The accuracy of different calculated methods using $^{99m}$Tc-DTPA
dynamic scintigraphy for split renal function estimation.
Comparison with standard $^{99m}$Tc-DMSA renal scan

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Abstract

Background $^{99m}$Tc-dimercaptosuccinic acid ($^{99m}$Tc-DMSA) is primarily used for imaging functioning cortical
mass and it is the most reliable method in assessing individual renal function. $^{99m}$Tc-diethylenetriaminepentacetate ($^{99m}$Tc-
DTPA) is routinely used to measure total and individual kidney functions.

Aim: To investigate whether any difference exists between
split renal function (SRF) obtained by routinely
used posterior $^{99m}$Tc-DTPA scan and that obtained from
$^{99m}$Tc-DTPA dual head scan compared with SRF
obtained from the standard $^{99m}$Tc-DMSA scan in different renal disorders.

Methods: This prospective study includes 121 patients [44 females and 77 males; mean age 3.4±21.2 years].
According to $^{99m}$Tc-DTPA dynamic renogram results, patients were divided into: obstructed group (66 patients) with unilateral or bilateral obstructed outflow tract; normal group (20 patients); renal impairment group (10 patients) and pediatric age group (25 patients). Dual-head $^{99m}$Tc-DTPA dynamic renal scans and
$^{99m}$Tc-DMSA static renal scans were performed for all patients. SRF was calculated for Rt and Lt kidneys
and the difference between Rt and Lt SRF from posterior scans and anterior scans to calculate the average Rt
and Lt kidneys SRF as well as the difference between Rt and Lt kidneys average SRF. These parameters were
then statistically compared and correlated with the SRF of Rt and Lt kidneys and the difference between them
obtained from the standard geometric mean of $^{99m}$Tc-DMSA static scan.

Results: No significant statistical difference (p>0.05) could be found on comparing the mean values of the
SRF quantitative parameters between $^{99m}$Tc-DTPA-POST as well as $^{99m}$Tc-DTPA-Average compared to the
same SRF parameters calculated from $^{99m}$Tc-DMSA scans in the four groups of patients. In correlation
analysis, a high significant correlation between the SRF obtained from the $^{99m}$Tc-DMSA and SRF obtained
from both $^{99m}$Tc-DTPA-POST and $^{99m}$Tc DTPA-Average, for left and right kidneys as well as for the
difference in split functions. Bland-Altman graphs in each studied group showed perfect agreement of $^{99m}$Tc-
DTPA-POST method and $^{99m}$Tc- DTPA-Average method with the $^{99m}$Tc-DMSA method in respect to SRF
calculation.

Conclusion: Based upon our findings, we have concluded that, whenever an accurate calculation of split
renal function is needed in different renal disorders, the routinely done $^{99m}$Tc-DTPA dynamic scan using
either single or dual head protocols can provide reliable measures of SRF similar to the standard $^{99m}$Tc-
DMSA renal scan. This would lead to considerable savings in time, cost and radiation burden especially in
pediatric age group.

Key Words: Split renal function, $^{99m}$Tc-DTPA dynamic renography, $^{99m}$Tc-DMSA static scan.