

# Anterior Ethmoidal Nerve Syndrome - An Under-diagnosed Cause of Headache

<https://doi.org/10.47210/bjohns.2022.v30i1.648>

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## ABSTRACT

### Introduction

The anterior ethmoidal nerve syndrome is a group of symptoms resulting from irritation of the terminal branches of the anterior ethmoidal nerve. Middle turbinate compression against the septum or the lateral nasal wall may cause a neuropathic facial pain syndrome which is often confused with sinogenic headache or other causes of headache. The diagnosis of anterior ethmoidal nerve syndrome is based on clinical and radiologic findings and needs a high index of suspicion. Our objective is to determine the nasal cause of headache and to create awareness among young ENT surgeons about various local causes of craniofacial pain.

### Materials and Methods

A retrospective observational study carried out in a tertiary care hospital of North India. 30 patients who fulfilled the clinical diagnostic criteria were selected for the study.

### Results

All the patients were analysed, managed accordingly by conservative and surgical management and outcome analysed. All patients were managed with medical and surgical management. Out of 30 patients, 28 (93.33%) patients improved in which 2 patients improved by medical management and 26 patients by surgical management.

### Conclusion

The diagnosis requires a strong clinical suspicion and appropriate evaluation including nasal endoscopy, scan and anesthesia of the suspected point of contact.

### Keywords

Anterior Ethmoidal Nerve Syndrome; Sluder's Neuralgia; Contact Point Headache; Charlin's Syndrome; Five Finger Headache

Headache and facial pain are very common symptoms with which patients present in Otolaryngology clinic. Often it becomes a challenge to pin point the diagnosis due to which the patients have to visit otolaryngologists, neurologists and ophthalmologists time and again. Patients with persistent pain over the nasal bridge may be due to anterior ethmoidal neuralgia. The pain syndrome arises when the middle turbinate compresses against the septum or the lateral nasal wall and results in a neuralgic Headache, periorbital pain and nasal root pain. Diagnosis of facial pain is based on a full and detailed history as well as physical signs. The anterior ethmoidal nerve is a branch of the ophthalmic division of the trigeminal nerve which innervates the middle turbinate and nasal septum. The promotion of symptoms by stimulation of the nerve and

their abolition after application of local anaesthetic are diagnostic features.<sup>1,2</sup>

A Persistent external nasal pain can be an extremely difficult pain condition to treat. In the ENT literature few references exist describing the refractory pain syndrome known as anterior ethmoidal neuralgia. The pain is usually at first a continuous throbbing ache which progresses to severe, sharp and stabbing pain.<sup>2,3</sup>

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## Material and Methods

A retrospective observational study carried out in the Department of ENT of a tertiary care hospital of Northern India from September 2020 to June 2022. 30 patients who fulfilled the clinical diagnostic criteria were selected for the study. The diagnosis of a probable case of anterior ethmoidal nerve syndrome was based on clinical evaluation and visualization of a contact point in the nasal cavity between the lateral and medial walls in diagnostic nasal endoscopy.

The clinical diagnostic criteria used was as follows<sup>1,2</sup> - unilateral localised pain over face, upper jaw and nasal bridge; sharp shooting pain, less commonly pressure pain; contact point pain & tenderness; not associated with nausea, vomiting, photophobia, lacrimation; temporary relief of pain on decongestant use (as a result of temporary mucosal decongestion and cessation of contact).

Demonstration of a quick but temporary relief in pain by placing pledgets soaked with 4% lignocaine at the contact point or local injection of lignocaine / bupivacaine at the junction of nasal bone and upper lateral cartilage (site of external nasal branch of anterior ethmoidal nerve) gives a more definite evidence of neuropathic pain due to anterior ethmoidal nerve irritation.

Imaging by CT scans were done in all of our cases and played a major role in determining the level of contact between the two walls of nose and ascertain the point of contact, however there is a chance of false positive findings as a result of physiologic mucosal nasal cycle or due to mucosal edema in seasonal rhinitis.

