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Evaluation and Surgical Outcome of Adrenal Incidentalomas

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Abstract.....Object: is to observe the presentation, radiological and endocrine evaluation, and management of incidentally discovered adrenal masses at our institution. **Methodology:** This retrospective study conducted Agha Khan University Hospital Karachi. Case records of patients undergoing adrenalectomy from July 1988 to December 2011 were reviewed. Patients with known or suspected adrenal disease prior to imaging were excluded. The clinical presentation, demographic data, preoperative workup and preoperative clinical diagnosis was reviewed and compared with the final histopathological diagnosis. **Results**: Out of 56 patients undergoing adrenalectomy, 23 had an adrenal incidentalomas (AI) which includes 14 males and 9 females. The mean age was 40 (± 14) years. Mean size of the adrenal mass was 6 (± 6) cm. Incidenataloma was detected on ultrasound in 12 patients, CT scan in 10 patients, and MRI in 1 patient. Twenty patients (87 %,) underwent biochemical evaluation, including urinary Vanillylmandelic acid (VMA) level in 15, serum cortisol in 10 and aldosterone level in 7. **Conclusion:** Complete metabolic workup in essential in all patients with incidentally detected adrenal mass. Although malignancy is a valid concern in >4cm adrenal mass, the possibility of subclinical functioning adrenal adenoma or pheochromocytoma should not be ignored.

Keywords: Adrenal incidentaloma, surgical outcomes, Radiological imaging, Mass

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INTRODUCTION

An adrenal incidentaloma (AI) is defined as an adrenal mass, discovered on a radiological study performed for the evaluation of a clinical presentation or pathology completely unrelated to the adrenal glands[1,2]. Increased utilization of radiological imaging, especially those of the abdomen have rendered the AI a common occurrence. Also improvements in these diagnostic modalities have led to increasing detection of AI. Studies have estimated the prevalence of AI found on CT scans of the abdomen to be between 0.4-4.4%, however autopsy studies have reported a higher prevalence (1.4-10%). This suggests that the actual prevalence of AI might be greater than that found on radiological imaging[3-6].

Adrenal incidentaloma (AI) poses a diagnostic challenge. Workup and management of such lesions is driven by the potential of these lesions to be hormonally active (cortisol, aldosterone, catecholamine or sex hormone production). Other differentials of an AI include malignancy of the adrenals or a metastatic lesion from extra adrenal sites [7, 8]. It is therefore advisable to fully work up these lesions so as to be able to differentiate them from benign and nonfunctioning lesions e.g. cortical adenomas.[4, 9].

A number of guidelines are proposed to work up AI in an attempt to come up with the best possible solution to effectively diagnose and manage patients presenting with such lesions. It is generally advisable that every patient presenting with an AI should first undergo a thorough history and physical examination to rule out signs and symptoms of a functional lesion. Following this a thorough biochemical workup should be performed in all but lesions with low attenuation (suggesting the diagnosis of a myelolipoma). An initial hormonal workup should include screening for Cushing syndrome, hyperaldosteronism and pheochromocytoma. One approach could be to perform serum cortisone, serum aldosterone and 24hr urinary VMA in all patients with AI. Evaluation of adrenal sex steroids (DHEA) is only recommended in symptomatic patients. Depending on the results of the aforementioned screening tests, further workup may be necessary to confirm or rule out a particular disease process[2, 7, 10-13].

Besides functioning tumor the other concern in AI is that of malignancy. Further radiologic studies may be warranted in some cases to rule out primary or secondary malignant lesions. Any lesion after hormonal workup that is found to be functional or greater than 4 cm in size should be surgically removed[10]. Patients with a tumor size less than 4 cm with CT scan findings suggestive of a benign lesion should undergo a repeat scan in 6 months and then annually for the next 2 years.[7, 13]

Methodology

We retrospectively reviewed medical records of all patients who underwent adrenalectomy between July 1988 and December 2011.All patients who underwent adrenalectomy for AI at AKUH between 1988 and 2011 were included in the study. Incomplete records were excluded from the study. Data was collected for Clinical presentation, demographic data, and preoperative workup including serum and urinary cortisol levels, Urinary VMA, renin and aldosterone level ACTH and DHEA when available. Preoperative clinical diagnosis was reviewed and compared with the final histopathological diagnosis and follow-up data were collected. The data was compiled and analyzed using SPSS version 19.0. Categorical variables were described in terms of frequencies and percentages whereas continuous variables were described in terms of means and standard deviation. Final histopathology was cross-tabulated with baseline hormonal workup.

