Evaluation of Clinicopathological Features and Management of Adrenal Tumours in a Tertiary Care Hospital

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ABSTRACT

BACKGROUND

Adrenal neoplasms range from asymptomatic cysts to fatal carcinomas. They have a variety of presentations starting from asymptomatic, to features of hypo- or hyper-functioning of the native adrenal hormones or mass effect. The aim of this study was to evaluate the clinicopathological features of adrenal tumours and their management at our tertiary care hospital.

METHODS

In this prospective observational study, 24 patients of adrenal tumours have been studied, out of which 16 patients underwent surgical management and 8 patients were managed conservatively with serial follow up. A detailed clinical evaluation, serological study and imagining was done in all patients to determine different characteristics of lesions, especially to identity the exact size and functional status of adrenal tumours.

RESULTS

In the present study, the peak incidence of adrenal tumours was seen in 4th decade with a mean of 35.62 years. The incidence of adrenal tumours is higher in females than males with a ratio of 2.4:1 and are more frequent on the left side. Asymptomatic cases (incidentalomas) comprised of 54.16%. Hypertension & pain abdomen were the predominant symptoms. 41.66% (10) cases were functional and predominantly these are pheochromocytomas. The mean tumour size in the present study was 4.75 cms with a range of 2.1 - 10 cms. Out of the 24 patients, 16 patients underwent adrenalectomy. Postoperative biopsy showed that 87.50% (14) patients had benign tumours and 12.50% (2) patients had malignant tumours. Mean hospital stay in the postoperative period in open adrenalectomy patients was 8.73 days and 2.5 days for laparoscopic adrenalectomy patients.

CONCLUSIONS

Though adrenal tumours are infrequent, identifying their functional status and size is very important for further management like surgical vs watchful conservative approach. In our study, we observed female sex and left sided predominance with more number of cases in fourth decade of life. Out of the symptomatic patients, hypertension and abdominal pain is predominant as pheochromocytoma was the most common histopathologic variant in our series. Benign tumours outnumbered the malignant tumours. Adenomas were most common incidentalomas.

KEYWORDS

Adrenal Tumours, Incidentalomas, Functional Tumours Pheochromocytoma, Histopathology of Adrenal Tumours

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BACKGROUND

Adrenal neoplasms range from asymptomatic cysts to fatal carcinomas. The majority (75% to 90%) of adrenocortical tumours are benign and unilateral, 10% are bilateral.[1] the most common benign adrenal tumours include pheochromocytoma, adrenocortical adenoma, myelolipoma, and simple cysts. The most common malignant adrenal tumours are adrenocortical carcinoma, neuroblastoma, and metastasis. Prevalence of adrenal tumours is estimated to be 3% in those older than 50 years and 6% in those older than 60. Primary malignancies of the adrenal glands are extremely rare.

Adrenal tumours have varied presentations based on their functionality and due to mass effect. Non-functioning adrenocortical tumours are most common (85%).[2] But most of them are silent (incidentalomas)[3,4,5] Early diagnosis and management of adrenal tumours has undergone a significant change with the advances in biochemical evaluation, diagnostic imaging techniques, advanced surgical methods. Appropriate assessment of an adrenal mass is an essential prerequisite prior to its definitive treatment. Considering the variant pathological views of adrenal tumours and their varying clinical symptoms, this study aims to evaluate the clinicopathological features of adrenal tumours and its management at our tertiary care hospital.

This study was performed to evaluate the distribution and clinical presentation of different types of adrenal tumours, to study their common pathological subtypes, to review the different management options and their outcomes at our tertiary care hospital.

METHODS

This was a prospective observational study of a single institutional study conducted in a tertiary care hospital with an attached medical college at Visakhapatnam, India for a period of 2 years and 4 months. 24 patients of adrenal tumours have been studied, out of which 16 patients underwent surgical management (adrenalectomy) and 8 patients were managed conservatively with serial follow up scans & hormonal evaluations.

All Patients attended to urology, endocrinology OPDs and patients who are referred form other departments who are diagnosed to have adrenal tumour were included in the study.

Institutional ethical committee permission was taken before conducting the study. Written & Informed Consent was taken from all patients before enrolling into study.

An elaborate study of all included patients with regard to the history of onset, duration and progression of various symptoms were documented. Previous history, family history, occupational history, socioeconomic status, demographic data was taken. Complete physical examination was done. A complete evaluation was done in every case.

