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SCIENTIFIC ARTICLE

Comparison of endotracheal tube cuff pressure changes using air versus nitrous oxide in anesthetic gases during laparoscopic abdominal surgeries[☆]



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KEYWORDS

Anesthesia;
Endotracheal cuff
pressure;
Laparoscopy;
Nitrous oxide

Abstract

Background and objectives: The purpose of this study was to compare the endotracheal tube cuff pressure changes during laparoscopic surgeries using air versus nitrous-oxide in anesthetic gas mixture; and to observe the incidences of postoperative sore throat, hoarseness and dysphagia.

Methods: Total 100 patients scheduled for elective laparoscopic abdominal surgery were allocated into two groups. Group A ($n = 50$) received air while Group N ($n = 50$) received nitrous-oxide in anesthetic gas mixture. After endotracheal intubation, cuff was inflated with air to achieve sealing pressure. Cuff pressure at baseline (sealing pressure), 30 min, 60 min and 90 min was recorded with a manometer. Incidence of sore throat, hoarseness and dysphagia was noted at the time of discharge from post-anesthesia care unit and 24 h after extubation.

Results: Cuff pressure increased from baseline in both the groups. The increase in cuff pressure in Group N was greater than that in Group A at all time points studied ($p < 0.001$). Within Group A, cuff pressure increased more at 90 min than at 30 min ($p < 0.05$). Within Group N, increase in cuff pressure was more at each time point (30, 60 and 90 min) than its previous time point ($p < 0.05$). The incidence of sore throat in post-anesthesia care unit was higher in Group N than in Group A.

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PALAVRAS-CHAVE

Anestesia;
Pressão do balonete
endotraqueal;
Laparoscopia;
Óxido nitroso

Conclusion: Use of nitrous-oxide during laparoscopy increases cuff pressure resulting in increased incidence of postoperative sore throat. Cuff pressure should be monitored routinely during laparoscopy with nitrous-oxide anesthesia.

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Comparação de alterações na pressão do balonete do tubo endotraqueal usando ar versus óxido nitroso nos gases anestésicos durante cirurgias abdominais laparoscópicas

Resumo

Justificativa e objetivos: O objetivo deste estudo foi comparar as alterações na pressão do balonete do tubo endotraqueal durante cirurgias laparoscópicas usando ar versus óxido nitroso na mistura dos gases anestésicos e observar a incidência de dor de garganta, rouquidão e disfagia no pós-operatório.

Métodos: No total, 100 pacientes agendados para cirurgia abdominal laparoscópica eletiva foram alocados em dois grupos: Grupo A ($n=50$) recebeu ar e Grupo N ($n=50$) recebeu óxido nitroso na mistura de gases anestésicos. Após a intubação endotraqueal, o balonete foi insuflado com ar para obter a pressão de vedação. As pressões do balonete na fase basal (pressão de vedação), aos 30 min, 60 min e 90 min foram registradas com um manômetro. A incidência de dor de garganta, rouquidão e disfagia foi observada no momento da alta da sala de recuperação pós-anestésica e 24 horas após a extubação.

Resultados: A pressão do balonete aumentou em ambos os grupos, comparada à pressão basal. O aumento da pressão do balonete foi maior no Grupo N que no Grupo A em todos os tempos avaliados ($p < 0,001$). No Grupo A, o aumento da pressão do balonete foi maior aos 90 min que aos 30 min ($p < 0,05$). No Grupo N, o aumento da pressão do balonete foi maior em cada um dos tempos (30, 60 e 90 min) que no tempo anteriormente mensurado ($p < 0,05$). A incidência de dor de garganta na sala de recuperação pós-anestésica foi maior no Grupo N que no Grupo A.

Conclusão: O uso de óxido nitroso durante a laparoscopia aumenta a pressão do balonete, resultando em aumento na incidência de dor de garganta no pós-operatório. A pressão do balonete deve ser rotineiramente monitorizada durante a laparoscopia sob anestesia com óxido nitroso. © 2018 Sociedade Brasileira de Anestesiologia. Publicado por Elsevier Editora Ltda. Este é um artigo Open Access sob uma licença CC BY-NC-ND (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Introduction

Laparoscopic surgeries are commonly preferred now-a-days over open abdominal surgeries because of the benefits like less incisional pain, quicker recovery and shorter hospital stay. General anesthesia with endotracheal intubation and controlled ventilation is considered as a safe technique of anesthesia for laparoscopy. Cuffed endotracheal tubes (ETT) are used to achieve a seal between the cuff and trachea with a pressure great enough to prevent aspiration but not so high that the tracheal blood flow will be impeded. Ischaemia of tracheal wall occurs when pressure against the tracheal wall from the hyper-inflated cuff exceeds the pressure in the capillary blood supply. Tracheal mucosal perfusion can be impaired by cuff pressure greater than 30 cmH₂O and thus patient can experience sore throat, hoarseness and dysphagia.^{1,2} It has been reported that laparoscopy causes an increase in endotracheal tube cuff pressure and sore throat in postoperative period.³ Intracuff pressure can also

be affected by the type of anesthetic agent. Nitrous oxide (N₂O) is known to diffuse into the endotracheal tube cuffs.⁴ There are studies which have shown that during general anesthesia with N₂O, intracuff pressure increases causing increase in tracheal injury and sore throat.^{1,5} However, in the modern era with emphasis on enhanced recovery after surgery, N₂O remains a valuable option in view of its effect on recovery and benefits in general anesthesia.⁶⁻⁸ Also, in Indian set-up, many hospitals and nursing homes have limited availability of air as an anesthetic gas. N₂O is freely available there and thus commonly used during laparoscopy. The effects of N₂O use during laparoscopy on cuff pressure changes have not been studied. The purpose of this study was to evaluate changes in endotracheal tube cuff pressure during laparoscopy using air versus N₂O in balanced general anesthesia. We aimed to observe the incidences of postoperative laryngo tracheal complaints and thus to assess the necessity of monitoring endotracheal tube cuff pressure during laparoscopy with N₂O anesthesia.

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