Clinical manifestations of Nephroptosis are ubiquitous. Diagnosis is achieved after ruling out all other causes of abdominal pain by investigations. However, Nuclear Scan with Tc-99m GHA, MAG 3 and DTPA renal agents with dedicated imaging in supine and erect postures confirms the diagnosis. Not only as a diagnostic aid, it also helps in decision making for surgical correction by depicting the changes in drainage and GFR in different postures. We describe a case of Nephroptosis where DTPA Renal Scintigraphy addressed the diagnostic and therapeutic issues in the case.

Keywords: Glomerular filtration rate (GFR), intravenous urography, nephropexy, nephroptosis

INTRODUCTION

Nephroptosis, also known as floating kidney and renal ptosis, is a condition in which the kidney descends more than two vertebral bodies (or >5 cm) during a position change from supine to upright. This condition is often treated with nephropexy, a surgical procedure that secures the floating kidney to the retroperitoneum.[1] The term nephroptosis was first coined by Glenard in 1885. The mobile kidney was first described in the literature by Franciscus de Pedemontanus in the 13th century. Throughout the years, the condition was often left untreated. In 1864, Dietl first characterized the symptoms of acute nephroptosis as episodes of acute abdominal pain, vomiting and orthostatic hypertension. 64% of patients with fibromuscular dysplasia of renal artery also have ipsilateral nephroptosis when the patient is upright.[2]

Nephropexy is a surgical repair, beneficial in certain symptomatic patients with obstruction of the collecting system or renal blood flow caused by documented renal ptosis. Usually diagnosis is suspected based upon patient symptoms, clinical examination and confirmed by intravenous urography (IVU), obtaining erect and supine films. However, IVU is useful only in anatomical diagnosis and minor abnormalities of drainage and Glomerular filtration rate (GFR) of ptotic kidney are not resolved. Renal dynamic scintigraphy with Tc-99m Diethylene triamine pentaacetic acid (DTPA) not only confirms the diagnosis, but also highlights the altered function, drainage in different postures and aids in the decision making of nephropexy by demonstrating the reduction in renal blood flow, glomerular filtration rate and drainage in symptomatic cases.

CASE REPORT

A 20-year-old gentleman presented with pain in the right-half of the abdomen in lower aspect for the past 6 months. The pain was dragging type. He said he had a feeling of a lump in that region. No relation with food intake. The pain worsened on jerky movement and prolonged physical activity. There was no history of trauma to the abdomen. About a month back, he had sudden pain at the same site with oliguria and dysuria. There was no radiation to the groin. There was no history of graveluria or hematuria.

The ultrasound abdomen and CT abdomen, done then, were normal. Intravenous urogram was not done due to the absence of any specific indication like non-visualization or non-functioning of kidney, renal calculus or ureteric calculus and hydronephrosis. The pain subsided after 24 h, with the use of analgesics, but he noticed frequent micturation during recovery. There was no history of fever, nausea or vomiting. There was no bowel disturbance. He was neither a diabetic nor hypertensive. On examination, he was thin built, moderately nourished, weight 52 kg, height 174 cm, not anaemic, no oedema, no cyanosis, no clubbing, and no lymphadenopathy. Blood
pressure: 110/70 mmHg. Pulse 72 bpm. Cardiovascular and respiratory examination was normal. Abdominal examination was unremarkable.

Complete blood and urine examination, including culture and sensitivity and radiograph of dorsolumbar vertebrae anteroposterior view and lateral view show normal.

**DISCUSSION**

Nephroptosis is a fairly rare condition, and the number of radiological diagnosis exceeds the number of patients with symptoms attributable to the condition. Many studies have estimated that nearly 20% of women have nephroptosis revealed by routine IVU, but far fewer (10-20%) actually present with symptoms attributable to the condition.\[^3\]

Symptomatic nephroptosis is more common in females, with a female-to-male ratio of 5-10:1. In addition, it is more common on the right side (70% of cases). Of interest, nearly 64% of patients with fibromuscular dysplasia of the renal artery also have ipsilateral nephroptosis.\[^2\] In this case, male patient presented with pain in the abdomen. Patient underwent \(^{99m}\)Tc DTPA renogram performed in usual supine position, which revealed normal morphology and parenchymal functioning and drainage of both the kidneys [Figures 1 and 2].

