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COMPARISON STUDY OF DIAGNOSIS OF LIPID RICH ADRENAL ADENOMA WITH CHEMICAL SHIFT MRI AND UNENHANCED CT SCAN

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Abstract:

Objective: *To assess whether by MRI adenomas can be visualized when CT findings are ambiguous and to assess adrenal adenoma in patients with both MRI chemical shift and unenhanced CT.*

Study Design: *A Retrospective study*

Place and Duration: *The study was performed in the Radiology Department of KRL Hospital Islamabad for the period of 2 Years from March 2015 to March 2017.*

Materials and Method*: 40 patients (42 suprarenal masses) underwent MRI with chemical shift and unenhanced CT were studied retrospectively. For each adrenal mass, adrenal-spleen chemical shift rate, Houns site units and indexed signal intensity were recorded. Qualitative assessment for signal loss in every adrenal mass in the reciprocal phase by the two-passer images was also performed and differentiated with quantitative analyzes. a measure of adenoid-rich lipid, adrenal spleen has a rate of chemical shift lower than 0.71 d, has a rate of signal intensity higher than 16.5%, and if the mass exceeds 10 h, or if the mass satisfies two of the above criteria and there are subsequent images without alteration.*

Results: *Sensitivity and adrenal-to-spleen contrast indicate the Cicadas to identify a lipid-rich adenoma using 92% (33/36) and 17% chemical shift qualitative index signal strength decline and analysis without CT (1/6), 100% (36/36) and (6/6), 100 (36/36) and 67% (4/6) and 78% (28/36) and 83%, 100% respectively (5/6). In lipids Twenty-eight (67%) are measured in rich adenomas, or below 10H, a ratio of the chemical lobe of lower than 0.72 adrenal spleen, and strength of signal index of more than 17.0%. 8 masses (19%) were not more than 10H but the adrenal spleen was less than 0.71% of the chemical and a ratio of 16.5% to an index at higher density and the tracking signal was unaltered.*

Conclusion: *Eight of 13 suprarenal adenomas (62%), which were measured more than 10 hours in CT scan unenhanced, were definitively characterized by MRI and chemical shift.*

Key Words: *Adenoma, MRI, CT Scan, Chemical shift, Suprarenal masses.*

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INTRODUCTION:

Adrenal mass has occasionally become a clinical problem, with the abdominal CT being discovered in up to 5% of the current diagnoses. Unconjugated and MRI chemical shift adenomas will be recognized in large quantities of intracytoplasmic lipids, while adrenal adenomas rich in other adrenal masses contain quantities of intracytoplasmic lipids sufficient to distinguish lipids from adrenal. However, as far as we know, we performed a direct comparison of the characterization of the adrenal gland using a contrast CT and MRI chemical shift that was not in the same group of patients in only two trials. When characterizing rich adrenal adenomal lipid, it is unclear whether there is direct relationship between techniques of imaging, especially when adrenal masses are characterized there. Our aim is to assess adrenal adenomas in both non-contrasting patients, such as chemical shift MRI, to determine whether there are other adrenal adenomatous conditions that are characterized by an imaging technique and are not lipid-rich.

MATERIALS AND METHODS:

This is a retrospective study of KRL Hospital Islamabad Radiology Department for 2 years from March 2015 to March 2017 after approval of the ethics committee. It contained the 875 CT report in which "adenoma" word was found. This patient was extended with this patient group with IDXrad radiological information system (IDX Systems) and MRI was defined with a chemical modification involving CT without enlargement and adrenal glands. This study consisted of 41 patients with 43 suprarenal masses. We excluded a patient having adrenal mass of 4 mm on CT because no mass was detected on MRI. Forty patients (25 males, 15 females, mean age, 73 years, 46-89 years) with 42 suprarenal masses were present in our last study cohort. 42, with an average mass dimension of 1.2 cm (range, 0.9-1.5 cm) and less than 1.5 cm. Overall, the mass size in average was 1.6 cm (range, 0.9-3.4 cm). In a patient with splenectomy (adrenal mass), the left kidney was used to measure the severity of the signal rather than the spleen. The largest ROI was placed for adrenal masses without partial volume effects of the Indian ink artifact in adjacent MR or reverse phase oil images. Large blood vessels are avoided for ROI measurements of the spleen. The rate of adrenal chemical exchange in the spleen and the signal intensity index were calculated. The rate of chemical change in the adrenal gland was defined as the ratio of mass to adrenal density in the phase contrast image by dividing the mass in the phase image by the distance to the adrenal signal-density ratio. The intensity index of the signal is divided by the signal strength of the adrenal mass in the phase image and the signal strength of the adrenal mass in the negative phase image and the density of the mass signal. The adrenal phase in the image was multiplied by 100%. All CT scans were made on helical scanners (CTI [n = 16 or HiSpeed Advantage [n = 15], Siemens Medical Solutions). All patients underwent T1-weighted images with bifurcation (phase and phase-phase) biaxial echo using an echo sequence redirected to 2D gradient. 152-200 was TR range and the 2.1-2.7 were TE ranges (reverse phase) and 4.8-5.3 (phase). The exact diagnosis of each case is based on current radiological and pathological data. If the lipid-rich adenomatous epithelium has a splenic adrenal chemical shift rate on MRI was less than 0.71 [1], if CT is measured to be equal to or less than 10 H in situ and greater than 16.5% signal intensity index [2], or if the mass meets 2 of the last 3 criteria and has followed the image for more than 6 months without any range change. For a lipid-rich adenoma if mass did not meet the criteria, imaging follow-up of 1 year or more was taken as benign.

