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# Effect of nasal packing on Eustachian tube function

A. C. THOMPSON, F.R.C.S., J. A. CROWTHER, F.R.C.S. (Glasgow)

**Abstract**

Sixty-three patients undergoing surgery to the nasal septum followed by bilateral packing had pre- and post-operative tympanometry in order to determine the effect on eustachian tube function. Fifty-five of the 126 ears tested (46 per cent) developed a reduction in middle ear pressure of at least 50 daPa; 76 per cent became normal within 24 hours of removing the nasal packs. All ears were asymptomatic and no patient had evidence of middle ear effusion. Nasal packing following septal surgery is a frequent cause of short-lasting eustachian tube dysfunction but rarely severe enough to cause symptoms or middle ear effusion. Tubal dysfunction is most likely due to a combination of surgical oedema and a direct effect of the nasal packing.

## Introduction

Mechanical interference is recognized as a cause of eustachian tube dysfunction (Tos and Bonding, 1977; Wake *et al.*, 1990) and if severe may lead to middle ear effusion (Khan and Campbell, 1981).

Patients occasionally complain of transient ear discomfort and mild hearing impairment following septal surgery. This appears to be due to acute eustachian tube dysfunction and is most probably a result of mucosal swelling of the eustachian tube orifice. This may result from surgical trauma or could be a consequence of the nasal packing.

Bonding and Tos (1981) found eustachian tube function to be impaired in a variety of abnormal conditions including infectious mononucleosis, tonsillectomy and nasal packing. They examined 15 patients with anterior nasal packing and found that seven (46 per cent) developed significant negative middle ear pressure which resolved on removal of the packs. Only data from the right ear was presented in that study. McCurdy (1977) found that 25 per cent of 99 ears developed significantly negative middle ear pressure three days after bilateral nasal packing. Johannessen and Poulsen (1984) studied 27 patients who had nasal packing left *in-situ* for at least five days. They attributed the subsequent eustachian tube dysfunction to oedema of the nasopharyngeal mucosa since the middle ear pressure tended to revert to normal prior to pack removal.

The aim of this study was to further assess the effect of nasal packing following septal surgery on eustachian tube function as indicated by tympanometry.

## Method

We measured the alteration in middle ear pressure using pre- and post-operative tympanometry on a series of patients who underwent septal surgery (submucous resection or septoplasty) with bilateral packing of the nasal cavities.

Sixty-three patients undergoing surgery to correct septal deformities were included in the study. Only patients with otoscopically normal tympanic membranes and bilateral normal type A tympanograms were included. Patients were also excluded if tympanometry was unsatisfactory for technical reasons.

All patients underwent otoscopic examination followed by pre-operative tympanometry performed using a Grason-Stadler GSI 28 impedance audiometer. Tympanometry was repeated 24 hours following septal surgery immediately prior to removal of nasal packing and again 24 hours following removal of the nasal pack. Otoscopy was performed prior to tympanometry and any clinical abnormality noted. If tympanometry was abnormal at the time of discharge it was repeated after six weeks at the time of outpatient review.

Nasal packing consisted of a 10 cm length of Vaseline gauze roll (Sofratulle) inserted bilaterally in all cases for 24 hours.

The tympanograms were classified in the standard manner similar to that originally described by Jerger (1970). In the present study a tympanogram with peak middle ear pressure between +10 daPa and −50 daPa was classified as type A. A tympanogram with the peak middle ear pressure at −50 daPa or more negative was classified as type C. A tympanogram with flattened peak of 0.3 ml admittance or less was classified as type B. A change in middle ear pressure of 50 daPa or more was considered significant in this study.

## Results

Twenty-nine of the 63 patients exhibited no significant change in middle ear pressure in either ear following the septal surgery and nasal packing.

Thirteen patients developed a unilateral 'C' pattern

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tympanogram following surgery with nasal packing *in situ*. Of these, 11 patients reverted to a normal 'A' type tympanogram 24 hours after pack removal and two patients remained type 'C'.

Twenty-one patients developed bilateral type 'C' tympanograms following surgery with nasal packing *in situ*. Of these, 13 became normal on both sides by the following day, five patients became normal on one side only and three patients remained with a bilateral 'C' type tympanogram pattern.

In total, 55 of 126 ears (46 per cent) developed a reduction in middle ear pressure of at least 50 daPa. Of the 55, 42 ears (76 per cent) became normal within 24 hours of removing the nasal packing.

