A COMPARATIVE STUDY OF PREOPERATIVE DIAGNOSIS AND PATHOLOGICAL DIAGNOSIS IN ADRENAL SWELLINGS

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ABSTRACT

BACKGROUND

The adrenal gland neoplasms include primary and metastatic malignant tumours. They can be functional or non-functional and also detected as incidentaloma lesions. Advanced imaging often reveals adrenal tumours and tumour-like conditions in both symptomatic and asymptomatic patients. Even with the functional study and advanced imaging, preoperative diagnosis is always challenging.

MATERIALS AND METHODS

A retrospective study of adrenal tumours performed during July 2014-April 2016 was done. Total 7 cases were included. Case records and histopathology reports were reviewed to collect data.

RESULTS

Majority were females (85%) with mean age of 50 years. 71% patients presented symptomatically and incidentaloma was noticed in 29%. Functional tumours were found in 71%. 42% discrepancy were noted between the radiological and final histopathological findings. 28% noted in benign lesions and 14% in malignant conditions.

CONCLUSION

In the current era, even though imaging can aid in diagnosis, histopathology still remains as gold standard investigation in adrenal tumours.

KEYWORDS

Adrenal Tumour, Pheochromocytoma, Histopathology, Radiology.

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BACKGROUND

The adrenal glands description and its physiology were described 500 years ago. In 1850, Thomas Addison[1] and Charles Brown-Sequard[2] proved the mineral and cortical function and described the adrenal disorder and its surgical management. Adrenal tumours can be benign and malignant lesions. These tumours can be either functional or non-functional. Malignant lesions can be primary or extra adrenal. Adrenal incidentaloma incidence is rising due to increased use of imaging modality in current era. Adrenal tumours can be asymptomatic or symptomatic in the form of tumour related or functional. These tumours are removed surgically in view of risk of malignancy and hormonal disturbances.[3] Even with the functional study and advanced imaging, preoperative diagnosis is always challenging and histopathology remains the gold standard for diagnostic confirmation. We present a retrospective analysis of adrenal tumours treated in past 2 years in our unit.

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MATERIALS AND METHODS

Total 7 adrenalectomies were done in our unit between July 2014 and April 2016. These cases were studied for clinical presentation and correlation with radiological and pathological investigation. Baseline hormonal assessment was evaluated by serum potassium, serum cortisol, serum DHEA, serum aldosterone, urinary 24 hrs. metanephrine and VMA levels. All cases evaluated with contrast-enhanced CT imaging. Postoperative adrenal specimens were analysed histopathologically by gross pathology, light microscopy and IHC evaluation.

RESULTS

Out of 7 specimens, 6 were females (85%) with mean age of 50 years. Majority of patients had symptoms (71%) and incidentaloma were found in 29%. All symptomatic patients

were functionally active (71%). Most common lesions were adrenal cortical adenoma (42.8%), pheochromocytoma (29%), adrenal metastasis (14.3%) and adrenal pseudocyst (14.3%).

Pathological Evaluation

Adrenal Cortical Adenoma

These patients (42.8%) with a mean age of 43 years were diagnosed as adrenal cortical adenoma. 2 out of 3 patients were females and both were functionally active. These patients were both hypertensive and adrenal mass was detected on evaluation. Both patients had raised S. aldosterone and diagnosed as Conn's syndrome preoperatively. The other patient was a 40-year-old male with a known case of RCC and on evaluation was detected with an adrenal mass incidentally on contralateral gland. He was asymptomatic and functionally stable. Preoperative diagnosis of metastasis from RCC was made based on imaging. Final diagnosis on histopathology was confirmed as cortical adenoma.

The specimens had a mean weight of 15 ± 4 gm and mean size of 5.5 ± 1.5 cm. Cross section showed circumcised encapsulated area of golden yellow colour. Histologically, cut section showed encapsulated neoplasm-containing cells in nests and sheets with distinct borders, clear vacuolated or granular oeosinophilic cytoplasm, pleomorphic vesicular nucleus with fine chromatin (Figure 1). No capsular or vascular invasion; Calretinin, CK AE1, AE2 were positive.

