

Pre-operative haemoglobin estimation in paediatric ENT surgery

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Abstract

Estimation of haemoglobin is still undertaken routinely before ENT surgery in many centres despite evidence that it is unnecessary, traumatic and expensive. The haemoglobin was estimated of all 372 children about to undergo ENT surgery in a busy district general hospital over a one year period. No child was noted to be clinically anaemic, and no child had a haemoglobin of less than 9 g/dl. Of 18 children with a haemoglobin level of 10.5 or less, 10 had their operations postponed and eight did not. There were no complications in the latter group. We can find no published evidence that operating on children with mild anaemia is unsafe. Ceasing routine pre-operative haemoglobin estimation would safely save an estimated £9000 per year in our unit.

Key words: Child; Preoperative care; Costs and cost analysis; Diagnostic tests, routine; Anaemia; Haemoglobin

Introduction

The purposes of estimating haemoglobin pre-operatively are to screen for anaemia and perhaps to provide a baseline for comparison with post-operative measurements in the event of haemorrhage. Pre-operative anaemia is not a risk factor for post-tonsillectomy haemorrhage (Tami *et al.*, 1987) nor does it contribute to mortality and morbidity in non-ENT surgery (Graves and Allen, 1970; Rawstron, 1970). Despite this, the established practice of routine pre-operative haemoglobin estimation and postponement below a set level continues and may be difficult to alter. This study was undertaken to ensure that the finding from a specialized ENT unit (Nigam *et al.*, 1990) and in adult dental patients (Griffiths *et al.*, 1992) that pre-operative haemoglobin estimation is of little value is also true for paediatric ENT practice in a district general hospital, and also to estimate the costs of a policy of routine pre-operative haemoglobin estimation.

Patients and methods

All children admitted for ENT surgical procedures other than insertion of grommets over a twelve-month period had venous blood taken for haemoglobin estimation in addition to routine clinical examination. A standard automated photometric method was used. Clinical and demographic data were recorded, as well as the operation and any complications. The decision whether or not to proceed with surgery in the light of the haemoglobin result was left to the surgeon and anaesthetist directly concerned.

Results

Haemoglobin estimations were made on 372 patients aged between two and 15 years old. The results are shown in Table I. No anaemia was detected clinically. Those with haemoglobin concentrations of 10.5 g/dl or below tended to be below the 50th centile for weight (average centile = 40th; 95 per cent confidence limits are 25 to 55), and also younger (average age with haemoglobin \leq 10.5 g/dl = 5.2 years, average age with haemoglobin $>$ 10.5 g/dl = 7.4 years; 95 per cent confidence limits of difference = 0.96–3.44 years). The child with the lowest haemoglobin, 9.1 g/dl, was of Asian origin and had sickle cell trait. No other haemoglobinopathy or disease was revealed. Of the 18 patients with pre-operative haemoglobin \leq 10.5, eight had their operations as planned (Table II). No complications were suffered by any anaemic patient who underwent surgery. The others were postponed for between two and three months and given oral iron therapy. Their haemoglobin estimations were repeated after treatment. Eight subsequently underwent uneventful surgery

TABLE I
RESULTS OF HAEMOGLOBIN ESTIMATIONS MADE ON 372 PATIENTS
AGED BETWEEN TWO AND 15 YEARS OLD

Haemoglobin	Frequency
< 9.0	0
9.0–9.5	1
9.6–10.0	7
10.1–10.5	10
> 10.5	354
Total	372

This study was performed at Russells Hall Hospital, Dudley, West Midlands.
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TABLE II
MANAGEMENT OF 18 ANAEMIC CHILDREN

Hb	Management	Delay (weeks)	Operation
9.6	Not postponed	0	Grommets and adenoids
9.9	Not postponed	0	Tonsils and adenoids
10.1	Not postponed	0	Myringoplasty
10.3	Not postponed	0	Tonsils and adenoids
10.4	Not postponed	0	Grommets and tonsils
10.4	Not postponed	0	Grommets, tonsils and adenoids
10.5	Not postponed	0	Grommets and adenoids
10.5	Not postponed	0	Grommets and adenoids
9.1	Oral iron (HbSs)	12	Tonsils
9.6	Oral iron	13	Tonsils
9.8	Oral iron	9	Tonsils and adenoids
9.8	Oral iron	12	Tonsils and adenoids
9.8	Oral iron	12	Grommets and adenoids
10.2	Oral iron		Failed to attend
10.2	Oral iron	12	Tonsils and adenoids
10.3	Oral iron	7	Otoplasty
10.3	Oral iron	8	Tonsils and adenoids
10.3	Oral iron	16	Further cancellation—gastrointestinal upset

with haemoglobin levels above 10.5. One failed to reattend and one was cancelled again for other reasons, although the latter's haemoglobin had increased to a normal level (Table II).

