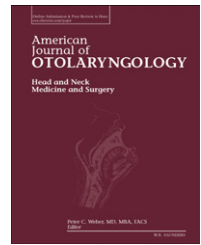


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# Cytological alterations of nasal mucosa after nasal packing<sup>☆</sup>



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## ABSTRACT

**Purpose:** To assess the efficacy, tolerability and cytological alterations of nasal mucosa with various materials for nasal packing.

**Materials and methods:** One hundred and five patients, submitted to a nasal surgery and post-operative packing with four different materials (Clauden®, MeroceI®, two-fingered glove pack with gauzes inside and Lyofoam™) were prospectively enrolled in the study. All patients were submitted to a questionnaire of 12 questions which required the patients to refer to the tolerability of packing. Finally a nasal cytological test was performed after removal of packing and 10 days after, to evidence the alterations of ciliated cells and reduction of supranuclear stria. **Results:** The questionnaire of tolerability of packing revealed a severe discomfort (grade III) in 13 patients (38.2%) with Clauden, 1 (2.4%) with MeroceI, 7 (41.1%) with two-fingered glove packing and 6 (46.1%) with Lyofon.

As regards cellular alterations, the two-fingered glove and the MeroceI groups had the lowest percentage of cellular alterations which was particularly different from the Clauden group ( $p = .0014$ ). The supranuclear stria was reduced in the Clauden group and the two-fingered glove packing group both after packing removal and after ten days with a statistical difference when compared to the other two groups ( $p < .001$ ).

**Conclusions:** MeroceI packing appears to be well tolerated by the patients with the lowest percentage of cytological alteration, of ciliated cells. Also finger glove packing shows scarce damage of nasal mucosa with a lower percentage of nasal bleeding but its tolerability is not so good.

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## 1. Introduction

Nasal packing is commonly used to control epistaxis and to prevent post-operative bleeding after nasal surgery. Although typically effective, nasal packing causes pain, rhinorrhea, nasal obstruction and inconvenience and its removal is painful and often associated with rebleeding [1,2].

Various studies have demonstrated that removal of packing is considered more stressful than the surgery itself. Many

patients state that the inconvenience caused by the packing would prevent them from considering revision surgery [2,3].

Besides the evaluations that are purely subjective, we cannot forget the risks and the complications of packing. These complications can involve the nasal cavity with mucosal lesions, septal perforations, fibrin accumulation, pack dislodgment with possible aspiration, paraffin granuloma and spherulocytosis, giant pyogenic granuloma and infection of the nasal cavity and vestibule [3]. Although rare,

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general complications can also be associated to nasal packing (allergy, toxic shock syndrome, obstructive sleep apnea and decreased arterial partial pressure of oxygen, middle ear dysfunctions or infections, infective endocarditis, acute dystonia, fracture of the lamina papyracea, velopharyngeal perforation and massive pneumocephalus) [3].

Such considerations have led to different studies, which have demonstrated the uselessness of the routine appeal of nasal packing, especially after endoscopic nasal surgery in relation to the low incidence of postoperative epistaxis and the relationship between costs and benefits [1,2,4-6].

Generally there is a lack of accepted standards regarding which material should be used for packing. When evaluating the suitability of the various packing materials for nasal surgery, their influence on wound healing should be given particular attention [3].

Nasal cytology can be an important diagnostic tool that can help in evaluating the alterations of the nasal mucosa after nasal packing and its restoration after a certain time [7].

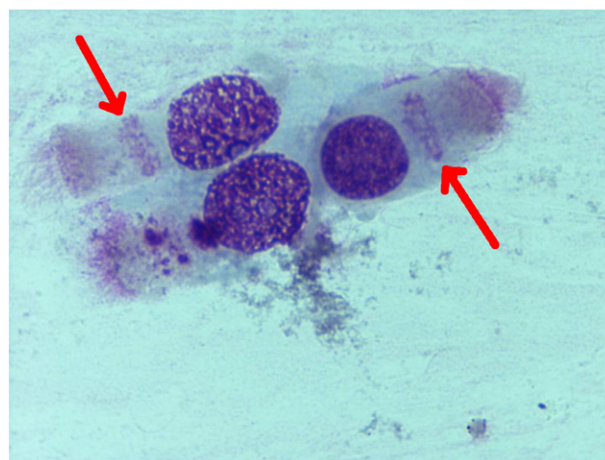
In the present study we used nasal cytology to assess the cytological alteration of nasal mucosa and its restoration after the application of various materials for nasal packing and we verified the efficacy and patients tolerability for each one.

