Operative Surgery

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ABDOMINAL INCISIONS

BENJAMIN W. RAWLES, JR.

Although the first and last steps of every abdominal operation are the making and the closing of the incision, these steps may appear to be inconsequential as compared to the details of the procedure performed in between. The success of an operation, however, may depend in part, at least, on whether adequate exposure is provided by the incision selected and also on whether the incision is closed satisfactorily without the development of wound infection, wound separation and evisceration, and postoperative ventral (incisional) hernias.

In the past, some type of vertical rectus incision has been preferred by most surgeons, but in recent years there has been a trend to the use of transverse abdominal incisions, particularly in surgery of the upper abdomen, as a result of a better appreciation of the anatomical structure of the abdominal wall. The rectus sheath is formed by the aponeurotic fibers of the flat abdominal muscles, the external oblique, internal oblique, and transversus abdominis. These fibers run generally in a transverse direction, never varying more than 30 degrees from the transverse, according to Coller. There is, therefore, a much greater pull from side to side than there is in the vertical direction. The approximated edges of a vertical incision are thus subjected to a much greater pull in a direction at right angles to the direction of the incision as compared to a transverse incision.

A firm abdominal musculature following incision of the wall may depend on preservation of the motor nerves to the recti muscles. The musculature is supplied by the lower six intercostal and the first lumbar nerves. These nerves are so interconnected that one, and possibly two, may be severed without affecting the segmental nerve supply. The course of the nerves is generally in a transverse direction. A vertical incision, with the exception of a midline or paramedian, therefore, more frequently may damage two or more nerves, with segmental musculature atrophy resulting, if the incision is of any great length. A transverse incision, on the other hand, runs in the general direction of the course of the nerve fibers so that there is less chance of injuring as many as two nerves.

A vertical incision may be advantageously used under some circumstances. First, the abdominal cavity can be entered quickly in case of emergency surgery; second, the incision can be extended upward or downward when exploration reveals the pathology to be away from the site of the original incision, although it may be the better practice to close the original incision and make a second properly placed

one over the site of the pathology; third, a short vertical paramedian incision is preferred to a McBurney incision for an appendectomy when the tentative diagnosis is chronic recurrent appendicitis in either sex, since the vertical incision more easily permits exploration of the pelvis or the rest of the abdominal cavity.

Transverse incisions require accurate localization of the pathology for proper placing of the incision, although they can be extended across the other rectus, or laterally, or a vertical limb can be added to give more adequate exposure. The many other advantages of the transverse incision make it the incision of choice for many surgical procedures. First, it provides adequate exposure without heavy pulling with a retractor against the abdominal wall, as is so often necessary for exposure with a vertical incision; second, there is minimum trauma to nerves; third, the incision closes with ease because there is minimal pull or tension perpendicular to the axis of the incision; fourth, the patient has minimal discomfort in the immediate postoperative period; fifth, incisional hernias rarely occur as a complication; sixth, wound separation and evisceration are less frequent than with vertical incisions.

Better exposure for certain operative procedures in the upper abdomen may be provided either through a transthoracic approach or through a thoracicoabdominal incision. During World War II military surgeons found that the organs in the upper abdomen could be adequately exposed through the diaphragm at the time of thoracotomy in the case of combination thoracicoabdominal injuries. Transthoracic incisions have been employed by some surgeons for the resection of lesions in the region of the esophagogastric junction. Carter has advocated a thoracicoabdominal incision for splenectomy and as the approach to lesions involving the upper end of the stomach or lower end of the esophagus. Satinsky suggested that it be employed in portacaval anastomosis.

TYPES OF INCISIONS

Vertical Paramedian Rectus Incision

This incision can be used in the upper, mid-, or lower abdomen, on either the right or the left (Fig. 547). The anterior rectus sheath is incised vertically for the desired length 1 to 3 cm. from the midline, and the rectus muscle is retracted laterally. In this way the motor nerves, which enter laterally, are not injured. The posterior rectus sheath and peritoneum are opened vertically in approximately the same plane as the anterior sheath. After closure the muscle acts as a buttress between the incisions in the anterior and posterior sheath. This type of incision on the left, extending from the symphysis pubis to a point above the umbilicus, provides excellent exposure for resection of the rectum and sigmoid colon. A similar incision placed on either side also provides good exposure for gynecologic surgery. A shorter incision, centered just below the umbilicus on the right, is ideal for exploration of the lower abdomen or for appendectomy when there is question as to the pathology. The incision may be used on the right in the upper abdomen to approach the liver, gall bladder, common duct, pancreas, duodenum, or stomach, or on the left for the spleen or stomach. This incision, particularly in the upper abdomen, is exposed to excessive strain when there is postoperative nausea and vomiting or violent coughing episodes with a higher incidence of wound separation

