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RESEARCH ARTICLE
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COMPARISION OF VASCULARITY IN RHINOLOGICAL SURGERIES -UNDERSTANDING ANAESTHETIC CONSIDERATIONS - A RETROSPECTIVE ANALYSIS

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ABSTRACT

INTRODUCTION: The procedures of otorhinolaryngology often involve either manipulation or sharing the airway and positioning of head and neck in the surgery. While the optical visualization by devices and precision of surgeries by microdebriders are advancing the anaesthetic requirements too expectantly proving advantageous and supportive towards a successful and safe surgical outcome. It has been often noted that otosurgeries need depth of anaesthesia and handling of nitrous oxide and ease of postoperative vomiting due to disturbance of vestibular apparatus during surgery, while rhino surgeries priorities clear surgical field due to high vascularity of sinonasal mucosa. The surgeries with the throat prioritise pain management and prevention of aspiration, working on control of bleeding. Anesthetic pharmacology and multiplicity of airway devices including use of microcuffed tubes and flexible laryngeal mask airway devices, have been part of a jugglery to synchronise the goals of clear surgical field and protection of airway. With newer drugs and techniques on the horizon, it is important to understand the basics of why such goals are special to rhinological surgeries. This article aims to analyse and relate the basic sciences of rhinology to the conduct of anaesthesia. As an upcoming postgraduate institution with both otorhinolaryngology and anaesthesiology, the retrospection of cases serves as an adult for improvement in future

Aims

1. To understand the anatomy and physiology and relate to anaesthetic goals in rhinological surgeries.
2. To analyse the pharmacological principles that synergize with surgical outcome.

Objectives

1. To learn from retrospection of rhinological procedures performed in our institution in the past 20 months
2. To offer recommendations for adopting strategies to improve patient safety, surgical outcome and early discharge.

MATERIAL AND METHODS

Study Type: Retrospective observational review.
Study Place: DSMCH
Study Period: January 2024 – July 2025.

Study Population: All patients recommended for rhinological surgery by the ENT surgeons.
Methods: Analysis of data from case sheets stored in medical records section.

RESULTS
374 cases of ear, nose, throat surgeries were performed of which 166 were rhinosurgeries, which is 44.38 %. All were done under endotracheal general anaesthesia as a standard protocol though pharmacological management varied with consultants.

CONCLUSION
Vascular and neural supply contribute towards the therapeutic measures to offer an oligemic field for the surgeon to perform rhino surgery Mere reduction of blood pressure with vasodilators does not offer a satisfactory surgical field. Vascular tone is mainly controlled by sympathetic innervation and sensations at touch, pain and temperature by trigeminal nerve. The goal of achieving a clear surgical field can be accomplished by using topical vasoconstrictors and by controlling sympathetic stimulation through management of pain, emotion, stress, and temperature. The variety of intraoperative drugs recommended have individual drawbacks such as lack of analgesia with metoprolol and nitroglycerine, tachycardia with nitroglycerine, lack of vasoconstriction with dexmedetomidine while vasodilation occurred with every drug. Any stimulus to the nose produces only vascular congestion due to sympathetic overactivity, the veins not in parallel with arteries and external and internal carotid contribution to vascularity further provoke vascular congestion. A combination of topical vasoconstriction, good pain relief adequate sympathetic ablation and relative bradycardia are all essential for a clear surgical field.

KEYWORDS: Vascular and Neural Supply of Nose, Rhino Surgery, Optimal Surgical Field for FESS and Grading Scale, Topical Vasoconstrictors, Vasodilators.

INTRODUCTION

The commonest nasal symptoms of patients needing rhinological interventions include nasal blockade and nasal discharge which may be unilateral or bilateral. A consistent unilateral nasal block with mild epistaxis and pain around orbit or nose often suggests malignancy. The common rhino surgeries are those involving septum or paranasal sinuses. Newer simple gadgets such as peak inspiratory nasal flow meter[1] with a normal value of 100 liters per minute in an adult have been used to detect early nasal obstruction or abnormalities with the internal nasal valve. Knowledge of developmental and functional anatomy of the nasal vestibule and paranasal sinuses throw conceptual light to enhance the ultimate goal of surgery which is the creation of a new functional sinus cavity. The functional units of nose and paranasal sinuses have clinical relevance and offer important perspective towards functional endoscopic sinus surgery.

The process such as flow metabolism coupling and neurovascular coupling play vital roles in cerebral autoregulation. The blood supply and nerve supply of the lateral wall of nose with the multiple points of drainage of paranasal sinuses and nasolacrimal duct and the increased nasal mucosa surface area are all closely linked to the pathophysiology of various nasal disorders. Any surgical instrumentation of the compartments necessitates complete dissection and removal of all diseased mucosal cells, prevent mucocele formation, reestablish post-surgical mucociliary function that is free of recirculation effects and enable maximal delivery of topical therapy.

Thus, a clear surgical field in the small cavity of 150cm^2(though on increased surface area including microvilli could be upto 960cm^2) is essential for a successful functional surgical outcome. This article discusses the basis of various approaches.

