

Transabdominal Approach to the Adrenal Glands

With Special Reference to Pheochromocytoma *

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Introduction

ADEQUATE surgical exposure of the adrenal glands may be satisfactorily obtained by the use of a conventional loin approach or by transabdominal means. Desirability of the former has been expressed by some authors.^{8, 9} For the surgery of pheochromocytoma and more recently for the single stage bilateral adrenalectomy in Cushing's disease, aldosteronism, and severe malignant hypertension use of the abdominal approach seems more rational. The extirpation of the undiseased adrenal gland combined with oophorectomy for control of metastatic carcinoma of the breast has been facilitated by this approach.¹

The diagnosis of pheochromocytoma is not always a simple matter. Once the diagnosis is established, there arises the more perplexing problem of determining the location of the lesion. Although current radiographic technics such as planography³ may allow for the preoperative localization of the tumor, the results are often equivocal especially if the tumor is small. The delineation of adrenal tumors by the contrast technic of perirenal air or oxygen insufflation has lost some of its popularity⁷ because of the associated mortality and morbidity and the incidence of diagnostic error. The obvious advantage of laparotomy in instances where the site of the lesion is

in doubt needs no comment. Two factors which lend additional support to the wisdom of this approach in operations for pheochromocytoma are the occurrence of bilateral tumors and lesions of the extra-adrenal chromaffin system. Each of these variations occurred in about 10 per cent of 207 cases reported by Graham.⁵ Finally, laparotomy allows for the discovery of metastases which provides the only means of establishing the rare diagnosis of malignancy in pheochromocytoma since the usual histologic criteria for this diagnosis are found in most of the tumors that are considered benign.

Technic

Except for minor variations the procedure of transabdominal adrenalectomy is standard.^{1, 2, 6} The peritoneal cavity is entered through an upper abdominal transverse incision. When necessary a paramedian extension will facilitate the exposure of the occasional high lying lesion (Fig. 1). Figure 2 illustrates the normal anatomic relationships of the adrenal glands showing the anterior position of the adrenal veins.

To expose the right adrenal, the hepatic flexure of the colon is retracted inferiorly and the duodenum is mobilized and reflected medially after incising the peritoneum parallel to the descending duodenum up to the posterior inferior surface of the liver as illustrated in Figure 3. This allows for excellent exposure of the vena cava which is so important in the later

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visualization of the junction of this structure with the adrenal vein. With firm cephalad retraction of the right lobe of the liver the superior pole of the kidney and the adrenal gland are brought into view (Fig. 4). Although there is no true pedicle of the gland, the adrenal vein is constant enough to be predictable in most instances. Locating this structure and its entrance into the cava is the single most important step in adrenalectomy for pheochromocytoma. This is readily accomplished by this exposure since the adrenal vein leaves the gland from an anterior position and enters the vena cava on its postero-medial aspect (Fig. 4). Once the vein has been secured the remainder of the dissection is relatively simple. The abundant arterial network is ligated where possible and by blunt manipulation the gland is mobilized. The primary step of vein interruption obviates any excessive vasopressor discharge which might occur during the final blunt maneuvers.

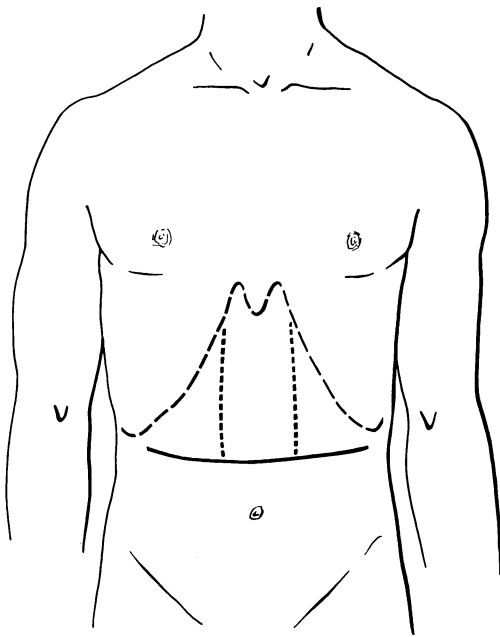


FIG. 1. The transverse skin incision is situated about midway between the umbilicus and the xiphoid. The paramedian extensions may be necessary for an occasional high lying gland.