Pheochromocytoma

Two patients (29%) were diagnosed as pheochromocytoma with mean age of 40.5 years and both were females and functionally active. Patients had uncontrolled hypertension on three antihypertensive drugs and were having palpitation. Both lesions identified as part of hypertensive evaluation.

The tumours were soft to firm nodular mass with mean weight of 160 ± 70 gm and size 8.5 ± 2.5 cm. Cross section revealed solid and cystic areas with yellowish to brownish area with specks of haemorrhage. Microscopic evaluation demonstrated neoplasm composed of cells in zellballen pattern with pleomorphic cells containing moderate to abundant granular oeosinophilic cytoplasm, nucleus with coarse chromatin and nucleoli (Figure 2A). Proliferation of thin-walled vessels noted. Cystic areas showed fibrocollagenous wall with no epithelial lining. Immunohistochemical analysis revealed cells, which showed chromogranin and NSE (Figure 2B), S100 positivity (Figure 2B).

Adrenal Metastasis

A 75-year-old female presented with abdominal pain. On evaluation, an adrenal mass was identified and lytic lesion on vertebra in CT abdomen suggestive of adrenocortical carcinoma with bone metastasis. Further evaluation with CT-guided biopsy proved as metastatic adenocarcinoma. Detailed physical examination and investigation finalised with the diagnosis of bronchial carcinoma.

The tumour was of size 6 x 2.5 x 4 cm. Cross section showed grey white lobulated area. Microscopically, neoplasm composed of cells in glandular nests and papillary pattern. Cell contained abundant oeosinophilic cytoplasm, pleomorphic vesicular nucleus with coarse chromatin and prominent nucleoli (Figure 3); dense lymphoplasmacytic infiltration seen with fibrous septa in between. Neoplasm was infiltrating the capsule and extending into the surrounding adipose tissue.

Adrenal Pseudocyst

A 67-year-old female with complaints of right-sided upper abdomen mass with no comorbidities; on evaluation, identified functional right adrenal tumour with raised urinary cortisol 175 micrograms/24 hrs. CT findings showed heterogeneous mass with multiple calcific specks, irregular enhancement suggestive of adrenal cortical carcinoma. On gross examination, external surface was nodular cystic tense mass weighing 1850 gm measuring 16 x 15 x 12 cm. Cross section showed well encapsulated lesion filled with brownish friable material and yellowish and cystic areas. A rim of adrenal tissue was present at the periphery.

Microscopically, it showed a cyst with wall composed of fibrocollagenous tissue, mild lymphocytic infiltration and compressed adrenal tissue with lumen containing haemorrhage and thrombus.

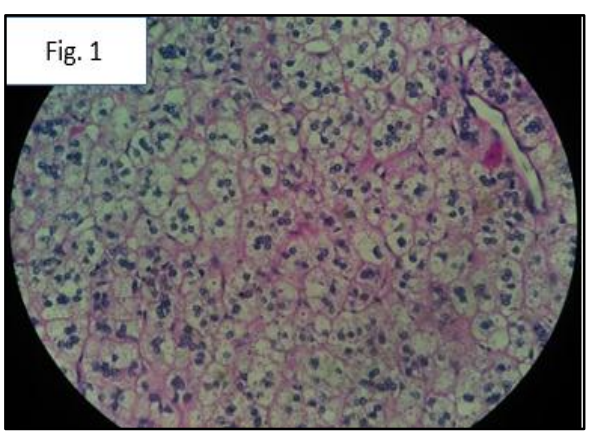

Figure 1. Adrenal Adenoma Composed of Cells Arranged in Sheets and Nest. Individual Cells have Distinct Cell Borders Abundant Vacuolated to Clear Cytoplasm, Mild Pleomorphic Nuclei with Clumped Chromatin and No Capsular or Vascular Invasion

