Applied anatomy of abdominal incisions

Introduction

Opening the abdomen is the essential preliminary to the performance of a laparotomy. A correctly performed abdominal exposure is based on sound anatomical knowledge. The surgeon needs direct access to the organ(s) requiring investigation and surgical treatment and must provide adequate room for the safe performance of that surgery. If possible, the incision should be capable of easy extension to allow for any enlargement of the scope of the operation, and it should interfere as little as possible with the strength and function of the abdominal wall.

There are more than a dozen named abdominal incisions in the large texts on operative surgery, but there are two of these in most common use in the repertoire of the general abdominal surgeon. The surgeon in training should be completely familiar with these, and should not be at all surprised that they are often asked in the operative surgery oral examinations. They are the midline and the right iliac fossa muscle split incisions.

The midline incision

The midline abdominal incision (*Figure 1*) has many advantages:

1. It is quick and easy to perform
2. It is relatively easy to close
3. It is virtually bloodless – no muscles are divided (and, incidentally, no nerves are cut)
4. It affords excellent access to the abdominal cavity, the pelvis and the retroperitoneal structures, so that there is no abdominal procedure which cannot be done through this incision
5. It can be extended, if necessary, from the xiphoid process to the pubic symphysis
6. If closure is performed with the mass closure technique, there is no difference in the incidence of wound dehiscence or incisional hernia compared with more complex incisions, for example, transverse or Kocher incisions.

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The upper midline incision is placed exactly in the midline, and reaches from the xiphoid to about 1 cm above the umbilicus. Skin, subcutaneous fat (varying widely in thickness with the bulk of the patient), the almost avascular linea alba, the extraperitoneal fascia and parietal peritoneum are divided in sequence. Note that there is no deep fascia over the trunk.

The extraperitoneal fascia is abundant and vascular in the upper abdomen, especially in the obese, and small vessels usually need to be coagulated. The falciform ligament, with the ligamentum teres in its free edge, commences at the umbilicus and runs upwards in the midline. It should be avoided by opening the peritoneum on one or other side of the midline. If the ligamentum teres interferes with the exposure, it is double clamped, ligated and tied.

The lower midline incision is similar to the upper. Below the umbilicus, the linea alba is narrow and, not infrequently, the rectus sheath is inadvertently opened on one or other side, but this is of no consequence.

The parietal peritoneum should be opened first at the lower end of the incision in the upper midline approach. This enables the position of the falciform ligament and ligamentum teres to be identified so that these may be dealt with as described above. In contrast, the peritoneum is opened first at the upper end of the incision in the lower midline approach in order to avoid the bladder. In addition, always have a catheter in place in the bladder when performing the lower midline approach in order to ensure that the bladder is empty.

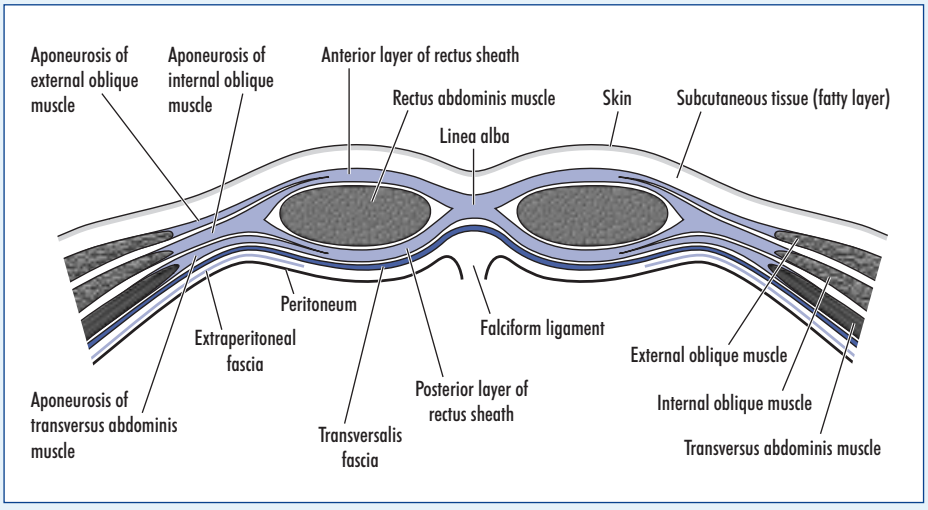
The upper or lower midline incisions can be extended for part or the whole extent of the abdominal wall. Most surgeons circumnavigate the umbilicus with the scalpel in doing this, others take the incision directly through it – the difference seems merely to be a question of taste or habit.

