LETTERS TO THE EDITOR

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Imaging the less seriously head injured child

EDITOR,—I read with interest the recent paper by Glasgow and McGovern which suggested that bruising with a yellow hue suggests that injury occurred at least 48 hours earlier.[1] Unfortunately, this statement is not referenced. However, I am aware of three papers on the age and colour of bruising.[2–4]

Langlois and Gresham[4] studied the colour changes of bruises with time and found it was possible to conclude only that a bruise with a yellow colour was more than 18 hours old. The significance of the appearance of other colours in terms of estimating the time of occurrence was not helpful.

Stevenson and Bialas[2] also found that aging of bruises was much less precise than text books imply and found that green or yellow hues suggest an injury that is at least 24–48 hours old. Finally, Schwartz and Ricci[3] concluded that the available literature does not permit the estimation of a bruise's age from colour with any precision.

I should be grateful to know if Glasgow and McGovern found any further research to assist them in aging bruises as I make a particular point of urging extreme caution on statements which specify the age of injuries based on their colouring when I teach child protection and when I write medicolegal reports.

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2 Stevenson T, Bialas Y. Estimation of the age of bruising. *Arch Dis Child* 1996;**74**:53–5.
3 Schwartz AJ, Ricci L. How accurately can bruises be aged in abused children? Literature review and synthesis. *Pediatrics* 1996;**97**:254–6.
4 Langlois NET, Gresham GA. The aging of bruises: a review and study of the colour changes with time. *Forensic Sci Int* 1991;**50**: 227–38.

Dr Glasgow and Mr McGovern comment:

The general thrust of our review of children with less serious head injuries was to advocate an approach based on clinical factors and, in particular, to use these to identify patients in whom immediate imaging was unnecessary. In the latter context, we made reference to the colour of scalp bruising and the fact that a yellow hue would indicate greater age of an injury than would likely be associated with intracranial bleeding—that is, more than six hours or so after injury.

The literature makes clear the difficulties in aging bruises.[1 2] The time taken for bruises to appear depends on several factors—for example, the depth of injury and the volume of blood extravasated. Hobbs and colleagues[3] state that in superficial bruises, yellowish tinges may appear in three days, although in deeper bruises this may take 7–10 days. One interesting study photographed the evolution of bruises in accident and emergency care patients, in patients, and staff over a very wide age range (largely adults). They concluded that a bruise showing a yellow colour must be older than 18 hours.[4] The converse was not necessarily true—that a bruise not showing this hue is less than 18 hours old. The authors add, however, that "bruises may not develop a visible yellow colour until much later than 18 hours". Therefore, the presence of such colouration in a bruise suggests that, other factors being equal, immediate imaging is not essential, which reinforces the prime aim of our review. We are indebted to Dr Light for her informed comment, but are unaware of other relevant literature. It seems to us that this area has more to do with the art than the science of medicine.

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1 Schwartz AJ, Ricci L. How accurately can bruises be aged in abused children? Literature review and synthesis. *Pediatrics* 1996;**97**:254–7.
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4 Langlois NET, Gresham GA. The ageing of bruises: a review and study of the colour changes with time. *Forensic Sci Int* 1991;**50**: 227–38.

Spacers and holding chambers: Not the last word, we hope—a reply

EDITOR,—In his recent letter, Dr Mitchell was concerned that the methodology used in our study did not simulate the release of aerosol from a metered dose inhaler (MDI).[1] However, as we discussed, the method of aerosol delivery in our study differs from that of a MDI but, because the delivery system was kept constant and the particular spacer varied, a valid comparison of the efficacy of different spacers could be made.[2] This delivery system has been previously developed and tested in older children.[3] In these studies, aerosol lung deposition was equivalent from a conventional spacer or sealed modified bottle spacer, although a cup performed poorly and delivered significantly less aerosol to the lungs than did the other spacers. The validity of these findings was borne out by the results of a clinical study in which a similar response to bronchodilator was obtained when children with acute asthma were given a β2 agonist via an MDI-bottle or conventional spacer but a poor response occurred in those using a cup.[4]

We agree with Dr Mitchell that the presence of an inhalation valve may affect pulmonary deposition of aerosol. However, valveless spacers may also function efficiently as spacers. When compared to an MDI alone, increased lung deposition has been reported with a valved cone spacer and a valveless tube spacer.[5] These two spacers have also been found to produce similar increases in bronchodilation compared to a MDI alone.[6] Moreover, oropharyngeal deposition may be reduced by up to 60% with a valveless spacer.[5] Recently, valveless spacers have been reported to enhance the delivery of aerosol to the lungs in infants with chronic lung disease, when compared to the same spacer with a valve.[7] The results of our clinical study suggest that a valveless bottle spacer provided effective drug delivery to the lungs resulting in similar bronchodilation compared to that obtained with a valved conventional spacer.[4]

The availability of a spacer device is essential in order to provide care to children with asthma. For many children, particularly those in developing countries, a low cost spacer is not available. We believe that our studies have shown that a modified 500 ml plastic bottle functions effectively as a spacer by providing equivalent or superior aerosol deposition to a conventional spacer and producing similar clinical improvement. Such a bottle spacer is the first step towards providing asthma care to many children throughout the world.

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