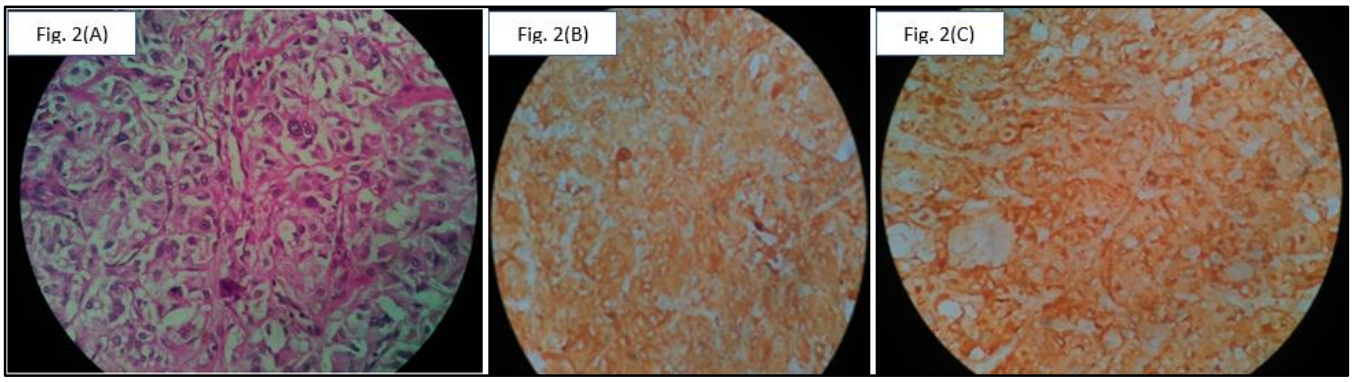

Figure 2. (a). Adrenal Cyst Wall Shows a Neoplasm Composed of Cells Arranged in Nests (Zellballen Pattern). Individual Cells have Moderate Cytoplasm, Pleomorphic Vesicular Nucleus, Coarse Chromatin and Nucleoli. (b). NSE Positivity. (c) Chromogranin Positivity

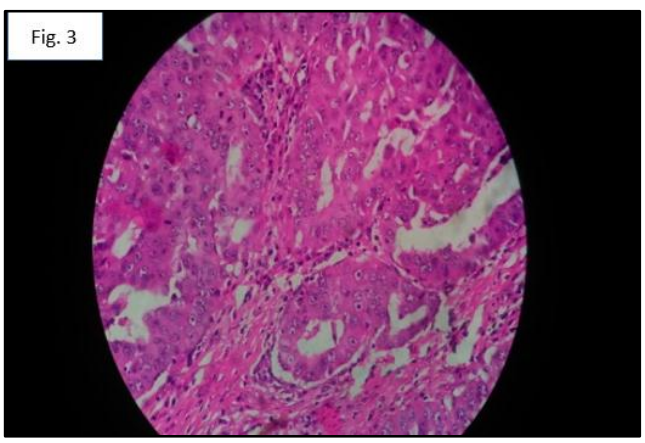

Figure 3. Section from Adrenal shows an Infiltrating Neoplasm Composed of Cells Arranged in Papillary and Glandular Pattern. Individual Cells are Columnar with Moderate Oeosinophilic Cytoplasm, Pleomorphic Nucleus, Coarse Clumped Chromatin and Nucleoli

DISCUSSION

Incidence of adrenal gland tumours is approximately 5%.[4] Tumours arising from adrenal cortex are adrenal adenoma, carcinoma and tumours of adrenal medulla are pheochromocytoma, neuroblastoma, ganglioneuroblastoma and ganglioneuroma. Rare tumours consist of myolipoma, adrenal cyst, adenomatoid tumour, mesenchymal tumours, sarcoma, malignant lymphoma and melanoma. The incidence of adrenal incidentaloma is about 20%.[5,6,7] Symptoms depend on functional status and the hormone overproduced. A multidisciplinary approach is needed for evaluation of adrenal gland tumours. It consists of biochemical, functional and imaging evaluation in the preoperative period. However, histopathological analysis still remains the gold standard for investigation. Preoperative diagnosis has always been a challenge for the treating physician and most of the times histopathology diagnosis comes as a surprise.

