DOI: 10.21276/aimdr.2018.4.3.EN2

Original Article ISSN (O):2395-2822; ISSN (P):2395-2814

A Microbiological Study of Nasal Packs.

N. Kumarjit Singh[1], Y. Tomba Singh[1]
[1]Assistant Professor, Department of Otolaryngorhinology, JNIMS, Imphal, Manipur, India.

Received: April 2018
Accepted: April 2018

ABSTRACT

Background: Nasal packing is the commonest mode of achieving haemostasis for nasal bleeds. The packs are usually removed after 24 hours but sometimes they have to be kept for two-three days. Out of all the materials used for the purpose, the conventional packing using cotton tape remains the commonest and the easiest. One of the commonest complications of nasal packing is infection. The present study was done to work out the bacterial flora of anterior and posterior nasal packs with different types of antibiotics-soaked packs, duration of pack and type of nasal packing. Further the study aimed to find out the effectiveness of drugs used in nasal packing. **Methods:** A prospective study was taken up in the Department of Otolaryngorhinology, JNIMS, Imphal, Manipur in which all the patients who attended the OPD or got admitted in the IPD of the otolaryngorhinology department during the period Nov 2012 to Oct 2014 were the study subjects. All nasal packs irrespective of site, disease or duration of usage from these patients were collected with due precaution to avoid contamination during removal. Then the middle part of the pack was cut and collected in sterile bottle under total asepsis. These packs were immediately transported to the Department of Microbiology, JNIMS for full bacteriological examination and sensitivity testing. **Results:** Out of a total of 120 nasal packs investigated, 98 packs (81.7%) showed bacterial growth. Packs removed after 72 hours showed 100% growth of organisms whereas packs removed within 48-72 hours, within 24-48 hours and packs removed within 24 hours of use respectively showed 92.9%, 59.1% and 76% growth of organisms. Pseudomonas aeruginosa was the most predominant one (41; 34.2%) followed by Staphylococcus aureus (37; 30.8%) and Klebsiella pneumonia (4; 3.3%) in the packs having single infections. Pseudomonas and Klebsiella co-infection was the commonest among packs with mixed infections. Plain gauze and Abgel packs showed 100% growth of micro-organisms which was followed by Betadin (95.6%), Neosporin (94.4%), Soframycin (60.4%). Liquid paraffin-soaked packs did not show any growth. The in-vitro chemo-sensitivity testing showed that almost all the different types of bacteriae isolated were sensitive to Garamycin (85.7%-100%). Cloramphenicol sensitivity was 79% for Pseudomonas, 60% for Staphylococcus and 21% for Klebsiella infection. Other antibiotics gave not so encouraging results especially in Proteus infection. **Conclusion:** Only a small proportion of nasal packs (18%) remain sterile after use, the chance of culture positivity being higher for posterior nasal packs compared to anterior ones and also depending upon to the duration of use, all packs after 72 hours of use becoming invariably positive. Medication of the packs with antibiotics or antiseptics does not help much in preventing micro-organism growths. Pseudomonas aeruginosa and Staphylococcus aureus are the leading causes of infection. Gentamycin/Garamycin is emerging as the most sensitive antibiotic against the culprit organisms. Drugs which were previously effective against microbes are now only partially sensitive or not effective at all. It is important to caution clinicians and microbiologists to keep a close watch on the sensitivity pattern of the organisms.

Keywords: Culture, Micro-organism, Nasal packing, Sensitivity.

INTRODUCTION

Nasal packing is the commonest mode of achieving haemostasis for nasal bleeds, be it in the treatment of the very common epistaxis or following nasal or sinus surgery. For this a loose cotton tape soaked in liquid paraffin, xylocaine or antibiotic ointments are commonly used. One or both the nasal cavities may need to be packed depending upon the circumstance. The pack(s) is/are usually removed after 24 hours but sometimes it has to be kept for two to three days.

Name & Address of Corresponding Author
Dr. Y. Tomba Singh
Assistant Professor
Department of Otolaryngorhinology
JN Institute of Medical Sciences (JNIMS)
Porompat, Imphal,
Manipur, India.

Newer materials in the form of calcium alginate soaked anterior nasal pack, nasal tampon and gelatine sponges are also used to apply pressure and achieve haemostasis. But, the conventional packing using cotton tape remains the commonest and the easiest.