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The goals of anaesthesia and surgery in rhinological surgical conditions need better understanding of embryology and surgical anatomy. The achievement of hemodynamic parameters by pharmacological methods alone may not be adequate for a clear surgical field. The basics of rhinology offer insights to optimize perioperative management of rhinosurgical procedures. The embryology and structural anatomy of nasal septum, lateral wall of nose and sinuses are of foremost consideration in the discussion.

The primitive nose starts developing from placodes which are essentially neural crest cells that migrate to the destination of future nose. This explains the importance of nerve and blood supply that are interrelated and any emotional triggers or sympathetic stimulus could increase vasodilation, nasal blockade or serous discharge through nostrils. We could recollect vasomotor rhinitis which is mentioned as the cause of serous nasal discharge immediately following a full meal.

Objectives	Strategies
Airway management	Facilitate surgical access
	Shared airway precautions
	Preference for the flexible laryngeal mask airway (FLMA) as a primary ventilatory device
Provision of a clear surgical field	Superior hemodynamic stability
	A stable, adequate plane of anesthesia
	Preference for total intravenous anesthesia (TIVA) with propofol and remifentanil
	Moderate controlled hypotension
	Relative bradycardia
	Preference for FLMA as a primary ventilator device
	Hypnotic monitoring
	Effective surgical hemostasis
	Elevating patient's head 15–20 degrees
	Minimizing mean inspiratory pressure during controlled ventilation
Immobility of the surgical field for precision surgery	Absence of patient's movement
	Hypnotic monitoring
	Avoidance of iatrogenic motion interference:
	Placement of blood pressure cuff away from the surgeon
	Situational awareness
Smooth and rapid emergence from anesthesia, without associated bucking, coughing, or straining	Preference for TIVA with propofol and remifentanil
	Avoidance of deep extubation
	Rapid return of consciousness and protective airway reflexes
	Smooth extubation strategies:
	Remifentanil emergence
	Bailey maneuver
	FLMA as a primary ventilatory device
Fast-tracking patients for discharge	Stratified use of intravenous opioids
	Multimodal analgesia
	Adjuvant techniques
	Aggressive prevention of postoperative nausea and vomiting