There was no otoscopic or tympanometric evidence of middle ear effusion in any of the patients and all ears were asymptomatic. No patients developed a type 'B' tympanogram during the period of study. If the tympanogram was abnormal on discharge, repeat testing at six weeks demonstrated a return to normal in all cases.

## Discussion

Eustachian tube dysfunction commonly occurs following septal surgery with nasal packing. Thirty-four of the 63 patients (54 per cent) developed a type 'C' tympanogram in at least one ear following septal surgery. The degree of eustachian tube dysfunction was relatively mild since no patients developed a middle ear effusion, however 33 per cent of patients were affected in both ears and developed bilateral type 'C' tympanograms. The duration of nasal packing in this study was 24 hours and the absence of middle ear effusions as described by Bonding and Tos (1981) could possibly be attributed to the fact that the packing was not left *in situ* for a sufficient duration.

There are several explanations that have been offered to account for the transient eustachian tube dysfunction in association with nasal packing. These have been described in detail previously (Bonding and Tos, 1981) but may be summarized briefly in the following manner:

1. Mechanical obstruction of the eustachian tube orifice may occur in some cases and in this study the packs used were potentially long enough to impinge on the orifice if fully inserted.
2. Inflammatory oedema of the nasopharyngeal mucosa is a likely consequence of both the presence of the pack and of the nasal surgery itself. Inflammation may inactivate the surfactant that facilitates opening of the eustachian tube and result in dysfunction (McCurdy, 1977).
3. Increased secretions from seromucous glands in the pharyngeal portion of the eustachian tube may accumulate and block the tube.
4. The action of swallowing is important in opening the eustachian tube and may be reduced in the early post-operative period due to impaired consciousness and discomfort in the nose and nasopharynx.

The eustachian tube dysfunction in this study was of short duration with 76 per cent of the type 'C' tympanograms reverted to normal within 24 hours of nasal pack removal. This contrasts with the findings of Tos and Bonding (1977) who reported only 31 per cent of 70 ears to have regained normal middle ear pressure three days after removal of a nasogastric or nasotracheal tube. A likely explanation for this is that a greater degree of mucosal oedema and inflammation is induced in the nasopharynx by the prolonged presence of a plastic tube compared to the 24 hours of nasal packing used in the present study.

Ten per cent of the total ears studied had eustachian tube dysfunction which lasted longer than 24 hours but had nevertheless resolved by the time of the six-week review.

Johannessen and Poulsen (1984) suggested that eustachian tube dysfunction after septal surgery with anterior packing was due to post-surgical oedema since negative middle ear pressures returned to normal prior to removal of packs at five or seven days. However, the shorter duration of nasal packing in our study certainly lead to an earlier recovery of eustachian tube function. We agree with McCurdy (1977) whose study supported the theory that nasal packing leads to eustachian tube dysfunction possibly by causing peritubal inflammation or stasis of peritubal lymphatics. We believe that eustachian tube dysfunction after septal surgery is most likely due to a combination of the effect of surgery and of the nasal packing. The shorter the duration of nasal packing the earlier eustachian tube function returns.

### References

Bonding, P., Tos, M. (1981) Middle ear pressure during brief pathological conditions of the nose and throat. *Acta Otolaryngologica*, **92:** 63–69.

Jerger, J. (1970) Clinical experience with impedance audiometry. *Archives of Otolaryngology*, **92:** 311–324.

Johannessen, J., Poulsen, P. (1984) The influence of anterior nasal packing on middle ear pressure. *Acta Otolaryngologica*, **97:** 363–364.

Khan, J. A., Campbell, J. C. (1981) Studies on the production of middle ear effusion in the experimental animal. *Journal of Laryngology and Otology*, **95:** 987–993.

McCurdy, M. J. A. (1977) Effects of nasal packing on eustachian tube function. *Archives of Otolaryngology*, **103:** 521–523.

Tos, M., Bonding, P. (1977) Middle ear pressure during and after prolonged nasotracheal and/or nasogastric intubation. *Acta Otolaryngologica*, **83:** 353–359.

Wake, M., McCullough, D. E., Binnington, J. D. (1990) Effect of nasogastric tubes on eustachian tube function. *Journal of Laryngology and Otology*, **104:** 17–19.

Address for correspondence:
Mr A. C. Thompson,
Department of Otolarynology,
Derbyshire Royal Infirmary,
Derby DE1 2QY.

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