## 2. Materials and Methods

From January 2011 to January 2012, 612 patients (223 women and 389 men; age range, 11-81 years; mean, 33.8 years) requiring a nasal procedure (rhinoplasty, septoplasty, turbinoplasty, reduction of nasal fracture, reparation of septal perforation or endoscopic sinus surgery) were evaluated for the study.

All patients underwent a preoperative evaluation at the Department of Otolaryngology of the University Hospital "Ospedali Riuniti" of Foggia (Italy) using:

- Case history: to evidence possible comorbidity (allergy, hypertension, thyroiditis, etc.)
- Routine blood test. Only patients with hemoglobin levels higher than 10 mg/dL, normal prothrombin and partial thromboplastine times were eligible for surgery.
- Nasal endoscopy to reveal the nasal pathology. In patients with nasal polyps, systemic corticosteroids were administered one week before surgery to minimize inflammation and therefore the risk of bleeding.
- Nasal cytological test, performed by scraping the middle part of inferior turbinate with a Rhino-Probe. The sample was stratified on a slide, fixed with methanol for 4 minutes and coloured using the May-Grünwald Giemsa staining method. Microscopic observation was performed at 400x magnification to check coloration quality and cell distribution, and at 1000x magnification in immersion to discriminate different cell types and to study the intracellular components including the hyperchromatic supranuclear stria (SNS), a particular intracellular hyperchromatic formation located over the nucleus of normal nasal ciliated cells and considered as a specific marker for the anatomic and functional integrity of the ciliated cell (Fig. 1) [8]. Ciliated cell alterations and SNS were expressed using the percentage of altered cells and SNS + cells per 10 fields.



**Fig. 1 – Ciliated cells of nasal mucosa with hyper-chromatic supra-nuclear stria (SNS) (M.G.G. ×1000).**

Surgeries were performed by four different surgeons of the Department of Otolaryngology University Hospital "Ospedali Riuniti" of Foggia (Italy).

Reduction of nasal fractures required routine nasal packing to stabilize nasal bones intranasally, whilst for the other nasal procedures techniques of endoscopic control of nasal bleeding enable us to avoid nasal packing in a large percentage of cases [4].

Only if diffused bleeding occurred which could not be controlled with these procedures, we used anterior nasal packing carried out with 1) open cell foam polymer of hydroxylated polyvinyl acetyl (Merocel® sinus pack, from Medtronic Xomed, Jacksonville, FL), 2) two-fingered glove pack with gauzes inside, 3) Lyofoam™ (Mölnlycke Health Care Ltd, Dunstable, UK.) and 4) Clauden® nasal packing (Lohmann & Rauscher, Sarreola di Rubano (PD) – Italy) according to the preferences of each surgeon. No randomization was applied.

Tranexenic acid was administered in all patients for 7 days post-operatively to reduce the risk of bleeding.

Only patients with post-operative packing and a nasal cytological test with < 5% of altered ciliated cells and > 75% of SNS + cells (to eliminate patients with pre-operative alterations of ciliated cells) were included in the study.

Packing was removed after 3 days in all patients. After surgery the bleeding during the packing period or after the removal of packing was considered.

All patients were subsequently submitted to a questionnaire of 12 questions (Fig. 2) which required the patients to refer to the tolerability of packing. The participant gave a score for each answer that could be "never" (0 points), "sometimes" (2 points) or "often" (4 points) and finally a grading of tolerability adding the points of the various answers. The discomfort was graded as: - grade I - mild (points 0-12), grade II - moderate (13-24 points), grade III- severe (25-36 points), grade IV - unbearable (points 37-48).

Finally a nasal cytological test was repeated after removal of packing and 10 days after to evidence the alterations of ciliated cells (ciliocytophthoria, cytoplasmic alterations) and the reduction of SNS + cells.

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