The right iliac fossa muscle split incision

The right iliac fossa muscle split incision (*Figures 2* and *3*) is the approach of choice for open appendicectomy. The external oblique aponeurosis, which runs downwards and forwards, is divided along the line of its fibres, and the internal and transversus abdominis muscles split along their lengths. There is no consequent weakness of the abdominal wall because no muscles are cut across. Wound dehiscence or incisional hernia are almost unknown if the incision is correctly performed.

Classically the incision is centred at McBurney's point (*Figure 2*), two thirds of the distance along a line from the umbilicus to the anterior superior iliac spine, and is placed at right angles to this line. This places the skin incision exactly along the line of the fibres of the external oblique aponeurosis. This is an excellent incision in the obese subject or when it

Figure 1. The upper anterior abdominal wall in section.



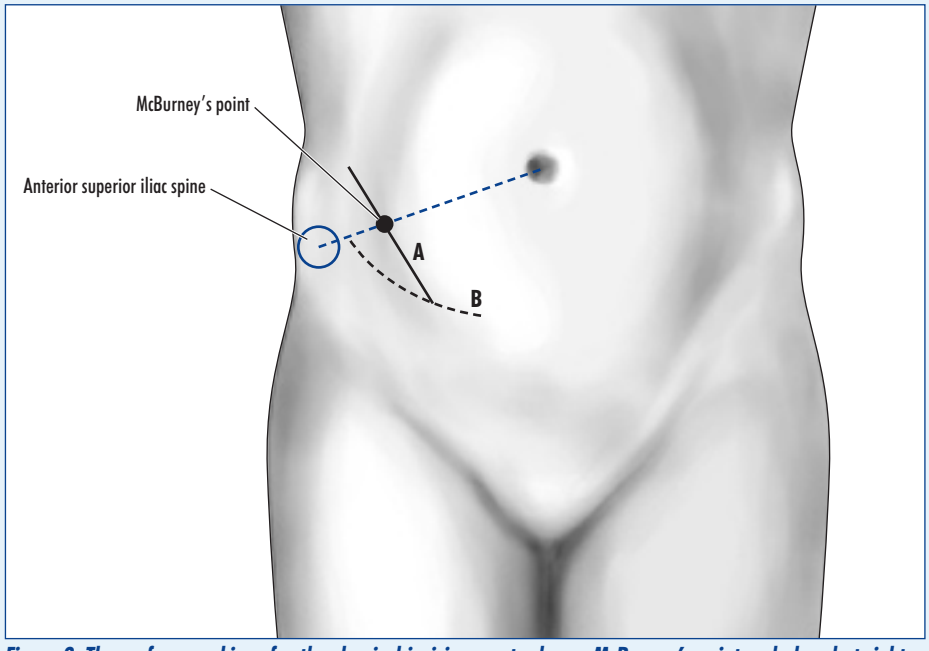


Figure 2. The surface markings for the classical incision, centred over McBurney's point and placed at right angles to the line joining the umbilicus to the anterior superior iliac spine (A). Many surgeons now use the skin crease incision (B), which commences just medial to the anterior superior iliac spine, in order not to overlie the anterior rectus sheath.

