



A SPECTRUM OF ADRENAL LESIONS AND THEIR CT WASHOUT CHARACTERISTICS

Radio-Diagnosis

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ABSTRACT

Background: The adrenal gland is involved in several pathologic conditions, including hyperplasia, hemorrhage, and benign and malignant masses. Most of the adrenal masses are discovered incidentally. Cross-sectional imaging plays a vital role not only in detection of adrenal abnormalities, but also in the characterization of the adrenal lesions. The most common lesion detected is incidental benign adrenal adenoma. **Materials And Methods:** Patients with suspected adrenal masses who presented to SMS hospital were referred to the Department of Radiodiagnosis for evaluation. CECT with adrenal protocol (non-contrast study, contrast study at 80 seconds and delayed study at 15 min) was done. Biopsy of selective lesions was performed. **Results:** A total of 43 patients were subjected to the study. The anomalies detected were- 30 adrenal adenoma, 3 adrenal metastasis, 2 adrenocortical carcinoma, 4 myelolipoma, 2 pheochromocytoma, 1 adrenal lymphoma and 1 adrenal tuberculosis. **Conclusion:** Adrenal adenoma is the most common adrenal mass and metastasis is the most common malignant adrenal mass. Multidetector CT is the primary modality for detection and characterization of adrenal masses.

KEYWORDS

Adrenal adenoma, adrenal washout

INTRODUCTION

Adrenal glands are significant part of endocrine system and play an important role in body's fight or flight response (1). The adrenal gland is involved in several pathologic conditions, including hyperplasia, hemorrhage, and benign and malignant masses (2). Cross-sectional imaging plays a vital role not only in detection of adrenal abnormalities, but also in the characterization of the adrenal lesions (3).

Characterization of an adrenal mass as benign or malignant is critical in influencing the clinical management of patients. CT is the first level imaging modality for evaluation of adrenal lesions. It is a quick modality, ensures high spatial resolution and we can study the washout characteristics of the lesion on post-contrast study. All these features allow us to correctly characterize an adrenal lesion (4).

The majority of adrenal lesions detected on CT are benign, like adenomas, myelolipomas, cysts, sequelae to prior trauma. The most common lesion detected is incidental benign adrenal adenoma (4). Adrenal adenomas can be differentiated from non-adenomas on basis of washout characteristics. Washout refers to the reduction of attenuation values in the adrenal lesion at CT during a variable period after intravenous injection of a bolus of contrast material (5).

With this study, we aimed to see the spectrum of adrenal lesions and their washout parameters.

MATERIALS AND METHODS

Our study was a hospital based observational study conducted at S.M.S Medical College and Hospital, Jaipur (Raj). A total of 43 patients with suspected adrenal pathology were included in the study. After approval from the institutional ethical committee, patients referred from department of surgery and endocrinology with suspected adrenal pathologies were included in the study on first come first serve basis.

CT scans were performed using 128 slice CT Philips Ingenia Machine. CECT with adrenal protocol (non-contrast study, contrast study at 80 seconds and delayed study at 15 min) was done. The following washout parameters of the adrenal lesions were calculated: Relative percentage washout (RPW) and absolute percentage washout (APW).

Absolute percentage washout (APW) = $(IA - DA) / (IA - UE) \times 100$

Relative percentage washout (RPW) = $(IA - DA) / IA \times 100$

where UE is attenuation during baseline CT, IA is the attenuation during intermediate scan (at 80-seconds delay) and DA is the attenuation during delayed scan (15-minute delay). Biopsy of selective lesions was performed.

RESULTS

The present study was conducted on 43 patients with suspected adrenal lesions with an average age of 44.8 years, ranging from 17 to 80 years. Out of 43 subjects, 18 were females (42%) and 25 were males (58%). The most common adrenal lesion encountered was adenoma accounting for 70% of the cases. Other lesions encountered were: metastases, myelolipoma, adrenocortical carcinoma, pheochromocytoma, adrenal lymphoma and adrenal tuberculosis.

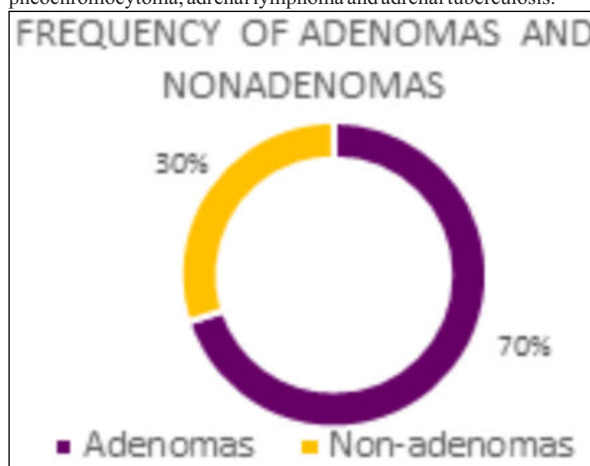


Figure-1

Most of the adrenal lesions were incidentalomas in the present study as they were discovered incidentally accounting for 28 cases (66%) and remaining patients presented with symptoms (34%).

