Methods and techniques

Peritoneoscopy as an aid to diagnosis

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Many incurable patients would be spared useless operations if their multiple metastases were recognized at the outset. The use of the peritoneoscope to examine parts of the abdominal cavity has not gained in popularity, in spite of intermittent reports outlining the technique and indications for the procedure (Walker and Playfair, 1942; Handley, 1955; Handley and Nurick, 1956; Ruddock, 1957).

The mortality from diagnostic laparotomy in patients with abdominal malignant disease and liver metastases is high and has been estimated at 12 to 19% (McHardy, Browne, and Edwards 1947; Cayer and Sohmer 1955). The morbidity from post-operative pain and complications is difficult to assess but is often severe enough to detract from the value of the operation. Peritoneoscopy provides the opportunity of examining parts of the abdominal cavity without the morbidity or mortality of laparotomy. A collected review of 8,000 patients examined by peritoneoscopy reports a mortality rate of 0.2% (Handley and Nurick, 1956). Peritoneoscopy causes little discomfort and the patients can leave hospital within a few days.

The limitations of the procedure must be emphasized. The anterior surface of the liver, the peritoneum of the anterior abdominal wall, and the omentum can nearly always be viewed. The spleen, the anterior surface of the stomach, and the gall bladder are sometimes visible. A systematic search of the intestine is not possible at peritoneoscopy and it is not a suitable way of examining the pelvic organs. Surgical manoeuvres through an operating peritoneoscope are difficult to perform, unsatisfactory in execution, and add to the risks of the procedure (Handley and Nurick, 1956).

Patients with evidence of cirrhosis of the liver and portal hypertension form another group where peritoneoscopy can prove valuable, provided that the appearances of the liver are considered together with biochemical tests of liver function and the histopathological picture of biopsy material.

The technique of the examination will be described.

The hazards and contraindications will be emphasized and an analysis given of the value of 130 examinations carried out by the staff of the Department of Surgery, Queen's University, during the past 13 years.

TECHNIQUE

INSTRUMENTS The majority of instruments consist of a telescope with a distal light source. The diameter of the shaft should be as small as possible so that the end-sheathing trocar can be passed easily and safely into the abdomen. The instruments produced by the Gentile Company of France and the Genito-Urinary Company of Britain are completely satisfactory in design. The recent instrument distributed in this country by Optec Ltd., which uses a proximal light source, has a much greater diameter and is rather bulky to handle. The main advantage of this instrument is that the strength of the illumination can be safely increased for photographic purposes.

EXAMINATION The procedure is carried out in an operating theatre under full aseptic technique. The patient's abdomen is prepared as for laparotomy. An area on the lateral margin of the left rectus at the level of the umbilicus is chosen and is infiltrated with local anaesthetic (1% xylocaine and adrenaline 1:200,000). The patient is asked voluntarily to contract the abdominal muscles and a fine trocar and cannula are introduced into the abdominal cavity at this point. The use of a fine trocar in the conscious patient reduces the risk of damage to underlying viscera. Some air is blown through the cannula and general anaesthesia is induced as soon as air is entering the peritoneal cavity. The abdomen is distended with air, blown in with a Higginsson syringe. This makes the introduction of the peritoneoscope safer and aids the subsequent examination. It is possible in many patients to carry out the examination with local anaesthesia only. It is important in patients with ascites to keep the fine needle close to the parietal peritoneum when blowing in the air. This eliminates bubbling and froth formation and keeps the view clear. Enough air is manually introduced to abolish the area of liver dullness. This method is safer than attaching a gas cylinder to the cannula. The site of introduction of the peritoneoscope is now selected. This is usually in the mid-line about 1 in. below the umbilicus or at the lateral border of the rectus.
muscle and 2 in. below the liver. The larger trocar and cannula are introduced through a small skin incision and the telescope placed in position. The pneumoperitoneum is maintained throughout the procedure by an assistant and the viscera are examined through a large bubble of air. The view can often be improved by tilting the table or rotating it to one or other side. The limitation of the view is quickly assessed and a detailed examination carried out of the visible structures.

