

LEVEEN SHUNT STUDY

(Tc-99m-Macroaggregated Albumin or Tc-99m-Sulfur Colloid)

Overview

- The LeVeen Shunt Study evaluates the patency of connections between the peritoneal cavity and the venous system or other cavities by tracing the movement of non absorbable labeled particles.

Indications

- Evaluation of the patency of peritoneo-venous (LeVeen) shunts (1-3).
- Evaluation of the patency of other connections with the peritoneal cavity (4,5).

Examination Time

- 1 hour; delayed images may be necessary.

Patient Preparation

- None.

Equipment & Energy Windows

- Gamma camera: Large field of view.
- Collimator: Low energy, high resolution, parallel hole.
- Energy window: 20% window centered at 140 keV.

Radiopharmaceutical, Dose, & Technique of Administration

- Radiopharmaceutical: Tc-99m-sulfur colloid (1).
 - θ Tc-99m-macroaggregated albumin (Tc-99m-MAA) (6).
 - θ Tc-99m-albumin colloid (3).
- Dose:
 - > Colloid: 3 mCi (111 MBq) (3).
 - > Macroaggregated albumin: 5 mCi (185 MBq) (6).
- Technique of administration: Intraperitoneal:
 1. Injection is performed by the nuclear medicine physician.
 2. Ultrasound imaging may be useful in locating pockets of ascites.

3. Local anesthesia is usually used.

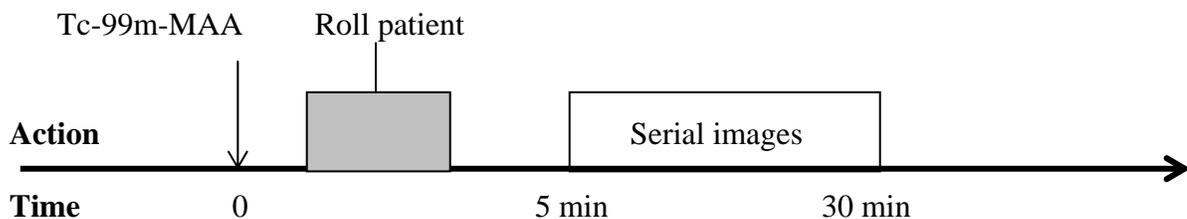
Patient Position & Imaging Field

- Patient position: Supine.
- Imaging field: Abdomen and chest.

Acquisition Protocol

- Mix the radiopharmaceutical within the ascites by ballotment of the anterior abdomen and/or rolling the patient side to side.
- Acquire ANT images of abdomen and chest (entire length of shunt tubing) at 5, 10, and 20 minutes:
 1. Acquire each image for 1 minute.
 2. Expose the images so that background activity is just visible.
- Timing of delayed images, if any, will depend on the findings in the initial images. Show the images through 20 minutes to the nuclear medicine physician.

Protocol Summary Diagram



Data Processing

- None.

Optional Maneuvers

- Direct injection into shunt tubing: The radiopharmaceutical may be injected directly into the shunt tubing rather than the peritoneal cavity (2).
- Evaluation of pericardio-peritoneal windows and diaphragmatic disruptions (4,5).

Principle Radiation Emission Data - Tc-99m (7)

- Physical half-life = 6.01 hours.

Radiation	Mean % per disintegration	Mean energy (keV)
Gamma-2	89.07	140.5

Dosimetry - Tc-99m-Sulfur Colloid (will vary greatly with patency of shunt) (8)

Organ	rads/3 mCi	mGy/111 MBq
Liver	1.02	10.2
Spleen	0.63	6.3
Bone marrow	0.03	0.3
Total body	0.04	0.4
Ovaries	0.02	0.2
Testes	0.002	0.02

Dosimetry - Tc-99m-Macroaggregated Albumin (will vary greatly with patency of shunt) (9)

Organ	rads/6 mCi	mGy/222 MBq
Lungs	1.10	11.0
Bladder wall		
2 hour void	0.15	1.5
4.8 hour void	0.27	2.7
Liver	0.09	0.9
Spleen	0.08	0.8
Total body	0.08	0.9
Kidneys	0.06	0.6
Ovaries		
2 hour void	0.04	0.4
4.8 hour void	0.05	0.5
Testes		
2 hour void	0.03	0.3
4.8 hour void	0.039	0.39

References

1. Rosenthall L, Arzoumanian A, Hampson LG, et al: Observations on the radionuclide assessment of peritoneovenous shunt patency. Clin Nucl Med 9:227-235, 1984.
2. Taggart GJ, Sullivan DC, Gusberg RJ, et al: Percutaneous transtubal scintigraphic assessment of patency of peritoneovenous shunts. Clin Nucl Med 6:70-72, 1981.
3. Williamson BRJ, Lambert MJ, Teates CD, et al: Patency evaluation of a LeVeen shunt using Tc-99m-sulfur colloid. Clin Nucl Med 3:343-345, 1978.

4. Joseph UA, Jhingran SG, Olivero JJ: Scintigraphic assessment of pericardio-peritoneal window patency: Relavance to peritoneal dialysis. Clin Nucl Med 20:613-614, 1995.
5. Cesane F, Zuckermann JA, Patange VB, et al: Peritoneoscintigraphy using Tc-99m MAA for diagnosis of diaphragmatic disruptions in trauma patients. Clin Nucl Med 21:290-292, 1996.
6. Balon H, Fink-Bennett D: Scintigraphic demonstration of restored Denver peritoneovenous shunt patency using urokinase. Clin Nucl Med 13:310-311, 1988.
7. 43-Tc-99m: In MIRD: Radionuclide Data and Decay Schemes, DA Weber, KF Eckerman, AT Dillman, JC Ryman, eds, Society of Nuclear Medicine, New York, 1989, pp 178-179.
8. MIRD Dose Estimates Report No. 3: Summary of current radiation dose estimates to humans with various liver conditions from Tc-99m-sulfur colloid. J Nucl Med 16:108A, 1975.
9. MIRD Dose Estimate Report No 10: Radiation absorbed dose from albumin microspheres labeled with Tc-99m. J Nucl Med 23:915-917, 1982.

NOTES