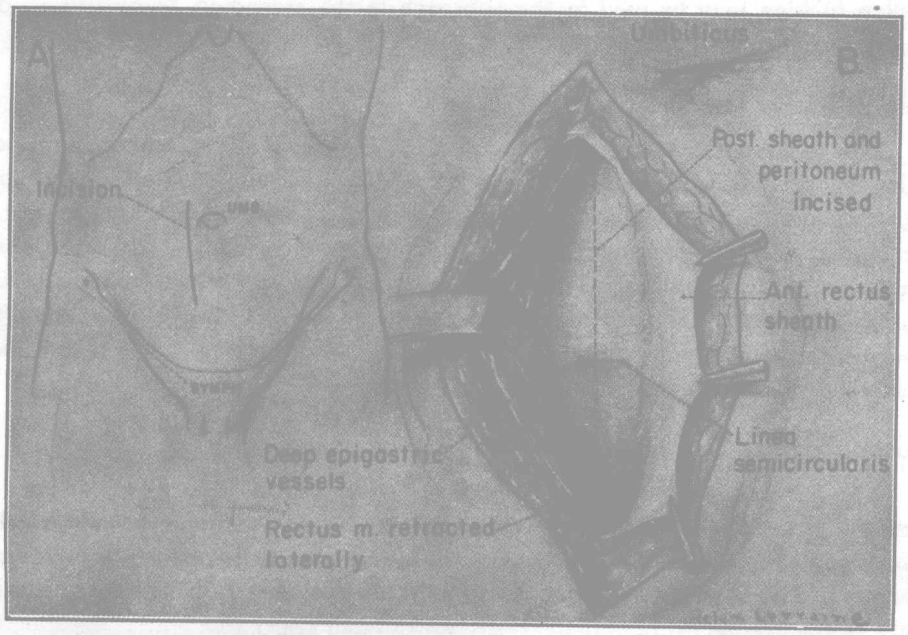

Fig. 547.—Vertical paramedian rectus incision.

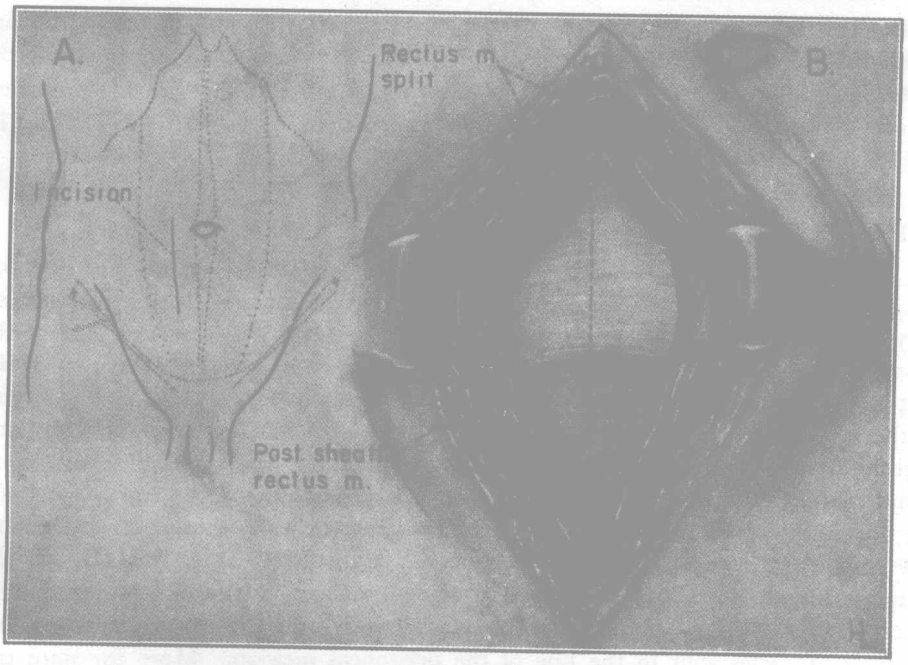

Fig. 548.—Vertical rectus muscle-splitting incision.

and incisional hernia than is experienced with a transverse incision. A mid-paramedian incision may be used as the approach to the ascending, transverse, or descending colon.