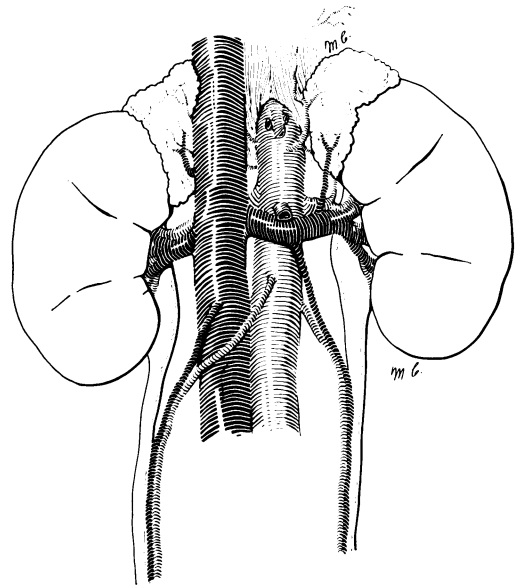


FIG. 2. The normal relationships of the adrenal glands. Note the anterior position of the adrenal veins as they leave the gland substance.

The transabdominal exposure of the left adrenal gland has been accomplished by various technics, including approaches through the gastrocolic omentum, the gastrohepatic omentum² and by mobilization of the spleen with tail of the pancreas and splenic flexure of the colon.^{1, 6} A practical modification in technic has been devised by the senior author, which eliminates the dissection necessary to either enter the lesser sac or the time consuming and frequently bloody mobilization of the spleen and splenic flexure of the colon. In this modified procedure the left adrenal gland is exposed through the bloodless area at the root of the left half of the transverse mesocolon as illustrated in Figure 5. The incision commences just above the left colic vessels and extends parallel with the inferior mesenteric vein to the marginal artery of Drummond. This opens the retroperitoneal space immediately over the body and tail of the pancreas. The latter can be readily elevated from its bed, thus exposing the left kidney and adrenal gland (Fig. 6). The adrenal vein on this side can be