RESULTS

Peritoneoscopy was performed on 130 patients during the past 13 years. There were 69 cases of suspected malignant disease where peritoneoscopy was indicated. An assessment of the results obtained is shown in Table I.

**TABLE I**

VALUE OF PERITONEOSCOPY IN DIAGNOSIS OF METASTATIC MALIGNANT DISEASE IN THE UPPER ABDOMEN

<table>
<thead>
<tr>
<th>No. of Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Secondary deposits found in liver and peritoneum</td>
</tr>
<tr>
<td>No secondaries visible</td>
</tr>
<tr>
<td>Investigation abandoned</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

**Further investigation of 30 negative cases**

<table>
<thead>
<tr>
<th>No. of Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laparotomy confirmed negative findings</td>
</tr>
<tr>
<td>Deposits found at laparotomy</td>
</tr>
<tr>
<td>No follow-up</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

Fifty-seven cases of suspected primary liver disease were also examined and the value of the examination is indicated in Table II. Four patients were examined for miscellaneous conditions. Two of the negative cases did not have any further exploration.

**TABLE II**

VALUE OF PERITONEOSCOPY IN PATIENTS SUSPECTED OF HAVING CIRRHOSIS OF THE LIVER

<table>
<thead>
<tr>
<th>No. of Cases</th>
</tr>
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<tbody>
<tr>
<td>Nodular and fibrotic liver consistent with cirrhosis</td>
</tr>
<tr>
<td>Normal liver with dilated omental veins (portal vein thrombosis)</td>
</tr>
<tr>
<td>Completely normal picture</td>
</tr>
<tr>
<td>Unhelpful</td>
</tr>
<tr>
<td>Another diagnosis made</td>
</tr>
<tr>
<td>Total</td>
</tr>
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</table>

Peritoneoscopy was judged to have been helpful in 59 out of 69 (87%) of the cases of suspected malignant disease which were examined. The main value of the procedure in this group was that laparotomy was avoided in 36 patients. It is not always necessary to add biopsy to peritoneoscopy, as the diagnosis is obvious in many instances and there is also the risk of uncontrolled haemorrhage after biopsy (Handley and Nurick, 1956). This risk was mainly associated with the biopsy forceps used through the shaft of the peritoneoscope. We have, however, on a few occasions used a Terry liver biopsy needle inserted through a separate puncture. This procedure requires the cooperation of two operators to guide the point of the needle to the required area of liver. There have been no complications from this manoeuvre. The bleeding from the liver puncture can be observed to continue for about five minutes.

Peritoneoscopy was even more valuable in liver disease and was judged helpful in 51 out of 57 (91%) of cases examined (Table II). The 57 patients examined had portal hypertension with or without other signs of hepatic dysfunction. The findings at peritoneoscopy were considered together with the biochemical, clinical, and histopathological examinations before reaching a final diagnosis.

Liver biopsy does not always give a completely true picture of the total disease process and peritoneoscopy is of particular value in juvenile portal hypertension. One child, who was bleeding from oesophageal varices, had no biochemical evidence of liver cell damage and a liver biopsy section was difficult to interpret. Peritoneoscopy, however, showed multiple nodular hyperplasia of the liver. Three other children with portal hypertension and normal liver function tests had the diagnosis of portal vein thrombosis confirmed at peritoneoscopy when a normal liver was seen with dilated veins in the omentum and falciform ligament.

MISCELLANEOUS INDICATIONS

Peritoneoscopy was attempted in four further cases for various reasons. A middle-aged woman was found to be a persistent faecal typhoid carrier. It was suggested that the organism was possibly present in the gall bladder. Peritoneoscopy was carried out in order to aspirate bile from the gall bladder for culture before considering cholecystectomy but this attempt was unsuccessful.