Routine surgical profile along with serum electrolytes, an ultrasound scan of abdomen and CECT Abdomen scan were done in all cases. All patients were evaluated for functional status of adrenal gland by hormonal evaluation, which included plasma cortisol measurement, 1 mg overnight dexamethasone suppression test (LD-DST); serum aldosterone in cases of patients who are having hypertension with hypokalaemia; serum DHEA & serum testosterone in cases of virilization, plasma metanephrine, 24 hour urinary metanephrine, and vanillylmandelic acid. Specific metastatic work up like liver function tests, alkaline phosphatase & chest x-ray were done. CT chest was advised on the basis of clinical suspicion and chest x-ray findings.

After Complete evaluation, patients were divided into functional and non-functional adrenal tumours. All functional adrenal tumours and non-functional tumours that were more than 6 cm in size were treated by surgery i.e. adrenalectomy. Non-functional tumours with size less than 4 cm were kept under follow up with serial imaging at every 6 months with an ultrasound scan of the abdomen and hormonal evaluation. Upon serial follow-ups, if any tumour grows by more than 1 cm or if it turns in to metabolically active or functional on hormonal evaluation, such tumours would be treated by adrenalectomy. If the lesion remains stable, serial ultrasound imaging and follow up hormonal evaluation were obtained at every 6 months.

Non-functional tumours with sizes between 4 to 6 cm were treated based upon CECT scan characteristics i.e., if CT scan shows features suspicious of malignancy it was treated by adrenalectomy. If CT scan clearly shows features of benign nature of the tumour it would be kept under serial follow up protocol with ultrasound scan and hormonal evaluation once in every 6 months.

All the patients were admitted one week before surgery in hospital to monitor blood pressure, blood sugar and for stabilization. In case of pheochromocytoma, Blood pressure was controlled with alpha-blockers drugs such as oral prazosin 5 mg to 10 mg and dose was titrated according to patients' blood pressure. Beta-blocker drugs such as propranolol were also added when required. Glycaemic control was achieved with regular insulin. Insulin and blood sugar chart were maintained. Good preoperative, as well as postoperative hydration, was maintained.

Once the surgical management (adrenalectomy) is planned, the surgical approach consists of either open or laparoscopic adrenalectomy. Open adrenalectomy is performed via either a flank approach, transcostal 11th rib approach, or by a thoracoabdominal approach from 8th inter costal space. (who are managed post operatively with under water ICD tube). Laparoscopic adrenalectomy is performed transperitoneally in lateral position.

All surgeries were done under general anaesthesia. In all pheochromocytoma patients, intraoperative blood pressure fluctuations were managed with sodium nitroprusside and /or nitroglycerin. All the excised adrenal gland tumours were sent to histopathological examination and post-operative HPE reports were analysed.

Functional adrenal tumours were followed up with hormonal evaluation after 2 weeks from the date of surgery. All pheochromocytoma patients advised hormonal evaluation annually after surgery. All non-functioning adrenalectomy patients were followed with USG scan and hormonal evaluation once in every 6 months. All patients were followed till the end of study period and conclusions made accordingly.

Statistical Analysis

Data obtained was entered in Microsoft Office Excel worksheet 2016. Descriptive statistical analysis has been carried out. Quantitative variables were expressed as mean & range, whereas qualitative data were presented as the number of observations with percentages.

RESULTS

A total 24 patients of adrenal tumours were included in the study, the data of which evaluated prospectively over a period of twenty-seven months i.e. from October 2016 to January 2019. Out of the 24 patients, 16 patients underwent surgical management and 8 patients were managed conservatively with serial follow up scans & hormonal evaluations.

Age distribution, gender distribution, side of the lesion, clinical features, hormonal status, size of the tumour, post-operative histopathology, type of surgery performed, mean hospital stay during postoperative period were studied.

Age Distribution	No.	Present Study (%)
10-20	2	08.33
21-30	7	29.16
31-40	8	33.33
41-50	2	08.33
51-60	5	20.83
Total	24	

Table 1. Age Distribution of the Study Population

In the present study, the peak incidence of adrenal tumours was seen in 4th decade consisting of 33.33% (8) patients, followed by the 3rd decade consisting of 29.16% (7) patients. The mean age at presentation was 35.62 years and the range was 13 - 60 yrs.

Character	Variable	No.	%
Sex	Male	7	29.16
	Female	17	70.83
Side	Right	11	45.83
	Left	13	54.16
Symptoms	Asymptomatic	13	54.16
	Symptomatic	11	45.83
Functional status	Non functioning	14	58.33
	Functioning lesions	10	41.66
Size	<4 cm	10	41.66
	4-6 cm	7	29.16
	>6 cm	7	29.16
Surgical approach	Open	14	87.50
	Laparoscopic	2	12.50
Mean hospital stay	Open	8.73	
	Laparoscopic	2.50	

Table 2. Different Variables in This Study

Out of 24 patients studied of 70.83% patients (17) were females and 29.16% (7) patients were males. The incidence of adrenal tumours is higher in females than males with a ratio of 2.4:1. The average age of male-patients was 43.28 years and the average age of female patients was 33.05 years. The proportion of female patients were more in the younger age group in the present study.