One of the commonest complications of nasal packing is infection. Nasal packs kept in-situ for more than 48 hours usually becomes infected and soaked with foul smelling discharge. Bacteraemia, toxic shock syndrome and hypoxia have been reported following nasal packing. However, very less is studied about the local infection. It is a known fact that many organisms reside in the vestibule and nasal cavity as commensal flora. And as the nasal cavity is exposed to the exterior it is not a sterile passage. Some of these micro-organisms in the presence of foreign materials e.g. anterior nasal

pack, raw surface, blood and blood clots become invasive resulting in infection and disease. Blood-soaked anterior nasal pack acts as a very good culture for growth and multiplication of local commensal flora.

Aims & objectives

The aims and objectives of the present study were to work out the bacterial flora of anterior and posterior nasal packs with different types of antibiotics-soaked packs, duration of pack and type of nasal packing. Further the study aimed to find out the effectiveness of drugs used in nasal packing.

MATERIALS AND METHODS

A prospective study was taken up in the Department of Otolaryngorhinology, JN Institute of Medical Sciences (JNIMS), Imphal, Manipur in which all the patients who attended the out-patient department or got admitted in the in-patient ward of the otolaryngorhinology department during the period November 2012 to October 2014 were the study subjects. All nasal packs irrespective of site, disease or duration of usage from these patients were collected with due precaution to avoid contamination during removal. Then the middle part of the pack was cut and collected in sterile bottle under total asepsis. These packs were immediately transported to the Department of Microbiology, JNIMS for full bacteriological examination (culture, staining reaction, motility) including biochemical tests for Gram negative bacilli (fermentation of sugar, indole production test, methyl red test, Voges-Proskauer test, citrate utilization test, urease test) for bacterial identification. Further antibiotic sensitivity testing was done by using Kirby-Bauer sensitivity method.
Data collected were analysed and presented by using descriptive statistics.

RESULTS

A total of 16750 patients either attended the OPD or got admitted in the IPD of otolaryngorhinology during the study period. Out of them, 235 had nasal or/and sinus problems. A total of 120 nasal packs could be retrieved from them for bacteriological study and sensitivity testing. The age-range of the patients from whom these packs were retrieved varied from < 1 year to 80 years, the majority being in the age-group of 21-30 years (43; 35.8%) followed by 11-20 years (33; 27.5%). Males outnumbered the female patients (74:46).
Epistaxis was the main reason for using packs (45; 37.5%) followed by deviated nasal septum (45; 20.8%) and polyp (18; 15%). Chronic maxillary sinusitis, nasal sinus, rhinosporodiosis, fracture nasal bone, dental cyst, maxillary mass, angiofibroma and angioma were the other reasons for indicating nasal packing.

Out of the total 120 nasal packs, 98 (81.7%) showed bacterial growth. More than two-thirds of the packs (82; 68.3%) had a single organism growth whereas the remaining 16 (13.3%) showed mixed pattern of organisms. [Figure 1]

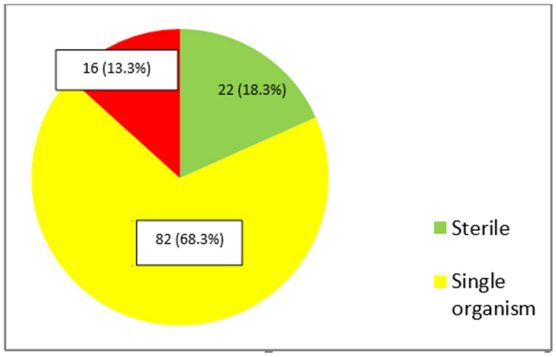

Figure 1: Distribution of nasal packs by bacterial growth

Of all the 82 single-type culture-growths, Pseudomonas aeruginosa was the most predominant one (41; 34.2%). It was followed by Staphylococcus aureus (37; 30.8%) and Klebsiella pneumonia (4; 3.3%). And out of the 16 mixed-pattern growths the distributions of micro-organism were Pseudomonas and Klebsiella (8; 6.7%), Pseudomonas and Staphylococci (6; 5%) and Klebsiella and Proteus (2; 1.7%).
Table 1 shows the numbers of packs with micro-organisms isolated by the duration of pack-use. Packs removed after 72 hours showed 100% growth of organisms whereas packs removed within 48-72 hours, within 24-48 hours and packs removed within 24 hours of use respectively showed 92.9%, 59.1% and 76% growth of organisms. As expected, the longer the duration of pack-use, the higher was the probability of organism-growth.