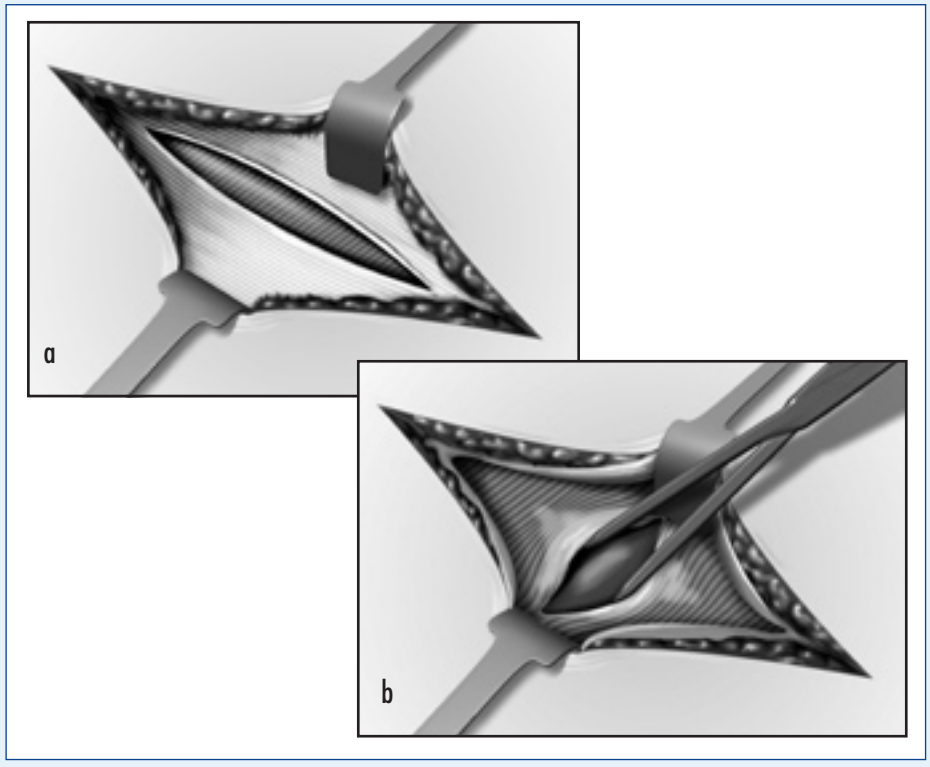
might be necessary to obtain further room, which can easily be performed by extending the incision laterally and further splitting the oblique muscles in the direction of their fibres.

Many surgeons prefer the more aesthetic skin crease incision (*Figure 2*). However, a common mistake is to use McBurney's point as the centre of this incision. This will place it too medially, and the surgeon will find him-/herself over the anterior rectus sheath and not the oblique muscles. In the patient of average build, the skin crease incision should commence about a centimetre or so medial to the anterior superior iliac spine.

After dividing skin and superficial fascia (fat) along the line of the skin incision, the external oblique aponeurosis is split along the line of its fibres – not a drop of blood should be spilt (*Figure 3a*). The aponeurosis is retracted open to expose the fibres of internal oblique, passing in an upwards and forwards direction (*Figure 3b*). These are split open with artery forceps or closed scissors at right angles to the fibres of the external oblique, commencing at the lateral edge of the rectus sheath, where the muscle is thinnest. The underlying transversus abdominis muscle is closely applied to the internal oblique, and will usually be found to split open with it; if not, it is split separately. The two muscle are then widely retracted with the two index fingers and held apart by retractors. A fold of peritoneum is then picked up with forceps, carefully nicked open with a scalpel and the opening enlarged with the two index fingers.

At the end of the operation, it will be found that the retracted muscles slip back in place. It was not the author's practice to put any sutures into them, merely to stitch the skin. However, many surgeons cannot resist putting a stitch or two into the muscle layers. BJHM

Figure 3. a. The aponeurosis of the external oblique is split along the line of its fibres. b. Internal oblique and transversus are then split at right angles to the fibres of external oblique.



Conflict of interest: none.

KEY POINTS

- There are a number of abdominal incisions which may be used but the most common are the midline incision and the right iliac fossa muscle split incision.
- The midline incision runs through the linear alba and is very versatile.
- The right iliac fossa muscle split incision is the approach of choice for open appendicectomy and does not cause subsequent weakness of the abdominal wall as no muscles are cut.