Adrenal Disorders, Surgical Approaches and Postoperative complications

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Summary:

Backgraound: *Adrenal disorders in surgical practice are presented either as hyperfunctional disorders or non functional disorders (incidentalomas). Functionally, medullary tumors (pheochromocytoma) result in excess secretion of catecholamines(l), on the other hand, functioning adrenocortical tumors could secrete excess of cortisol (Cushing syndrome), aldosterone (Conn's syndrome) or sex hormones (virilizing syndromes). (2*
The aim of our study is to identify and to show our experience in the surgical approach and postoperative complications of adrenal disorders.
Patients & methods: *This is a prospective study of 20 cases diagnosed as having adrenal disorders, admitted and evaluated in Baghdad Teaching Hospital-Medical City from January 2002 to December 2004. The data collected including age, gender, types of clinical adrenal disorders, surgical approaches and postoperative complications.*
Result: *Surgical excision was performed in 19 cases, eleven through anterior transabdominal approach (11/20, 55%), and eight through thoracoabdominal approach (8/20, 40%). A better outcome was recorded in the thoracoabdominal approach. The most common encountered surgical morbidity was hypertension (3/19, 15.8%) and hypocalcemia (3/19, 15.8%).*
Conclusion: *Thoracoabdominal approach has better outcome especially in excising right adrenal tumor but transabdominal approach is preferable in excising a bilateral adrenal gland.*
Keywards: *Adrenal Disorders, Surgical approach, Postoperative complications*

Introduction:

Historically, in 1552, the Roman anatomist Barthoomaeas Eustachius first described the adrenal glands referring to there as "glandular renibus incumbetes" (glands lying on the kidneys) (1).

Adrenal disorders in surgical practice are presented either as hyperfunctional disorders or non functional disorders (incidentalomas). Functionally, medullary tumors (pheochromocytoma) result in excess secretion of catecholamines(3), on the other hand, functioning adrenocortical tumors could secrete excess of cortisol (Cushing syndrome), aldosterone (Conn's syndrome) or sex hormones (virilizing syndromes).'4) The management of adrenal disorders includes multiple steps. First step is by history and physical examination which should lead to the suspicion of an adrenal disorder (5, 6). The second step is by laboratory tests to diagnose functional tumor. [7] Localization studies is the 3`d step in the management. The initial localizing procedure of choice is a contrast enhanced CT scan because it can detect virtually all adrenal masses that are large enough to cause a syndrome [3]. MRI adds more accuracy to the localization procedure and even small lesions can be accurately identified. [8]

Step four; all patients are prepared preoperatively to correct their blood pressure, D.M., hypovolemia, electrolyte imbalance, and alkalosis if any is present.

The three procedures used most frequently for adrenalectomy are the anterior transabdominal approach, the posterior flank approach and the combined thoracoabdominal approach.[9] Another approach which has been evolved recently is the laparoscopic adrenalectomy.[10,11] This technique is regarded as the most recent development in the field of adrenal surgery, it is used for small benign adrenal disorders and has been reported to be better tolerated by the patients owing to less postoperative pain, reduced time by return of bowel function, decreased length of hospital stay and the potential for earlier return to work as compared to the open approach. Contraindication to laparoscopic adrenalectomy includes definite or presumed invasive adrenal tumor and technically difficult procedure (large tumor) (11, 12, 13)

Patients and methods

This is a prospective study of 20 patients

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who were diagnosed to have adrenal disorders, admitted and treated at the surgical ward in the Baghdad Teaching Hospital-Medical City during the period from January 2002 to December 2004. Data were collected regarding the association between adrenal disorders and certain varieties namely, age (patients were grouped in 10 years cohort), sex, types of surgical approaches, intraoperative and postoperative complications. These data were analyzed and the results shown in the form of tables.

Results

In this prospective study of a consecutive of 20 cases with variable adrenal disorders, table (1) shows the distribution of patients according to their age and sex. The most affected age group was (30-39 years) (9/20, 45%). The mean age was 40 years old, and there was a female preponderance with -~: d' ratio of 2:1. The mean age for Cushing patients was 35 years and that of pheochromocytoma patients was 40 years.

In respect to the clinical types of adrenal disorders, table (2) shows that hypercortisonism in the form of Cushing disease and Cushing syndrome was found in (8/20, 40%) of patients, pheochromocytoma was manifested in 6 patients (6/20, 30%), one patient (1/20, 5%) had presented with a virilizing tumor and 5 patients (5/20, 25%) were incidentally diagnosed as having an adrenal mass.

Considering the treatment of our patients, table (3) shows that 19 of them were submitted to surgical treatment, the twentieth one didn't attend his appointment for surgery. The thoracoabdominal approach was used to excise the unilateral right sided adrenal pathologies (8/20, 40%), while the anterior transabdominal approach was used to resect the left sided pathologies (6/20, 30%). Also the transabdominal approach was used to perform bilateral adrenalectomy in the 4 patients with bilateral adrenal hyperplasia due to Cushing disease (4/20, 20%). Furthermore, the anterior transabdominal approach was employed to excise bilateral pheochromocytoma (1/20, 5%). Table (4) established a comparison between the anterior transabdominal and the posterior lateral thoracoabdominal approach used for adrenalectomy in our patients and it shows that the median operative time was (120 min) in the transabdominal approach and (90 min) in the thoracoabdominal approach. Median blood loss was (1000cc) in the transabdominal approach and (500cc) in the thoracoabdominal approach. Intraoperative hypertension was recorded in (2/11, 18%) of patients approached transabdominally and in (1/8, 12.5%) of patients approached thoracoabdominally. Concerning ambulation and restoration of bowel function, they were earlier in the thoracoabdominal approach.. The median hospital stay was 14 days in the transabdominal approach and 7 days in the thoracoabdominal approach.

