Percutaneous catheter drainage of abdominal abscesses

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Summary

Eleven patients with 12 abdominal abscesses underwent percutaneous insertion of tube drains into the abscess cavities under radiographic control. Once inserted the catheters were managed in the same way as surgically placed drains. Broad-spectrum antibiotic cover was provided. Of the abscesses 10 resolved and 2 required open drainage; 1 of the latter patients improved dramatically on percutaneous drainage. There were 2 deaths, neither of which was related to the procedure.

Radiographically controlled percutaneous catheter drainage of abdominal abscesses is an easy and effective alternative to formal surgical drainage. Cross-sectional imaging modalities and angiographic catheter exchange techniques are combined for the safe insertion of drainage catheters into abdominal abscesses. Our initial experience with the procedure at Groote Schuur Hospital, Cape Town, is described.

Patients and methods

Once an abdominal abscess is detected radiologically, percutaneous drainage is planned with surgical support if drainage fails or complications occur. Informed patient consent is obtained, and the prothrombin index and platelet count should be adequate. All patients are maintained on broad-spectrum antibiotics. Plain radiographs, contrast studies of the bowel and/or computed tomography (CT) scans are assessed so as to select a drainage site free of intervening viscera (Figs 1-3). The final puncture site and the depth of the abscess are best determined by ultrasonography (Fig. 4). When operative incisions, sutures and drains interfere with scanning, the area can be sealed with OpSite membrane to facilitate scanning.

Following ultrasonic assessment, the patient is transferred to a fluoroscopy room for direct fluoroscopic visualization when manipulating catheters and guide-wires. The ultrasonically determined depth of the abscess is transposed to the aspiration needle. After an injection of local anaesthetic, the presence of the abscess is confirmed by preliminary aspiration (with a 22G spinal or Chiba needle) and culture of pus. The preliminary aspiration also confirms the site, depth and angle of insertion of the needle before the drain is inserted.

In the case of small abscesses only a little pus is aspirated so as to prevent shrinkage of the cavity. An 18G Teflon sheath-needle combination with a needle stop for depth control is then inserted into the abscess cavity. The needle is withdrawn while retaining the sheath in the abscess, and an angiographic guide-wire is then passed down the sheath into the abscess. The sheath is replaced with an 8F pigtail catheter with multiple side-holes (Fig. 5). The guide-wire is removed and the catheter is secured to the skin with a Molnar disc.

Large abscesses need the largest possible chest drain. At the drainage site a tract 1 cm in diameter is created as deeply as possible by means of blunt dissection down to the abscess. The trocar-catheter combination of the chest drain is then gently forced into the abscess cavity using a large clamp across the drain as a stop to prevent puncture of the deep wall of the abscess. The initial dissection down to the abscess minimizes the force used during insertion of the drain. Once it is in the abscess the trocar is removed while advancing the drain slightly until the resistance of the abscess wall is felt. The drain is sutured in position after the abscess has been evacuated by aspiration, with gentle compression and saline irrigation (Fig. 6).

In the case of a discharging abscess sinography will outline the tract along which a guide-wire can be directed under fluoroscopic control (Fig. 7). When intraperitoneal collections of fluid are present contrast medium is given to outline bowel (Fig. 2). Once it is in place, the catheter should be irrigated with 100-200 ml of saline introduced in small amounts to allow good initial evacuation. After the catheter has been secured to the skin it is connected to a closed biliary drainage bag. Smaller (25 ml) aliquots may be injected without aspiration every 4-6 hours for a
Fig. 2. Case 2. Left: barium follow-through study. The small bowel is displaced to the right by a large intraperitoneal abscess on the left. Right: follow-through study at 24 hours. The left colon (arrows) is displaced posteriorly by the abscess. The drain was inserted anterolaterally.

Fig. 3. Case 3. CT scan of left subphrenic abscess. The anterior abscess (arrows) was easily drained with an anterior approach after ultrasonic localization (L = liver, K = kidneys).

day or two. Catheter drainage continues until there is clinical response with cessation of discharge and resolution of the cavity on CT or sinography (Figs 8-10).