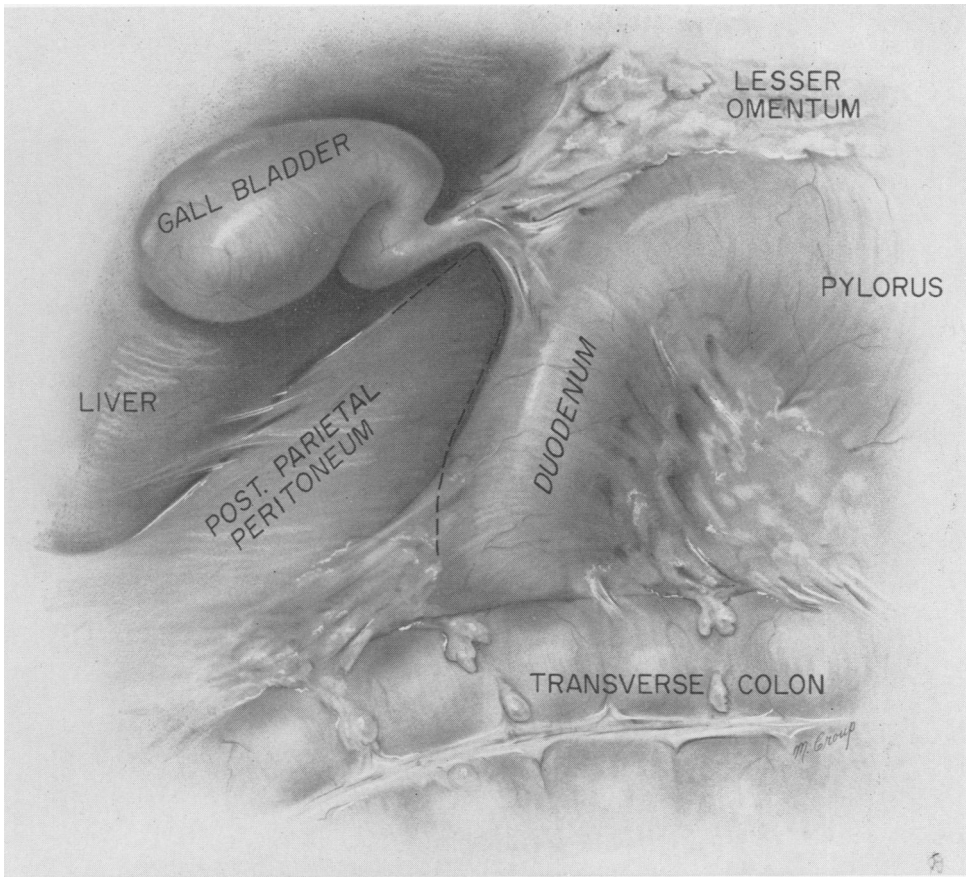


FIG. 3. The line of incision in the posterior peritoneum for exposure of the right kidney and adrenal gland.

seen on the anterior surface of the gland, facilitating its ligation prior to the blunt dissection.

The authors have used this simple effective technic of transabdominal adrenalectomy for pheochromocytoma with gratifying results in three recent cases.

Case Reports

Case 1: P. F., a 35-year-old white male, was admitted to Mercy Hospital, Pittsburgh, Pennsylvania, with the history of palpitations and frontal headache. An arterial blood pressure of 220/140, and a BMR of plus 20% was found. A test with phentolamine produced a 40 mm. Hg drop of systolic pressure and a 35 mm. Hg drop of diastolic pressure.

Laparotomy was performed and a pheochromocytoma measuring 5 cm. in diameter was excised

from the right adrenal gland. The gallbladder containing multiple small calculi, was removed after the blood pressure had stabilized. The patient's convalescence was uneventful, and the blood pressure finally stabilized at 140/100.

Case 2: R. M., a 41-year-old white female, was admitted to Mercy Hospital, Pittsburgh, Pennsylvania, with a history of hypertension of 12 years duration associated with tinnitus, and blurred vision.

Physical examination revealed an arterial blood pressure of 170/115 mm. Hg and a BMR was plus 16%. A test with phentolamine revealed a 90 mm. Hg fall of systolic and a 60 mm. Hg fall of diastolic pressure. Increased amounts of pressors amines were found in the urine. Abdominal planograms revealed a soft tissue mass in the region of the left adrenal gland.

Transabdominal exploration revealed a pheochromocytoma 7 cm. in diameter which was ex-

