

## Detection of Spontaneous CSF rhinorrhea in an obese diabetic woman by Tc-99m DTPA Cisternography: A Case Report

Khan SH, Rather TA

Department of Nuclear Medicine, Sher-i- Kashmir Institute of Medical Sciences, Srinagar, JK, India, 190011.

### Abstract:

*Cerebrospinal fluid (CSF) rhinorrhea is a form of CSF leak through a bone or dural defect in the floor of anterior cranial fossa. The defects occur mostly after a trauma sustained through an accidental injury or surgical procedure. Spontaneous leakage due to congenital developmental weakness in the floor of anterior cranial fossa may also occur in some of the cases. Patients with persistent CSF leak need surgical correction of the defects as they may be at risk of developing serious complications like meningitis and brain abscess. An accurate preoperative localization of the defect site facilitates planning and execution of the surgical procedure. The authors present a patient of spontaneous CSF rhinorrhea diagnosed with Technetium-99m diethylenetriaminepentaacetic acid (Tc-99m DTPA) radionuclide cisternography.*

*Key Words: Spontaneous CSF rhinorrhea, radionuclide cisternography.*

**World J Nucl Med 2009;8:182-183**

### Introduction:

Most of the cerebrospinal fluid (CSF) leak occurs after head trauma, with the remainder attributed to postoperative or spontaneous mechanism (1, 2, 3, 4). The terms otorrhea and rhinorrhea are defined as CSF dripping from the ear and nose respectively and patients can present with one or the other or sometimes both. Otorrhea is often caused by a temporal bone fracture and rhinorrhea is commonly caused by a fracture in the frontal, ethmoid or sphenoid bones. Fractures of the cribriform-ethmoid junction and through the ethmoid bone itself are the most frequent causes of rhinorrhea (5). Most of the CSF leaks stop of their own within one week. Some time prophylactic antibiotics to

reduce the risk of meningitis are advised in patients with basilar skull fractures (6). Patients who fail conservative treatment are considered for definitive operative treatment. The choice of the procedure depends on the accurate localization of the site of CSF leak. Computed tomography, Contrast cisternography and radionuclide cisternography are the frequently performed CSF leak localizing techniques. A combined computed tomography- contrast cisternography can localize active leaks accurately in 76-100% of case (7, 8). Failure to localize an active CSF leak by computed tomography-contrast cisternography or leaks that are intermittent can be investigated by radionuclide cisternography using Technetium-99m labeled and Indium-111 labeled compounds (9, 10). A 70% accuracy with radionuclide cisternography has been reported for active leaks (10).

### Case Report:

A 45 years old obese poorly controlled diabetic woman presented to an otorhinolaryngologist with a 4 months history of spontaneous intermittent clear watery discharge through both the nostrils. The patient was initially treated with antibiotics and antihistamines. As there was no relief of her symptoms, she was later suspected to have a CSF rhinorrhea. Clinical examination of the patient that included examination of the optic fundi did not suggest raised intracranial pressure. The biochemical examination of the nasal discharge revealed sugar levels of 188mg/dL and protein levels of 340 mg/dL. On microscopic examination, neutrophils comprised 40% and lymphocytes 60%. The facility for beta2 – transferrin test was not available. The patient was referred for a radionuclide cisternography to confirm the clinical diagnosis and localize the site of CSF leak. One hour prior to the study nasal pledgets were placed in both the nostrils. Under all aseptic precautions 111 mBq of Technetium-99m diethylenetriaminepentaacetic acid (Tc-99m DTPA) was injected intrathecally through a lumbar puncture. The patient was put in a prone Trendelenburg position for 5 minutes to enhance the tracer flow to the basal cisterns. Serial planar 500 K count images of skull that included an anterior and two lateral views were acquired on a single head gamma camera fitted with a low energy all-purpose collimator. The images were acquired at 15, 30 and 60 minutes post injection. An abnormal tracer collection was observed in an area corresponding to the nose (Figures 1, 2). Normalized background adjusted pledget to serum ratio of radioactive counts was 2.9 in the left nostril and 1.9 in the right nostril. The study was reported positive for bilateral

### Correspondence

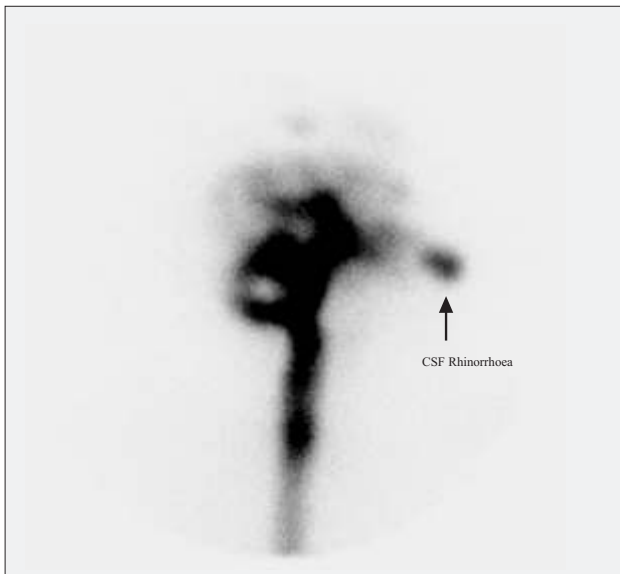
Shoukat.H.Khan, MD

Associate Professor & Head

Nuclear Medicine,

SKIMS, Srinagar, India.190011.

