

Acta Otorrinolaringológica Española

www.elsevier.es/ otorrino



ORIGINAL ARTICLE

Nasal packing in posterior epistaxis. Comparison of two methods

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Received August 29, 2009; accepted November 18, 2009

KEYWORDS

Epistaxis; Treatment; Packing

Abstract

Objective: To evaluate tolerance and efficiency of two nasal blocking systems for posterior refractory epistaxis.

Patients and methods: A five year comparative and longitudinal prospective study was developed in patients with epistaxis who attended our Emergency Unit and who required posterior nasal packing. Two groups were considered: one group was treated with a bi-chamber pneumatic inflation system (n=105). In the other one, posterior occlusion was carried out with gauze, accessing through the mouth and using nasal reinforcement (n=47). The tolerance was measured by means of an analogue scale of pain intensity during the placement and maintenance of the packing, as well as for the need of analgesia. The efficiency was evaluated by episodes of rebleeding, need for other concomitant measures, blood transfusion and side effects.

Results: In patients with inflatable nasal packing, its placement was significantly faster (36 ± 19 s vs 228±102 s; P.001) and less painful (6.7 ± 1.7 vs 8.3 ± 1.5 ; P.001), requiring less analgesia until its removal. Patients with gauze packs showed a lower average incidence of rebleeding (17% vs 26%; P.001), fewer cases of blood transfusion (15% vs 18%; P.001) or of other procedures (4% vs 11%; P.001). The health cost of the latter was also lower ($\pounds1,327\pm\pounds202$ vs $\pounds1,648\pm\pounds318$; P.001) and it generated fewer short and long-term complications.

Conclusions: The classic posterior packing with gauze is less rapid and comfortable to adapt, but it ensures a higher success rate in the control of epistaxis, produces fewer local injuries and reduces health costs in comparison with inflatable balloon packing.

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PALABRAS CLAVE Epistaxis; Tratamiento; Taponamiento

Taponamiento nasal en la epistaxis posterior. Comparación de dos métodos

Resumen

Objetivo: Evaluar la tolerancia y eficacia de 2 sistemas de taponamiento nasal para epistaxis posteriores refractarias.

Pacient es y métodos: Estudio comparativo longitudinal y prospectivo de 5 años en pacientes que acudieron a Urgencias por epistaxis y precisaron taponamiento posterior. Se consideraron 2 grupos: uno atendido con un sistema de hinchado neumático bicameral (n = 105); otro en el que se efectuó oclusión posterior con gasa accediendo por boca y refuerzo anterior (n = 47). La tolerancia se midió mediante escala analógica de intensidad dolorosa durante la colocación y mantenimiento del tapón, así como por necesidad de analgesia. La eficacia se valoró por índices de resangrado, necesidad de medidas concomitantes, transfusión de hemoderivados y efectos secundarios.

Resultados: En los pacientes con taponamiento hinchable la colocación fue significativamente más rápida (36 ± 19 s vs. 228 ± 102 s; p < 0,001) y menos dolorosa (6,7 ± 1,7 vs. 8,3 ± 1,5; p < 0,001), precisando menos analgesia hasta su retirada. El taponamiento de gasa presentó menor porcentaje de resangrados (17% vs. 26%; p < 0,001), menos necesidades de transfusión de hemoderivados (15% vs. 18%; p < 0,001) o de otros procedimientos (4% vs. 11%; p < 0,001). El gasto sanitario con este último fue menor (1.327 ± 202 € vs. 1.648 ± 318 €; p < 0,001) y generó menos complicaciones a corto y largo plazo.

Conclusiones: El taponamiento posterior clásico con gasa resulta menos cómodo y rápido de adaptar, pero asegura un mayor porcentaje de éxitos en control de epistaxis, genera menos lesiones locales y reduce costes sanitarios con respecto al neumotaponamiento.

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Introduction

Epistaxis describes any kind of bleeding with a source in the paranasal pits or sinuses manifesting through the nostrils or the mouth, representing a common reason for emergency consultation. Its control is often quick and simple, so it tends to be regarded as a banal process. However, its recurrence or intensity may at times compromise the vital prognosis, thus requiring more aggressive and even invasive procedures to stop it.

