*The Journal of Laryngology & Otology*
February 2002, Vol. **116,** pp. 123–124

# Short Communication

# Novel use of nebulised adrenaline in the treatment of secondary oropharyngeal haemorrhage

R. G. Rowlands, M.R.C.S., L. Hicklin, F.R.C.S., A. E. Hinton, F.R.C.S.

**Abstract**
We report the use of nebulised adrenaline in the treatment of secondary oropharyngeal haemorrhage. Cases involving two adults and one child are presented to illustrate the usefulness of this technique in helping to achieve haemostasis without the need for a general anaesthetic. The mechanisms of the haemostatic action of adrenaline are also explored. We believe that in selected cases nebulised adrenaline is both safe, effective and easily tolerated and represents a useful additional tool in the treatment of oropharyngeal haemorrhage.

**Key words: Adrenaline; Nebulizers and Vaporizers; Pharynx; Haemorrhage**

## Introduction

Secondary oropharyngeal haemorrhage is a relatively common emergency presentation to ENT departments. It usually arises between five and 10 days following tonsillectomy but can also occur secondary to invasive tumours of the oropharynx and oral cavity. The standard conservative treatment comprises the use of adrenaline-soaked gauze swabs applied to the bleeding point to achieve haemostasis. However, many patients cannot tolerate this treatment due to pain or trismus and this may result in a general anaesthetic being required to facilitate control of the bleeding.

Nebulised adrenaline may be utilized to achieve haemostasis in selected cases where other forms of treatment are not feasible. Nebulised adrenaline has been well established as a safe and effective treatment in cases of severe croup in children[1,2] where studies have reported no significant adverse effects as a result of the treatment. In addition, in adult patients, nebulised adrenaline is a mainstay in the treatment of stridor, where there is a significant inflammatory component.[3]

## Case reports

### *Case 1*

*Tonsillar haemorrhage secondary to carcinoma*

A 75-year-old gentleman presented to casualty with heavy bleeding from the oral cavity, the site of which could not be demonstrated due to marked trismus at presentation. Six years previously he had undergone radical radiotherapy for the treatment of a $T_3$ squamous cell carcinoma of the left tonsil but recently had been diagnosed with recurrent disease at the site of the primary tumour.

The patient was haemodynamically stabilized with an intravenous infusion and thereafter received nebulised adrenaline in the form of 5 ml 1:1000 adrenaline diluted in 5 ml of normal saline. The patient continued to receive adrenaline nebulisers every six hours for the next two days after the bleeding ceased, and there was no further haemorrhage over the next four days while the patient remained on the ward. He was discharged home and no other episodes of bleeding were reported.

### *Case 2*

*Post-tonsillectomy secondary haemorrhage*

A four-year-old girl was admitted to hospital with significant bleeding from the oropharynx four days after undergoing tonsillectomy. The patient suddenly began spitting fresh blood and later vomited copious quantities of fresh and altered blood.

On arrival in casualty the patient was still bleeding heavily, but due to distress and non-compliance on behalf of the patient, the oropharynx could not be inspected sufficiently to identify the source of the bleeding. The patient was given nebulised adrenaline in the form of 5 ml 1:1000 adrenaline diluted in 5 ml normal saline. The bleeding ceased soon afterwards and the patient was admitted for observation and intravenous antibiotics. No episodes of bleeding were observed over the next 24 hours and the patient was discharged home with no further reports of haemorrhage.

### *Case 3*

*Post-tonsillectomy secondary haemorrhage*

A 17-year-old female patient was admitted eight days following tonsillectomy with a severe secondary orophar-

From the Department of Otolaryngology, St George's Hospital, London, UK.
Accepted for publication: 3 August 2001.

yngeal haemorrhage. A bleeding point could be clearly seen in the right tonsillar fossa and an attempt was made to apply an adrenaline-soaked gauze swab to this area. Unfortunately, the patient gagged and subsequently vomited increasing the rate of haemorrhage. Nebulised adrenaline was administered however and the bleeding settled shortly after. The patient was admitted to hospital but no further episodes of bleeding occurred and the patient was discharged two days later with no reports of significant bleeding at home.

## Discussion

These cases demonstrate that nebulised adrenaline can be considered an important adjunct in the treatment of oropharyngeal haemorrhage and is particularly useful when dealing with patients who are unable, for a variety of reasons, to open their mouths or tolerate the local application of adrenaline-soaked gauze swabs. The nebuliser mask is well tolerated by patients who would otherwise not be amenable to conservative management of the profuse bleeding.

