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Original Article

Effect of Anterior Nasal Packing on Eustachian Tube Function and Middle Ear Pressure

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Abstract:

The present study includes evaluation 60 ears of 30 nasal patients admitted to department of Otolaryngology and Head-Neck Surgery at Banghabandhu Sheikh Mujib Medical University. Each patient underwent nasal surgery followed by anterior nasal packing for 48 hours. All patients were investigated by tympanometry prior to surgery, 2nd post operative day before pack removal and on 7th post operative day 5 days after pack removal. This study shows that nasal packing result in Eustachian tube dysfunction and negative middle ear pressure which is reversible in nature.

Keywords: *Eustachian tube, Middle ear pressure, Nasal pack.*

Introduction:

The Eustachian tube has two main function: to maintain the middle ear pressure at atmospheric pressure and to allow the normal secretion of the respiratory mucosa to pass on into the nasopharynx.[1] The normal middle ear has an inherent tendency to loss gas by diffusion into the surrounding tissue and circulation. The loss is compensated by Eustachian tube, which admits just enough gas to maintain the middle ear pressure. When this system fails to function properly, a negative gas pressure develops in the middle ear.[2]

The lymphatics of middle ear and Eustachian tube course along the postero-inferior aspect of the Eustachian tube, getting afferent from nasal cavity, paranasal sinuses, nasopharynx and adenoids. Efferent from plexus terminate in retropharyngeal lymp nodes. Inflammation and oedema in these areas cause obstruction to flow, resulting in retrograde obstruction of tympanic and tubal lymphatics producing tubal dysfunction and middle ear effusion.[3] Although tubal dysfunction and middle ear effusion may occur simultaneously, but effusion can occur in absence of frank obstruction of Eustachian tube lumen and development of middle ear vacuum.

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Lymphatics stasis in the peritubal plexus of lymphatic channels and vein has been believed to be a possible aetiological factor in Eustachian tube dysfunction in case of nasal obstruction. Nasal packing causes complete nasal obstruction, which results in oedema of nose, nasopharynx and paranasal sinuses.[4] Thus nasal packing causes lymphatic stasis in nasopharynx and the opening of Eustachian tube, which ultimately results in middle ear dysfunction. Thomson and Crowther noticed nasal packing following septal surgery is a frequent cause of short lasting eustachian tube dysfunction.[5] Mohan et al, found nasal packing results in Eustachian tube dysfunction and negative middle eat pressure, which is reversible.[6]

Methods:

It was a Cross-sectional study and 30 patients were randomly selected from Banghabandhu Sheikh Mujib Medical University, Shahbagh, Dhaka in the period of October 2003 to March 2004.

of otitis Inclusion criteria: Patients having deviated nasal septum, nasal deformity or polyposis undergoing nasal surgery followed by anterior nasal packing for 48 hours within the age range of 10 to 50 years.

Exclusion criteria:

1) Patients having history media or history of ear trauma.
2) Children below 10 years and adult above 50 years.
3) Duration of nasal pack less than 48 hours or more than it.

Data collection method:

Data has been collected by personal interview with data sheet, clinical examination of Ear, Nose and Throat and impedance audiometry.

All patients were subjected to tympanometry prior to surgery and result recorded. Interacoustics impedance audiometer AT22t was used for tympanometric study and display on Interacoustic control panel. The middle ear pressure below -100 daPa was considered abnormal. Middle ear pressure were measured 48 hours after application of anterior nasal packing just before removal of pack that is in 2nd post operative day. The case were again tested 5 days after pack removal (7th post operativ day), to ascertain about reversibility of the phenomenon.

Anterior nasal packing consist of a one quarter inch gauze impregnated with Neobacrin skin ointment (Neomycin sulphate, Bacitracin zinc). Bilateral anterior nasal pack was applied in all patients for 48 hours in this group.

Result & Observation:

Table-I

Age distribution(n=30).

Age group	Number of Patients	Percentage
10-19	10	33.33
20-29	15	50
30-39	4	13.33
40-50	1	3.33

Table-II

Sex of the patients (n=30).

Sex	Number of patients	Percentage
Male	20	66.66
Female	10	33.33

Table-III

Symptoms of the patients (n=30).

Symptoms	Number of patients	Percentage
Nasal obstruction	30	100
Headache	14	46.66
Nasal discharge	13	43.33
Disorder of olfaction	12	40.00
Epistaxis	5	16.66

Table-IV

Diagnosis of the patients (n=30).