Results

A total of 56 patients underwent adrenalectomy during the study period. 10 patients were excluded because of incomplete or missing records. Half of these adrenalectomies (23/46) were done for an AI (Table 1). Incidentaloma was detected on ultrasound in 12 patients, CT scan in 10 patients, and only 1 patient had incidentally detected adrenal mass on MRI. Twenty patients (87 %,) underwent some form of biochemical evaluation guided primarily by preoperative imaging findings. This included urinary Vanillylmandelic acid (VMA) level in 15, serum cortisol in 10 and aldosterone level in 7 patients.

A total of 4 patients had suspicion of subclinical Cushing's syndrome based upon an increased level of serum cortisol. A provisional biochemical diagnosis of Cushing syndrome was confirmed by an increased 24 hour urine free cortisol in all 4 of these patients. Serum ACTH was found to be borderline high in one of these 4 patients. Three patients had an increased aldosterone level. Of these 2 patients were found to have an adenoma and 1 had adrenal hyperplasia on final histopathology.

For excluding diagnosis of pheochromocytoma, 15 (65.2%) patients had a urinary Vanillylmandelic acid (VMA) level. Eleven patients were found to have pheochromocytoma on final histopathology including 8 who had increased VMA and 3 with normal VMA. Out of 23 patients only one underwent laparoscopic adrenalectomy and 22 had open surgery. Mean operative time was 186±77 minutes. Only 2 patients had complication during adrenalectomy, 1had diaphragmatic and 1 had duodenal injury. In open surgery Median EBL 300 (±533)

The mean follow up duration was 22 weeks. Follow-up urinary VMA was performed on 8 patients who had a pheochromocytoma and raised VMA preoperatively, and was found to be normal in all of them.

Mean body mass index was 23.24 ± 4.86 kg/m^2. Our study results reported 127 (59.9 %) were normal weight, 56 (26.4 %) were overweight and 29 (13.7 %) were obese (Table No.2). Smoking was noted in 100 (47.2 %) of our study cases. Mean duration of illness was 26.37 ± 15.21 months and 155 (73.1%) had disease duration more than 18 months.

Discussion

Due to increasing use of imaging modalities like ultrasound and CT scan, incidental finding of adrenal mass is commonly encountered in clinical practice. Adrenal incidentaloma (AI) presents a diagnostic challenge. A systematic approach is advisable to be able to easily and effectively diagnose and manage patients presenting with these lesions.

Most of the patients in our study had a functioning tumor (8 with raised VMA, 4 raised aldosterone and 2 raised serum cortisol). This differs from other studies where most of the masses found are non-functioning[5, 14]. This difference is probably due to the fact that we only evaluated patients who underwent an adrenalectomy, whereas patients with small, benign looking non-functioning lesions managed conservatively were not included. The common occurrence of functioning tumor in incidentally detected adrenal masses justifies complete metabolic evaluation even in these asymptomatic patients. Cortical adenoma is the most frequent type of adrenal incidentaloma, accounting for approximately 50% cases in surgical series, and even a greater share in medical series[15, 16]. Whereas, the final pathology in our series showed that pheochromocytoma was the most common diagnosis. This may be attributable to the fact that although 7 of these patients were hypertensive they were not worked up for secondary causes of hypertension until the incidental finding of adrenal mass on imaging.

Interestingly final histopathology did not always correlate with preoperative endocrine workup. Of the 11 patients with histological proven pheochromocytoma only 8 had raised VMA. This highlights the fact that urinary VMA levels are highly specific for pheochromocytoma but its sensitivity is lower (95% vs 64%)[17].

A total of 4 patients had suspicion of subclinical Cushing's syndrome based upon an increased level of serum cortisol. One of these patients had adrenocortical carcinoma while another had adrenal hyperplasia. Interestingly 2 of these patients had pheochromocytoma and raised VMA as well. Several cases of pheochromocytoma with subclinical Cushing syndrome have been reported in literature. Concomitant adrenal hyperplasia[18] and ACTH producing pheochromocytoma[19] can explain this finding.

The 2002 NIH and America association of clinical endocrinology (AACE) Consensus Conference suggested that adrenalectomy should be considered in patients with functional adrenal tumors and in those with nonfunctional adrenal incidentalomas 4-6 cm because of risk of malignancy[20, 21]. In our series only 2 patients had adrenocortical carcinoma. Both of these patients had tumor >4cm. One of our patients was found to have Renal Cell Carcinoma. This was basically an 11cm heterogeneous mass involving adrenal on preoperative CT scan.

Conclusion

Based upon our findings we conclude that complete metabolic workup in essential in all patients with incidentally detected adrenal mass. Although malignancy is a valid concern in >4cm adrenal masses, the significant possibility of subclinical functioning adrenal mass should not be ignored.

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