With any acute episode of epistaxis, there has to be correct differential diagnosis between epistaxis, haemoptysis, gastrointestinal haemorrhage and other causes of bleeding with exteriorisation through nose or mouth. We also have to perform an initial screening of base pathologies and associated therapies that may precipitate or aggravate the condition.

Approximately 60% of the population suffers an episode of epistaxis at some point in their lives; of these, 6% require medical treatment.¹ The prevalence of epistaxis is between 10% and 12%. In the USA, one ER consultation out of every 200 is due to epistaxis. There are age periods with a higher incidence: between 5 and 20 years and over 55. There is little impact on lactating infants and consultations increase during winter.^{2,3}

Most epistaxis originates from a vascular plexus of the anterior septum (Kiesselbach's area). The majority (80%) of nasal haemorrhages have an anterior origin, while 5%-10% are of a posterior location. This location varies depending on age, the septal wall being the most frequent origin of epistaxis in young patients and the posterior in adults.^{1,4}

After a rapid, adequate patient assessment, the options for epistaxis control range from simple anterior blockages to surgical manipulation under endoscopic control. However, posterior packing still proves a useful tool in the treatment of refractory epistaxis to exclusive manoeuvres through the nostril. Posterior packings vary in structure and method of placement. The ideal packing would be that which, in addition to effectively controlling the haemorrhage, was easily adaptable and reasonably well tolerated by the patient. We assessed these factors in our centre among patients who consulted due to posterior epistaxis. The objective of this study was to assess the reliability of the two most commonly used types of posterior packing in terms of tolerance, comfort and capacity of terminating the haemorrhage.

Patients and methods

We reviewed all cases of patients seen and admitted by the Otolaryngology Service for posterior epistaxis that required packing between 1st September 2003 and 31st August 2008. These were patients in whom conventional alternatives such as anterior packing with cotton, gauze or cellulose pads were ineffective in the first attempt or in repeated ER visits. To assess the therapeutic reliability of such packings, we elaborated a prospective and longitudinal follow-up study comparing the techniques employed.

This service performs two techniques, chosen by the medical specialist on duty:



Figure Design of both posterior nasal packings. A) Inflated bicameral plug. B)Classic posterior packing with gauze introduced through oral cavity and with anterior reinforcement.

- 1. Classic posterior packing with gauze soaked in tetracaine paste and impacted into the cavum and choana, introduced through the mouth using traction probe from the nostril involved. The packing is completed by adding gauze through the nostril until the maximum possible area of the nasal segment is filled. The patient is systematically administered 5 mg of diazepam and 2 g of metamizole intravenously 30 s before plugging.
- 2. Pneumatic packing device with a length of 12cm coated in tetracaine paste with 2 chambers and anterior

introduction; it accepts a maximum inflation with saline solution of 10 cc in the posterior compartment and up to 30 cc in the anterior (Figure). The intravenous preparation of the patient is similar to the previous group.

All patients included in the study were informed during their hospital stay of the evaluations and parameters that would be measured in their short and medium-term monitoring, for which they gave their signed informed consent according to the specifications of the Ethics Committee of the Department of Clinical Research at our centre.

As tolerance factors, in all cases observed, we recorded severe pain associated with the packing (during its placement, on the third day and upon withdrawal) through the score indicated by the patient on a visual analogue scale, 10 cm in length, where the left end reflected the absence of pain and the right the greatest pain imaginable.

In addition, we also noted the time taken by the doctor to place the packing and the characteristics of concentration and association of analgesia required by the patient while the packing was in place.

In terms of effectiveness, for each of the two groups we recorded the number of subjects who presented an episode of rebleeding with the packing in place or after its withdrawal. The need to change the plug or utilise other additional procedures (selective embolisation or endoscopic ligation-cautery under general anaesthesia) was also noted. Embolisation was chosen over endoscopic review due to the exploratory convenience this technology offers without needing to remove the packing and without requiring general anaesthesia. We also quantified the percentage of decrease in patient haemoglobin concentration and the blood replacement needs.

A medium-term review enabled us to identify the number of patients with complications in the nostrils after 15 days of the packing and the persistence of definitive structural alterations. To this end, patients were reviewed at 3 and 6 months of the haemorrhagic event.