Regarding the surgical morbidity, table (6) elucidate that intraoperative complications in the form of hypertension, bleeding were found in (3/19, 15.81%) and (1/19, 5.3%) of patients respectively. Postoperative complications were in the form of hypocalcemia in (3/19, 15.8%), chest infection in (2/19, 10.5%), Nilson's syndrome (skin hyperpigmentation and pituitary enlargement) in (1/19, 5.3%) and incisional hernia following wound infection in one patient (1/19, 5.3%).

Tables:

Table (1): Distribution of patients according to age and sex.

Age groups (years)	Males	Females	Total	
			No.	
1-9	1	1	2	10%
10-19	1	1	2	10%
20-29	1	1	2	10%
30-39	1	8	9	45%
40-49	1	2	3	15%
50-59	0	1	1	5%
60-69	1	0	1	5%
Total	7	14	20	100%

Table (2): clinical types of adrenal disorders.

Type	No.	
Cushing disease		20%
Cushing syndrome		20%
Pheochromocytoma	6	30%
Virilizing syndrome		5%
Incidentoma		25%
Total	20	100%

Table (3): Types of surgical approaches for adrenalectomy.

Approach	No.	
Anterior transabdominal	11	55%
Thoracoabdominal	8	40%
Total	19	99%

Table (4): Surgical morbidity.

Complication	No.	
Intraoperative hypertension	**3/19**	**15.8%**
Intraoperative bleeding	**1/19**	**5.3%**
Hypocalcemia	**3/19**	**15.8%**
Chest infection	**2/19**	**10.3%**
Nilson's syndrome	**1/19**	**5.3%**
Wound complication and incisional hernia	**1/19**	**5.3%**

Table (5): Comparison between anterior transabdominal and thoracoabdominal approaches for adrenalectomy.

Outcome	Anterior transabdominal	Throacoabdominal
Median operative time	**120 min**	**90 min**
Median blood loss	**1000 cc**	**500 cc**
Intraoperative hypertension	**18%**	**12%**
Ambulation and resumption of intestinal function	**Late**	**Early**
Respiratory complication	**None**	**Two patient**
Hospital stay	**10 days**	**7 days**
Incisional hernia	**One patient**	**None**

Discussion

In this prospective review and analysis of the data that were taken from 20 patients with adrenal disorders, we found that the mean age was 40 years and there was a 2:1 female preponderance; this result concedes with that of: Suresh KN [(11):] who found a 0 ratio of 2.3:1 and the mean age of 38.6 years.

Considering the clinical types of adrenal disorders, hypercortisonism was found in (8/20, 40%) next to it was pheochromocytoma in (6/20, 30%), incidentaloma was found in (5/20, 20%) and virilizing syndrome in (1/20, 5%). This result_concedes with that of: Suresh KN et al [(11):] who found that in descending order of frequency, Cushing disease and syndrome, pheochromocytoma, incidentaloma, and virilizing tumor are the most common presenting clinical syndromes of adrenal disorders. Considering the outcome of the two used surgical approaches in our study, the median operative time was (60min) less in the thoracoabdominal approach. Median blood loss was more in the transabdominal approach (1000cc) versus (500cc) in thoracoabdominal approach. Earlier ambulation and resumption of intestinal function were recorded in thoracoabdominal approach together with shorter hospital stay. These results are in accordance with that of: Suresh KN et al (11); who found that thoracoabdominal adrenalectomy had a shorter operative time because of its direct and easy access to the adrenal gland, lower blood loss, less intraoperative and postoperative complications, earlier ambulation, lower incidence of paralytic ileus and shorter hospital stay. Regarding the morbidities recorded in our study, they were divided into intraoperative and postoperative complications.

The most common encountered intraoperative complication was hypertension in (3/19, 15.8%) who had pheochromocytoma. This result is close to that of: Bjorn Edwin et al (12) who reported that intraoperative hypertension is the most common intraoperative complication and it occurred in 20% of cases. Intraoperative bleeding was encountered in (1/19, 5.3%) of cases. The bleeding was from a small tear in the inferior vena cava at site of insertion of the right adrenal vein. It was sutured with 4/0 prolene and the bleeding was effectively controlled. This result concedes with that of: Suresh KN et al [(11)] who conducted introoperative bleeding in 7% of his patients mainly from injury to the adrenal vein or inferior vena cava. What has facilitated the control of bleeding is the wide exposure through the right thoracoabdominal incision which allowed a better exploration of the area of the adrenal gland and the surrounding structures, thus a better access to the bleeding point and eventually a better opportunity of controlling the bleeder. Hypocalcemia with its clinical features of circumoral and fingertips numbness, positive Chvostek's sign and positive Trousseau's sign was manifested in three patients, all of them were Cushings. This may be attributed to the fact that hypercortisonism state causes a negative calcium balance resulting in mobilization of calcium from the bone to the circulation causing osteoporosis. [(14)] The hypocalcemic state was transient and treated with calcium supplementation.

Nilson's syndrome "skin hyperpigmentation and pituitary enlargement" had occurred in one Cushing patient after bilateral adrenalectomy (1/4, 25%). The patient was referred to the

radiotherapist, because of the unavailability of selective pituitary microsurgery.

This concedes with: Harrison BJ(14): who found that Nilson's syndrome occur in 20% of cases after bilateral adrenalectomy and this can be avoided by patient selective microsurgery. Montgomery DAD(15) and Orth DN (16): who advised pituitary irradiation in case of unavailability of pituitary selective microsurgery.

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