Previously diagnosed case of chronic rhinosinusitis, chronic rhinosinusitis with nasal polyposis, known case of trigeminal neuralgia, migraine, brain lesion, and patients using spectacles are excluded from our study.

## Results

In our study 30 patients were included, out of which 12 were males and 18 females with minimum age 24 years and maximum 53 years with a mean of 36.2 years. Of these, 10 patients complained of symptoms on the right

side and 20 had complaints on the left sided, none had bilateral pain.

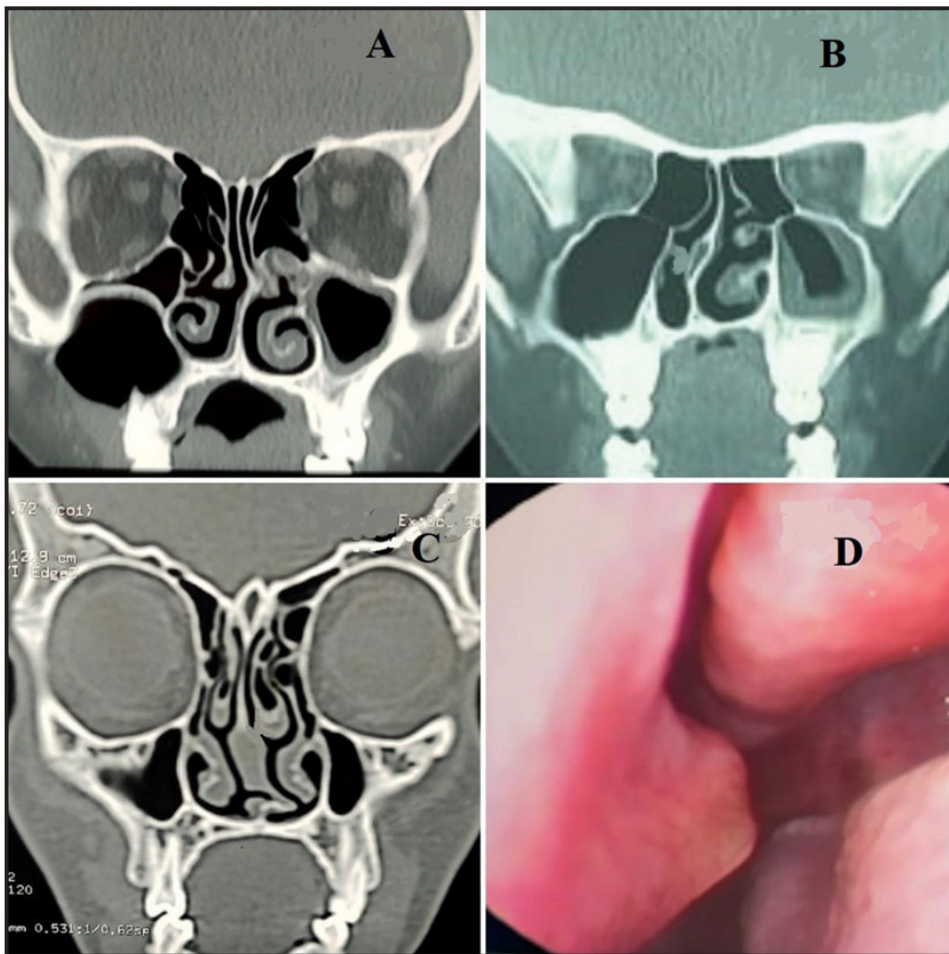
The diagnosis of anterior ethmoidal nerve syndrome was reached after ruling out other common causes of headache with detailed clinical history and examination, diagnostic nasal endoscopy and imaging using CT scans. (Fig. 1) Finally the diagnosis was ascertained by placing a pledget soaked with local anaesthetic agent in the ethmoidal cleft which led to immediate but temporary relief of symptoms.