RESULTS:

The last clinical findings in 42 suprarenal masses were: pheochromocytoma (n = 1), lipid-rich adenomas (n = 36) and other adrenal benign masses (n = 6). Sensitivity and specificity were 92% (33/36) and 17% for a lipid-rich adenomic diagnosis using adrenal-spleen qualitative chemical shift ratio, unenhanced CT attenuation and signal intensity index analysis. (1/6), 100% (36/36) and 100% (6/6), 100% (36/36) and 67% (4/6), and 78% (28/36) and 83% In turn (5/6) Quantitative analyzes included an adrenal chemical shift rate and an index signal intensity strain in a spleen of less than 0.71, which was equal to or even equal to 10 H in untreated CT in 28 (67%) of the suprarenal masses (67%). Consistent with lipid-rich adrenal adenoids, it is greater than 16.5% (Figs. 1 and 2) and the signal intensity average index was 56.7%. (range, 27-84%). Eight unenhanced masses (19%) were measured over 10 H in CT, but there was an adrenal mass.

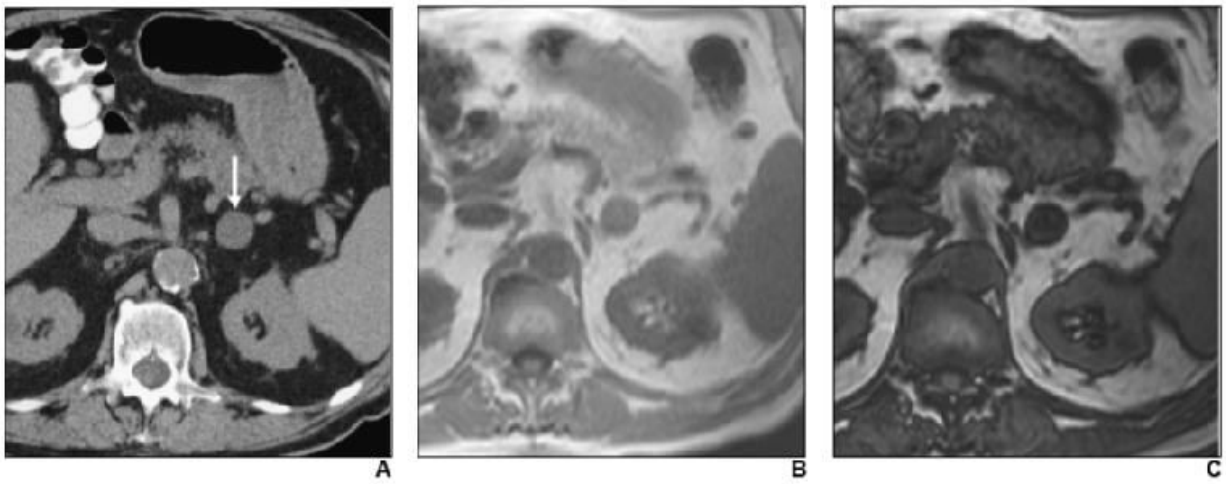

Fig. 3.—84-year-old man with adrenal adenoma that was characterized using chemical shift MRI but not with unenhanced CT.
A, Unenhanced axial CT image shows 1.5-cm left adrenal mass (*arrow*), which measures 20 H.
B, Axial in-phase MR image shows that adrenal mass is slightly hyperintense with respect to spleen.
C, Axial opposed-phase MR image shows that mass is isointense–hypointense with respect to spleen. For this lesion, adrenal-to-spleen chemical shift ratio and signal-intensity index were 0.32 and 58%, respectively. Qualitative analysis identified signal loss on opposed-phase image. This mass has been stable for 6 years and is consistent with lipid-rich adrenal adenoma.

A signal intensity index of sodium chemical shift less than 0.71 and greater than 16.5% (Figure 3). 2masses (5%) were measured more than 10 H in non-contrast CT and had chemical shift of adrenal gland equal to 0.71 or rate greater this, but had a signal intensity index higher than 16.5% [3]. The mean intact weakening of the CT scan, the rate of displacement of adrenal to the splenic artery and the signal intensity index were 18.8 H. A single mass (2%) was measured as -8H in CT without elevation, but with an adrenal chemical displacement rate to a 1.2 spike and 0% a signal intensity index. This mass was not modified after one year of follow-up and was considered benign. Qualitative analysis was consistent with the 3 quantitative assessments in 28[4].