The average age of person with adrenal gland tumour is between 45 and 50 yrs.; however, these tumours can occur at any age. Women are more prone to be diagnosed with adrenal tumours versus men. In our study, mean age was 50 years with higher incidence in females (85%). 71% patients presented symptomatically and incidentaloma was noticed in 29%. Functional tumours were found in 71%.

Adrenal cortical adenoma (42.8%) accounts for the most common tumours followed by pheochromocytoma (29%), adrenal metastasis (14.3%) and adrenal pseudocyst (14.3%).

Adrenal adenoma accounts for more than 10% of incidentaloma. Approximately, 7% adenoma exhibit metabolic hyperactivity. All cases in our study were incidental findings and two cases were hypertensive and diagnosed as Conn's syndrome with raised aldosterone levels. Preoperative imaging findings were suggestive of adenoma with (-20 to -30 HU) on CECT abdomen and signal drop out on out of phase MR imaging. In final case, a preoperative diagnosis of adrenal metastasis was made in view of history of contralateral RCC and CT imaging showing enhancing lesion and metabolic activity on FDG PET scan.

Pheochromocytoma is seen in 5% of incidental mass. Most common age is fourth to sixth decades of life.[8] In our study, both patients were females with mean age of 40 yrs., evaluated for hypertension and had raised catecholamines. Most common symptoms were headache followed by palpitation and sweating. On imaging, well-defined heterogeneous enhancing lesion with mean size of 6.5 cm was identified with no signal drop out and no evidence of calcification or invasion. No discrepancy observed in pre and postoperative diagnosis.

The adrenal glands are a common site of metastases. It is suspected when patients with a history of malignancy are found to have adrenal incidentaloma.

Renal cell carcinoma, breast cancer, medullary thyroid carcinoma, contralateral adrenocortical carcinoma, gastrointestinal malignancies, prostate adenocarcinoma, cervical cancer, basal cell, pancreatic tumours, cholangiocarcinoma, urothelial carcinoma, squamous cell carcinoma, seminoma, thymoma, chronic myelogenous leukaemia and other malignancies can all exhibit metastatic deposits within the adrenals.[9] Bilateral and bulky disease (>4 cm) is necessary to produce biochemical evidence of adrenal insufficiency. Our patient was a 75-year-old female with preoperative diagnosis of adrenocortical carcinoma with bone metastasis on imaging underwent CT-guided biopsy, which showed of adenocarcinoma metastasis.

Histopathologically, diagnosis was confirmed as a 6 x 4 cm mass probably metastasised from adenocarcinoma. Initial imaging diagnosis was made in view of enhancing lesion with vertebral metastasis and later confirmed as adrenal metastasis.

Adrenal cyst account for 1% to 22% of incidentally detected adrenal lesions.[10] An increased incidence of adrenal cysts has been noted in women with a peak incidence between the third and sixth decades of life.[11] Pseudocysts and endothelial adrenal cysts are the most common types. 7% of the lesions were associated with malignancy. It is difficult to distinguish a benign adrenal cyst from cystic adrenal neoplasms. Cystic adrenal neoplasms tend to be larger (>7 cm) and have thicker walls. In our study, it was a 67-year-old female incidentally identified functional adrenal mass with preop diagnosis of adrenocortical carcinoma with heterogeneous lesion with calcific specks on imaging came out to be as pseudocyst of size 16 x 15 cm on histology. Adrenal cysts that are heterogeneous, large, thick-walled or symptomatic warrant further evaluation and surgical excision in risk of malignancy.

CONCLUSION

We identified that even in the current era of advanced imaging technique, there exist discrepancy (42%) between the radiological and final histopathological findings. 28% noted in benign lesions and 14% in malignant conditions. No discrepancy was noted in pheochromocytoma cases. Even though, imaging can aid in diagnosis, histopathology still remains as gold standard investigation in adrenal tumours.

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