Technical Notes

Direct Coronal Images – A Valuable Addition to Pediatric Body CT-Scanning

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Abstract. The authors advocate the use of direct coronal computed tomography in the investigation of the thorax and abdomen and describe the technique used. The indications for its application in the pediatric field are specifically defined.

Key words: Pediatric radiology – CT-scanning, whole-body – Direct coronal mode

Direct coronal computed tomographic scans were performed by sitting the child in the gantry opening. For those under heavy sedation or anesthesia it is possible to obtain similar results by using a lateral decubitus position. This method provided better quality images than those produced by electronic reconstruction from conventional CT scans; also not all machines have the capability to perform coronal reconstruction. The ability to achieve good quality coronal scans should make optimal planning possible for radiotherapy and also in monitoring response to radio/chemotherapy. With the exception of the anterior mediastinum, the whole thorax and abdomen may be investigated in this way. The full potential of this method has yet to be realized because of the technical limitations of the present equipment.

Procedure

The patient sat as upright as possible in the gantry opening, on the end of the adjustable table (Fig. 1). It was necessary for the patient to maintain a slight anterior curve of the cervicothoracic spine in order to keep head, shoulders and arms out of the circle of reconstruction as the high CT numbers of bone at the edge of or outside the circle caused artifacts. The benefit of this maneuver is the reduction in the normal lumbar lordosis; this allows the CT cuts of the abdomen and lumbar spine to be more truly coronal. Attention was paid to the symmetry of the patient inside the gantry. The adjustable table top not only provided a seat for the patient, it allowed fine anteroposterior adjustment of the patient once the initial position had been established. Also it kept the patient’s bony pelvis well within the circle of reconstruction, thus avoiding artifacts. The most comfortable position for the patient was sitting facing the back of the machine with the legs resting on the more gently sloping contour of the gantry on the back of the apparatus. The light localizer was used to determine the level of the first scan through the region of interest. A 10mm slice thickness and a 9.6 second scan time were used together with the largest circle of reconstruction (42 cm on our General Electric 8800 scanner). The patients were requested to sit still and stop breathing during each scan. Obviously the children must be able to co-operate regarding the maintenance of this upright position or a lateral decubitus position under sedation is necessary.

Fig. 1. Diagram showing patient sitting inside the gantry orifice for the direct coronal mode. Table top device allows performance of serial contiguous slices

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Illustrative Cases

Case 1

A ten-year-old boy presented with episodes of right upper quadrant swelling and on one occasion jaundice. Ultrasound demonstrated a large fluid filled tubular structure extending from the porta hepatis to the right paravertebral region just anterior to the right kidney. A smaller cystic structure was present anteriorly and was continuous with the above mass. Both the common and intrahepatic bile ducts were dilated. A radionuclide hepatobiliary scan did not clearly define the bile ducts. A CT scan following intravenous Cholografin was performed. The sitting position of a direct coronal slice enabled the contrast medium to drain into the distal common bile duct and into the duodenum (Fig. 2). A dilated

Fig. 2. Direct coronal cut of the abdomen and lower part of the thorax. A grossly enlarged common bile duct filled with contrast material (black arrow) and a dilated gallbladder containing a minimal amount of contrast in two dependent parts (white arrows) are demonstrated.

Fig. 3. Direct coronal cut through the spine and posterior portion of the abdomen. The tumour mass is sharply outlined within the left side of the abdomen. The left hemidiaphragm is elevated. The liver, right kidney and psoas muscles are clearly delineated.

Fig. 4. a Coronal cut shows a hyperdense liver and an enlarged spleen. b Prominent portal vessels are outlined in both liver lobes.