Table 2: Number of micro-organism+ packs by duration of pack

Duration of pack	Number of packs (%)	No. of growth+ packs (%)	No. of sterile packs (%)
< 24 hours	22 (18.3)	13 (59.0)	9 (40.0)
24-48 hours	42 (35.0)	32 (76.0)	10 (23.8)
48-72 hours	42 (35.0)	39 (92.9)	3 (7.1)
> hours	14 (100)	14 (100)	-

Table 3: Number of micro-organism+ packs by site of use

Site of pack	Number of packs (%)	No. of growth+ packs (%)	No. of sterile packs (%)
Anterior nasal	90 (75.0)	72 (80.0)	18 (20.0)
Posterior nasal	14 (11.6)	14 (100)	-
Maxillary	16 (13.3)	12 (75.0)	4 (25.0)

When the packs from the different sites were compared, the posterior nasal packs showed 100%

growth of micro-organisms which was followed by anterior nasal packs (80%) and the maxillary antrum packs (75%). [Table 3]

When analysed by the different types of medicated packs, plain gauze and Abgel packs showed 100% growth of micro-organisms which was followed by Betadin (95.6%), Neosporin (94.4%), Paraaffin (90%), Soframycin (60.4%). [Table 4]

Table 4: Number of micro-organism+ packs by type of medicated pack

Type of medication	Number of packs (%)	No. of growth+ packs (%)	No. of sterile packs (%)
Soframycin oint.	48 (40.0)	29 (60.4)	19 (15.8)
Betadin oint.	23 (19.1)	22 (95.6)	1 (4.3)
Neosporin oint.	18 (15.0)	17 (75.0)	1 (5.5)
Plain gauze	13 (10.8)	12 (100)	-
Liq. paraffin	10 (8.3)	9 (90.0)	1 (10.0)
Abgel	8 (6.6)	8 (100)	-

The in-vitro chemo-sensitivity testing showed that almost all the different types of bacteriae isolated were sensitive to Garamycin (85.7%-100%). Cloramphenicol sensitivity was 79% for Pseudomonas, 60% for Staphylococcus and 21% for Klebsiella infection. Other antibiotics gave not so encouraging results especially in Proteus infection. [Figure 2]

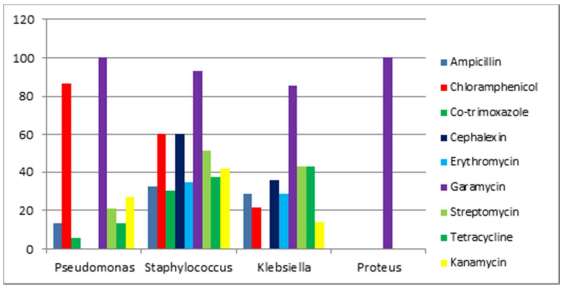

Figure 2: In-vitro sensitivity pattern

DISCUSSION

In the present study, a majority of the patients belonged to the age-group of 21-30 years. This is the most active and productive period of life and hence, they might be readily submitting themselves for curative treatment. Males outnumbered females in the ratio of 2:1. Males are usually earning members of the family and remain mostly outdoors thereby exposing themselves more to the external environment along with its various hazardous conditions. As a result they suffer more from diseases. The present study findings correlate with the Public Health Laboratory Research Report.[1] As epistaxis is a fairly common occurrence irrespective of age and sex it undoubtedly comprised the major chunk of the cases (37.5%) needing nasal packing. The other conditions requiring packing are usually slow, gradual and chronic in nature and come only when they have more acute and serious problems.

92% of the nasal packs showing growth of micro-organisms might be an underestimation as anaerobic culture was not done in the current study because of resource-constraints. Also, those patients who have had started taking antibiotics might have produced sterile results.

The incidence of Gram-negative organisms obtained in the present study was 81%, the main organism being Pseudomonas aeruginosa. The high incidence reflects a favourable ecological niche related to antibiotic misuse. Brown JH et al and Gillespie SH have also reported a high incidence of Gram-negative bacteria.[2,3] The present study finding of Pseudomonas isolated from 46% of packs is double of the reported figure of 23% by Gupta A et al in 1999.[4] The gap between the two studies might explain this difference. Nevertheless, the present finding is comparable to study finding of 45% made by Johnson WG et al.[5] Haffner FD et al have also mentioned about patients with conversion of flora to Gram-negative bacilli following antibiotic use.[6] The current study of finding Klebsiella in 12% was also higher than what was found by Gupta A et al from their study four decades back whereas the presence of Staphylococcus in the current study is slightly lower than what they found.[4]

Mixed infection was present in 13% of the cases in the present study. This finding corroborates with earlier study findings reported in Pub Health Lab Rep and study findings made by Stokes EJ et al.[7] It was also noticed that longer the pack was used, higher was the proportion of micro-organism growth. Packs removed after 72 hours invariably showed micro-organism growth. Packs soaked with antibiotics did not have much of an effect beyond a certain time-period. This finding is comparable with what was found by Gupta A et al.[4] This phenomenon warrants removal of the nasal packs as early as possible once their haemostatic effect is obtained.

