

## EXPERIENCE OF DOING ENDOSCOPIC SINUS SURGERY FOR CHRONIC MAXILLARY SINUSITIS WITHOUT PRE-OPERATIVE CT-SCAN IN A PERIPHERAL HOSPITAL

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### ABSTRACT

**Objective:** To determine frequency of our complications of endoscopic sinus surgery without pre-operative CT-Scan and to compare this frequency with other similar studies done with the help of pre-operative CT-Scans.

**Study Design:** Cross sectional study.

**Place and Duration of Study:** ENT Department, Combined Military Hospital Skardu Pakistan, from Jun 2017 to Jun 2019.

**Methodology:** Total 69 patients (116 Sides) were operated under general anesthesia by using 0 and 30 degree endoscopes to address the Maxillary sinusitis. Frequency of complications was compared to other studies by applying chi-square test for goodness of fit. The complications were also correlated to ages of patients by applying Spearman correlation analysis.

**Results:** Mean age was  $29.75 \pm 10.9$  years (range 15-75). Overall complications rate was 4.3% (5 out of 116 sides, 95% confidence interval 4.23-4.4). Peri-orbital ecchymosis and peri-orbital emphysema were most commonly occurring complications (4.3%). This complication rate was compared to few other studies, which proved that difference was not statistically significant. Correlation of occurrences of orbital complications with the age proved that there was no statistically significant correlation (Correlation coefficient  $r = -0.085$ ,  $p$ -value 0.276).

**Conclusion:** Isolated chronic maxillary sinusitis refractory to medical treatment can be treated by endoscopic sinus surgery without pre-operative CT-Scan.

**Keywords:** Complications, Endoscopic sinus surgery, Maxillary sinus, Nasal polyps, Orbital haemorrhage, Orbital penetration, Pre operative CT-Scan, Sinusitis, Sinus osteoma, Skardu.

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### INTRODUCTION

Endoscopic sinus surgery is a tremendous development for the surgical management of chronic sinusitis and has role in the surgery of sinus, orbit, and skull base diseases.<sup>1</sup> However such new procedures carry risk of orbital and ocular complications because of the close relation to orbit. These complications include ecchymosis, pain and subconjunctival haemorrhage. But serious complications like cerebrospinal fluid leak, optic nerve and extraocular muscle damage and visual loss is also reported.<sup>2</sup> These complications can be minimized by doing meticulous preoperative assessment especially the CT Scan of paranasal sinuses to look for any anatomical variations and the extent of disease. Skardu is a remote small city of Gilgit Baltistan in Pakistan's north at an altitude of 8000 feet. The city is a valley surrounded by peaks of Hamalaya and Karakoram ranges. The climate here is dry and cold. A large number of patients with chronic sinusitis not properly treated for years were found in the ENT outpatient

department. They were not willing to travel the unaffordable and tiring journey to down country for endoscopic surgical treatment of sinus diseases. After procuring the necessary equipment, we planned to perform endoscopic sinus surgeries for chronic maxillary sinusitis without pre operative CT scan paranasal sinuses. Instead of pre operative CT scan we performed diagnostic endoscopy and serial x-rays before and after the recommended medical treatment prior to endoscopic surgery. A preoperative written consent was obtained after counseling the patients about risks of complications of ESS. We confined ourselves to chronic maxillary sinusitis considering the devastating complication of endoscopic sinus surgery. Combined efforts of otorhinolaryngologist, anaesthetist and ophthalmologist made it possible to embark upon this risky affair to promptly diagnose as well as manage any complication.

The objective of this study was to determine frequency of our complications of endoscopic sinus surgery without pre operative CT Scan paranasal sinuses and to compare this frequency with other similar studies done with the help of CT Scans.

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**METHODOLOGY**

This cross sectional study was performed in the ENT Department of Combined Military Hospital Skardu, from June 2017 to June 2019. Formal approval from Institution’s Ethical and Review Board was obtained. Total 69 patients (116 sides) were selected from ENT outpatient department by non-probability convenience sampling technique. Only the patients fulfilling inclusion and exclusion criteria were recruited in this study. A written informed consent from all the patients participating in this study was obtained.

**Inclusion Criteria:**The diagnosed cases of chronic maxillary sinusitis refractory to medical treatment. Only the patients above 16 years of age were selected for this study.

**Exclusion Criteria:** Patients having diabetes mellitus, hypertension, bleeding disorders, nasal polyps or sino-nasal tumours were excluded. On the basis of history, examination, x-ray and endoscopic assessment patients having frontal or ethmoidal sinusitis were also excluded from study. Likewise patients with previous history of endoscopic sinus surgery were also excluded.