E-mail: drshkhan199@yahoo.co.in



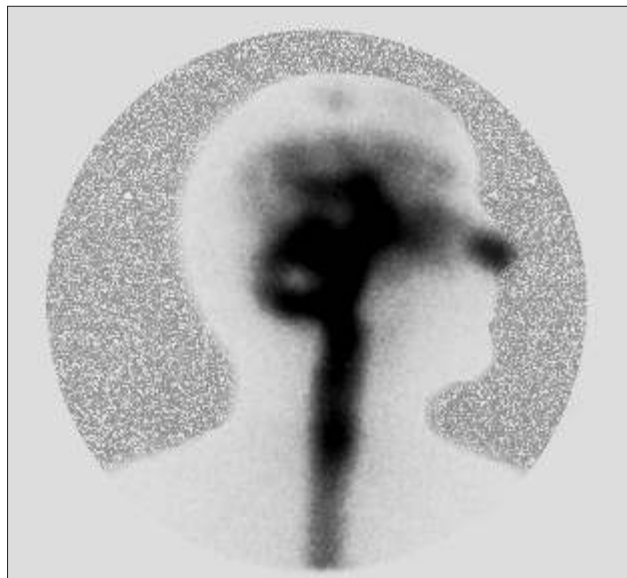
**Figure 1.** Tc -99m DTPA Cisternogram, Lat View (Skull).

CSF rhinorrhea with a possible site of leakage in the floor of anterior cranial fossa. A pre-operative high resolution CT scan revealed a bony defect in the cribriform plate. The patient was subsequently operated for closure of the surgical defect.

The case illustrates the utility of radionuclide cisternography in confirming the diagnosis of CSF rhinorrhea.

#### Discussion:

The underlying defect responsible for CSF rhinorrhea irrespective of the etiology is disruption in the dura and arachnoid mater coupled with a bony defect and a CSF gradient that is continuously or intermittently more than the tensile strength of the disrupted tissue (1). Most of the CSF leaks are related to an antecedent trauma (2). Although most traumatic CSF leaks resolve without surgical intervention, persistent CSF leaks may lead to serious complications like meningitis and abscess and thus require surgical closure of the defect (2). Confirmation of a CSF leak can be established by beta-2-transferrin content in CSF. This protein is highly specific for human CSF and requires a small sample size (3). Pre-operative localization of the anatomic defect is useful for its successful surgical closure. The imaging modalities commonly used are CT scan, contrast enhanced CT cisternography, radionuclide cisternography and more recently the MR cisternography (2). In a comparative study it has been reported that a high resolution CT scan is the most useful examination in the work up of a patient with suspected CSF rhinorrhea or otorrhea (2). Several published studies have reported on the use of MR cisternography with a sensitivity as high as 90% (4, 5, 6, 7). In future the use of high resolution CT scan and MR cisternography for the diagnosis and localization of CSF leak will eliminate the need of a lumbar puncture, reduce patient discomfort, reduce time and expenses and unlike radionuclide cisternography may not require an active CSF leak at the time of imaging. Both CT cisternography and radionuclide cisternography may retain



**Figure 2.** Tc -99m DTPA Cisternogram, Lat View (Skull). For ease of interpretation the skull outline has been artistically drawn

their usefulness in exceptional situations like localizing the site of leak in patients with multiple cranial fractures.

#### References:

1. Park JI, Strelzow VV, Friedman WH. Current management of cerebrospinal fluid rhinorrhea. *Laryngoscope* 1983;93:1294.
2. Lewin W. Cerebrospinal fluid rhinorrhea in closed head injuries. *Br J Surg* 1954;42:1.
3. Raaf J. Post traumatic cerebrospinal fluid leaks. *Arch Surg* 1967;95:648.
4. Spetzler RF, Zabramski JM. Cerebrospinal fluid fistula. *Contemp Neurosurg* 1986; 8:1.
5. Klastersky J, Sadeghi M, Brihaye J. Antimicrobial prophylaxis in patients with rhinorrhea or otorrhea: A double blind study. *Surg Neurol* 1976; 6:111.
6. Schaefer SD, Diehl JT, Briggs WH. The diagnosis of CSF rhinorrhea by metrizamide CT scanning. *Laryngoscope* 1980; 90:871.
7. Chow JM, Goodman D, Mafee MF. Evaluation of CSF rhinorrhea by computerized tomography with metrezamide. *Otolaryngol Head Neck Surg* 1989; 100:99.
8. Kirchner FR, Proud GO. Method of identification and localization of cerebrospinal fluid, rhinorrhea, otorrhea. *Laryngoscope* 1960; 70:921.
9. McKusic KA, Malmud LS, Kordela PA. Radionuclide cisternography. Normal values for nasal secretion of intrathecally injected In-111 DTPA. *J Nucl Med* 1973; 14: 933.
10. Eljamel MS. Fractures of the middle third of the face and cerebrospinal fluid rhinorrhea. *Br J Neurosurg* 1994; 8:289.