Adrenal tumours in the present study were more frequently found on the left side than on the right side, with a ratio of 1.18:1. Thirteen (54.16%) patients had left sided adrenal tumours and eleven (45.83%) patients had right sided adrenal tumours.

Out of the 24 cases studied 13 cases were asymptomatic adrenal tumours, came to attention because of imaging for non-adrenal causes i.e. incidentalomas. Such cases comprise 54.16% and the remaining 45.83% patients (11) were symptomatic. Hypertension & pain abdomen were the predominant symptoms, followed by headache; symptoms of Cushing's syndrome in one patient, and weight loss in two patients.

Out of the total 24 cases studied 41.66% (10) cases were metabolically active i.e. functional. Out of which 8 cases were of pheochromocytomas secreting catecholamines, 1 case was aldosterone-secreting tumour and 1 case was of cortisol-secreting type. Remaining 58.33% (14) cases were metabolically silent i.e. non-functional adrenal tumours. Out of the 24 adrenal tumours studied, 41.66% (10) tumours were of size less than 4 cm, 29.16% (7) tumours were of 4 to 6 cm and 29.16% (7) were of size more than 6 cms. The mean tumour size in the present study was 4.75 cms with a range between 2.1 to 10 cm. Out of the total 24 cases studied 66.66% (16) cases were treated surgically with adrenalectomy and remaining 33.33% (8) cases were managed non surgically, with serial follow up with imaging & hormonal evaluation at every 6 months. Out of the 16 cases treated surgically, 87.50% (14) adrenalectomies were done by the open approach and 12.50% (2) adrenalectomies were by laparoscopic approach. Out of the 14 open adrenalectomies done, 71.42% (10) were done by flank approach via 11th transcostal approach and 28.57% (4) cases were done by thoracoabdominal approach via 8th intercostal space.

Out of the 16 patients who underwent adrenalectomy, postoperative biopsy showed that 87.50% (14) patients had benign tumours and 12.50% (2) patients had malignant tumours, both were adrenocortical carcinomas. Out of 8 cases which were not operated, all were benign and consists of adrenal adenomas.

Out of the 24 adrenal tumours studied, 10 tumours were of size less than 4 cm, of which 8 were adenomas, 2 were Pheochromocytomas. Out of 7 tumours of 4 to 6 cm size range, 3 were adenomas, 3 were Pheochromocytomas, 1 was paraganglioma. Among more than 6 cms sized tumours, 3 were Pheochromocytomas, 2 were Adrenocortical carcinomas, 1 each of ganglioneuroma & schwannoma. (Figure 1) (Table 3)

Type of Tumour	No.	Total	%
Benign			
Adrenal adenoma	3	14	87.50
Pheochromocytoma	8		
Ganglioneuroma	1		
Paraganglioma	1		
schwannoma	1		
Malignant			
Adrenal cortical carcinoma	2	2	12.50

Table 3. Histopathology of Adrenal Tumours

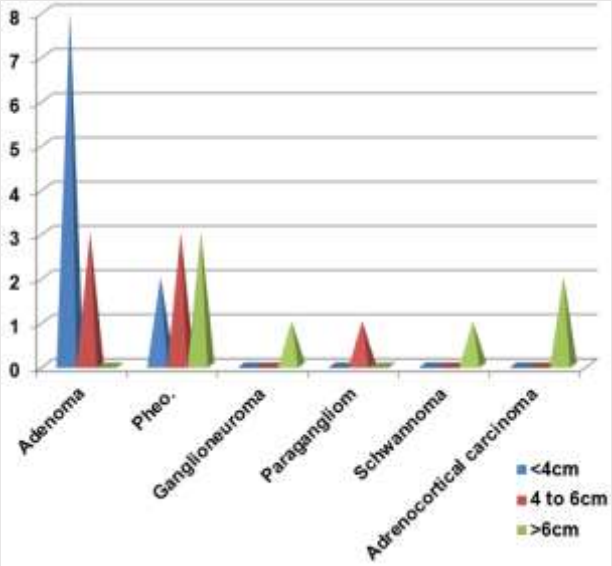

Figure 1. Size and Types of Adrenal Tumours

Out of 24 patients included in the study, 13 patients were asymptomatic (incidentalomas) and 11 patients were symptomatic. Among the Symptomatic patients, 6 patients had pheochromocytoma, 2 patients had a carcinoma, and adenoma, schwannoma, paraganglioma, an adrenal cyst was seen 1 patient each. Amongst incidentalomas 9 cases were adenomas, 2 pheochromocytomas and 1 case each of ganglioneuroma and adrenal cyst.