Table 1: Anaesthetic Strategies for Patient Undergoing Rhinological Procedures

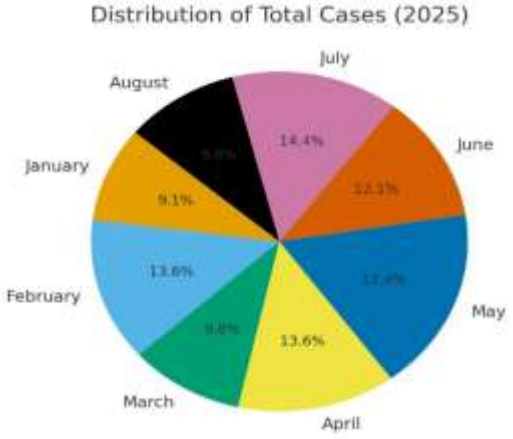

Figure 1: Distribution of Total Cases

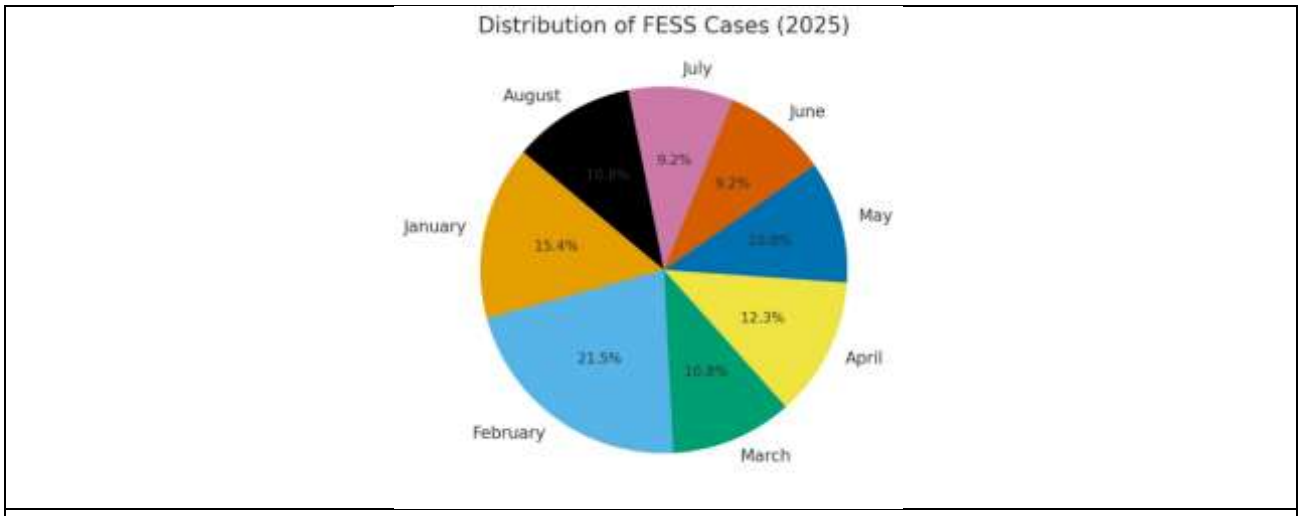

Figure 2: Distribution of Fess Cases

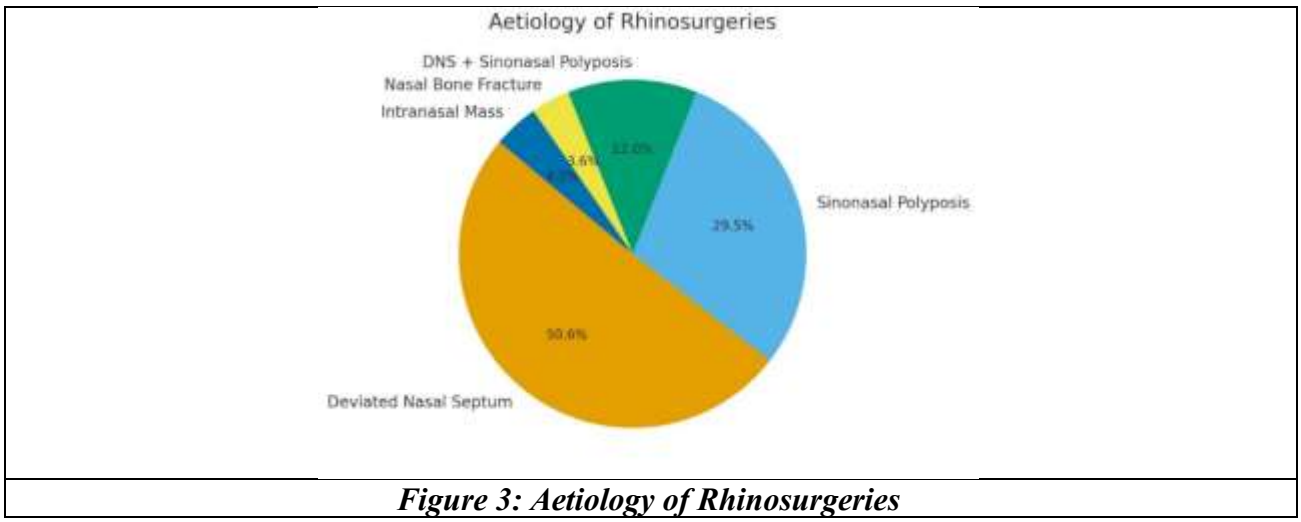

Figure 3: Aetiology of Rhinosurgeries

DISCUSSION

Embryology

The nose develops from a number of mesenchymal processes during 4th week of gestation. Collection of neural crest cells undergo proliferation and form nasal placodes.[2] Sinking of nasal placodes form nasal pits that deepen to form nasal sac. Medial and lateral nasal prominences surround the pit and sac as proliferations of mesoderm. These form the nares. The lateral nasal prominences form nasal bones. Upper lateral cartilages and lateral cous of lower lateral cartilages. The nasal septum develops from posterior midline growth of the frontonasal process in the root of the oral cavity and extends posteriorly to the opening of the Rathke's pouch.

The maxillary sinus is the first sinus to appear between 7th and 10th weeks of gestation. The maxillary sinus appears as a shallow groove expanding from primitive ethmoidal infundibulum into the mass of the maxilla. Expansion and absorption results in a small sinus cavity at birth. Rapid growth of this cavity occurs until age 7 and reaches final size by 17-18 years. Extensive pneumatization may occur to involve the entire hard palate.n During the 9th and 10th weeks of gestation a series of folds called the ethmo-turbinals appear in the lateral wall of nasal capsule. All permanent ethmoidal structures are present at birth and develop from crests and furrows between them. Hence acute sinusitis in children often involves ethmoidal cavity and cause orbital complications. The ethmoturbinals define a series of lamella from anterior of sinonasal cavity to the sphenoidal sinus. The sphenoid sinus develops in the 12th week of gestation. A small sphenoidal sinus is present at birth with progressive enlargement from the age of three during pneumatization

of sphenoid bone. Sellar, presellar and conchal patterns are the variations in pneumatization of the sphenoid which are important in planning trans-sphenoidal approaches to pituitary tumors. The pneumatization results in exposure of the neurovascular structures surrounding the sphenoidal sinus. The frontal sinus is the most variable sinus in terms of size and shape. Pneumatization of frontal bone begins during 16th week of gestation originating from anterior ethmoid complex. These are radio logically visualised better at the age of eight years until 18 years of age where progressive pneumatization occurs. The paranasal sinuses have important function during respiration and play important role in maintaining temperature homeostasis, the sinuses offer humidification and warmth to the inspired Air, they lighten the weight of the head, protect the skull from trauma and acts as resonating chambers for speech. Thus, a functional endoscopic sinus surgery aims to preserve all the functions of the sinuses and prevent an empty nose syndrome which is an avoidable, post-operative complication, resulting in impaired smell and loss of aforesaid functions.

