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An alternative approach to gastric emptying time scintigraphy and investigation of clinical importance

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Introduction: Gastric emptying time scintigraphy is an important functional investigation test for evaluating the gastric mechanical functions. Nevertheless this test is not ideal because of the proposed meal, energy content, quantity, deficiencies in composition standardization and also lack of practicality in preparation and a application. For this reason, there are not internationally accepted normal values of the test. The aims of this study are to investigate the potential role of oral barium solution, used as radiological contrast in gastric imaging, mixed with Technetium-99m macro aggregate albumin (Tc-99m MAA) as a standart test meal in gastric emptying time scintigraphy and to evaluate its potential importance in clinical investigations by imitating conditions of gastroparesis via applying atropine.

Methods: In this study, 14 male New Zeland rabbit 2000-2500 gr weighted were used. Each rabbit was fed with 1 mCi Tc-99m MAA mixed with 40 gr oral barium solution (1 mg/ml, Radiobarit solution, Reccordati medical) by nasogastric catheter. Rabbits stabilized on a wood floor without anesthetic medication were scanned by gamma camera for one hour dynamically (1 frame/minute). A few days later, the same rabbits were scanned under the same conditions after 1 mg atropine injection to imitate gastroparesis condition. The area of interest was drawn around the stomach in the first and last minute anterior and posterior projection images and counts were obtained and geometric averages were calculated. Gastric emptying rate was calculated by the formula: $(1.\text{min. count} - 60.\text{min. count}) / 1.\text{min. count} \times 100$ and baseline and post-atropine differences were investigated by Wilcoxon signed rank test.

Results: When the dynamic images were examined, barium was found to cause controlled drainage of Tc-99m MAA from the stomach. The basal gastric emptying time was mean \pm SD:74,24 \pm 8,32, after atropine injection the values were decreased to mean \pm SD:50,34 \pm 12,37. The %25-75 percentile values in basal group were %67,15-80,24, after atropine injection these values decreased to % 41,34-62,11 and this decrease was determined to be statistically significant ($p < 0.001$).

Conclusions: Oral barium solution which has no side effect as it is not absorbable in gastrointestinal system and used as contrast agent in gastrointestinal system imaging was mixed with Tc-99m MAA in this study. It has been understood that this standard mixture in regards of calorie, content and quantity, which prevents the radioactive solution from being suddenly discharged from the stomach, has potential to be used in gastric emptying studies and to provide useful information in gastroparesis conditions.

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