Left adrenal gland (55%) was more commonly affected than right (39%) and bilateral involvement (6%).

Table – 1 Spectrum Of Adrenal Lesions

Spectrum of cases	No. of cases	Frequency
Adenomas	30	70%
Adrenocortical carcinoma	2	4.6%
Myelolipoma	4	9%
Adrenal Tuberculosis	1	2%
Metastases	3	7%
Pheochromocytoma	2	4.6%
Adrenal lymphoma	1	2%
TOTAL	43	100%

Adenomas with attenuation of <10 HU are considered as lipid-rich and >10 HU as lipid-poor. Out of the 30 adenomas observed in our study, 18 were lipid-rich and 12 were lipid-poor.

Table-2 Distribution Of Adenomas Based On Lipid Content

Adenomas on basis of lipid content	No. of cases	Frequency
Lipid-rich adenomas	18	60%
Lipid-poor adenomas	12	40%
TOTAL	30	100%

The mean attenuation value of all adenomas at unenhanced CT observed in our study was 10.3 HU with a range of -15 to 31 HU and that of non-adenomas was observed to be 40.1 HU and with a range of 28 to 48 HU.

Table-3 Mean Attenuation Value Of Lesions On Unenhanced CT

Adrenal lesions	Mean attenuation value
Adenomas	10.2 HU
Non-adenomas	40.1 HU

The washout parameters of adrenal adenomas were: absolute percentage washout of >60% and relative percentage washout of >40%. Non-adenomas had absolute percentage washout of <60% and relative percentage washout of <40%.

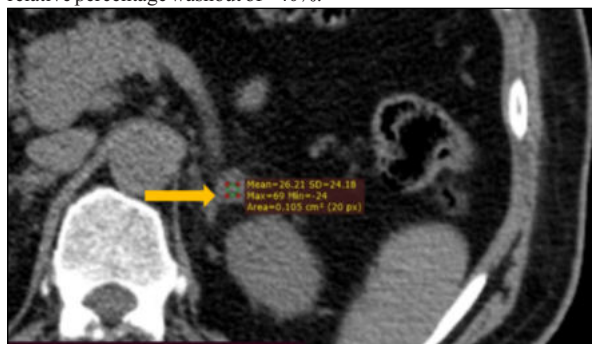


Figure-2 Axial NCCT In 56-year-old Male Who Presented To Us With Hypertension Showing Left Adrenal Adenoma. (HU=25)

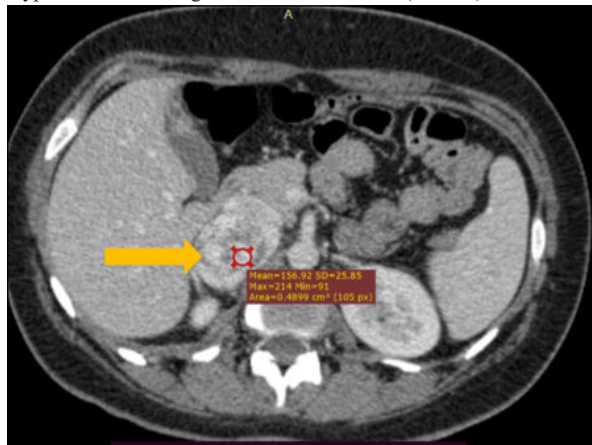


Figure-3 Axial CECT In 18-year-old Female Who Presented To Us With Palpitations Showing Right Pheochromocytoma. (HU=156)

DISCUSSION

Computed tomography represents a powerful imaging tool for assessment of adrenal glands. CT can characterize adrenal masses into adenomas and non-adenomas based on their washout characteristics. The washout is expressed as- the ratio of attenuation of adrenal gland at delayed CT to the attenuation at dynamic CT- or absolute by taking into account the attenuation of adrenal gland at unenhanced CT.

In our study, the most common adrenal lesion encountered is adenoma accounting for 70% of the cases. This finding is consistent with the previous studies by Minal et al (6) that adenomas are the most common encountered adrenal lesions.

The adenomas are further differentiated into lipid-rich and lipid-poor based on the attenuation value at unenhanced CT. Adenomas with attenuation of <10 HU are considered as lipid-rich and >10 HU as

lipid-poor. Out of all the adenomas, 60% were lipid-rich and 40% were lipid-poor in the present study. This is in corroboration with other study by Monica et al (7) and Minal et al (6).

Adenomas and non-adenomas were differentiated on basis of the CT washout parameters, that is, absolute percentage (APW) and relative percentage washout (RPW). Lesions with APW of >60% and RPW of >40% were diagnosed as adenomas.

CONCLUSION

The study concludes that the most commonly encountered adrenal lesions are adenomas. Most of the adrenal lesions are incidentally discovered and are called as incidentalomas. Washout characteristics of adenomas are: absolute percentage washout of >60% and relative percentage washout of >40%.

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