Ultrasonic Visualization of Tablets in the Gastrointestinal Tract

TO THE EDITOR: In addition to our work on the in vivo measurement of the dissolution rates and gastrointestinal transit times of technetium-99m- (^{99m}Tc) labeled tablets (*1*), we would like to emphasize the possibility of visualizing these tablets by ultrasound when they are in the stomach. Four fasted volunteers swallowed a tablet of theophylline labeled with 3.7 MBq of [^{99m}Tc]diethylenetriaminepentaacetic acid and containing 1.9% (10 mg) of dicalcium phosphate for improved echogenicity. In vitro measurements done with tablets of the same preparation have shown that the dissolution rates of theophylline and [^{99m}Tc]DTPA are not modified by the presence of that amount of dicalcium phosphate. Immediately after ingestion, the tablet was observed for up to 90 min using a bidimensional echograph equipped with a 3.5 MHz transducer. In each volunteer the sonograms allowed us to see whether the tablet was sticking to the gastric mucosa or not, to observe its shape and to measure its length as long as it stayed in the stomach (Fig. 1). However, it could not be detected after it had entered the intestine. Angulation between the transducer and the tablet long axis could result in an apparent shortening of the tablet length. We admit that angulation was neglectible (a) when the tablet appeared with a straight and symmetrical rod shape and (b) when its length as measured on the section was equal to the actual length of the tablet. If the length of the tablet had changed during the study, only the largest length measured on several sections should have been considered. The diagnosis of sticking or nonsticking was done exclusively on sections passing through the long axis of the tablet. In these conditions it only depended on whether or not the tablet was in contact with the gastric wall. Interpreting sections oblique or perpendicular to the long axis could lead to the false conclusion of a nonsticking tablet because they possibly show the free extremity of the tablet. To our knowledge, this is the first time tablets have been visualized by sonography in the gastrointestinal tract. This study demonstrates that the calculation of the dissolution rate of a tablet and the visualization of its morphology and anatomical position can be performed simultaneously by using noninvasive methods.

Reference

1. Maublant JC, Sournac M, Aiache JM, et al. Dissolution rate and transit times of technetium-99m-DTPA labeled tablets. *J Nucl Med* 1987; 28, 1199–1203.

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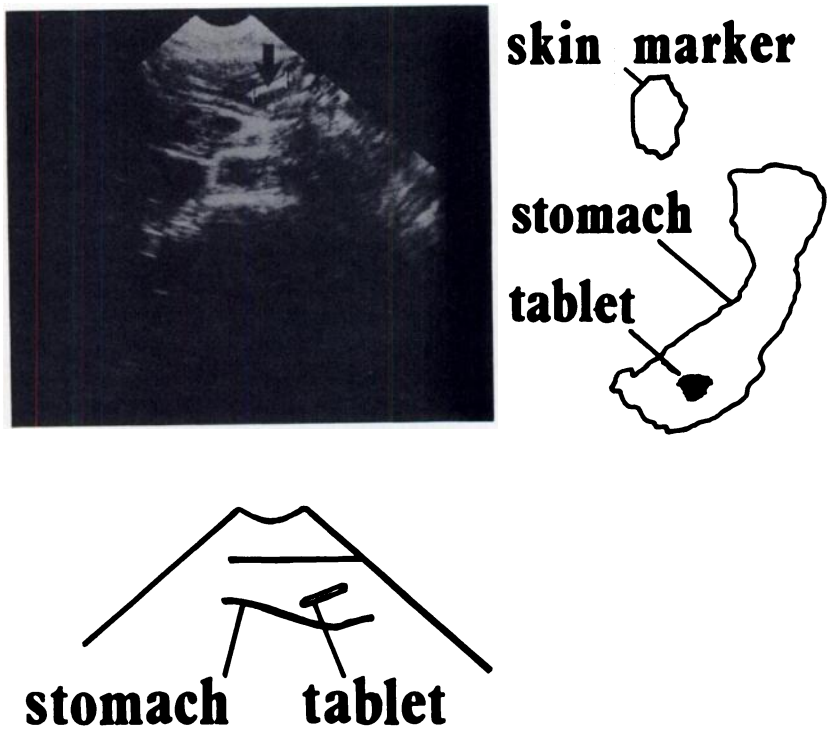

FIGURE 1
At scintigraphy (top right panel) the tablet is located in the antrum. The limits of the gastric wall were obtained from a solution of [^{99m}Tc]sulfur colloid that has been swallowed by the subject. At sonography (top left panel) the tablet is seen on a section passing through its long axis. This view shows that the tablet was not attaching to the gastric mucosa at the time of the picture.