The anterior third of nasal passage has a critical functional role and can greatly influence nasal air flow. The nasal cartilages consist of Hyaline cartilage is which includes upper and lower, lateral cartilages, septum and sesamoid complex. The relationship and architecture of these cartridges from the external and internal nasal valves which are critical to nasal airflow. The internal nasal valve is the narrowest portion of nasal cavity and any structural deviation of the cartilage architecture could result in nasal obstruction.

Blood Supply

The arterial supply to the external nose has both external carotid and internal carotid artery contributions. Branches of facial artery supply, the alar region and include angular and superior labial arteries. The angular artery and its lateral nasal branch supply the nasal side wall and Ala. The superior labial artery gives rise to a columellar branch that supplies the nasal columellar and a septal branch that supplies the anterior nasal septum. The ophthalmic artery gives rise to the dorsal nasal branch which anastomoses with the lateral nasal branch of angular artery to supply the dorsum and nasal side wall. The nasal dorsum and nasal sidewall also receive vascular supply from external nasal branch of anterior ethmoidal artery and infraorbital artery respectively. There are rich anastomoses between these vessels on each side and between right and left sides of the nose.

To summarise the nasal blood supply, branches of ophthalmic and maxillary artery namely anterior and posterior ethmoidal from ophthalmic and sphenopalatine, greater palatine, infra orbital and superior labial arteries from maxillary artery form kiesselbach's Plexus on the anterior septum.

Anterior ethmoidal artery supplies upper septum and anterior lateral wall. Posterior ethmoidal artery supplies superior turbinate and upper septum. Sphenopalatine artery supplies middle and inferior turbinates and posterior septum. Superior labial artery supplies anterior septum and nasal flow while the greater palatine artery supplies the renal flow.

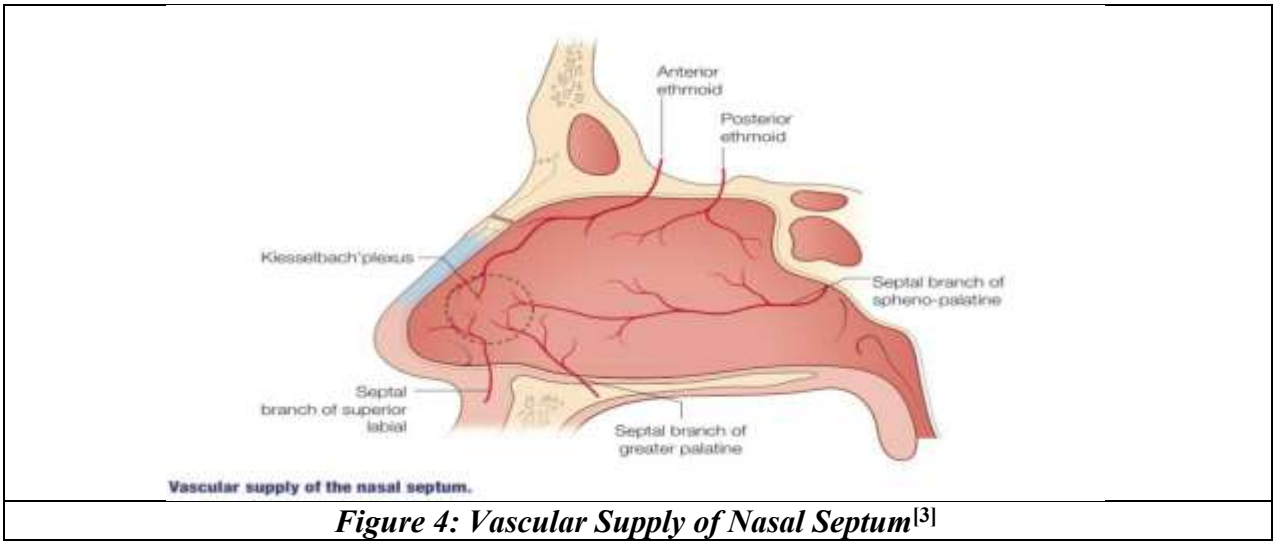

***Figure 4: Vascular Supply of Nasal Septum*[3]**

The most vascular part of nose is the kiesselbach's plexus which is a crucial anastomosis between branches of superior labial artery, anterior ethmoidal, greater palatine and sphenopalatine arteries. The ethmoidal sinuses are supplied by the anterior and posterior ethmoidal artery.[4] Maxillary sinus is supplied by branches of maxillary artery and infraorbital artery. Sphenoidal sinus is supplied by pharyngeal branch of maxillary artery.