The unwanted systemic effects of adrenaline include cardiac arrythmias, but experimental studies have highlighted the fact that adrenaline is poorly absorbed via the upper airway into the circulation.[4] There is also no evidence to show that adrenaline is absorbed systemically in clinically significant amounts when administered in a nebulised form at a therapeutic dose. A dose of 5 ml of 1:1000 adrenaline appears to be well tolerated by patients, including children, with no significant cardiovascular sequelae.[3,5] Dilution of the adrenaline in 5 ml of Normal saline ensures that there is a significant quantity of agent to be delivered to the patient via the nebuliser as only a proportion of the nebulised adrenaline will be directed to the oropharynx. Air delivered at a rate of 6 litres per minute via the nubuliser mask enables the adrenaline/saline mixture to be nebulised and administered to the patient over a period of 15 minutes.

Adrenaline has several important properties which can be utilized in the control of oropharyngeal haemorrhage. Firstly, it acts as an effective vasoconstrictor, acting via alpha-adrenergic receptors on pre-capillary arterioles and this action reduces overall blood flow to the affected area. In addition, vasoconstriction reduces the intra-luminal diameter of vessels influencing the flow of blood and the changes in shear forces thus enhance platelet activation and deposition.[6] Secondly, adrenaline has long been demonstrated in experimental in vitro studies to induce platelet activation by enhancing the effects of other platelet agonists such as adenosine diphosphate (ADP).[7–9] Thirdly, recent studies in porcine models have shown that adrenaline enhances platelet deposition on damaged vessel walls,[10] a key precursor in the formation of thrombi which in the situation of uncontrollable oropharyngeal haemorrhage would be advantageous.

## Conclusion

We believe that nebulised adrenaline can be given safely and effectively to patients with oropharyngeal haemorrhage in the emergency situation and is a valid and useful modality of treatment where access to the oropharynx is compromised.

## References


1 Kristjansson S, Berg-Kelly K, Einso E. Inhalation of racemic adrenaline in the treatment of mild and moderately severe croup. Clinical symptom score and oxygen saturation measurements for evaluation of treatment effects. *Acta Paediatr Int J Paediatr* 1994;**83**:1156–60

2 Ledwith CA, Shea LM, Mauro RD. Safety and efficacy of nebulised racemic epinephrine in conjunction with oral dexamethasone and mist in the outpatient treatment of croup. *Ann Emerg Med* 1995;**25**:331–7

3 Macdonnell SPJ, Timmins AC, Watson JD. Adrenaline administered via a neubuliser in adult patients with upper airway obstruction. *Anaesthesia* 1995;**50**:35–6

4 Kestin JG, McCrirrick AB. Haemodynamic effects of tracheally administered adrenaline in anaesthetised patients. *Anaesthesia* 1995;**50**:514–7

5 Remington S, Meakin G. Nebulised adrenaline: 1:1000 in the treatment of croup. *Anaesthesia* 1986;**41**:923–6

6 Lassila R, Badimon JJ,Vallabhajosula S, Badimon L. Dynamic monitoring of platelet deposition on severely damaged vessel wall during blood flow. Effects on different stenoses on thrombus growth. *Arterioscler Thromb* 1990;**19**:306–15

7 Bushfield M, McNichol A, MacIntyre DE. Possible mechanisms of blood-platelet activation by adrenaline. *Biochem J* 1987;**241**:671–6

8 Thompson NT, Scrutton MC, Wallis RB. Synergistic responses in human platelets. *Eur J Biochem* 1986;**161**:399–408

9 Colman RW. *Hemostasis and Thrombosis*. 3rd edn. Philadelphia: JB Lippincott, 1994

10 Badimon L, Martinez-Gonzalez J, Royo T, Lassila R, Badimon JJ. A sudden increase in plasma epinephrine levels transiently enhances platelet deposition on severely damaged arterial walls. *Thromb Haemost* 1999;**82**:1736–42



Address for correspondence:
Mr R. G. Rowlands,
48 Sandtoft Road,
Charlton,
London SE7 7LR, UK.

E-mail: GRowlands1@aol.com



Mr R. Rowlands takes responsibility for the integrity of the content of the paper.
Competing interests: None declared