EDITORIAL

Commentary: for the children’s sake, avoid non-contrast CT

Kieran McHugh and Luisa Disini

Department of Radiology, Great Ormond Street Hospital for Children, Great Ormond Street, London, WC1N 3JH, UK

Corresponding address: Kieran McHugh, Department of Radiology, Great Ormond Street Hospital for Children, Great Ormond Street, London, WC1N 3JH, UK.
Email: mcHughk@gosh.nhs.uk

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Abstract

Enough literature now exists such that doing a non-contrast abdominal or chest computed tomography (CT) scan for suspected mass lesions in children borders on malpractice. Although there is great uncertainty regarding estimated radiation doses and long-term cancer risks in childhood, there is no doubt that an entirely unnecessary CT study does more harm than good. When a chest or abdominal mass is suspected in a child, only a post-intravenous contrast enhanced CT examination is needed, and a prior non-enhanced CT run exposes the child to unnecessary radiation.

Keywords: Computed tomography; oncology; paediatrics; contrast.

Some years ago we presented a paper at the European Congress of Radiology with the take-home message that non-contrast enhanced computed tomography (CT) scanning of the abdomen was almost always non-contributory in paediatric oncology imaging[1]. It seems the message has still not gotten through to the general radiological community. Ten years later it is common practice, typically in non-paediatric centres, to include a non-contrast CT run when a new abdominal mass is encountered (Fig. 1). Non-contrast CT is very sensitive in the detection of (tumour) calcification. Calcification is usually easy to see after intravenous contrast administration also, however. All the useful diagnostic information regarding tumour margins, size and characteristics are discernible from the post-contrast CT study[2-5]. Suspected mediastinal masses similarly merit only a post-contrast examination as the lack of mediastinal fat in children, similar to their lack of retroperitoneal fat, makes a non-contrast study essentially uninterpretable; here again a non-contrast enhanced examination is unnecessary irradiation and a waste of time (Fig. 2)[1,6]. Intravenous access in children can admittedly be difficult at times. Nobody would want their child to have an unnecessary CT examination with the associated radiation burden, however. Thus, persevering to ensure adequate intravenous access for a contrast-enhanced CT of diagnostic quality will always be worth the effort.

There is a growing wealth of literature on the harmful effects of the radiation doses from CT scanning, particularly in childhood[7-9]. The Image Gently website and campaign is a very laudable North American effort to reduce doses from paediatric CT to as low as is possible[10]. Approximately 70% of all children with cancer now achieve long-term survival and cure and so the ALARA (as low as reasonably achievable) concept is just as applicable in paediatric oncology patients as it is in other paediatric patients[11,12].

There are only a few specific indications for non-contrast CT in childhood, which include acute brain trauma, suspected renal calculus disease, lung high resolution CT (HRCT) for suspected pulmonary interstitial disease, perhaps paranasal sinus imaging and for some skeletal pathologies[13-15]. Other than these indications, just about all other problems can be addressed by a combination of ultrasound and magnetic resonance imaging (MRI) or contrast-enhanced CT, without the need for a non-contrast CT examination in most situations.

CT imaging parameters are continuously evolving. As an example, for our routine abdominal CT studies we...
currently use 50 mAs for children weighing less than 15 kg, and 75 mAs for children weighing less than 35 kg. With dose modulation, these numbers inevitably vary (and could be regarded as minimum noise reference levels), but they emphasise that when adult parameters of, say, 200 mAs are used for young patients these doses are unnecessarily high.

Enough literature now exists such that doing a non-contrast abdominal or chest CT for suspected mass lesions in children borders on malpractice[16]. Although there is great uncertainty regarding estimated radiation doses and long-term cancer risks in childhood, there is no doubt that an entirely unnecessary CT study does more harm than good[17]. Please remember, particularly if you do some paediatric imaging, that non-contrast chest or abdominal CT is generally verboten for children.

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