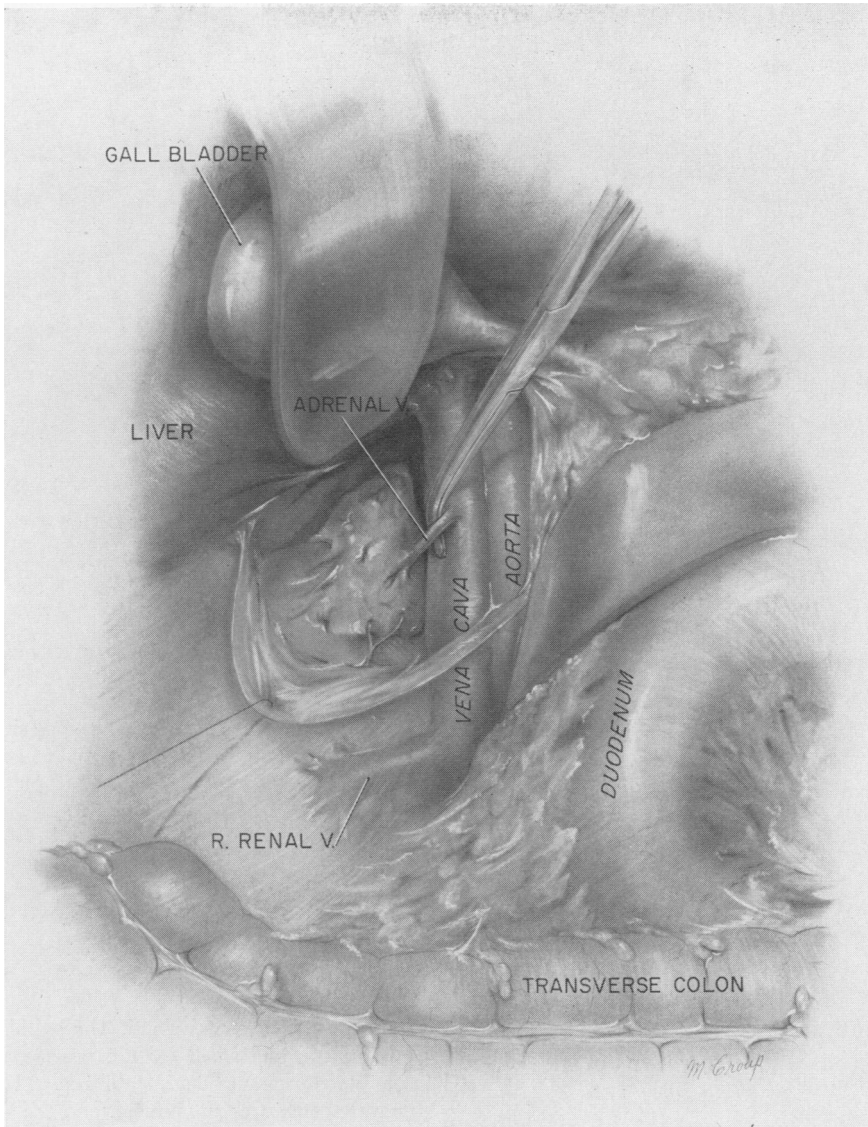


FIG. 4. The liver and duodenum are retracted allowing access to the vena cava-adrenal vein junction. The cava has been rolled slightly medialward.

cised from the left adrenal gland. The postoperative course was uneventful and the blood pressure stabilized at 120/90.

Case 3: (Reported in detail elsewhere.⁴) A 38-year-old white man entered the Veterans Administration Hospital, Pittsburgh, Pennsylvania, because of intense headaches and blurred vision. A test with phentolamine failed to establish the diagnosis of pheochromocytoma. While on a rice diet the patient developed or activated an ulcer of the duo-

denum from which he experienced massive hemorrhage. While undergoing laparotomy for the ulcer, a right adrenal pheochromocytoma measuring 8 × 5 cm. and a left one measuring 5 × 3 cm. were encountered and removed.

An acute non-bleeding peptic ulcer of the posterior duodenal wall was oversewn through an anterior duodenotomy. The average preoperative blood pressure of 200/150 mm. Hg has remained at a postoperative level of 150/110 mm. Hg in the year following operation.

