Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.elsevier.com/locate/mjafi

Case Report

High altitude induced laryngopharyngitis sicca

Lt Col Ravi Roy*

Classified Specialist (ENT), Command Hospital (Eastern Command), Kolkata 700027, India

ARTICLE INFO

Article history:

Received 3 November 2015

Accepted 13 April 2016

Available online 25 May 2016

Keywords:

High altitude

Rhinitis sicca

Atrophic rhinitis

Pharyngitis sicca

Cough

Case Report

A 34-year-old male patient resident of Madhya Pradesh working at an altitude of 14,000 ft in Ladakh region for last six months, presented to the ENT centre with complaints of nasal obstruction, crusting, occasional blood stained nasal discharge, mouth breathing, dryness of throat since his arrival to high altitude region and recurrent bouts of dry cough and hoarseness of voice for last 2 weeks duration. There was no history of voice abuse, acid reflux, nasal allergy or respiratory distress. A regular smoker, smoked 5–10 biddies a day with no co-morbidities.

On examination of nose, crusting and ulceration was visualised in nasal valve area with septum in midline (Fig. 1). The throat examination showed dry and congested mucosa with crusting in posterior pharyngeal wall (Fig. 2). Indirect laryngoscopy revealed “salt and pepper appearance” of larynx with dry and congested bilateral vocal cords with crusting, however the cords were mobile (Fig. 3). The individual was evaluated for granulomatous disease of nose, hypothyroidism, chronic renal and liver disorder and was found normal. A mucosal biopsy from the site of ulceration and crusting on nasal septum was taken and reported as nonspecific inflammatory changes, a throat swab for culture and sensitivity yielded no growth after 48 h. The individual was diagnosed as a case of high altitude induced laryngo-pharyngitis sicca and was started on therapy with voice rest, hydration of mucosa by steam inhalation, saline nasal douching, local application of petroleum jelly (vaseline) with adequate intake of oral fluids and PPI drug. For troublesome recurrent bouts of dry cough was prescribed antitussive syrup dextromethorphan. After a week of evaluation and medical therapy the individual was sent on 6 weeks of convalescence away from high altitude. On review after 6 weeks, the individual was asymptomatic,

Introduction

Ladakh is a desert mountainous region with extreme cold climate and low relative humidity. Its average altitude of 12,000 ft, temperature ranges from 30 to -30°C with average relative humidity of 25–50% causes high morbidity in people posted to this region. The nasal symptoms in the form of obstruction, crusting and epistaxis are the commonest problems encountered in ENT. If the nasal problems are not addressed to, it can further lead to dryness of the upper aerodigestive tract causing laryngo-pharyngeal symptoms. There is paucity of literature on the progressive chain of events leading to pathophysiological changes in the aerodigestive tract in high altitude. This case study highlights on one of such scenario.

* Tel.: +91 9830245666.

E-mail address: rroy76@yahoo.co.in<http://dx.doi.org/10.1016/j.mjafi.2016.04.002>

0377-1237/© 2016 Published by Elsevier B.V. on behalf of Director General, Armed Forces Medical Services.

clinical examination revealed normal mucosa of the upper aerodigestive tract. However the individual was counselled for vocal hygiene and adequate hydration.

There were three such cases diagnosed in a period of one year. The salient features of the cases are summarised below.

anaemia, malnutrition, lupus, tuberculosis, hypothyroidism and chronic liver and renal diseases.¹ In high altitude, the chill factor and low relative humidity are the major causes for impairment of upper aerodigestive tract mucosa. The pathophysiology of the disease is not clearly understood. There are a

