

Measuring Liver and Spleen by Ultrasonography

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Understanding and defining the normal is usually the most difficult part of labeling something as abnormal. The morphological characterization of liver and spleen is one of the many parameters that go into detecting liver disorders and systemic infectious, inflammatory and malignant pathologies. Invariably the complete characterization of the disease process may need morphological assessment of other anatomical structures and laboratory reports. However, there are many conditions where organomegaly may be the only feature on ultrasonography like splenomegaly in malaria, kala-azar and hepatomegaly in many metabolic conditions like glycogen storage disease, besides infections. On the contrary, clinically palpable liver and spleen may not be pathological. Pushed down liver and spleen due to lung or subdiaphragmatic pathology, visceroptosis and palpable spleen in 10% to 15% of normal children are a few examples of palpable liver and spleen without any clinical significance(1).

Ultrasonography is used routinely to evaluate visceral organs in children. In many countries with endemic schistosomiasis, abdominal ultrasonography is used for organometric investigations of the spleen and liver and shown to be reliable and reproducible(2). In India too, ultrasonography can be used in epidemiological studies of many endemic diseases like kala-azar and chronic malaria, provided we have normative data. So far we did not have any normative data on liver and spleen size in children from our country. In this regard, the study by Dhingra *et al.*(3) is a positive step.

Ultrasonography is non-invasive and

reproducible but its accuracy in measuring organ size depends on some technical factors. The type of probe used is important in measuring liver length. Convex probe is shown to be better than the linear one as the latter, because of the interposition of lung between the dome of the liver and the anterior abdominal wall; prevents some of the superior portion of liver from being observed(4). The plane of measurement is another factor; for the liver, mid-clavicular line is better than sagittal line because the left lobe of liver in particular differs in extension and size from person to person and with age but right lobe measurements are more consistent(4). For the measurement of spleen, position of the subject (slight right lateral decubitus or supine) is important. Ideally volumetric assessment should be considered in three-dimensional organs like liver and spleen but it is cumbersome, time-consuming and is not accurate for an organ like liver as its shape does not comply with usual geometric shapes which is essential for volumetric assessment(5). Thus an assessment in a single longitudinal axis is sufficient and is easier to use. The same holds good for the measurement of spleen and the measurement should be the optically maximal distance at the hilum on the longitudinal coronal view between the most superomedial and the most inferolateral points. The normative data for these measurements have been defined for children in various countries and there seems to be a good agreement between countries(6).

Unlike in adults, visceral organs grow with age and hence we can't have a fixed standard measurement of liver and spleen. Measurement

needs to be correlated with age, length/height, body weight and body surface area. As expected, in children there is no difference in organ size between males and females. Though liver and spleen size measurements correlate best with height, some studies have shown a good correlation with weight and body surface area too(4,7).

The study by Dhingra, *et al.*(3) is the first of its kind from India and will help in setting up normative data for our children. However, there are inherent problems of doing this kind of study in a government hospital. For setting up normative data, a study should be done on 'true' healthy children and those should come from the community and should represent all strata of the society. In India, government hospitals mainly cater to the poorer segment of the society and nutrition related variables like malnutrition, anemia etc. are known to influence the size of live and spleen. Secondly, to represent the whole community we need to have adequate number of children in each age group. The number of children in < 3 months, <6 months and <12 months are abysmally low. Hence, we need to have a bigger study conducted in the community to set up our own normative data on liver and spleen size in children; till such time this pilot study will provide a ready reference.

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