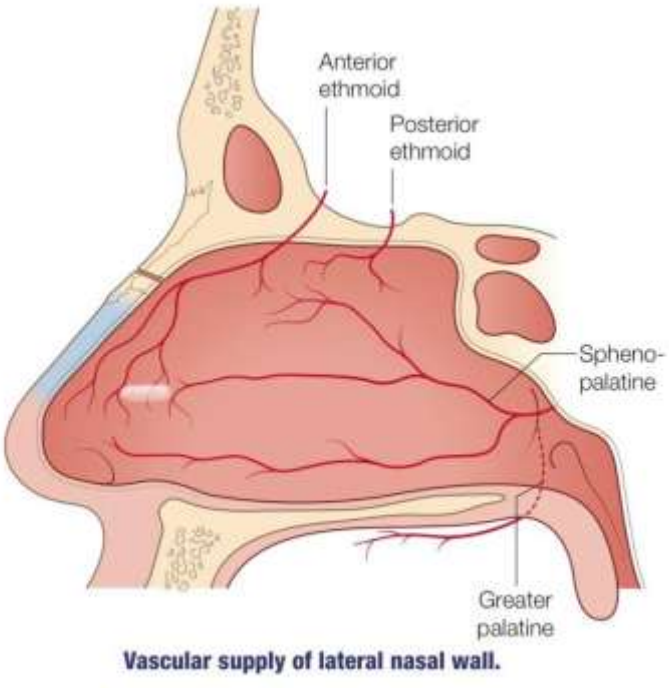

***Figure 5: Vascular Supply of Lateral Nasal Wall*[5]**

The venous networks do not parallel the arteries but correspond to territories termed arteriovenous units. The frontomedian area drains to facial vein and orbitopalpebral area drains to ophthalmic vein. The facial vein communicates through a valveless venous system with cavernous sinus via ophthalmic vein. The upper lip and nose are considered the danger area of face because infections in this region may be transmitted in a retrograde fashion intracranially to the cavernous sinus.[6]

The nerve supply of external nose offers the advantage of performing nerve blocks for rhinoplasty or closed reduction of nasal fracture. The supra and infratrochlear branches of the ophthalmic nerve supply the nasal root, bridge and upper portion of side wall of nose. The infraorbital branch of maxillary nerve supplies the remaining skin of nasal side wall. The skin over the dorsum and tip is supplied by external nasal branch of anterior ethmoidal nerve.

Innervation of nasal mucosa has both autonomic and sensory components. The autonomic nervous system regulates the degree of vascular tone (turbinate congestion) and nasal secretions present in the nose. Nasal secretion is regulated by parasympathetic system. Presynaptic parasympathetic fibers travel along the vidian nerve (contribution from greater superficial petrosal (parasympathetic) and deep petrosal (sympathetic) nerves and synapse within sphenopalatine ganglion to innervate the nasal mucosa via postsynaptic fibres. Vascular tone and turbinate congestion are regulated by the sympathetic nervous system. Thus, any emotional or stress factors affect the working field of nasal mucosa, producing a bloody surgical field.

Postsynaptic sympathetic fibers pass through sphenopalatine ganglion and terminate in the nasal mucosa. The ophthalmic and maxillary divisions of the trigeminal nerve provide the sensory innervation to the nasal mucosa. Trigeminal nerve also passes the sphenopalatine ganglion and transmits sensations of pain, touch and temperature. The lateral wall of nose and turbinates are

supplied by the posterolateral nerves from V2 arising from sphenopalatine foramen and ethmoidal nerves from V1. The neural innervation of the lateral wall of nose continues caudally.
Thus, the parasympathetic supply regulatesNasal secretions, sympathetic supply regulates vascular tone, and turbinate congestion and the trigeminal nerve controls nasal cavity congestion. Superficial muscular aponeurotic system (SMAS). Is an organised fibrous network, comprised of platysma, parotid fascia, and fibromuscular layer covering the cheek. This divides the deep and superficial adipose tissue.[7]