Further we looked for the etiology of anterior ethmoidal nerve syndrome with nasal endoscopy and CT scans. (Table I)

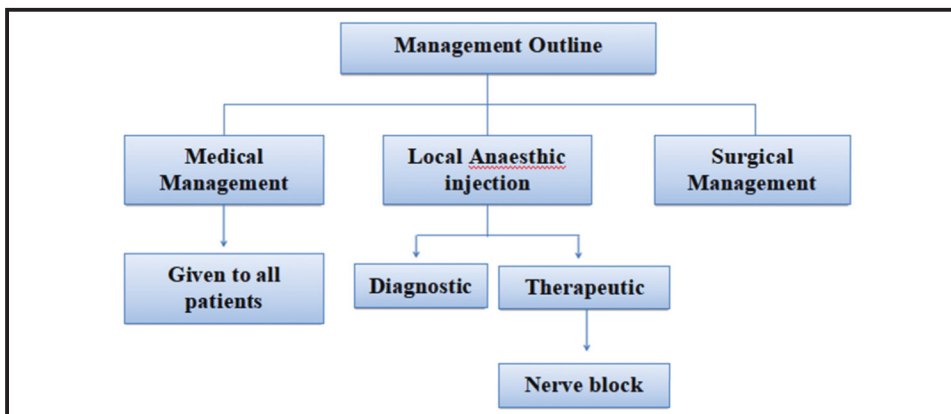
**Table I: Causes of Anterior Ethmoidal Nerve Syndrome**

CAUSES	NUMBER OF CASES
Concha bullosa	3
Deviated Nasal Septum(DNS) only (Fig 1B)	4
DNS with Septal spur (Fig. 1A, 1D)	10
DNS with concha bullosa (Fig. 1C)	4
Trauma	2
Nerve sheath Tumour	1
Paradoxical curved middle turbinate	1
Superior terminate touching septum	1
Large ethmoidal bulla	2
Idiopathic / cluster headache	2
<b>Total</b>	<b>30</b>

We treated the patients according to the following flowchart (Fig. 2). All patients were symptomatically treated for neuralgic pain using Gabapentin and Pregabalin for a variable duration.



**Fig. 1.** CT scan images of (A) Left sided DNS with septal spur; (B) Right sided DNS only; (C) DNS and spur with Concha bullosa respectively; (D) Endoscopic view of DNS with septal spur (after decongestion )



**Fig. 2.** Flowchart showing management outlines

Table II: Surgical intervention

ETIOLOGY	SURGICAL INTERVENTION	NUMBER OF CASES
Concha bullosa	Middle turbinoplasty	3
Deviated nasal septum with concha bullosa/ Paradoxical curved middle turbinate	Middle turbinoplasty with septoplasty	5
Deviated nasal septum with Septal spur	Septoplasty	10
Deviated nasal septum only/ Superior turbinate touching septum	Septoplasty with nasal skin degloving	5
Nerve sheath Tumour	Nerve sheath tumour excision	1
Trauma	Septorhinoplasty	2
Large ethmoidal bulla	Ethmoidal bulla decompression / Mini FESS	2
	<b>Total</b>	<b>28</b>

The patients with specific etiologies and anatomic disorders were treated surgically.

Medical management was offered initially to every patient in form of drugs for neuropathic pain which included Gabapentin, Pregabalin and Carbamazepine. Out of 30 patients, 2 patients got symptomatic improvement after 8 weeks of conservative treatment however the rest 28 patients showed no improvement. These patients were then offered surgical treatment based on the specific etiologies. (Table II)

The outcomes of surgical treatment were quite promising with 26 patients reporting in improvement in pain after surgery out of the 28 surgeries performed. The two patients who were not relieved included one with Deviated nasal septum with spur and one patient with post traumatic septoplasty.