S No.	Features	Case 1	Case 2	Case 3
1	Age	34 years	22 years	38 years
2	Gender	Male	Male	Male
3	Residents of	Madhya Pradesh	Punjab	Kerala
4	Smoker	Yes	No	No
5	Exposure to room heating appliances	Yes	Yes	Yes
6	Duration of stay in high altitude	6 months	9 months	5 months
7	Common symptoms	Nasal obstruction/crusting Blood stained discharge Dryness of mouth Hoarseness of voice Bouts of dry cough ^a	Nasal Obstruction/crusting Blood stained discharge Dryness of mouth Hoarseness of voice Bouts of dry cough ^a	Nasal Obstruction/crusting Blood stained discharge Dryness of mouth Hoarseness of voice Bouts of dry cough ^a
8	Signs	Nasal crusting/ulceration Nasal mucosa congestion Crusting posterior pharyngeal wall Congestion, crusting vocal cords	Nasal crusting Nasal mucosa congestion Crusting posterior pharyngeal wall Congestion, crusting vocal cords	Nasal crusting Nasal mucosa congestion Congested posterior pharyngeal wall Congestion of vocal cords

^a Symptom that made the patient seek medical advice.

None of the three had any co-morbidity and all were asymptomatic after a convalescence period of 6 weeks away from Ladakh region.

Discussion

Laryngo-pharyngitis sicca is an extension of dry mucosal condition of rhinitis sicca. The various factors known to be associated with the disease are hot/cold and dry climate,

few hypotheses to explain the cause of such changes, but it all starts with the nose, as it is the part of airway to first come in contact with the extremes of climate. When the nose is exposed to cold and dry air on inspiration it causes congestion of erectile tissues of the nose to facilitate heat exchange and humidification of inspired air with increased nasal secretion. On prolonged exposure, there is loss of heat and water from the respiratory epithelium leading to desiccation of epithelium with crusting.² Factors such as low temperature and humidity are independently known to cause delay in nasal mucociliary transit time (NMTT)^{3,4} thus contributing to nasal obstruction and crusting. All the three cases had symptoms and signs of nasal obstruction and crusting which is the commonest nasal presentation in high altitude.⁵

A study by Rostovshchikov on nasal mucosa at high altitude for a stay of more than two weeks showed changes as mucosal oedema, leucocyte infiltration and desquamation and for a stay for more than one month resulted in reversible metaplastic changes of respiratory epithelium into multilayer squamous epithelium.⁶

The nasal changes lead to nasal obstruction and mouth breathing causing secondary changes in the rest of the airways in form of congestion and crusting, which was seen in all the three individuals. In addition, the hypoxic state of the atmosphere leads to hyperventilation and further worsening of the condition.

Life style factors such as smoking is known to affect mucociliary transit time. It causes oxidative stress impairing the mucociliary clearance and on prolonged exposure causes disturbance in cell differentiation, repair and function of

Fig. 1 – Crusting and ulceration in high altitude rhinitis (endoscopic view).

Fig. 2 – Crusting in posterior pharyngeal wall (high altitude induced pharyngitis).

respiratory epithelium.^{7,8} Out of the three individual affected by laryngo-pharyngitis sicca, one was a chronic smoker however the mean duration of stay at high altitude inducing the disease was comparable thus smoking causal relationship to laryngo-pharyngitis sicca in this study cannot be commented.

All the three individuals had long standing nasal symptoms of crusting, nasal obstruction, occasional blood stained nasal discharge and mouth breathing, but the recurrent bouts of non-productive cough was the symptom that made them seek medical attention.

There is no formal treatment protocol for high altitude induced laryngo-pharyngitis sicca but is primarily aimed at

- (1) Hydration
- (2) Re-establishing the nasal breathing
- (3) Reversing the pathophysiological changes by giving a break from the high altitude.

The hydration is addressed by advising adequate fluid intake orally and inform of steam inhalations at regular intervals to replenish the fluid lost from the upper airway.

The next step is to establish functional nasal airway, this is achieved by isotonic saline nasal douching which helps in physical cleansing and flushing of the thick mucus, debris and crust, thus improving the nasal mucociliary function. The second approach is local application of oil based nasal ointments. It is postulated that nasal ointment helps keep the mucosa moisten by preventing the water loss from surface and improving the nasal mucociliary function.⁹

All the three cases were also started on antitussives syrup dextromethorphan for suppression of irritating bouts of dry cough; however the role of antitussive in cough suppression is controversial.¹⁰ All three did show improvement in their symptoms of cough after 4-5 days of combined therapy and so attributing the response to antitussive therapy is difficult to comment in this study. The other nonspecific treatment given was in the form of proton pump inhibitors to prevent the micro-acidic trauma to the already inflamed upper airway.