The costs derived from hospital stay according to the procedure chosen included the daily cost of a room, packing, medications prescribed at the hospital and alternative procedures when applicable, as currently stipulated in the Fees Law of the Generalitat Valenciana on rates per hospital process and diagnostic and therapeutic procedures.⁵

These parameters could be quantified in the form of quantitative numerical variables or percentages, enabling the comparison of both groups of packings in terms of efficacy and tolerance. This was accomplished by applying Student's t-test for the data recorded, such as average and standard deviation, assuming variables with a normal distribution, and also applying the χ^2 test for proportions, through the use of the SPSS statistical package. Differences were accepted as statistically significant if *P*<.001.

Results

In the 5 years of follow-up, 105 pneumatic packings were placed, as well as 47 classic blockages with gauze in cavum

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	Bicameral pneumatic plug (n=105)	Anterior and posterior gauze plug (n=47)
Pain during placement, VAS	6.7±1.7	8.3±1.5*
Pain at 3rd day, VAS	3.4±2.2	5.7±2.7*
Pain at removal, VAS	1.3±1.8	2.1±2.2
Duration of placement, s	36±19	228±102*
Need for paracetamol, g/kg weight	0.20±0.05	0.25±0.06*
Patients with analgesic associations	38 (36.2%)	31 (65.9%)*
Patients plugged by resident physicians	72 (68.5%)	34 (72.3%)
Rebleeding with packing placed	28 (26.6%)	8 (17%)*
Rebleeding just after removal	11 (10.5%)	1 (2.1%)*
Need to place a different packing	17 (16.2%)	4 (8.5%)*
Need for additional procedures	12 (11.4%)	2 (4.2%)*
% decrease in haemoglobin levels	16.2±9.4	17.4±10.5
Need for BC transfusion	19 (18.1%)	7 (14.8%)*
Control with a single packing	71 (67.6%)	37 (78.7%)*
Rebleeding in the 3 months following	9 (8.5%)	2 (4.2%)*
Nasal complications at 15 days	26 (24.7%)	4 (8.5%)*
Definitive structural complications	8 (7.6%)	2 (4.2%)*
Prior ER visits due to epistaxis	3.8±2.2(1-6)	4.1±2.6(1-4)
Hypertensive emergency	22 (20.9%)	8 (17%)
Anticoagulants / hepatopathy	18 (17.1%)	5 (10.6%)*
Antiplatelet / thrombocytopenia	15 (14.2%)	5 (10.6%)*
Rendü-Osler disease	7 (6.7%)	3 (6.4%)
Trauma/postoperative	6 (5.7%)	3 (6.4%)
Hospital stay, days	5.2±1.3	4.2±0.9*
Cost per case, €	1,648.84±318.74	1,327.58±202.26*

Table Clinical characteristics of patients treated with pneumatic and gauze plugs

BC indicates red blood cells concentrate; VAS, visual analogue scale. *P<.001.

and anterior strengthening as an initial epistaxis control. A total of 140 patients were treated: 96 with a pneumatic packing and 44 with a classic gauze packing.

The clinical characteristics of patients assisted with these procedures are described in Table. The pneumatic plug was used in patients with an average age of 51.2 ± 11.8 years (range, 37-74 years) and a male to female ratio of 2.2:1. The classic gauze plug was used in subjects with an average age of 54.8 ± 9.9 years (range, 40-68 years) and a 3.2:1 ratio.

The choice of packing was made by the doctor on duty in accordance to the emergency considerations suggested by the situation in each case. There were more cases assisted with pneumatic packing, with a statistically significant difference, among those patients with clotting or platelet aggregation disorders. This was significantly less painful in the visual analogue scale and faster to place, being better tolerated than the classic packing even on the third day after its placement. In addition, it required a lower concentration of paracetamol as an analgesic. A significantly higher number of patients with gauze packing in cavum required a combination of analgesics (metamizole was associated in 12, dexketoprofen in 7, tramadol in 6, dolantin in 3 and metamizole with dexketoprofen in another 3 patients). Of the 38 patients with bicameral plug who required enhanced

analgesia with paracetamol, metamizole was sufficient in 29 and dexketoprofen in 9.