An attempt was made to apply diathermy to the ovaries in another patient with metastatic carcinoma of the breast. This manoeuvre was only partially successful. Subsequent laparotomy showed that the ovarian destruction was incomplete. Peritoneoscopy was performed in a woman with an intra-abdominal mass fixed to the costal margin. It was found that the swelling was separate from the viscera and attached to the parietal peritoneum. A needle was placed in the mass and pus was obtained from which tubercle bacilli were isolated. The final case was that of a woman with calcification in the left hypochondrium. A large intrahepatic cyst was seen at peritoneoscopy. This was later found to be congenital cystic disease
of the liver. Peritoneoscopy was of value in two of these four miscellaneous cases.

COMPLICATIONS

The investigation had to be abandoned on three occasions because of bleeding. On two occasions the finer trocar pierced a vessel in the posterior rectus sheath and bleeding was observed before entering the peritoneum. The third case was one of suspected malignant disease in which the trocar pierced a large vessel lying on the anterior surface of a large hypernephroma. Firm pressure was applied and the bleeding was easily controlled in each case. This complication of bleeding from the rectus sheath has also been reported by Aronson and Parker (1960) and the investigation must be abandoned when it occurs. Two patients died soon after peritoneoscopy. Both were advanced cases of cirrhosis of the liver with gross ascites. The first was an elderly lady who collapsed when air was introduced into the peritoneal cavity after withdrawal of ascitic fluid. She developed circulatory arrest and died within a few minutes.

The second patient collapsed and died 28 hours after peritoneoscopy. It is difficult to be precise about the cause of death in both cases, as air embolism was not excluded at necropsy. In general, however, severely ill patients should not be investigated in this manner and if they are only a moderate amount of air should be introduced into the peritoneum.

The presence of intra-abdominal infection is a strong contraindication to peritoneoscopy. This is well illustrated by the following history.

An elderly woman was found to have obstructive jaundice and an enlarged liver. The clinical diagnosis was that of carcinoma of the head of the pancreas with secondary involvement of the liver. Peritoneoscopy was attempted but no view was obtained. Soon after peritoneoscopy the patient complained of severe pain in the gall bladder region, the abdomen became distended, and there were signs of peritonitis in the right hypochondrium. Laparotomy was undertaken in case the small intestine had been damaged at peritoneoscopy. At operation an acutely inflamed gall bladder was found to have been the origin of the peritonitis, and there were numerous stones in a dilated common bile duct. The introduction of air and the peritoneoscope stirred up the inflammatory process and precipitated the clinical picture.

DISCUSSION

This experience of peritoneoscopy emphasizes the value of the procedure in carefully selected cases, particularly those with either primary or secondary disease of the liver. The investigation is safe provided certain precautions are observed.

Patients who have had previous upper abdominal surgery are not suitable for the examination because of peritoneal adhesions. Any indication of intra-abdominal infection either acute or chronic is a complete contraindication.

Patients who have evidence of cardiac decompensation and ascites constitute a poor risk and the risk does not justify the result of the investigation in such patients.

The value of peritoneoscopy would be enhanced if photographic records could easily be made, otherwise the only method of recording is to employ the services of a skilled medical artist.

Peritoneoscopy is valuable when the appearances are considered alongside detailed biochemical tests of hepatic function and the histological picture. Peritoneoscopy alone can be most useful and economical in areas devoid of extensive laboratory facilities and with a limited number of beds.

The diagnosis of suspected malignant spread of an abdominal growth was confirmed in 36 of the selected cases and no further investigations or operations were performed in these patients and all of them have since died.

All but two of the patients in whom no evidence of metastatic disease was found at peritoneoscopy had subsequent laparotomy with a view to palliative or curative surgery. Four patients were found to have distant spread and in each case a few deposits were found on the posterior surface of the liver or on the under surface of the left lobe. These areas were outside the range of the peritoneoscope.

The remaining 24 patients had no evidence of metastatic disease at laparotomy. Patients with suspected spread in whom peritoneoscopy shows no evidence of metastatic spread should have a laparotomy in order to establish the diagnosis. This is well illustrated by the false negative cases in the present series.

REFERENCES