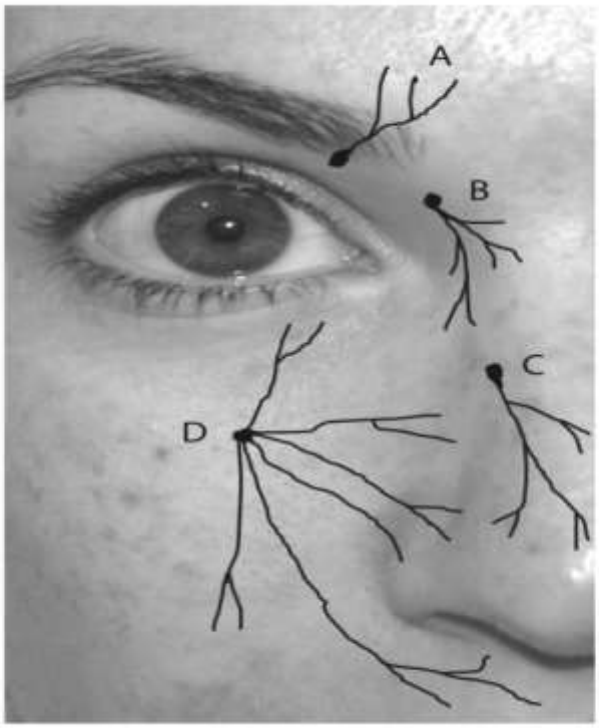

***Figure 6: (A) Supratrochlear nerve (B) Infratrochlear nerve (C) Anterior ethmoid nerve (D) infraorbital nerve*[8]**

Anatomically SMAS lies inferior to zygomatic arch and superior to platysmas muscular belly and forms, and aponeurotic mask over the facial muscles. SMAS is mainly innervated by facial nerve whose branches, temporal, zygomatic and marginal mandibular nerves travel Deep to SMAS while the sensory branches of trigeminal nerves course superior to SMAS, the great auricular nerve supplies inferolateral SMAS.[9]
Nasal Surgery involves external procedures those within nasal cavity, surgery with nasal bones and nasal sinus surgery. Special concerns during pre-operative assessment needs focus on selection of appropriate drugs for topical and intravenous use in the peri operative period, possibly of undiagnosed, obstructive sleep apnoea, and potential presence of Santers triad namely asthma, nasal polyp and aspirin sensitivity. Nasal surgeries are aimed at improved nasal air flow and ventilation of the sinuses. Any nasal pathology presence with nasal obstruction, either unilateral partial or near total. Nasal congestion and vasodilation are present almost in all cases of nasal obstruction. Near total nasal airway obstruction could occur as a result of gross septal deviation blocking one nasal passage and contralateral, inferior turbinate hypertrophy blocking the other passage.[10]
The goals of nasal surgery include blood free surgical field, patient mobility, stable cardiorespiratory conditions, and gentle emergence from Anaesthesia. The choice of drugs begins from pre-medicating with oral drugs in the ward on the night prior to the day of surgery. The choice of drugs progress through induction, maintenance, and emergency. Controlled hypotension itself is not a sole Answer for a clear surgical field. Studies have shown better operating condition with

intraoperative beta blockers rather than Vasodilatory drugs.[11] Despite minimal arterial pressure difference between surgical conditions could occur because of lower heart rate and cardio output.
Topical decongestants and Vasoconstrictors such as oxymetazoline and 1 percent lignocaine with 1 in 100000 epinephrine especially have been extensively advocated to counter the Vasodilatory blockade of nose, which may be due to inflammatory pathology or any sympathetic stimulation. The advantages of a clear surgical field during use of an image guided surgical system allows the surgeon to know where they are exactly operating with a real time, endoscopic view which visualise coronal, sagittal and axial CT images at the same time. Oral predications on the night prior to the day of Surgery have proved to be useful in intro operative management. Various studies comparing different medications. Different roots of administration are available to compare intro operator. Vasodilators in order to achieve a surgical field. The commonly used tablets are clonidine, metoprolol XL, Pregabalin, Flupirtine, nifedipine retard to name a few.
Clonidine, an alpha2 agonist, 75mcg on the night prior to day of surgery or two hours before surgery has proved to be safe and effective and providing or potentiating depth of Anaesthesia, reduce bleeding, and gradual fall of blood pressure.[12] Western literature suggests 200 mcg of clonidine given two hours before surgery as an effective measure concurring surgeons satisfaction. The next drug is metoprolol, acardio selective beta blocker when give 100 mg one hour prior to surgery significantly lowered heart rate and blood pressure. It was noted that a sympathetic response of tachycardia as an inflammatory response of surgical handling with sympathetic stimulation was controlled better with the beta blocker as a clearer surgical field showed up with bradycardia irrespective of hypotension with tachycardia. Metoprolol was thus known to significantly improve visual clarity and hemodynamics during FESS.[13] The surgical field was graded by the surgeon using Fromme - Boezaart grading scale.[14]

Grade	Assessment
0	No bleeding (cadaveric conditions)
1	Slight bleeding - no suctioning required
2	Slight bleeding - occasional suctioning required
3	Slight bleeding - frequent suctioning required; bleeding threatens surgical field a few seconds after suction is removed
4	Moderate bleeding - frequent suctioning required and bleeding threatens surgical field directly after suction is removed
5	Severe bleeding - constant suctioning required; bleeding appears faster than can be removed by suction; surgical field severely

***Table 2: Fromme Boezaart Grading Scale*[15]**

There are other recent studies that compare clonidine and metoprolol and suggested superiority of oral clonidine over metoprolol due to its anesthetic sparing effect or reduced requirements of anesthetics with clonidine in pre medication.[16]
Pregabalin is an analgesic that also reduces neuronal excitability and an anticonvulsant. The mechanism of action is by binding to alpha 2- delta subunit of pre synaptic voltage gated calcium channels, resulting in reduction in release of glutamate, noradrenaline, serotonin, dopamine and substance P.[17] Pregabalin is a structural synthetic derivative of the inhibitory neurotransmitter gamma aminobutyric acid and hence has analgesic,anticonvulsant, anxiolytics and sleep modulating activities, when used as premedication it reduced laryngoscopic response and prolonged analgesia. The effects of Pregabalin are dose dependent usage from 50 to 300 mg have been reported. Doses below 150mg are sedative and anxiolytics, while analgesic properties are achieve with 150 to 300 mg. adverse effects occurred beyond 300 mg such as dizziness and light headedness. Multiple

studies comparing Pregabalin and benzodiazepines showed a high postoperative sedation score with the former and reduced postoperative analgesic requirement.[18] Pregabalin with the dose of 75 mg one hour before surgery attenuates sympathetic response to endotracheal intubation and nasal stimulation thus causing a clear surgical field.

