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BIPP induced methaemoglobinaemia

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Abstract
Bismuth subnitrate, one of the constituents of BIPP is known to cause methaemoglobinaemia. Ten patients had blood estimations for methaemoglobin levels before and after nasal packing with BIPP impregnated gauze. Only one patient exhibited abnormal levels of methaemoglobin and this was most probably the result of the large quantity of BIPP used. It is unlikely that significant methaemoglobinaemia occurs during the routine use of BIPP in the nose.

Introduction

BIPP is without doubt the commonest dressing in use amongst otolaryngologists in the UK. Introduced in 1916, it contains two parts of iodoform and one part of bismuth subnitrate in a liquid paraffin base. Bismuth subnitrate was included for its astringent activity and was also said to contribute to the antiseptic activity of BIPP by releasing dilute nitric acid on hydrolysis (Chambers and Goldsmith, 1917). There is some evidence that this hypothesis might be incorrect (Nigam and Allwood, 1990).

Bismuth subnitrate has been known to cause methaemoglobinaemia (Wade, 1979) and several cases including fatalities have been recorded after its use in the treatment of diarrhoea (Marcus and Joffe, 1949). The mechanism of production of methaemoglobinaemia is as follows: bismuth subnitrate on reaching the bowel is reduced to nitrite by resident bacteria. Absorption of this nitrite results in oxidation of the normal heme iron (Fe++) to Fe+++ producing methaemoglobin. There is no report in the literature of methaemoglobinaemia following the use of BIPP but it is inevitable that some of the BIPP paste from a nasal pack will be swallowed. This study was carried out to assess whether the routine use of BIPP results in significant methaemoglobinaemia.

Materials and methods

Ten consecutive patients requiring BIPP nasal packs had blood samples taken prior to and twenty-four hours after placement of the pack. The twenty-four hour period was based on reports of methaemoglobinaemia induced by other substances and our findings in a pilot study. Blood samples were analysed for methaemoglobin by a spectroscopic technique.

Results

Methaemoglobin Level (% of total Hb)

Initials	Indication	Pre-BIPP	Post BIPP
BE	Epistaxis	1.1	1.9
BK	Epistaxis	0.4	0.7
MH	Septoplasty	1.6	1.1
BH	Angiofibroma	2.6	3.6
AS	Epistaxis	1.4	1.6
DL	Epistaxis	0.7	0.9
BK	Polyps	1.1	1.4
WP	SMR	1.5	1.9
JR	Epistaxis	1.0	1.3
HM	Epistaxis	1.2	1.2

Reference range: 0- 1.9%

Discussion

Many drugs are known to cause methaemoglobinaemia, after oral ingestion, per rectal administration or surface application (Kearns and Fisher, 1988., Frayling *et al.*, 1990). The first fatal case of bismuth subnitrate induced methaemoglobinaemia was reported in 1906, and by 1949 four more were recorded. Of the thirty cases of nitrate methaemoglobinaemia reviewed by Marcus and Joffe (1949) most were from bismuth subnitrate given orally or as an enema. The severity of methaemoglobinaemia was found to be related to the amount ingested, and in one fatality it followed the administration of 0.1 grams every three hours for one day in a three week infant. An injured gastrointestinal mucosa

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was said to allow easier absorption of nitrite, and the incidence of methaemoglobinaemia was more in infants and in those with impaired renal function.

When the level of methaemoglobin exceeds 10% of total haemoglobin the affected individual will have clinically obvious cyanosis. It is only when the level approaches 30–35% that the individual experiences headache, weakness and breathlessness (Bunn, 1987). In this series only one patient exhibited abnormal levels of methaemoglobin. He was a 17-year-old, transferred from another hospital where a BIPP pack had been placed for a bleeding nasopharyngeal angiofibroma. This would explain the high pre-operative level of methaemoglobin and a further rise in its level was noted when the large cavity and maxillary sinus were packed with BIPP to control haemorrhage. The high level observed after surgery is probably a reflection of the quantity of BIPP gauze used for packing. For obvious reasons wide variations exist, but a length of BIPP impregnated gauze 60 cm long which is sufficient for an average nasal pack contains approximately 5.6 gm of bismuth subnitrate. Of this only a small quantity will reach the bowel. It is unlikely that BIPP when used in the everyday situation causes clinically significant methaemoglobinaemia since the amount of bismuth subnitrate reaching the gut is not enough to produce toxic levels of nitrate. The potential toxicity of BIPP must be borne in mind when packing large cavities such as those following maxillectomy since iodoform poisoning has been known to occur and it may then be prudent to use an alternative dressing such as Whitehead's varnish. Admittedly situations are few, but care should also be taken when using large quantities of BIPP in children since they are more prone to methaemoglobinaemia.

Key words: BIPP, methaemoglobinaemia

Conclusion

The routine use of BIPP impregnated gauze in packing the nasal cavity of patients with epistaxis, or following nasal surgery is not associated with clinically significant methaemoglobinaemia. Caution should be exercised when packing large cavities and an alternative dressing used if possible.

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