



## Role of Radioisotope Scanning (DMSA and DTPA) in the Diagnosis and Management of Pediatric Urology Cases

## KEYWORDS

Urology, Pediatric, DMSA, DTPA

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**ABSTRACT** DTPA scan is used for Glomerular filtration rate (GFR) Estimation / Pelvi ureteric junction PUJ Block / Hydronephrosis / Non functioning kidney on Intravenous pyelography (IVU) and Dimercaptosuccinic acid (DMSA) for diagnosis of Pyelonephritis, Scars, Vesicoureteric reflux (VUR). Objectives: To study the role of Radio nucleotide DTPA and DMSA scanning in diagnosis and management of pediatric urology cases. Materials and Method: 40 pediatric cases of urology were randomly selected for the study. Cases underwent DMSA and DTPA scanning and after the diagnosis the line of management was decided. Results: Out of 40 cases 17 had Hydronephrosis, 5 had renal agenesis, 4 had vesicoureteric reflux and urinary tract infection, 3 had Pelviureteric junction obstruction, 2 had renal hypoplasia and 1 cases each had renal cyst and failure to thrive each. Conclusion: In pediatric urology, for functional assessment DTPA scan is important and for morphological assessment DMSA scan has a role.

**Introduction:**

Nuclear medicine refers to the constantly evolving medical specialty that involves the use of radioactive isotopes in the diagnosis and treatment of disease. Nuclear Medicine sits at the heart of medical specialties. [1] In radioisotope scanning, radioisotopes are introduced into the body for the purpose of imaging, evaluating the function of an organ, or for determining the location and extent of tumors. Radionucleotide diethylene triamine penta acetic acid (DTPA) is used for GFR Estimation / PUJ Block / Hydronephrosis / Non functioning kidney on IVU and Dimercapto succinic acid (DMSA) for diagnosis of Pyelonephritis, Scars, VUR.[2,3]

Due to lack of knowledge about nuclear medicine and radioisotope scan fear of radioactivity, nuclear medicine use in, diagnostic modalities in medical field has become somewhat short. These procedures are not routinely carried out. As radiation dose received is medically insignificant to cause side effects, people are very careful about their patients (children) and after use of antenatal USG in diagnosis of renal diseases in children, which has become routine procedure, the use of radioisotope scanning should be carried out routinely in specific conditions.[4]

The present study was planned with the objective to study the role of Radio nucleotide diethylenetriaminepentaacetic acid (DTPA) and dimercaptosuccinic acid (DMSA) scanning in diagnosis and management of pediatric urology cases.

**Materials and methods:**

The study was conducted in a tertiary care hospital of western India attached to Medical College.

40 pediatric (age-0-12 yrs) cases admitted in the urology ward underwent radionucleotide scan randomly for study. Proforma of the case was performed including preliminary data, chief complaints, detailed history, general examination, systemic examination, specific investigation, treatment and follow up. Name of patients, age, sex, address were noted. Detail birth history, immunization history and family history

were taken. Patients were thoroughly examined for general condition and systemic examination. They were initially investigated for, primary basic routine investigations. Those cases required MCU underwent it. All cases were undergone ultrasonography. After primary investigation all cases undergone DTPA or DMSA or both. Definitive diagnosis was done and treated accordingly.

**Results:**

Table-1&2 .Out of 40 cases majority of children 18(45%) were between 1-5 yrs of age and 29 (72.5%) were male. 36(90%) of cases had normal Renal function test. Out of 25 cases among which Micturating Cysto Urethrogram (MCU) was done 10 (40%) had vesicoureteric reflux. DTPA scan was done in 24 (60%) cases, DMSA scan was done among 14 (35%) cases and both scans were done in 2 (5%) cases.

40 cases of children wherein nuclear renal scan was done had clinical diagnosis as follows. Table:3

17 (42.5%) cases Hydronephrosis (unilateral and bilateral), 5 cases renal agenesis or ectopic kidney, 4 cases vesicoureteric reflux [VUR] (Unilateral/Bilateral) and urinary tract infection (UTI), 3 cases Pelviureteric junction obstruction (PUJ) (unilateral or bilateral), 2 cases of renal hypoplasia and 1 cases of renal cyst and failure to thrive each.

In this study, 20 cases were treated conservatively and 20 cases were treated with surgeries. Conservative management was given to cases of Vesicoureteric reflux (VUR) in the form of low dose antibiotic chemoprophylaxis, frequent micturition etc. The cases of UTI without vesicoureteric reflux were treated with short course of antibiotic.