Flupirtine is a non-opioid analgesic used for mild to moderate pain relief. It's a selective potassium channel opener that reduces excess electrical activity causing pain. It's also an antagonist NMDA. Early advent of altered liver biochemistry with variable progression to liver dysfunction and poor analgesic properties made usage of Flupirtine very limited.[19] This drug up regulates BCL 2, increases glutathione levels, activates an inwardly rectifying potassium channel and delays loss of inter mitochondrial membrane calcium retention capacity. Topical vasoconstrictors are the next in the ladder.

Decongestants such as oxymetazoline, vasoconstrictors such as phenylephrine, epinephrine with or without lignocaine have been described. Cocaine is a local anesthetic and vasoconstrictor. Any type of a sympathetic stimulation causes vasodilation and nasal congestion due to the rich blood supply of lateral wall of nose and also sympathetic nerve supply of the turbinates along with sensory nerve supply by trigeminal drive around the nostrils.

Oxymetazoline stimulates alpha adrenergic receptors in the nasal lining causing blood vessels to narrow. It's an imidazole derivative developed from xylometazoline by wolfgang fruhstorfer and helmatmuller calgan in 1961.[20] Oxymetazoline is a direct sympathomimetic but binds to and activated alpha one adrenergic receptor and alpha 2 adrenergic receptors. It has such vasoconstricting properties to be used to treat nasal bleeds, the disadvantages include dependence and rebound congestion or rhinitis medicamentosa.[21] Dependence is countered by fluticasone. The vasoconstrictive properties are due to its action on endothelial post synaptic alpha 2 receptors, systemic action on alpha 2 receptors cause vasodilation in contrast. The vasoconstriction counters pathologic vasodilation by relieving nasal congestion and increasing luminal diameter along with exudation of fluid from post capillary venules. It's excreted unchanged by kidneys (30%) with elimination half-life in humans of 5-8 hours.[22] The use of topical vasoconstrictors especially in cosmetic rhinoplasty have been extensively studied. Comparison of topical aqueous solution of 4 % cocaine and 1:1000 epinephrine found as stronger and predictable vasoconstrictive effect with the former.[23] As general anesthesia caused wide spread vasodilation and hyperemic nasal mucosa topical applications to decongest nose and reduce nasal blood flow to optimize the operative field is considered essential several combinations of agents such as moffett's solution[24] an eponymous title for mixture of cocaine, sodium bicarbonate and adrenaline were used and published as reliable method of topical preparation of nose not only for rhino surgeries but also for nasal intubation in patients with complicated cardiac conditions and preeclampsia to ablate the hemodynamic response to intubation.[25]

Phenylephrine is a selective alpha 1 adrenergic receptor agonist and tried as nasal decongestant in the form of nasal spray. However, its effectiveness as an oral nasal decongestant has been questioned. Food and drug administration concluded in 2023 that phenylephrine was ineffective as nasal decongestant when taken orally.[26]

Epinephrine acts as a topical vasoconstrictor by acting on alpha adrenergic receptors in small blood vessels leading to their constriction, reduced blood flow and improved hemostasis. The fear of cause acute cardiovascular changes such as acute tachycardia, hypertension, and probable corona events was evaluated by several studies on topical use of epinephrine.[23] Topical epinephrine is generally safe and efficacy of its use in adults undergoing endoscopic sinus surgery, except in those with pre-existing cardiovascular disease was highly acceptable and considered as an ideal topical vasoconstrictor in several studies. The higher concentrations were needed for hemostasis.

Lignocaine when used alone has a Vasodilator effect but offer potent and prolonged local anaesthetic effect and Vasoconstriction when combined with adrenaline.

Anatomical structure and area of sinonasal region limits the approach of septoplasty, optimal visualisation of Surgical field could be achieved by countering the Vaso dilation with epinephrine.

The usage of epinephrine with lignocaine is essential to achieve this goal in rhino logical surgeries. Several studies have been conducted widely all over the world regarding Lignocaine with and without epinephrine with different concentrations of lignocaine variable concentrations of adrenaline and so on epinephrine reduces intraoperative bleeding, delays systemic absorption, prolongs anaesthetic effect, allows higher volumes with a lesser risk of toxicity.[27] The best pain relief and preferable duration was achieved with 2% lignocaine with 1:200000 adrenaline among different concentration of lignocaine namely .5%, 1%, 1.5% and 2% concentration.[28]

In our institution rhino, Surgery's constituted 44.38% of 374 cases of ear, nose, throat surgeries. Different techniques and drugs were adopted for hypotension in order to achieve clear surgical field. Dexmedetomidine, propofol, nitroglycerin and remifentanyl were the drugs used by different consultant which are briefly discussed as follows: all the patient had fentanyl, propofol and vecuronium or rocuronium for induction and intubation. Intraoperative infusions were started soon there of propofol 1mg/ml dexmedetomidine 2 mcg/ml and remifentanyl 1 mcg/kg over 90 seconds intravenously Followed by infusion of 0.25 -1mcg with isoflurane 1% and IPPV. (0.25-1mcg/kg/min)

Remifentanyl hydrochloride is the most recent addition to the group of narcotics it is rapidly elimination than fentanyl with a very short half-life of 3-10mins and peak effect occurs in 1.6mins (as effect site concentration reaches a peak in 1.1min only) the remarkable pharmacokinetics is an extraordinary clearance of 3litres/min. The advantages are prompt achievement and steady state concentration in plasma leading to rapid onset, lessaccumulation, predictable termination of effects, allowing precise titration. The pharmacokinetic are unchanged in renal and hepatic failure. The undesirable effects of bradycardia, hypotension, respiratorydepression, muscle rigidity along with poor analgesia in routine doses. Hence it is often needed to add up analgesic and muscle relaxants, whenever this drug is used. Due to the presence of glycine in the formula remifentanyl is contraindicated for epidural or intrathecal root of administration.[29] Routine use of remifentanyl is subject to availability, affordability and nature of procedure along with its duration. vasodilation, musclestiffness, inadequate analgesia adds to its limitations.