In our centre there is a tendency to maintain the packing in place for 3-5 days. The percentage of cases showing rebleeding while carrying the nasal plug, or after its withdrawal, or who required the placement of a second different packing (passing to classic gauze plug, or only anterior with Merocel-type polyvinyl plastic sponges or edged gauze) was significantly higher among those treated initially with pneumatic packing. There was rebleeding in the initial 3 days during hospitalisation in 28 cases treated with pneumatic packing and in 8 treated with classic gauze packing. The number of patients with haemostasis disorders was 17 (60.7%) and 6 (75%), respectively. The current rapid control of coagulation factors and platelet counts enables patients suffering from these disorders to receive a more optimal prognosis.

The proportion of cases requiring only one packing for the control of epistaxis was higher among those treated with classic gauze plugs, with statistically significant differences.

The number of patients who, after being plugged with bicameral plug, required superselective embolisation of carotid vessels (n=9), endoscopic review for sphenopalatine

ligation (n=2) or both (n=1) during their admission was also significantly higher. Among those treated with classical plugs, only 2 cases required embolisation. There were no differences in the percentage of decrease in the concentration of haemoglobin or in the need for transfusion of packed red blood cells between the 2 groups. Rebleeding within 3 months was significantly higher among patients with pneumatic plug; there were 9 in all, of which 6 were anticoagulated patients.

In this situation, patients who underwent packing with pneumatic bicameral systems stayed an average of one day longer than those treated with posterior occlusion with gauze. The average health cost for patients treated with the first method was $\leq 1,648.84 \pm \leq 318.74$, while it was $\leq 1,327.58 \pm \leq 202.26$ for those treated with posterior gauze plug. These differences were also statistically significant.

A total of 24.7% of patients treated with pneumatic plugs presented local discomfort 15 days after removing the plug (20 patients had nasal pain, 13 had sinusitis, 11 with nasal blockage due to scabs, 8 with migraine, 5 with pain in the upper gum and 3 had velar incompetence, these circumstances being cumulative). Among those treated with gauze plug, there were 3 patients with persistent nasal pain, 2 with headache and one case of sinusitis.

Among patients treated with pneumatic packing, there were 5 cases of destructuring and necrosis of the inferior turbinate, 3 of anterior septal perforation, 3 of alar cartilage necrosis, 2 with sinusitis, 2 with serous otitis and one with septal cartilage fracture (cumulative circumstances). In the gauze packing group, one patient presented resorption of the tail of the inferior turbinate and another partial necrosis of the veil combined with serous otitis.

Discussion

Nasal packing is a procedure of required learning and common use by the specialist physician. In patients with epistaxis, it is not always possible to find an origin of bleeding that is accessible through anterior rhinoscopy and the coexistence of predisposing factors can turn a seemingly banal haemorrhage into a severe blood loss condition.

In the Emergency Department, posterior or uncontrollable epistaxis requires a quick response with gauze and/or expandable or inflatable materials. This action is often effective and, in our experience, prevents the need for more aggressive procedures. Other authors advocate ligation or endoscopic cauterisation as the treatment of choice with elevated levels of effectiveness and lower health costs, limiting the role of packing to a mere temporary containment manoeuvre.⁶⁻⁹

Selective embolisation of terminal branches of the external carotid does not offer worse results.¹⁰⁻¹³ In the comparative study on both techniques by Cullen,¹⁴ similar rates of failures and complications were found. However, the author recommended ligation of the internal maxillary artery since it was a more accessible procedure in non-specialised centres.

Packings for posterior epistaxis respond to a need that is not uncommon in specialised care. Their adaptation offered

a variable level of performance, between 45%-81%, in the reviews carried out by colleagues from our environment.^{8,9,15} Being unable to explain this difference in the results clearly, we can assume the existence of concomitant factors, the control of which could optimise the response. Such factors would be arterial hypertension in 30 cases (19.7% of the entire number studied) and disorders of haemostasis in 43 (28.3%). These values are especially highlighted by Viducich as an aetiopathogenic mechanism of haemorrhage in the monitoring of 88 cases, although no predictive power on the possibility of rebleeding was attributed.¹⁶

In fact, the finding that posterior gauze packings clearly require more time for their placement than bicameral inflation systems was the main reason for the latter to be chosen in cases of massive or initially uncontrollable epistaxis. Patients with haemostatic disorders or hypertensive crises were therefore preferably plugged with inflation systems, although this difference was only statistically significant for coagulation disorders.