Nephrologist strongly suspected it to be a case of nephroptosis and asked for \(^{99m}\)Tc-DTPA renogram in prone position. \(^{99m}\)Tc-DTPA renogram reveal normal morphology and functioning of left kidney with normal clearance and lowaly placed malrotated right kidney with mildly diminished parenchymal function and non-obstructive drainage [Figures 2 and 3]. As compared to baseline supine renogram, there is reduction in the right kidney GFR. This patient benefits from nephropexy.

Standing or sitting may provoke a drop in blood pressure and faintness, which necessitates maintaining the supine position. According to Braasch et al.,\[^4\] the influence of postural changes in renal function was determined in 13 patients with nephroptosis and in five normal subjects by measuring GFR in the erect and supine positions. The results indicate that GFR was reduced in the erect position in 10 of 13 patients with either unilateral or bilateral nephroptosis, whereas, GFR was increased in the erect position in four of five patients without renal disease.

Usually diagnosis is suspected based upon patient symptoms and confirmed by IVU, obtained in erect and supine films. But, IVU is useful in anatomical diagnosis and drainage of ptotic kidney. Recently, nuclear scan with \(^{99m}\)Tc-Glucoheptonate (GHA),\[^5\] Mercaptoacetyltriglycine (MAG)\(_3\) and DTPA renal agents also pick up not only the diagnosis, function, drainage and also aid to nephropexy in reduction in renal blood flow, glomerular filtration rate and obstructive drainage cases and in symptomatic cases.

Treatment is surgical (nephropexy-reattachment of the kidney to its anatomical position) to stabilize the kidney, however, surgery is not recommended in asymptomatic patients. Surgical repair is beneficial in certain symptomatic patients with obstruction of the collecting system or renal blood flow caused by documented renal ptosis.\[^8\] In 1993, Urban, et al., at Washington University successfully conducted the first laparoscopic nephropexy.\[^7\] Subsequently, McDougall, et al., (2000) further legitimized laparoscopic nephropexy as a valid surgical treatment
for nephroptosis by showing improvement in pain conditions in a long-term outcome study. Laparoscopic nephropexy has recently become available for selected symptomatic patients.

REFERENCES

1. Winfield H. Nephroptosis. In: The 5-Minute Urology Consult. Vol. 1. Philadelphia: Lippincott Williams and Wilkins; 2000. p. 368-9.
2. Hoenig DM, Hemal AK, Shalhav AL, Clayman RV. Nephroptosis: A “disparaged” condition revisited. Urology 1999;54:590-6.
3. Plas E, Daha K, Riedl CR, Hübner WA, Pflüger H. Long-term followup after laparoscopic nephropexy for symptomatic nephroptosis. J Urol 2001;166:449-52.
4. Braasch WF, Greene LF, Goyanna R. Renal ptosis and its treatment. J Am Med Assoc 1948;138:399-403.
5. Kumar R, Gupta R, Reddy SN, Malhotra A. Nephroptosis: the Tc-99m glucoheptonate scan as a diagnostic method. Clin Nucl Med. 2000; 25:473.
6. Bischoff JT, Kavoussi LR. Nephropexy. In: Campbell-Walsh Urology. Vol. 9. Ch. 51. Philadelphia: Saunders Elsevier; 2007. p. 1776-8.
7. Urban DA, Clayman RV, Kerbl K, Figenshau RS, McDougall EM. Laparoscopic nephropexy for symptomatic nephroptosis: Initial case report. J Endourol 1993;7:27-30.
8. McDougall EM, Afane JS, Dunn MD, Collyer WC, Clayman RV. Laparoscopic nephropexy: Long-term follow-up – Washington University experience. J Endourol 2000;14:247-50.

How to cite this article: Murari SB, Gadepalli T, Rao VP, Ram R. Renal scintigraphy in diagnosis and management of nephroptosis. Indian J Nucl Med 2012;27:52-4.

Source of Support: Nil. Conflict of Interest: None declared.