Mean hospital stay in the postoperative period in open adrenalectomy patients was 8.73 days and 2.5 days for laparoscopic adrenalectomy patients. In the case of open adrenalectomy cases, mean hospital stay in postoperative period for a flank approach was 7.72 days and for thoracoabdominal cases, it was 9.75 days.

DISCUSSION

The present prospective study was undertaken to study the distribution and clinical presentation of different types of adrenal tumours, to study the common pathological subtypes and to study the different management options of adrenal tumours in a tertiary care center.

The mean age of the patients is 36 years and ranges from 13 years to 60 years in the present study of 24 cases. 33% of patients were in their fourth decade and most of the (92%) were adults. These observations were similar to Rashmi D. Patel[6]. Shokouh Taghipour Zahir,[7] Khanna et al [8] studies. The incidence of adrenal tumours is higher in females (70%) with female male ratio of 2.4: 1. Females patients found to present at a younger age group than males. Majority of the similar studies[9,10,11] have similar female preponderance in the present study, adrenal tumours were more frequently seen on the left side (54%). There were no cases of bilateral adrenal tumours in the present study.

The pattern of Clinical signs and symptoms of adrenal tumours are varied in the present study, with 54% (13) of patients were symptomatic, hypertension, abdominal pain and headache are more common. In Khanna S et al[8] study the abdominal pain was the most common symptom (57.14%); anorexia and weight loss were the second most common presentation (28.57%), which were also comparable to the study by McGrath et al.[12] Comparison between benign and malignant lesions showed that patients with benign lesions were significantly more likely to experience paroxysmal hypertension, followed by excessive sweating, headache and palpitation, but patients with malignant lesions had an abdominal pain followed by abdominal mass, loss of appetite, weight loss and prolonged fever.[13,14]

In our study 58% of patients were having non-functional adrenal lesions while rest 42% were metabolically active, out of which pheochromocytoma was predominant (80%). Rashmi et al showed 55% and Fazal et al[9] showed 67% of their study population were metabolically active. Whereas Khanna S et al[8] study differs in that only 15% of their patients had functional tumours. Out of the two cases of adrenocortical carcinoma one is metabolically active with cortisol production. There were no cases of androgen or oestrogen secreting tumours reported in the present study. In the present study of 24 cases, the mean tumour size was 4.75 cm with a range between 2.1 to 10 cm. A 2.1 cms sized tumour was adenoma and 10 cm tumour was schwannoma. But mean sizes of other studies were little bit higher in other studies.[8,9] Out of the 24 adrenal tumours studied in the present study, 42%(10) tumours were of size less than 4 cm, 29% (7) tumours were between 4 to 6 cm and 29% (7) were of size more than 6 cms. The two cases of adreno cortical carcinomas were more than 4 cm, which is the cut of for suspecting malignancy. In the present study of the 24 patients, 16 patients underwent adrenalectomy, so 16 histopathological reports were analysed and shown to have 87.5% of (14) benign adrenal tumours and 12.5% of (2) malignant adrenal tumours.

Out of the 8 cases which were not operated, all of them were shown to be adenomas on CECT scan and CT washout studies. Of the 14 benign tumours, most of the tumours are Pheochromocytomas seen in 8 patients, followed by adenomas which are seen in 3 patients. The spectrum of benign tumours in the present study correlates with the studies.[6,7,9,10]

The incidentalomas in our study accounted for 54% a bit high incidence may be due the widespread availability of imaging and ours being a referral centre from surrounding districts like Song et al.[1516,17]

Mean hospital stay in the postoperative period in open adrenalectomy patients is 8.73 days and 2.5 days for laparoscopic adrenalectomy patients. All studies prove that

the admission rates for laparoscopic approach were less than open surgical approach.[18,19]

CONCLUSIONS

The highest number of adrenal tumours was noted in the fourth decade of life followed by the third decade. Most of the patients in the present study were adults. The mean age of the patients is 36 years. Adrenal tumours are more commonly seen in females. Asymptomatic patients were more in number than symptomatic patients in the present study with abdominal pain and hypertension being the most common symptoms. Metabolically silent tumours were more common than functional tumours. The mean tumour size was 4.75 cms. Benign tumours outnumbered malignant tumours. Pheochromocytoma is most common followed by adenomas. Among malignant tumours, all were adrenocortical carcinomas. Majority of cases were treated with adrenalectomy. All incidentalomas were benign tumours with adenoma being more common and the two were functional i.e. pheochromocytomas.

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