## Discussion

The anterior ethmoidal nerve enters the anterior ethmoid foramen and canal then ascends into the cranial cavity

superior to the cribriform plate. It then descends through a slit besides the crista galli to enter the nasal cavity where it divides into medial and lateral internal nasal branches. The anterior part of the lateral wall of nose is supplied by lateral internal nasal branch, while the anterior and upper parts of the nasal septum is supplied by medial internal nasal branch. Anteriorly, the anterior ethmoidal nerve emerges as the external nasal nerve below the inferior margin of nasal bone, and supplies the skin of the external nose. The posterior ethmoidal nerve is a branch of the nasociliary nerve lies in the medial wall of the orbit and exits through the posterior ethmoidal foramen and supplies the ethmoid and sphenoid sinuses.<sup>1</sup>

The pathogenesis of Anterior ethmoidal nerve syndrome is due to the irritation of sensory fibres of Anterior ethmoidal nerve which usually occurs due to Contact and friction of the medial and lateral walls of the nasal cavity.<sup>2,3</sup>

Patients may present with pain located exactly over the nasal bridge skin surface on one side that may radiate

into the eye. This pain often occurs due to DNS and spur, after nasal trauma of some kind or surgery or idiopathic. Many times there are no physical abnormalities on examination either clinically or on endoscopy. Imaging studies often may come back normal.<sup>4,5</sup>

Anterior ethmoidal nerve syndrome is recognized when probing the ethmoidal cleft region reproduces the characteristic symptoms of nasal pain and local anaesthetic placement relieves them. Our study shows that often any unexplained localised unilateral facial pain or headache may occur due irritation at the level of contact point within the nasal cavity. A detailed endoscopic examination along with CT scan support can easily detect an anatomical point of contact and impingement.<sup>6</sup>

Local anaesthetic applied to the anterior ethmoid fissure and/or the middle turbinate body has met with considerable success in the diagnosis and relief of the pain and headache of this origin. It has been indicated that surface pressure on the mucous membrane covering the nerve can develop in the area of the olfactory fissure and that intranasal surgical treatment may suffice in treating many cases.<sup>7</sup>

Differential diagnosis of Anterior ethmoidal nerve syndrome at this point would be any dental issue, atypical migraine, cluster headache, trigeminal neuralgia, trigeminal migraine, or a true sphenopalatine ganglion neuralgia.<sup>4,7</sup>

Pain and tenderness over the nerve at the bony cartilage junction of the nasal pyramid, points towards an irritable focus in the nerve which is confirmed by local anaesthetic infiltration. Treatment requires exclusion of underlying pathology and correction of any deformity giving pressure on medial branches of anterior ethmoid nerves over the anterior part of the middle turbinate.<sup>7</sup>

The pain may be slowly subsided in months without any treatment, while some patients may require treatment with drugs to cure a non-resolving neuropathic pain which include drugs like Carbamazepine, Gabapentin and Pregabalin etc. If the drugs do not work, injection to the painful site with a numbing and/or steroid agent gives good short term results (Anterior ethmoidal, nasociliary

and/or sphenopalatine nerve block). But definitive treatment is through the correction of the anatomical defect which led to the contact point.<sup>7,8</sup>

The external nasal nerve is prone to be traumatized during nasal injuries. It supplies the skin of the external nasal skin, the external nasal nerve continues lateral side of the upper lateral nasal cartilage and turn medially enters deep to the nasal bone. At this point the nerve is vulnerable to traumatic shearing movements between the mobile cartilage and the fixed bone. The parent anterior ethmoidal nerve section relief persistent neuropathic pain.<sup>2,9</sup>

Thus, it is quite evident from the above discussion that Anterior ethmoidal nerve syndrome is often an under-diagnosed entity and is often confused with cluster headache or migraine and the patients end up receiving prolonged course of Anti neuropathic drugs and nootropics.<sup>10</sup> In absence of anatomic abnormalities, it becomes less likely for a contact point headache to be present. High index of suspicion and a specific history leads to arrival to the possible diagnosis of AENS and which is further confirmed by endoscopy and imaging.<sup>10</sup>

## Conclusion

Anterior ethmoidal nerve syndrome is often an under-diagnosed entity and is often confused with cluster headache or migraine and the patients end up receiving prolonged course of Anti neuropathic drugs and nootropics. Awareness and High index of suspicion is necessary for appropriate diagnosis and alleviation of symptoms.

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