42 adrenal masses (64%), mass 16 (36%), incompatible with one at least of the numerical assessments (Table 1). In two (13%) of these 15 masses (1 and 2 in Table 1), three numerical parameters were not adenomatous, characteristic lipid, qualitative analysis visual signal loss was detected. Lipids in two (13%) were diagnosed by any of the three quantitative measures rich in adenoma (mass 3 and 4), in which 15 mass signal loss qualities were detected. Eight of 15 patients (53%) (masses 5-12), adrenal chemist.

TABLE 1 **Fifteen Adrenal Masses with Discrepant Findings Between Qualitative and Quantitative Analyses**

Mass	Qualitative Analysis[a]	Quantitative Analysis			Diagnosis
		Adrenal-to-Spleen Chemical Shift Ratio	Signal-Intensity Index (%)	Hounsfield Unit Measurement[b]	
1	No	0.67	36	–1	Adenoma
2	No	0.41	58	–15.1	Adenoma
3	Yes	1.1	01	40	Stable 2 yr
4	Yes	0.84	16	21.1	Stable 3.2 yr
5	No	0.48	46	22	Adenoma
6	Yes	0.4	46	26	Adenoma
7	Yes	0.67	28	21.1	Adenoma
8	Yes	0.32	68	20	Adenoma
9	Yes	0.58	44	14.8	Adenoma
10	Yes	0.48	64	14.1	Adenoma
11	Yes	0.45	57	15	Adenoma
12	Yes	0.58	39	19.2	Adenoma
13	Yes	0.76	40	16.7	Stable 2.4 yr
14	Yes	0.73	27	20.9	Stable 1.4 yr
15	Yes	1.01	0	–6	Stable 1 yr

Note.—No = no visual loss of signal of the adrenal mass on the opposed-phase images, Yes = visual loss of signal of the adrenal mass on the opposed-phase images.
[a]Performed using the spleen as an internal reference standard.
[b]Using unenhanced CT.

The signal-to-noise ratio and intensity index of the signal characterize a adenoma lipid-rich, but these all masses measure more than 10 H in unenhanced CT [5]. In the remaining seven cases (6/12 mass) the qualitative analysis detected a loss of qualitative signal (collective 5) and signal loss was detected.

DISCUSSION:

Rich adrenomal adenomas in lipids, MRI with unacceptable chemical shift in reverse phase, low attenuation in signal loss, inclusion of intracytoplasmic lipids. Although there are MRI and chemical changes, both unapproved adrenal adenomas are useful for a lipid-rich character, these patients rarely have published a comparison of these techniques in the same group [6]. It is not known whether there is a direct relationship between the chemical shift-rich adrenal adenomas of undeveloped CT and lipid MRs. In this study, 13 adenomas represent eight (62%) cholesterol, which can be characterized by a chemical change. 10 The values of CT taken from the sea are shown in H. et al. [7] also conducted a similar study using the same ratio of adrenal marrow chemistry, showing a correlation between the increase in adrenal masses and the chemical change in adrenal ratios of non-declining spleen [8]. Our findings are also similar to the assumptions that suprarenal adrenal masses (lipid-rich adenomas) measure less than 0.71, suprarenal splenic suppressants without contrast-enhanced CT, and chemical changes that measure more than 10 H sensitivity [9]. However, a single malignant lesion was erroneously operated to work with a 0.70 chemical displacement of the adrenal spleen. McNicholas et al. [6] also compared the chemical change in the evaluation of unused magnetic resonance and adrenal masses [10]. The same chemical, adrenal, spleen and threshold MR displacement rates used in this study were used, but fewer thresholds (H0) were used to detect benign non-benign mass [11]. Chemical shift showed that MR characterized four, five suprarenal masses with benign and indeterminate CT attenuation (between 1 and 20 E). However, these four injuries did not increase by 10 H or less. The fifth lesion was measured between 10 and 20 M, but had a higher adrenal mass displacement rate of 0.7 [12]. Most importantly, the study correctly identified all malignant lesions using a chemical shift of 0.70% of the adrenal marrow span. This result has important implications in the algorithm for the evaluation of adrenal gland in cancer patients. If suprarenal mass is present in unenhanced CT and does not meet the adenomatous criteria (≤10 H), a chemical change MRI can be performed for a possible characterization before a CT adrenal lavage study is performed [13]. The upper limit of inactive CT attenuation of an adrenal gland is unknown, because MRI has the ability to characterize a lipid-rich adenoma. In this study, however, a lipid-rich adrenal adenoma on MRI was measured up to 26 H in unenhanced computerized tomography.

CONCLUSION:

As a result, incidental adrenal masses are common, and adequate characterization is especially important in cancer patients. In clinical practice, unenhanced CT and chemical change MRI are used to distinguish lipid-rich adrenal adenomas from other suprarenal masses. However, this study showed that 62% of non-CT adenomas increased more than 10 H, and that chemical change could be rich in lipids by quantitative MRI.

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