De-induction from high altitude helped in the reversal of mucosal changes which confers with the study by Rostovshchikov which stated that the changes in the mucosa was reversible⁶ but the duration of convalescence away from high altitude is controversial. On looking up for literature, the process of re-epithelialisation of nasal mucosa starts as early as 2 weeks and completed by 10 weeks in cases of trauma following nasal surgeries.¹¹ The time period is variable but in all the three cases who returned after convalescence of 6 weeks showed complete mucosal healing which stands in agreement with the above study. The other forms of supportive care mentioned above aided in the reversibility of upper airway mucosa. However more cases needs to be identified to understand the disease course and management.

Conclusion

Dry nose in high altitude is one of the common ENT problems in lowlanders at high altitude. It has a negative impact on the quality of life and low performance status on lowlanders. The high altitude induced laryngopharyngitis sicca is the sequel of high altitude induced rhinitis sicca and is probably caused due to longer duration of exposure to low relative humidity and temperature. It is important to recognise this pathological entity and educate the people being inducted to high altitude. The primary preventive measure is hydration and prevention of loss of body moisture through upper airway. High altitude induced laryngopharyngitis sicca has hardly been documented in literature and as such the treatment is also institution based. We had three such cases at our centre, but more of such cases need to be identified and a larger study needs to be carried out to understand this disease entity.

Fig. 3 – Crusts over vocal cords (high altitude induced laryngitis).

Conflicts of interest

The author has none to declare.

REFERENCES

1. Zakrzewski J. The etiology of systemic ozaena. *Otolaryngology*. 1993;47(5):452–458.
2. Assanasen P, Robert. Naclerio M. Cold, dry air, and hyperosmolar challenges in rhinitis. *Allergy Front: Clin Manifest*. 2009;3:157–171.
3. Green A, Smallman LA, Logan AC, Drake-Lee AB. The effect of temperature on nasal ciliary beat frequency. *Clin Otolaryngol*. 1995;20:178–180.
4. Salah B, Dinh Xuan AT, Fouilladieu JL, Lockhart A, Regnard J. Nasal mucociliary transport in healthy subjects is slower when breathing dry air. *Eur Respir J*. 1998;1:852–855.
5. Dutta R, Panwar SM. Impact of nasal symptoms on the quality of life of fresh inductees in high altitude. *Med J Armed Forces India*. 2008;64:214–217.
6. Rostovshchikov AS. Pathomorphology of the mucous membrane of the human nose exposed to high altitudes. *Ark Patol*. 1983;45(9):23–30 [in Russian] PubMed PMID: 6651546.
7. Cosio MG, Hale KA, Niewoehner DE. Morphologic and morphometric effects of prolonged cigarette smoking on the small airways. *Am Rev Respir Dis*. 1980;122: 265–271.
8. Xavier RF, Ramos D, Ito JT, et al. Effects of cigarette smoking intensity on the mucociliary clearance of active smokers. *Respiration*. 2013;86:479–485.
9. Hildenbrand T, Weber RK, Brehmer D. Rhinitis sicca, dry nose and atrophic rhinitis: a review of the literature. *Eur Arch Otorhinolaryngol*. 2011;268(January (1)):17–26.
10. Bolser DC. Pharmacologic management of cough. Cough: an interdisciplinary problem. *Otolaryngol Clin N Am*. 2010;43 (February (1)).
11. Pajić-Penavić I. Endoscopic monitoring of postoperative sinonasal mucosa. In: Iancu C, ed. In: *Wounds Healing, Advances in Endoscopic Surgery*. InTech; 2011:978-953-307-717-8. 456 pp. [Chapter 21].