Vertical Rectus Muscle-Splitting Incision

The incision is made through the skin, subcutaneous tissue, anterior and posterior sheaths, and peritoneum, as in the paramedian, but the muscle fibers are split and the incision is carried straight through instead of around the mesial border of the muscle (Fig. 548). The peritoneal cavity can be entered quickly and the incision extended, if necessary, but the nerve supply to the mesial portion of the muscle may be so damaged that atrophy results if the incision is of any great length. The incision is used as the approach for the same procedures as the paramedian incision.

Vertical Midline Incision

This incision extends through the relatively avascular linea alba. It may be used in the upper or lower abdomen. The abdominal cavity is entered quickly through it and the incision may be extended by curving it about the umbilicus. There are disadvantages from the standpoint of repair, as the incision is at the midpoint of the transverse pull of the flat muscles from either side.

McBurney Muscle-Splitting Incision

The McBurney incision is the ideal incision for removal of an acute appendix (Figs. 648-654). The details of the incision are described in the section on appendicitis (Chapter 58). If necessary, it can be extended transversely across the rectus muscle and the anterior and posterior rectus sheaths to provide more exposure, as was first described by Harrington and Weir. This incision may also be used for cecostomy or, on the left side, for sigmoid colostomy.

Upper Quadrant Transverse Incision (Subcostal)

This incision may be used on either side. On the right it is an ideal incision for cholecystectomy, while on the left it may be used for splenectomy. The incision may be a true transverse, or it may be made obliquely in the general line of the lower costal border, but it is actually a transverse incision, since the division of the rectus muscle and fascia is generally in the transverse direction. The incision begins in the midline midway between the xiphoid and umbilicus and runs laterally and slightly downward to a point in the anterior axillary line just below the lower costal margin (Fig. 549, *A*). The anterior rectus sheath is divided transversely and the muscle is exposed (Fig. 549, *B*). The muscle is divided transversely. The posterior sheath and peritoneum are then opened transversely (Fig. 549, *C*). If the rectus is broad, adequate exposure is provided without extension laterally, but, if necessary, the external oblique is retracted laterally and the internal oblique and transverse muscles split in the line of the peritoneal incision. More exposure can also be provided by carrying the incision across the sheath of the left rectus with retraction or transverse division of the muscle. The falciform ligament is divided if this is done.