As we were not doing pre operative of CT scan, we meticulously performed endoscopic examination under local anesthesia (to confirm the diagnosis of chronic obstruction of maxillary sinus ostia) before going for surgery. After pre anesthesia assessment all patients were admitted before surgery. They were operated under general anesthesia by using zero and 30 O endoscopes (Karl Storz 4mm diameter) to address the Maxillary sinus ostia. In addition septal deformities and turbinate hypertrophies were also treated where required. All the surgeries were performed by the single surgeon, with the same endoscopes under same operative settings. Nasal packing and nasal splints were placed in all the patients to avoid bleeding and synechiae formation. Furthermore post operative regular nasal toilet performed and patients were advised oral antibiotics, analgesics and nasal douching post operatively.

All patients’ data including age, gender, operative procedure and complications was recorded on a performa. The data was analyzed using SPSS-19. Descriptive statistics of age, gender and complication were calculated. Furthermore frequency of complication was compared to other studies by applying chi-square test for goodness of fit ( $p$ -value  $<0.05$  was considered to be statistically significant). The complications were also correlated to ages of patients by applying Spearman correlation analysis.

**RESULTS**

Mean age of all 69 subjects was  $29.75 \pm 10.9$  years (95% confidence interval 26.74-30.76).The range was 15-75 years. As for the gender distribution 49 (71%) were male and 20 (29%) were female. Overall complications rate was 4.3% (5 out of 116 sides, 95% confidence interval 4.23-4.4). All of these were due to orbital penetrations and were managed conservatively without any worst outcome. No patient had loss of vision or diplopia at the end of treatment. Peri-orbital ecchymosis and peri-orbital emphysema were most commonly occurring complications (4.3% out of total 69 patients) as shown in Table-I. Our this complication rate was compared to few other studies by applying chi-square test for goodness of fit to assess the significance of difference as shown in Table-II. Correlation of occurrences of orbital complications with the age proved that there was no statistically significant correlation (Correlation coefficient  $r=-0.085$ ,  $p$ -value 0.276).



**Figure-I: Haematoma of lower eyelid and sub-conjunctival haemorrhage.**

**Table-I: Percentages of each complication.**

Complication	Percentage n=116 sides
Peri-orbital ecchymosis	4.3%
Peri-orbital emphysema	4.3%
Sub conjunctival haemorrhage	2.9%
Peri-orbital hemorrhage	2.9%
Numbness of lower eye lid, cheek	1.4%

**Table-II: Comparison with incidence of complications of ESS in other studies.**

Study Reference	Percentage of complications of FESS	$p$ -value (chi-square test compare with this study result 4.3%)
Asakaet al <sup>3</sup>	5.8	0.492
Mayet al <sup>4</sup>	5.4	0.604
Massimo et al <sup>5</sup> meta-analysis	6.6	0.328
Guerrero et al <sup>6</sup>	19	0.005

## DISCUSSION

As explained in details in introduction part, the unique situation of a remote peripheral hospital and poor socioeconomic condition of local population should be kept in mind while going through this study. By doing detailed pre operative workup including x-ray and diagnostic endoscopy we only operated upon those patients which were having isolated chronic maxillary sinusitis. At the same time we tried our best to ensure that no disease should be left behind, by not performing surgeries on patients having nasal polyposis and pan-sinusitis etc. However minor other issues were addressed.

A similar study was conducted by Asaka *et al*<sup>3</sup> (n=706), to assess the complications of sinus surgeries. According to them minor complications occurred in 40 patients (5.7%), with the most common being hemorrhage (n=18). Multivariate analysis revealed that presence of asthma and the total polyp score correlated significantly with the occurrence of these complications. Pre operative CT scan was performed in this study as pre requisite of endoscopic surgery. Our complications rate is not statistically different than this study (*p*-value 0.492), we limited ourselves to the chronic maxillary sinusitis only and we avoided surgery of nasal polyposis and other sinuses because pre-operative CT scan facility was not available in vicinity.

Mayet *al* published analysis of 2108 cases for the complications of endoscopic sinus surgery in 2009<sup>4</sup>. Most common minor complications were those related to penetration of orbit and adhesions of middle turbinate while minor complications occurred in 6.9% of the total 2108 patients. This percentage is again not statistically significant compared to our percentage (*p*-value 0.604). Our study was lacking pre operative CT scan but as we limited ourself to anterior aspect of lateral nasal wall and extra vigilance was observed not to do any extra adventure in deeper structures, that is why our complication rate was not high.

A meta-analysis was performed to compare the surgery complications between traditional endonasal surgeries and endoscopic sinus surgeries encompassing published studies from 1979-2007<sup>5</sup>. They included all those articles in which surgeries were performed for chronic sinusitis, nasal polyposis and lesions of sinuses. They divided the complications into major and minor categories. As we did not encounter any such major complication in our study so we compared minor complications rate 6.6 to our study results and the

difference between two was not statistically different (*p*-value 0.328).

