses, orbit, brain and nasopharynx [10]. However, the description of the pathology was not included in the report.

## Conclusion

Preoperative CT checklist for endoscopic sinus surgery improves surgeon understanding of the anatomy, nature of the disease and helps planning the surgery. The checklist aids to organize the process of interpretation of CT scans and avoids missing significant findings. In addition, it improves young resident's knowledge and helps to build up their surgical concept. However, careful reviewing of preoperative images with radiologist is crucial and can help to address critical anatomical areas in order to avoid complications. The ultimate goal of this innovative surgical procedure is to allow the presentation of virtual objects to all of the human senses in a way identical to their natural counterpart. This technique will enable surgeons to get complete and aware orientation in the operative field, where 'overlapping' of the real and virtually created anatomic models is inevitable. New 'spatial experience' in the OR must be comprehensively and correctly recognized in each segment of the operation. Precise differentiation of pathology and normal soft tissue differences, as well as fine bony details, in ideal conditions , are basic conditions in which our SW can be employed, integrating LM-controller with medical imaging systems only with 'in the air' real control by surgeon's hands. In this application, it is very easy to integrate real and 3D-virtual objects (with high rendering speed without reducing visual quality), making it necessary to present and manipulate them simultaneously in a single scene1, with development of hybrid systems referred to as AR systems, or similar. Patients should be inspected by dentists carefully when the patient has symptoms rather than sinusitis-like symptoms, the possibility of OMS should always be considered. Dental examination can help to determine whether a maxillary sinusitis has a dental origin, periodontitis and odontogenic radicular cysts still are the most common causes comparing with iatrogenic factors. Patients treated with ESS showed better tolerance and fewer postsurgical complications. Not all patients with OMS including SDCT need definitely surgery whether ESS or intraoral approach, removing dental focus followed with antibiotics would be optimistic choice.

In this way, three-way communication between the endocamera, VE-LP-monitors and the surgeon's senses will provide active virtual tracking, with detecting abnormal patterns in rhinologic endoscopy (any model and/or virtual model of the surgical field is defined as it actually exists in its natural surroundings of the surgical field).

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## Conflict of Interest

None

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