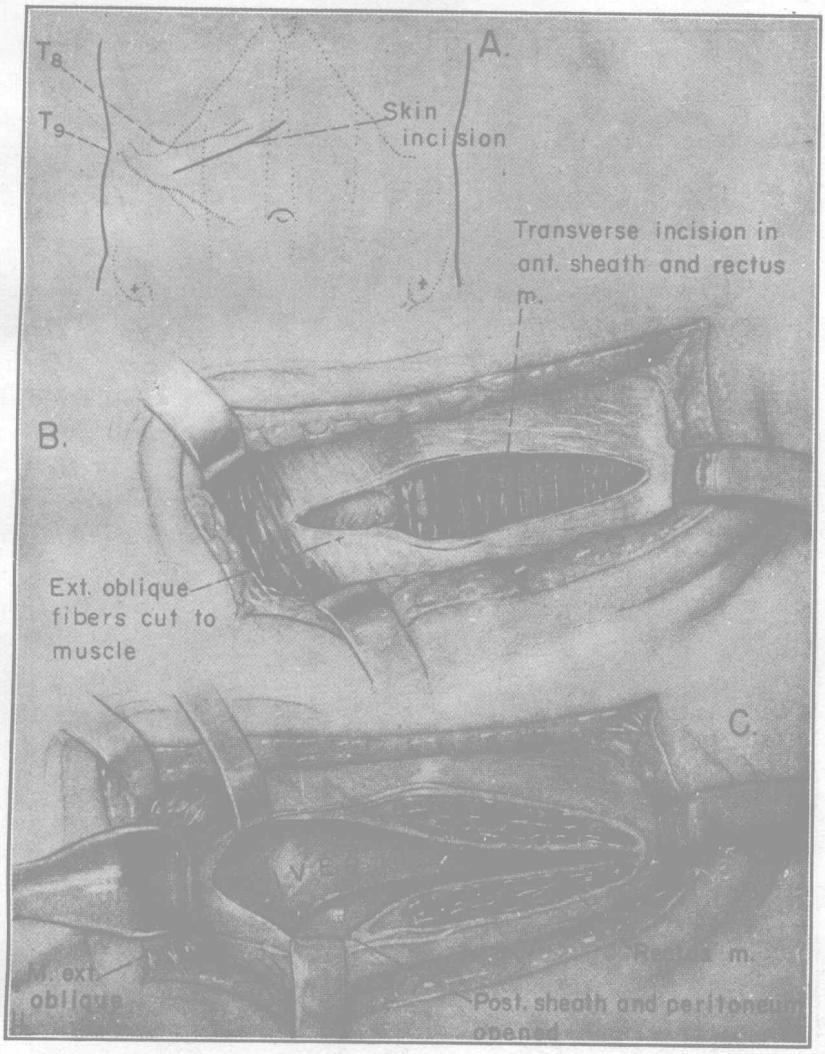

Fig. 549.—Upper quadrant transverse incision (subcostal).

Upper Abdominal Transverse Incision

This incision gives adequate exposure for operations on the stomach, duodenum, and pancreas. It is ideal for gastrectomy and pancreatoduodenectomy. The incision extends from a point just below the costal margin on one side in the anterior axillary line to the same point on the opposite side and is curved (concavity downward) with the mid-point lying approximately midway between the xiphoid

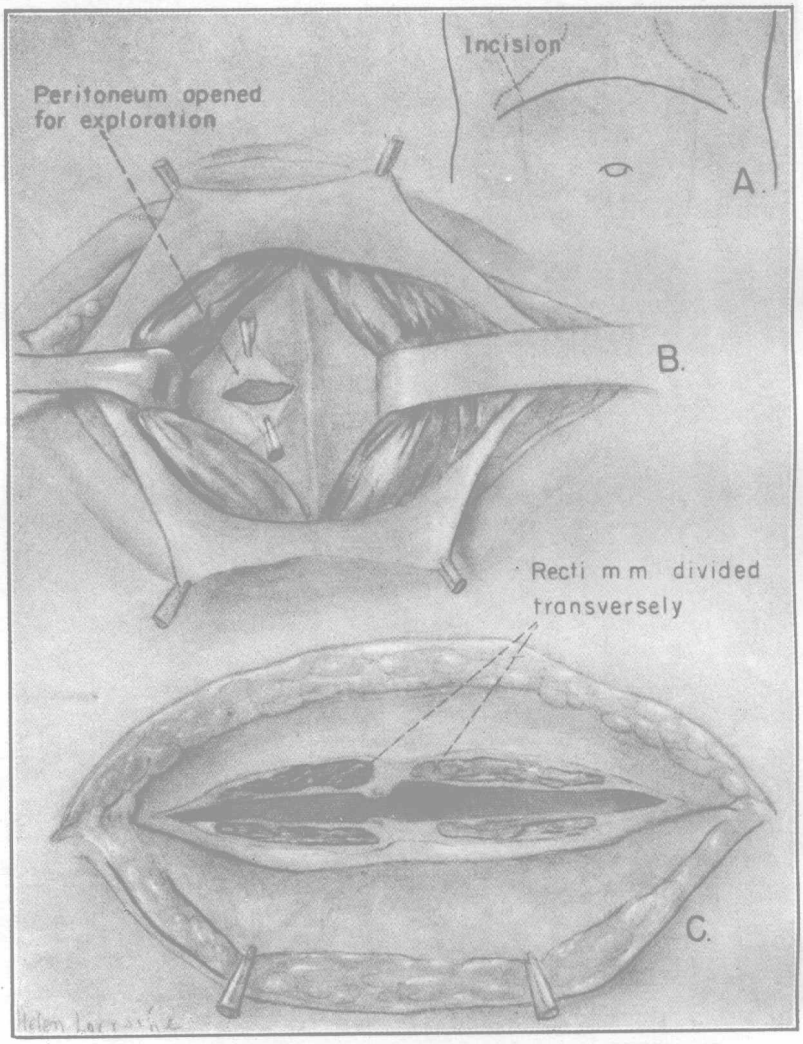

Fig. 550.—Upper abdominal transverse incision.