Discussion

Enquiries amongst anaesthetists and surgeons at this hospital suggested that routine pre-operative estimation of haemoglobin was undertaken largely for historical reasons, with a haemoglobin concentration of ≤ 10.5 g/dl being taken as a contraindication to routine surgery. The policy had not been reviewed formally by those currently in senior anaesthetic or surgical posts. Surgeons felt that anaesthetists required it; most anaesthetists admitted they would be happy to proceed without it in clinically fit children. Two reasons why it should continue were cited, namely to screen for anaemia and to provide a baseline for comparison with subsequent estimations in the event of post-operative haemorrhage.

To be useful, pre-operative tests should detect conditions which affect operative and anaesthetic mortality and morbidity, and in the light of which management would be modified to reduce this mortality and morbidity. There is little evidence that mild anaemia affects the complications of anaesthesia or surgery, and less evidence which is specific to paediatric ENT surgical practice. Studies looking at the effects of pre-operative anaemia show little increase in risk down to haemoglobin levels of 5 g/dl provided that the circulating volume is maintained (Graves and Allen, 1970; Rawstron 1970).

The management of post-operative bleeding is either expectant or operative. Copious bleeding or a shocked patient requires urgent surgical haemostasis. Slight bleeding in a well patient does not. The immediate management decision does not depend on haemoglobin estimation or a measured fall from the pre-operative level, but is clinical. Similarly resuscitation of a bleeding patient is directed towards volume replacement in the first instance and is not governed by haemoglobin estimation. Acute bleeding reduces the circulating volume but does not affect haemoglobin concentration initially. Measuring the haemoglobin concentration in an acutely bleeding patient may

delay further management whilst the result is awaited. A normal result may be falsely reassuring and contribute to an underestimate of the severity of the bleed. Only after restoration of the circulating volume does a reduced haemoglobin concentration reflect the amount of blood lost. This anaemia may if severe need be corrected by blood transfusion, but the trend is away from correcting mild to moderate anaemia by this method because of the risk of transmission of infection. Unless severe enough to give rise to symptoms it is reasonable to treat post-operative anaemia conservatively with iron supplements. Such a decision is based on the clinical state of the patient and the measured severity of the anaemia rather than depending on any fall from a pre-operative level.

Anaemia has not been shown to be a risk factor for post-tonsillectomy bleeding (Tami *et al.*, 1987). A recent paper from a specialized ENT Hospital (Nigam *et al.*, 1990) studied 250 children pre-tonsillectomy and found only two mildly anaemic children (Hb between 9.1 and 10 g/dl). Both were Asian with thalassaemia minor and both were suspected clinically. No complications referable to anaemia were reported, and knowledge of a normal pre-operative haemoglobin did not influence the management of the one patient who bled. In this series no child was clinically detected to be anaemic, no child had any symptoms attributable to anaemia, and no child was found to have more than moderate anaemia (minimum 9.1 g/dl). Only one haemoglobinopathy was found. No complications were seen in the eight patients in this series who had operations with haemoglobin concentrations between 9.6 and 10.5 g/dl.

Neither argument for the benefits of pre-operative haemoglobin estimation therefore stands up to scrutiny. Despite this some clinicians are reluctant to dispense with

TABLE III
ESTIMATED ANNUAL COSTS OF PRE-OPERATIVE HAEMOGLOBIN ESTIMATION

Laboratory costs (including repeat tests) $400 \times \pounds 20$	£8000
Wasted theatre time $10 \times 0.5 \text{ h} \times \pounds 100/\text{h}$	£ 500
Extra clinic visits $10 \times \pounds 50$	£ 500
Total	£9000

it, for 'medico-legal reasons'. In the event of a serious mishap being scrutinized before the courts, it is feared that the lack of a pre-operative haemoglobin estimation would be questioned and might be construed as contributing to an impression of negligence. Perhaps legal counsel should be sought as to whether these fears are realistic.

The costs of pre-operative haemoglobin estimation include the staff and laboratory costs of the test, the distress the venepuncture causes to the child, the disruption to the child and family if an operation is postponed, the wasted operating time if an operation is postponed, and the extra clinic appointments required to recheck the haemoglobin concentration. An estimate of quantifiable annual costs is presented in Table III, amounting to £9000. Those haunted by the medico-legal spectre consider this to be money well spent, but in these days of budgetary restrictions the basis for and justification of such expense should be explicitly discussed and evaluated.

Conclusion

Pre-operative haemoglobin estimation in children

undergoing routine ENT surgery could safely be abandoned, saving £9000 annually in this hospital and also sparing children considerable distress.

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