However, the posterior packing manoeuvre is uncomfortable because the internal shape of the nostril impedes introducing any device. Indeed, intranasal inflation systems significantly relieve this condition, as recognised by Randall, in comparison with the application of spongy materials or gauzes,¹⁷ but present limitations when compared to classic plugs.

Low¹⁸ recognised that the large septal spurs pose anatomical barriers that are occasionally insurmountable for the axis of pneumatic packing. In addition, the gradual increase in pressure of the packing inside the nostril may move it from its initial position and reduce the homogeneity of its action. This favours rebleeding while in place, as well as intensifies the complications inherent to the obstruction in the path of the nasal arteries involved, especially the sphenopalatine¹⁹ or in the maxillary drainage ostia and not the bleeding point; fertile ground is thus created for sinus hypoventilation and for necrosis by reabsorption of mucosa and even bone. In our series, the bicameral plug generated up to 12% of cases of acute maxillary sinusitis and 2 sinusitis processes of long evolution, which is still less than the 21% of cases of sinusitis described by Viducich in his series of 88 posterior epistaxis.¹⁶

Furthermore, the pneumatic plug tends to lose pressure with the passage of days, as Ong found by assessing different haemostatic inflation systems. This decrease in pressure reduces the calibre of a Foley catheter to half on the fifth day after being placed.²⁰

Packing with gauze in cavum and anterior reinforcement, while being more traditional and uncomfortable in its placement and maintenance, generated a lower incidence of rebleeding while in place, as well as after its removal in the following months. There were fewer cases requiring other haemostatic alternatives, less need for transfusion of blood products and significantly fewer long-term complications. This could be explained by the strong fixation performed on the posterior segment and by the ability to model the mass of gauze according to the demands of the nostrils, depending on patient anatomy or the apparent source of the bleeding.

This source was described anatomically in 36 cases by Thornton: 7 cases bled from the septum, 7 from the inferior turbinate, 4 from the inferior meatus, 10 from the middle turbinate and 8 from the middle meatus.¹⁹ The vascular origin was more systematised by Trinidad in a series of 35 cases, detecting the source of bleeding in the sphenopalatine artery in 28 of them, in the anterior ethmoid in 4, and in both in another 4 cases.²¹ Perhaps the accumulation of gauze with a posterior choanal limitation also of gauze produces more effective functional performance. Infectious complications due to endocarditis-type secondary infection are little less than anecdotal.

Conclusions

Posterior packing is, even today, an effective treatment option in emergency control of severe epistaxis or epistaxis with a focus that cannot be identified by anterior rhinoscopy. Its placement often allows control over this bleeding point while other factors that enhance haemorrhage are being equally treated. Although it does not require anaesthetic procedures, it is uncomfortable and its maintenance requires continuous analgesia, so patient hospitalisation is recommended.

Among the various posterior packings that can be placed, the most common are those using a bicameral inflatable device and nasal occlusion in cavum reinforced by gauze in nostril. The first offers shorter placement times and its adaptation and maintenance are better tolerated by the patient.

The second, though more cumbersome and awkward to place, presents lower rebleeding rates during its placement and after withdrawal, involving a lower hospital cost. In addition, short and long-term side effects (especially headache, sinus pathology and structural nostril damage) are significantly less with the adaptation of gauze than with the compression of an inflatable device, and the costs in material and hospital stay are also lower.

We believe that the classic gauze plug should be maintained as a first-line option in the treatment of posterior epistaxis, recommending the manual preparation of some of them prior to any eventual emergency needs.

Conflict of interests

The authors declare no conflict of interests.

References

- 1. Gifford TO, Orlandi RR. Epistaxis. Otolaryngol Clin North Am. 2008;41:525-36.
- Shaw CB, Wax MK, Wetmore SJ. Epistaxis: a comparison of treatment. Otolaryngol Head Neck Surg. 1993;109:60-5.

