

nCPAP-induced Nasal Injury: Case Series and Brief Literature Review

Paola Cavicchioli¹, MD; Valeria Silecchia², Enrico Valerio², MD; Margherita Fantinato², MD; Irene Giovannini², MD; Ramon Grimalt³, MD, PhD; Mario Cutrone¹, MD

1 Department of Pediatrics, Ospedale Dell'Angelo, Mestre (VE), Italy;

2 Department of Woman and Child Health, Medical School, University of Padua, Padova, Italy;

3 Universitat Internacional de Catalunya. Dermatology, Sant Cugat del Vallès. Barcelona, Spain.

Conflict-of-interest statement: The author(s) declare(s) that there is no conflict of interest regarding the publication of this paper.

Open-Access: This article is an open-access article which was selected by an in-house editor and fully peer-reviewed by external reviewers. It is distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>

Correspondence to: Enrico Valerio, Pediatric Intensive Care Unit, Ospedale San Bortolo, Vicenza, Italy.

Email: enrico.valerio.md@gmail.com

Telephone: +39 0444 75 2887

Fax: +39 0444 75 2796

Received: July 30, 2019

Revised: August 6, 2019

Accepted: September 1, 2019

Published online: December x, 2019

ABSTRACT

nCPAP-induced nose skin injury is a common issue in NICUs all over the world. Damage may vary from simple hyperemia in the region of application of nasal cannulae up to complete destruction of the columellar region. We here report a case series of three patients displaying various grades of nasal damage, ranging from soft hyperemia to ulcerative lesions, up to complete columellar breakdown. Not only lesions with loss of substance are documented in literature; cases of post-discharge nasal vestibular stenosis and nasal synechiae obstruction are also reported. Risk factors for nCPAP-induced nasal injury include low birth weight, low gestational

age, and increased time on nCPAP. Good clinical practices to prevent and treat nCPAP-induced skin damage are here briefly reviewed; strong efforts must be spent in NICU personnel education in order to enhance awareness about this topic and ensure a correct prevention.

Key words: Columellar transection; nCPAP; Neonatology; Newborn

© 2019 The Author(s). Published by ACT Publishing Group Ltd. All rights reserved.

Paloni G, Silecchia V, Berti I, Tagarelli A, Mazzoni E, Lambertini A, Valerio E, Grimalt R, Cutrone M. nCPAP-induced Nasal Injury: Case Series and Brief Literature Review. *Journal of Dermatological Research* 2019; 4(2): 185-186 Available from: URL: <http://www.ghrnet.org/index.php/jdr/article/view/2734>

CASE SERIES

Nose skin injuries caused by ventilatory devices are a quite common issue in neonatal intensive care units (NICUs) all over the world. In particular, nasal continuous positive airway pressure (nCPAP) prongs are notoriously associated with a broad range of skin damage, as substantiated by the present case series: injury ranges from soft hyperemia in the region of application of nasal cannulae (Figure 1) to more serious ulcerative lesions (Figure 2), up to complete destruction of the columellar region (Figure 3). All the three patients here reported are preterm babies (range 25-30 weeks of gestational age at birth) who needed nCPAP support for a variable lapse of time (ranging from 3 weeks in Figure 1 case to 8 weeks in Figure 3 case); erogated FiO₂ ranged from 21% to 65%. The rest of the clinical course of these three babies was substantially uneventful.

DISCUSSION AND BRIEF LITERATURE REVIEW

Known risks of nCPAP therapy in preterm infants include abdominal distension due to gut air swelling, increased incidence of necrotizing enterocolitis (NEC), pneumothorax, and nasal skin and mucosal damage. The latter has been documented even for brief courses (as short as three days) of nCPAP therapy^[1].

nCPAP-associated skin and mucosal damage encompasses a wide range of clinical pictures including nasal hyperemia, snubbing (upward pressure on the nose, see Figures 2 and 3), nasal flaring

(abnormal enlargement of nostrils, see Figures 1, 2, and 3), nasal pressure ulcers, septum crusting and excoriation (Figure 2) which can ultimately lead to necrosis and destruction of columellar region^[2] (Figure 3).