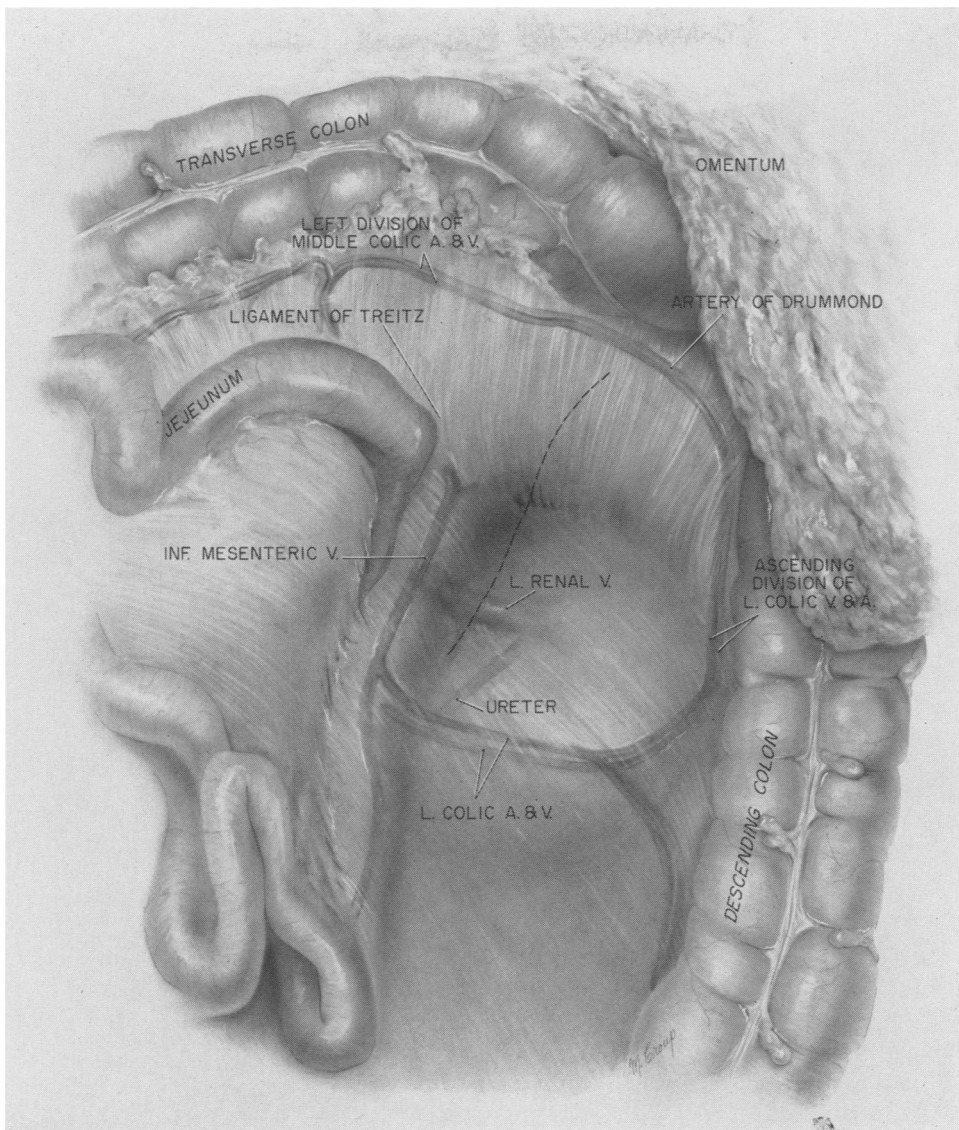


FIG. 5. The incision line at the root of the left side of the transverse mesocolon is shown.

Comment

Cases 1 and 3 demonstrate another advantage of the transabdominal approach since secondary abdominal lesions may be corrected at the time of laparotomy.

Summary

The reasons for the superiority of a transabdominal approach to the adrenal gland especially in cases of pheochromocytoma

are presented. A simple rapid anatomic approach to the left adrenal gland is described. Three cases in which pheochromocytomas were variously located (right, left, and bilateral) illustrate the application of this technic.