Of all the growth+ packs, the occurrence was found to be absolute in the posterior nasal packs. This confirms the quotation made by Ananthanarayan and Paniker in their textbook of Microbiology that nasopharynx can be considered the natural habitat of common pathogenic bacteriae which cause infections of the nose, throat, bronchi and lungs.[8] Gwaltney JM et al found Staphylococcus epidermis in 40-100%, Staphylococcus aureus in 25-50% and Gram-negative bacteria in 1% on culture from the nasal vestibule.[9] The present study finding conforms to this. Gram-negative bacilli were grown in 81% of the cases in the present study. Alteration of noso-bacterial flora by antibiotics is a well established phenomenon.

In the present study, the maximum strains were sensitive to Gentamycin/Garamycin. This finding supports the study findings made earlier by various

researchers.[3,10,11] This finding suggests that Gentamycin/Garamycin is the drug of choice at the moment in the treatment of Pseudomonas infection resistant to other antibiotics. Kanamycin scored a good index of sensitivity (27%) in the present work compared to those of the two researchers mentioned above. However, the statistical data appear to be insufficient to provide a definitive pointer towards increasing susceptibility of Pseudomonas to this drug. It seems that Pseudomonas is becoming resistant to common antibiotics. In the present series, Kanamycin obviously occupies the second position as the drug of choice. The selection of an appropriate antibiotic for treatment after duly carrying out in-vitro chemo-sensitivity test is of immense value.

It is clear that the common microbes developed resistance to antibiotics. Initially when sulphonamides and penicillin were introduced in therapy there was dramatic change in incidence, mortality and morbidity of infections. The abuse of these antibiotics soon caused the sensitive microbes to undergo mutation and develop resistance.

CONCLUSION

Only a small proportion of nasal packs (18%) remain sterile after use, the chance of culture positivity being higher for posterior nasal packs compared to anterior ones and also depending upon to the duration of use, all packs after 72 hours of use becoming invariably positive. Medication of the packs with antibiotics or antiseptics does not help much in preventing micro-organism growths. Pseudomonas aeruginosa (46%) and Staphylococcus aureus (36%) are the leading causes of infection. Gentamycin is emerging as the most sensitive antibiotic against the culprit organisms. Drugs which were previously effective against microbes are now only partially sensitive or not effective at all. It is important to caution clinicians and microbiologists to keep a close watch on the sensitivity pattern of the organisms.

REFERENCES

1. Public Health Research Laboratory Report, 1822. Quoted by Duc Laux E in Pasteur, the history of mind. WB Saunders & Co. 1920.
2. Brown JH, Brenn L. Bull John Hopkins Hosp. 48:69. AFIP Manual of histological staining technologies. 3rd ed., ed. G Luna, New York: MacGraw Hill Publications, c.1968, p.222
3. Gillespie SH. Gram negative coccobacilli. ResearchGate In book Medical Microbiology Illustrated, pp 68-81.
4. Gupta A, Bhatia UN, Venugopal P, Talwar JH. Ind Tour Med Res 1971;59:1002.
5. Johnson WG, Pierce AK, Stouford JP, Thomas JD. Nosocomial respiratory infection with Gram-negative bacilli: the significance of colonization in the respiratory tract. Ann Internal Med 1972;77:701-6.
6. Haffner FD, Neter E, Rubin MI. Penicillin and its effect in producing a predominant Gram-negative bacillary flora in upper respiratory tract in children. Pediatrics 1950;6(2):262-8.
7. Stokes EJ. Clinical Bacteriology 1975, 4th ed. Pp 203-61.
8. Ananthanarayan and Paniker's Textbook of Microbiology, 2005, Orient Longman, 2nd ed.
9. Gwaltney JM, Hayden A, Barbara A. Acute community-acquired bacterial sinusitis: the value of antimicrobial treatment. Clin Inf Dis 2004;38(2):227-33.
10. Prabhakar H, Arora S. JIMA 1970;73:145-7.
11. Mohon U, Jirdal N, Aggrawal P. Species distribution and antibiotic sensitivity pattern of coagulase negative Staphylococcus isolates from various clinical specimens. Ind J Med Microbiol 2002;20(1):45-6.

How to cite this article: Singh NK, Singh YT. A Microbiological Study of Nasal Packs. Ann. Int. Med. Den. Res. 2018; 4(3):EN05-EN08.

Source of Support: Nil, **Conflict of Interest:** None declared