Surgical management given on terms of following operative procedure: 1.Nephrectomy – Nonfunctional kidney Multi cystic kidney: 5 cases underwent nephrectomy. 2. Pyeloplasty – All 9 cases undergone Andersons-Hyne's Pyeloplasty. 3. Nephrostomy, Pyelostomy – palliative or temporary surgical procedure done in 3 cases. 4. Uretricreimplantation – Done in 3 cases.

There was no morbidity of any kind in all the 40 cases studied, due to DTPA/DMSA scans. The cases managed conservatively are symptoms free, while the cases managed with surgical treatment had uneventful recovery. 6 cases followed up regularly out of which 3 cases undergone surgical treatment (Pyelostomy, Nephrostomy) showing improvement on follow up radionuclide scan, 3 cases undergone conservative treatment with follow up scan. No post-operative mortality seen. No mortality seen in cases undergone conservative line of management.

#### Discussion:

In this study, out of 40 cases (0-12yr) age group maximum number of cases were from 1-5yr age group. Cases in 0-1month age group were antenatally scanned and referred to surgery department.

DMSA/DTPA scan was preferred in this age group because it doesn't need bowel preparation. In pediatric age group (bowel) GIT gas is more. There are no hazards of radiation. As no contrast is used chances of drug allergies and anaphylactic shock are nil. It can be done in cases of deranged renal function test. Ditchfield MR. et al (1998)<sup>7</sup> reported DTPA/DMSA scan as important investigation in pediatric urology. Giardin E. Benador et al(1998)<sup>9</sup> studied role of DMSA/DTPA scan in managing pediatric pyelonephritis.

In this study there were 4 cases (10%) of deranged renal function undergone DTPA and DMSA. Chandra Dass et al (1997)<sup>5</sup> found radionuclide methods are most useful in patient in whom urine collection is difficult, among poorly cooperative, children and in those with renal insufficiency. Stokland et al (1998)<sup>22</sup> stated DMSA scintigraphy used in deranged renal function (acute and chronic) in children.

It is found that clinical diagnosis continued or changed after(DTPA/DMSA) scan. Line of management is decided after DTPA and DMSA scan only. Biggi et al(2001)<sup>4</sup> reported prognostic value of DMSA scan in children with first urinary tract infection. Mergeurian et al(1999)<sup>12</sup> reported DMSA scanning is valuable in evaluation of children with primary vesicoureteric reflux. Kao PF et al(2003)<sup>11</sup> stated DTPA and DMSA scan useful in diagnosis of horseshoe kidney, renal agenesis and hypoplasia. Abrar A W et al(2003)<sup>2</sup> stated radionuclide scan is an effective, easy to perform, reproducible and objective technique to investigate various functional renal parameters in obstructive uropathy before and after surgical intervention.

In this study all 40 cases underwent radionuclide renal scan (DTPA/DMSA). In gross, if functional assessment is required, patient underwent DTPA scan; if morphological assessment is required patient underwent DMSA scan.

#### Conclusions:

In pediatric urology, for functional assessment DiethyleneTriaminePentacetic Acid (DTPA) scan is important and for morphological assessment Dimercapto Succinic Acid (DMSA) scan has a role. By radio nucleotide scan definitive diagnosis of renal agenesis, hypoplasia, mass and pyelonephritis is done. In deranged renal function radionuclide scan can be done safely among children in whom IVP is contraindicated.

**Table: 1 Age wise distribution cases**

Age	No. of Cases	Percentage%
Neonate	5	12.5
Infant	10	25
1 – 5 yr	18	45
5 – 10 yr	4	10
10 – 12 yr	3	7.5
Total	40	100

**Table: 2 Sex wise distribution cases**

Sex	No. of Cases	Percentage %
Male	29	72.5
Female	11	27.5
Total	40	100

**Table: 3 Diagnosis of cases**

Clinical Diagnosis	No. of Cases	Percentage %
Renal Agenesis	5	12.5
Hydronephrosis (Bi/Unilateral)	17	42.5
Vesico-uretric Reflux	4	10
Pelvi-uretric junction obstruction	3	7.5
Renal hypoplasia (Rt/Lt)	2	5
Renal cyst	1	2.5
Urinary Tract Infection	8	20
Total	40	100

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