Bibliography

1. Aird, I. and P. Helman: Bilateral Anterior Transabdominal Adrenalectomy. *Brit. M. J.*, 2:708, 1955.

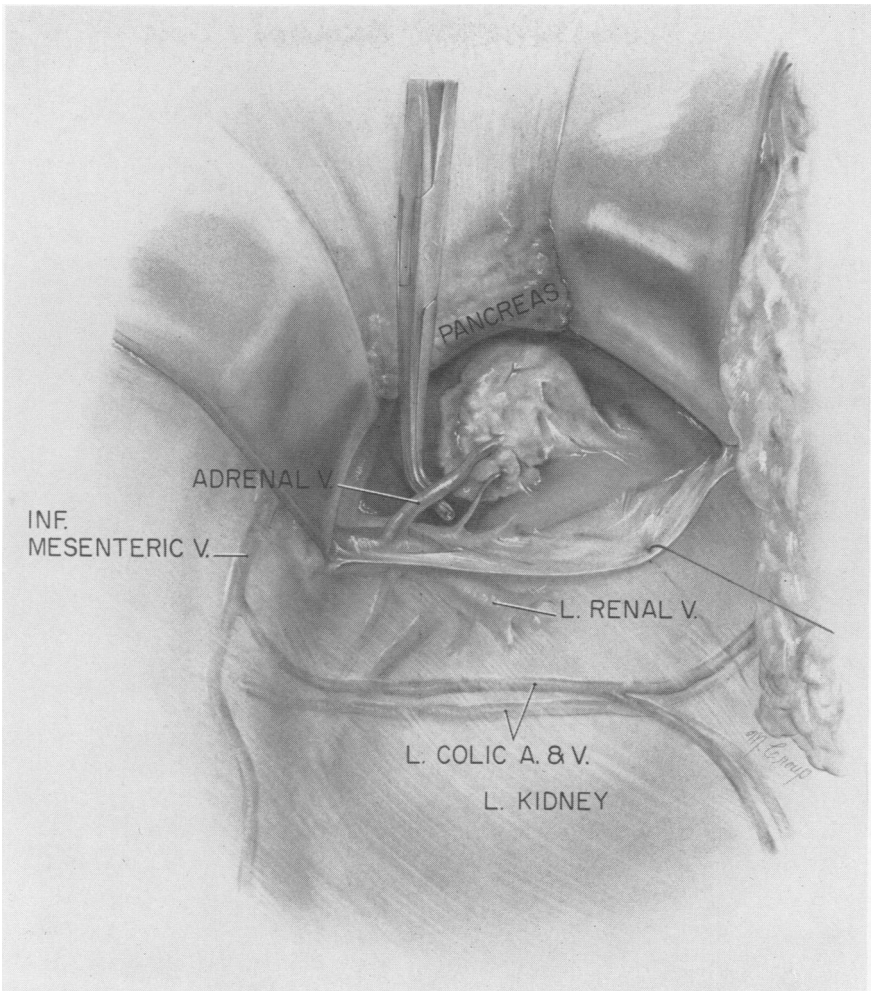


FIG. 6. The exposed left adrenal gland and kidney are seen after the body and tail of the pancreas is elevated and retracted. Again the anteriorly located adrenal vein can be readily visualized with this exposure.

2. Bowers, R. F., F. H. Knox, Jr. and B. R. Gendel: Adrenalectomy for Hypertension: Advantages of the Anterior Abdominal Approach. *Surgery*, 34:664, 1953.
3. Evans, J. A. and N. Poker: Newer Roentgenographic Techniques in the Diagnosis of Retroperitoneal Tumors. *J. A. M. A.*, 161:1128, 1956.
4. Flandreau, R. H. and A. S. Goushien: Bilateral Pheochromocytoma. *A. M. A. Arch Surg.*, 76: 62, 1958.
5. Graham, J. B.: Pheochromocytoma and Hypertension: An Analysis of 207 Cases. *Internat. Abstr. Surg.*, 92:105, 1951.
6. McKeown, K. C. and A. Ganguli: Anterior Approach for Bilateral Adrenalectomy. *Brit. M. J.*, 1:1466, 1956.
7. Pendergrass, H. P. and P. J. Hodes: Complications of Retroperitoneal Contrast Studies. *Pennsylvania M. J.*, 60:1453, 1957.
8. Priestley, J. T., Randall G. Sprague, Waltman Walters and Robert M. Salassa: Subtotal Adrenalectomy for Cushing's Syndrome. *Ann. Surg.*, 134:464, 1951.
9. Zintel, H. A., Charles C. Wolferth, William A. Jeffers, Joseph H. Hofkenshiel and Francis D. W. Lukens: Subtotal Adrenalectomy in the Treatment of Patients with Severe Essential Hypertension. *Ann. Surg.*, 134:351, 1951.