- 3. Pallin DJ, Chang YM, McKay MP, Emond JA, Pelletier AJ, Camargo Jr CA. Epidemiology of epistaxis in US emergency departments, 1992 to 2001. Ann Emerg Med. 2005;46:77-81.
- Pashen D, Stevens M. Management of epistaxis in general practice. Aust Fam Physician. 2002;31:717-21.
- Ley 11/2000, de 28 de Diciembre, de Medidas Fiscales, de Gestión Administrativa y Financiera, y de Organización de la Generalitat Valenciana, Artículo 9; BOE Núm. 32, tuesday, 6/2/2001: 4385-433.
- Moshaver A, Harris JR, Liu R, Diamond C, Seikaly H. Early operative intervention versus conventional treatment in epistaxis: randomized prospective trial. J Otolaryngol. 2004; 33:185-8.
- 7. Douglas R, Wormald PJ. Update on epistaxis. Curr Opin Otolaryngol Head Neck Surg. 2007;15:180-3.
- Vergara Hernández J, Ordóñez Ordóñez LE. Comparación del manejo quirúrgico versus no quirúrgico en pacientes con epistaxis posterior. Acta Otorrinolaringol Esp. 2006;57:41-6.
- Rejas Ugena E, Trinidad Ruiz G, Alvarez Domínguez J, Carrasco Claver F, Pino Rivero V, Blasco Huelva A. Utilidad del tratamiento quirúrgico de la epistaxis grave mediante abordaje endoscópico de las arterias esfenopalatina y etmoidal anterior. Acta Otorrinolaringol Esp. 2006;57:228-34.
- Fukutsuji K, Nishiike S, Aihara T, Uno M, Harada T, Gyoten M, et al. Superselective angiographic embolization for intractable epistaxis. Acta Otolaryngol. 2008;128:556-60.
- Ricci G, Molini E, Hamam M, Ciorba A, Altissimi G, Campanella S, et al. Treatment of severe epistaxis by superselective embolization: a review of 22 cases. Rev Laryngol Otol Rhinol. 2004;125:247-51.
- Sadri M, Midwinter K, Ahmed A, Parker A. Assessment of safety and efficacy of arterial embolisation in the management of intractable epistaxis. Eur Arch Otorhinolaryngol. 2006;263:560-6.
- Oguni T, Korogi Y, Yasunaga T, Sadanaga T, Uozomi H, Kawanaka K, et al. Superselective embolisation for intractable idiopathic epistaxis. Br J Radiol. 2000;73:1148-53.
- Cullen MM, Tami TA. Comparison of internal maxillary artery ligation versus embolization for refractory posterior epistaxis. Otolaryngol Head Neck Surg. 1998;118:636-42.
- Pino V, Barrantes G, Trinidad G, Montero C, Keituqwa T, Blasco Huelva A. Estudio retrospectivo de epistaxis ingresadas: etiopatogenia, tratamiento y evolución clínica. ORL-DIPS. 2002;29:224-8.
- Viducich RA, Blanda MP, Gerson LW. Posterior epistaxis: clinical features and acute complications. Ann Emerg Med. 1995;25:592-6.
- 17. Randall D.A. Epistaxis packing. Practical pointers for nosebleed control. Postgrad Med. 2006;119:77-82.
- Low C, Walshe P, Hone S. How to perform adequate nasal packing in posterior epistaxis with difficult access. Rhinology. 2003;41:182-3.
- Thornton MA, Mahesh BN, Lang J. Posterior epistaxis: identification of common bleeding sites. Laryngoscope. 2005;115:588-90.
- Ong CC, Patel KS. A study comparing rates of deflation of nasal balloons used in epistaxis. Acta Otolaryngol Belg. 1996;50:33-5.
- Trinidad Ruiz G, Rejas Ugena E, González Palomino A, Pantoja Hernández CG, Mora Santos ME, Blasco Huelva A. Aspectos prácticos sobre el tratamiento endoscópico de la epistaxis. Acta Otorrinolaringol Esp. 2006;57:394-400.