and the umbilicus (Fig. 550, *A*). The anterior rectus sheath on either side is divided transversely and the recti muscles are exposed. If there is any question as to operability, the recti muscles can be retracted laterally and the posterior rectus fascia and peritoneum divided transversely to permit exploration before unnecessarily dividing the recti muscles (Fig. 550, *B*) as is done in the Sanders modification of the Sloan incision. If the lesion is found to be operable, the muscles are divided transversely. At the lateral aspects of the incision the external oblique muscle is

retracted or divided and the internal oblique and transversalis abdominis muscles are split in the line of the incision (Fig. 550, *C*). The intercostal nerves are preserved, if possible, but one, and even possibly two, can be divided without causing segmental muscle atrophy.

Midabdominal Transverse Incision

This incision begins slightly above or below the umbilicus on either the right or the left side and is carried laterally into the flank (Fig. 551, *A*). If necessary, it can be extended across the opposite rectus sheath and muscle. It provides good

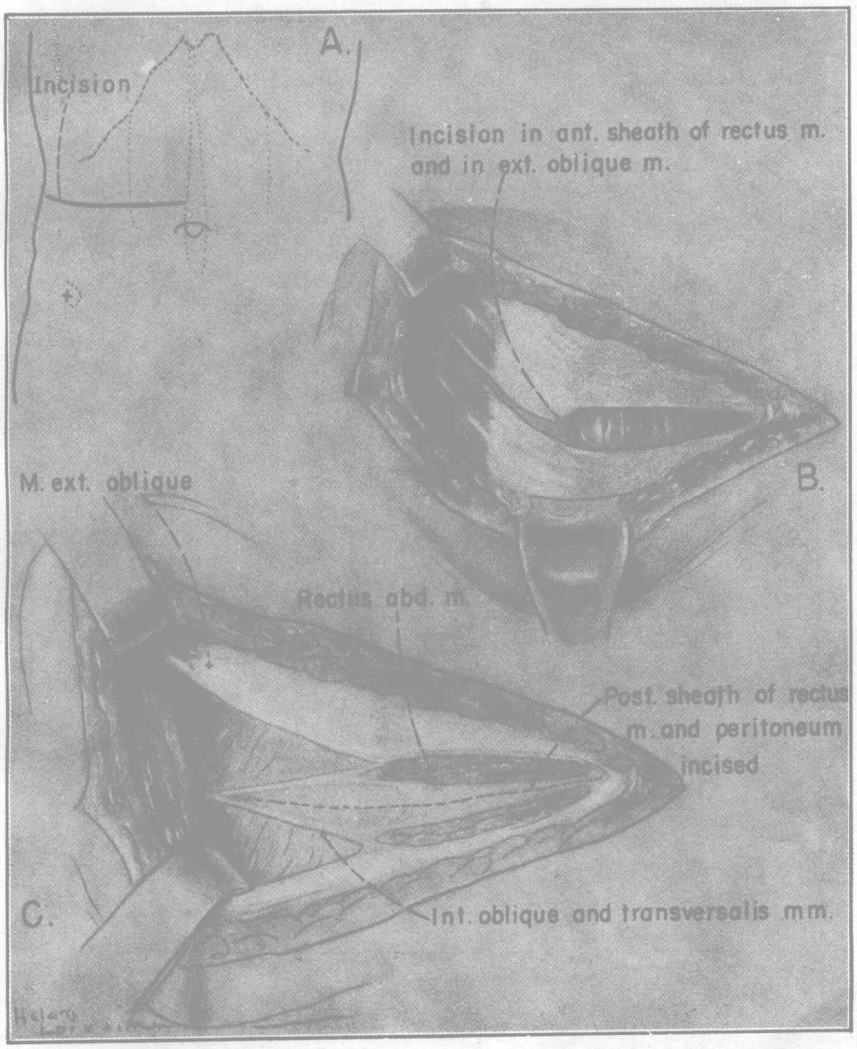

Fig. 551.—Midabdominal transverse incision.