Functional endoscopic sinus surgery aims to restore sinus ventilation and function. Better surgical field visualisation could prevent complications such as injury to vital structures namely optic nerve and internal carotid artery.

Dexmeditomidine is a highly selective alpha 2 agonist which shows promising results in sedation, analgesia, post op shivering, reduced narcotics or analgesic requirement and so on. Dexmeditomidine as 0.5mcg/kg/hr infusion following a bolus of 1mcg/kg has been widely studied[30] property of bradycardia and depth of analgesia have provided an oligemic surgical field rather than hypotension. All the studies concluded the prolonged extubation time though the process were smooth. The patient who undergoes FESS is often expected to be clear headed so as to voluntarily do adequate mouth breathing in the event of bilateral nasal pack. Several studies significant hypotension that could be caused by dexmeditomidine which also showed weak analgesic properties that are inadequate for a surgical pain. Reduced perioperative blood loss has been consistently noted by several researchers. Simpson P.et al confirmed the reduced blood loss during various surgeries. Goksu et al[31] reported moderate controlled hypotension lesser pain scores, better surgical visibility, and lesser side-effects when dexmeditomidine was used. Ulger et al compared nitroglycerin and dexmeditomidine in middle ear surgeries[32] and found that dexmeditomidine maintained hemodynamic stability and better, Surgical visibility, contrary to nitroglycerin that caused reflex tachycardia with a possibility of rebound hypertension. While dexmeditomidine does not produce Analgesia for Surgical pain, less hypotension and the bradycardia seem advantageous in creating an ideal oligemic field, nitroglycerin produces hypotension but not a satisfactory surgical field.

If the rate component appears more effective to create a comfortable field, metoprolol cardio selective Beta blocker, causes reduction in heart rate, very gradual fall in blood pressure, no analgesia, no potentiation or prolongation of Anaesthesia.

Propofol infusion at a rate of .3 to .6mg/kg/hr has been used following an induction dose as bolus of 2Mg/kg. It is not ideal drug in FESS as the Vasodilation causes congestion of the surgical field, in spite of hypotension. It has no analgesic property but causes transient, increase in depth of sedation but aimed rapid recovery.

SUMMARY

In our series of 153 cases of Nasal surgeries including nasal septal correction and sinonasal polyposis handled by, different consultants over a period of 20 months, all the above said infusions of dexmeditomidine, propofol and nitroglycerin were used with variable results on clear surgical field (FB SCALE. 2- 4 grades). Probing into the rich blood supply, forming an idea of the pathology with the pre-operative CT scan and endoscopy findings by the ENT surgeon, it was understood about the dominant sympathetic supply, and any stimulus resulting only in Intra nasal Vasodilation and congestion of the field. Thus, topical vasoconstriction and ablation of sympathetic responses were found to be of for most consideration. 20 cases of sinonasal polyposis received nasal packing in the recumbent position with 2% lignocaine with adrenaline (1:200000) after explaining to the patient and encouraging mouth, breathing one hour before surgery. Patient was sedated with 2mg of midazolam intravenously and monitored in the preoperative area with recommended standard monitoring and intravenous fluids. Always shifted in a trolley into the operation theatre, and after removal of nasal pack routine endotracheal general anaesthesia was instituted. Sympathetic response to endo intubation was taken care by lignocaine 2mg IV, good full dose of propofol (2mg/kg), vecuronium, oxygen, nitrous oxide, isoflurane / IPPV.

This procedure gave an excellent oligemic surgical field (FB scale grade 1) though blood pressure was maintaining a MAP. < 70 mmHg. Continuous infusion to produce further hypotension was not required as the field was already optimal. Patient with systemic hypertension though needed nitroglycerin administration (0.1 mg bolus + 5 mcg /kg/hr.

CONCLUSION

The lateral wall of nose is highly vascular with blood supply from both internal and external carotid arteries. The nerve supply is sympathetic, parasympathetic, and sensory supply by trigeminal nerve around Ala nasi. The nose is complex in structure with bony and cartilaginous septal component, direct communication with cavernous sinuses and a vasodilatory response to any stimulus. Though controlled hypotension with multiple drugs including alpha2 agonist, beta blockers and vasodilators is an aspect of reducing the bleeding, a calm patient with good topical vasoconstriction, smooth endotracheal intubation, correct depth of Anaesthesia and paralysis of NMJ all play vital role in providing a satisfactory oligemic field for the surgeon that preventing injury to vital structures and effective surgical management.

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