A simple staging system to classify nCPAP-induced skin damage has been proposed by Fischer *et al*^[3] stage I injury is identified by nasal erythema (see Figure 1); stage II displays as superficial ulceration (Figure 2); stage III encompasses full-thickness necrosis (Figure 3).

Not only lesions with loss of substance are documented in literature; cases of post-discharge nasal vestibular stenosis and nasal synechiae obstruction due to extended use of nCPAP have also been reported, either requiring surgical intervention or endoscopic synechiolysis and repeat dilatations to attain a patent nasal airway. Stenotic lesions may speculatively derive in a stepwise fashion from ulcerative lesions followed by secondary healing with exuberant granulation tissue^[1].

Risk factors for nasal injury include low birth weight, low gestational age, and increased time on nCPAP^[2] (although nasal damage has been reported in as little as three days of nCPAP treatment)^[1]. Immature preterm skin associated with smaller nasal columella and often longer nCPAP duration may explain the high incidence of nCPAP-related nasal skin injuries among premature infant population.

Which are the best treatment strategies to manage nCPAP-related nose damage is debatable; what's clear is that efforts must be waged to improve care and monitoring in order to enhance awareness and prevention of iatrogenic damage in nCPAP-ventilated patients.

Burch *et al* identified the following good clinical practices as useful for nose skin injury prevention in such babies^[4]: (1) 4-hourly columellar region evaluation (removing nCPAP device from the baby); (2) Leaving at least 2 millimetres between columella and the binasal prongs; (3) Periodically alternating different types of nCPAP devices (eg, mask and prongs) in order to allow relieving of skin pressure points; (4) Applying hydrocolloid patches over the nose and philtrum; notably, patches should be replaced only at their spontaneous detachment (occurring every 24-48 hours) avoiding active nurse removal, which can of course induce or worsen nasal skin damage.

In addition, Günlemez *et al* found silicon gel sheeting of columella and nares to be an effective prevention strategy of nCPAP-induced skin injury^[5].

Following of the above mentioned practices has been associated to decreased incidence of nasal injuries in nCPAP-ventilated NICU patients.

In addition to necessity to enhance NICU personnel education and awareness about this topic to ensure a correct prevention of such lesions, further research is needed to assess real efficacy and feasibility of therapeutic strategies once nCPAP-associated skin damage has established.

REFERENCES

1. Robertson NJ, McCarthy LS, Hamilton PA, Moss AL. Nasal deformities resulting from flow driver continuous positive airway pressure. *Arch Dis Child Fetal Neonatal Ed.* 1996; **75**: 209-212. [PMID: 8976689]; [PMCID: PMC1061202]; [DOI: 10.1136/fn.75.3.f209]
2. Newnam KM, McGrath JM, Estes T, Jallo N, Salyer J, Bass WT. An integrative review of skin breakdown in the preterm infant associated with nasal continuous positive airway pressure. *J Obstet Gynecol Neonatal Nurs.* 2013; **42**: 508-16. [PMID: 24020476]; [DOI: 10.1111/1552-6909.12233]



Figure 1 Columellar hyperemia in a preterm baby after 3 weeks of nCPAP treatment.



Figure 2 Columellar crusty pressure ulcer associated with bilateral nostril flaring in a preterm baby being administered nCPAP for 6 weeks.



Figure 3 Complete columellar breakdown following ulcerative necrosis in a preterm baby ventilated with nCPAP for 8 weeks.

3. Fischer C, Bertelle V, Hohlfeld J, Forcada-Guex M, Stadelmann-Diaw C, Tolsa JF. Nasal trauma due to continuous positive airway pressure in neonates. *Arch Dis Child Fetal Neonatal Ed.* 2010; **95**: 447-51. [PMID: 20584802]
4. Burch K, Rhine W, Baker R, Litman F, Kaempf JW, Schwarz E, Sun S, Payne NR, Sharek PJ. Implementing potentially better practices to reduce lung injury in neonates. *Pediatrics.* 2003; **111**: 342-436. [PMID: 12671163]
5. Günlemez A1, Isken T, Gökalp AS, Türker G, Arisoy EA. Effect of silicon gel sheeting in nasal injury associated with nasal CPAP in preterm infants. *Indian Pediatr.* 2010 Mar; **47**(3): 265-7. [PMID: 19430064]; [DOI: 10.1007/s13312-010-0047-9]