Diagnosis	Number of patients	Percentage
DNS	9	30.00
DNS with HIT	11	36.66
Ethmoidal polyp	5	16.66
Antrochoanal polyp	3	10.00
DNS with nasal deformity	2	6.66

DNS= Deviated Nasal Septum
HIT= Hypertrophy of Inferior Turbinate

Table-V

Surgical treatment (n=30).

Name of operation	Number of patients	Percentage
Septoplasty	9	30.00
Septoplasty with SMD	11	36.66
FESS	8	26.66
Septorhinoplasty	2	6.66

FESS= Functional Endoscopic Sinus Surgery
SMD= Submucosal diathermy

Table-VI

Number of ears showing pre-pack middle ear pressure (n=60).

Middle ear pressure(daPa)	Number of ears	Percentage
-300 to -250	0	0
-250 to -200	0	0
-200 to -150	1	1.66
-150 to -100	3	5.00
-100 t0 -50	2	3.33
-50 to 0	32	53.33
0 to +50	18	30.00
+50 to +100	4	6.66
+100 to +150	0	0

Table-VII

Middle ear pressure after 48 hours of anterior nasal packing: (n=60).

Middle ear pressure(daPa)	Number of ears	Percentage
-300 to -250	5	8.33
-250 to -200	4	6.66
-200 to -150	10	16.66
-150 to -100	7	11.66
-100 t0 -50	6	10.00
-50 to 0	20	33.33
0 to +50	5	8.33
+50 to +100	3	5.00
+100 to +150	0	0

Table VIII

Middle ear pressure 5 days after pack removal (n=60).

Middle ear pressure (daPa)	Number of ears	Percentage
-300 to -250	0	0
-250 to -200	0	0
-200 to -150	1	1.66
-150 to -100	2	3.33
-100 t0 -50	4	6.66
-50 to 0	27	45.00
0 to +50	22	36.66
+50 to +100	3	5.00
+100 to +150	1	1.66

Discussion

The patients of this series were of different age group. The minimum age was 12 years and maximum was 45 years and 50 percent of the patient were in third decade (Table-I). Two-thirds of the patient were male (Table-II). Majority of the patients were presented with multiple symptoms and commonest was nasal obstruction (Table-III).

Among 30 patients, 9 patients diagnosed as deviated nasal septum, 11 patients deviated

nasal septum with hypertrophy inferior turbinate, 5 patients ethmoidal polyps, 3 patients antrochoanal polyps & 2 patients as deviated nasal septum with nasal deformity (Table-IV). In this study 9 patients underwent septoplasty, 11 patients had septoplasty with SMD, 8 patients had FESS & septorhinoplasty in 2 patients (Table-V).

Middle ear pressure -100 daPa has been considered to be normal middle ear pressure. The prepack middle ear pressure range between -50 daPa to 0 daPa were maximum (53.33%) (Table-VI). The mean prepack middle ear was -8 daPa. Out of 60 ears only 4 years showed abnormal middle ear pressure that means below -100 daPa. The middle ear pressure ranges between -150 daPa to -100 daPa in 3 ears in patients having unilateral nasal obstruction more than I year.

After 48 hours of anterior nasal packing (2nd post operative day) just before pack removal abnormal middle ear pressure was seen in 26 ears (43.33%) (Table-VII). Middle ear pressure 5 days after pack removal (7th post operative day) was found abnormal in 3 ears (Table-VIII). This result is consistent with the findings of Bonding & Tos and Thomson & Crowther.[5,7] Bonding & Tos examined 15 patients with anterior nasal packing and found that seven (46%) developed significant negative middle ear pressure which resolved on removal of packs. Thomson & Crowther showed 126 ears of 63 patients, 55 of 126 ears tested (46%) developed a reduction of middle ear pressure of at least < -100 daPa. Finding of present study is similar to the result Mohan, Saxena & Chauhan.[6] They found 40 ears out of 80 had below -100 daPa middle ear pressure 48 hours after anterior nasal packing which was reversible in nature.

A significant finding was that 3 ears (75%) out of 4 ears having antro-choanal polyp showed no improvement even five days after pack removal.[8] Chronic nasal obstruction appears to have detrimental effect on middle ear ventilation.[9]

Conclusion:

Anterior nasal packing causes reversible Eustachian tube dysfunction and negative middle ear pressure which return to normal 5 days after pack removal.

Chronic nasal obstruction seems to have a detrimental effect on middle ear pressure , which may not return to normal even after removal of chronic obstruction. It appears from this study that there might be some permanent change in peritubal nasopharyngeal mucosa due to chronic nasal obstruction, which needs to be proved histopathologically.

Lymphatic stasis at peritubal plexus of lymphatic channels and veins appears to be the cause of lymph oedema following nasal packing.

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