Guerrero *et al* study included surgeries for chronic Sinusitis and Nasal polyposis (n=110) and most common complication they encountered was nasal adhesions (19%)<sup>6</sup>. In our study we included cases of only chronic sinusitis and because we placed nasal splints in all the patients, that is why we did not face this complication. It's quite evident that doing pre operative CT scan, has no significant role in reducing complication of adhesions after endoscopic sinus surgeries.

Another study of retrospective evaluation of 192 paranasal sinus CT examinations of patients with a clinical history of sinusitis was carried out to estimate the incidence of sinonasal anatomic variations<sup>7</sup>. They also assessed their relation to sino-nasal mucosal diseases. In this study most common normal variants were septal deviation, Aggar nasi cells, and extension of the sphenoid sinuses into the posterior part of nasal septum. There was no statistically significant difference in the prevalence of any of these anatomic variants between patients with minimal and those with clinically significant nasal or paranasal sinus diseases. So they found out that analysis of every routine CT scan performed for rhinitis or sinusitis for the presence of different anatomic variations is of questionable importance unless sinus surgery is planned for these diseases.

Modern CT Scans are now being designed to limit the amount of radiation dose to patients. Wuestet *al* said that shaping the energy spectrum of the x-ray beam resulted in low-dose CT scans. His aim was to analyze dose and image quality of tin filtration at 100kV for preoperative planning in low-dose paranasal CT scan imaging in a large group of patients<sup>8</sup>. In this prospective study they concluded that spectral optimization allowed for visualization of the paranasal sinuses with sufficient image quality at a very low dose radiation exposure. A retrospective study was carried out to compare the absorbed dose of radiation from Cone beam CT scans and conventional CT scans. They compared clarity and image quality of sinus anatomy in patients with sinonasal diseases requiring CT scans.<sup>9</sup> They found out that cone beam CT scan is a quick as well as efficient alternative to conventional CT scans with substantially lesser radiation dose over conventional techniques. Another similar study concluded that Ultra-low-dose CT scan protocols provided sufficient image quality for scanning patients undergoing endoscopic surgery for benign paranasal sinus diseases<sup>10</sup>.



On the contrary there are many researchers strongly proving the benefits of pre operative paranasal sinus CT scans. One of these benefits is identification of critical anatomic sinus variations<sup>11</sup>. The completeness of structured reports of preoperative CT scan images is more beneficial<sup>12</sup>. Revision functional endoscopic sinus surgeries especially need strong support of CT scan imaging to avoid potential complications. CT scans can also delineate anatomical findings that may contribute to recurrent disease in order to improve the success rate in the primary surgery<sup>13</sup>. Likewise the status of Olfactory area and lacrimal system can precisely be assessed using CT scan imaging<sup>14,15</sup>.

PNS and brain CT increase the theoretical risk of thyroid cancer incidence<sup>16</sup>. Study on human cadavers have concluded that sinusitis and preoperative sinus surgery planning can be performed in diagnostic image quality at low radiation dose levels with a multipurpose X-ray system<sup>17</sup>. Pediatric population is especially at risk of radiation exposure when scanned for paranasal sinuses, it is suggested that proper exposure parameters and precise justification will significantly reduce pediatric radiation doses<sup>18</sup>. An ultra-low tube voltage (70 kVp) combined with the Flash CT technique and iterative reconstruction (IR) can reduce the radiation dose significantly<sup>19,20</sup>.

Keeping in view the heavy dose of radiations of CT scans it is suggested that all patients undergoing intranasal surgeries should not be subjected to CT scans. Following steps may be adopted to assess the requirements of CT Scans.

Digital x-ray paranasal sinuses before and at the end of medical treatment of sinusitis. Detailed endoscopic intra nasal examination after xylometazoline nasal spray and lignocaine sprays. Detailed history of the patients and complete examination.

If at all still we need to get the CT scans before surgery, requirement of contrast should also not be used without its judicious use. Plain CT scans are usually sufficient to see all the anatomical variations. However if we are suspecting polyposis, soft tissue mass, cysts, tumours or more complex pathologies then contrast is always required.

High resolution CT scans with thin slices are no doubt better than older versions in providing better guidance about disease as well as surgical steps.

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### LIMITATION OF STUDY

This study was conducted in small hospital with less radiological support like CT scan.

### CONCLUSION

Isolated chronic maxillary sinusitis refractory to medical treatment can be treated by endoscopic sinus surgery without pre operative CT Scan. However it is pertinent to say that meticulous pre operative workup is required to ensure that there is no other pathology existing in other paranasal sinuses.

**Conflict of Interest:** None.

### Authors' Contribution

AA: Study design and surgeon, SA: data collection, SMASB: Manuscript writing, UI: data analysis, SI: Critical revision, SL: data collection

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## Chronic Maxillary Sinusitis

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