exposure for the ascending and the descending colon. It also provides a good retroperitoneal approach for lumbar sympathectomy, vena cava ligation, and for removal of retroperitoneal tumors. The anterior rectus sheath is divided transversely and the incision extended upward and laterally in the line of the fibers of

the external oblique (Fig. 551, *B*). The rectus muscle is divided transversely. The posterior sheath and peritoneum are incised transversely, care being taken to preserve the intercostal nerves as they run over the posterior sheath (Fig. 551, *C*). The incision in the posterior sheath and peritoneum is carried laterally, splitting the fibers of the internal oblique and transverse abdominis to provide adequate exposure.

Diagonal Incision for Resection of Colon (Coller)

This incision can be used for abdominoperineal resection of the rectum and sigmoid colon and anterior resection of sigmoid colon and upper rectum with primary anastomosis. As described by Coller, the incision begins just above the symphysis to the right of the midline and extends laterally on the left to the outer border of the rectus and then upward in the line of the fibers of the external oblique to a point just above and mesial to the anterior superior iliac spine (Fig. 552, *A*).

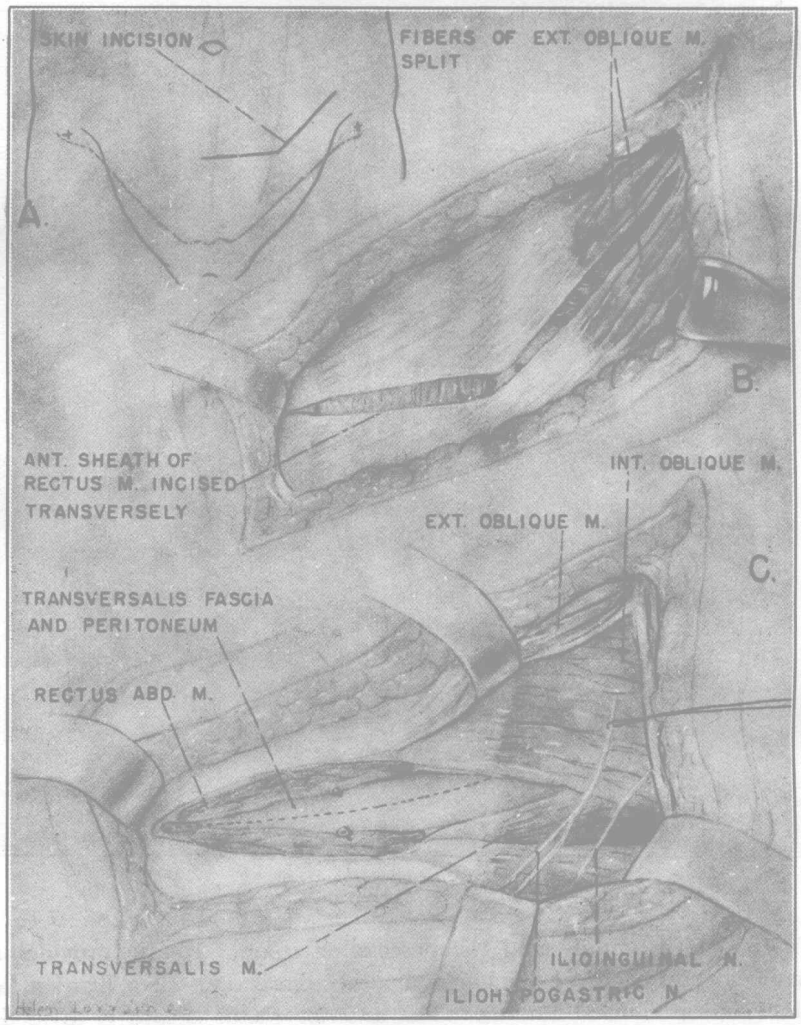

Fig. 552.—Lower quadrant transverse incision (Coller).