Results (Table I)

Percutaneous drainage of 12 abscesses under radiographic control was carried out in 11 patients during a 6-month period. No complications resulted from the procedure. Percutaneous drainage was sufficient to drain the abscess in 9 cases, the drainage period ranging from 1 to 36 days (mean 19 days). An 8F angio-

Fig. 4. Case 4. Ultrasound scan of left subphrenic abscess (sagittal scan through eleventh intercostal space). The abscess (arrows) is above the left kidney (K). The cursor marks and broken line mark the angle, depth and skin entry site for needle insertion and drainage.

graphic pigtail catheter was used to drain 7 abscesses, a chest drain to drain 4 and a Jacques catheter to drain 1.

Two patients required open drainage; one of the 2 deaths recorded was in one of these patients. Both deaths were unrelated to the drainage procedure, and both of the patients who died (Nos 8 and 9) had retroperitoneal abscesses.

Discussion

Intra-abdominal abscesses continue to present a problem, especially as complications of surgery and diseases of the gastro-
intestinal and urogenital tracts. A satisfactory outcome depends on early diagnosis and adequate drainage of the abscess. Its presence and extent are confirmed by conventional radiographic techniques, CT and ultrasonography. The improved visualization provided by these latter modalities coupled with angiographic catheter exchange techniques now allows safe percutaneous placement of drainage catheters in the abscess.

Careful assessment of the clinical situation and liaison with the attendant surgeons are essential before proceeding with diagnostic aspiration and then therapeutic catheter drainage. Selection of the drainage site is determined by the safest and shortest route. The path selected must be free of all viscera and should preferably be extraperitoneal. Posterior and lateral abdominal approaches are safer and allow more dependent drainage. CT is best for path selection (Fig. 3), but conventional contrast studies of bowel suffice for large intraperitoneal collections of fluid (Fig. 2). The final site, depth and angle of drain...
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<td>120 ml</td>
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<td>Fluoroscopy</td>
<td>32F chest drain</td>
<td>11th intercostal space</td>
<td>750 ml</td>
<td>24 d, successfully drained</td>
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SPA = subphrenic abscess
insertion are determined by ultrasonography (Fig. 4). When recent incisions interfere with scanning, sealing of the wounds with Op-Site membrane allows satisfactory ultrasonic examination. In most patients, especially those with smaller collections of fluid, fluoroscopy allows easier manipulation of the guide wire and catheter. Small amounts of contrast medium may also be injected during fluoroscopy. Fluoroscopic control of percutaneous drainage is also necessary when abscess gas interferes with localization by ultrasonography (cases 1 and 6) and also when a guide-wire has to be passed along the sinus tract outlined by sinography (case 5, Fig. 7).

Ideally the tube with the largest possible diameter is used. This is determined by the size and site of the abscess. Smaller tubes such as the 8F pigtail catheter are therefore used for small collections of fluid or where tube placement is difficult, as in high subphrenic collections (cases 1 and 4). For high subphrenic abscesses a route below the diaphragmatic attachments is selected so as to prevent intrathoracic extension of infection. An anterior or lateral subcostal approach is therefore used, while posterior collections are best drained below the twelfth rib. Use of the eleventh intercostal space in 3 patients (Nos 4, 7 and 11) was trouble-free. Different-sized chest drains are available for the larger abscesses. The chest drains are rather rigid, and 1 patient (No. 3) experienced a great deal of discomfort until it was replaced by a softer tube.

Immediately after evacuation of pus at the time of drain insertion the catheter is irrigated using 100 - 200 ml saline, which allows good initial clearing of the pus. For 1 - 2 days, 4 - 6-hourly irrigation using smaller aliquots of saline without aspirating ensures catheter patency and improves flow by decreasing pus viscosity. Gentle irrigation and antibiotic cover will decrease the risk of bacteraemia. Similar care should be exercised during sinography, especially in the period soon after drainage, when overdistension of the cavity must be avoided.

Formal surgical drainage was necessary in cases 7 and 9. Percutaneous drainage worked well as a temporizing measure in case 7. The patient's uncontrolled diabetes was stabilized, and she became a pyrexial and was in a better general condition for formal surgical drainage of an extensive retroperitoneal collection of fluid (Fig. 10). Patient 9 had a multilocular, retroperitoneal abscess, and open drainage was required after 1 day of inadequate catheter drainage. Van Sonnenberg et al. regard phlegmonous collections as unsuitable for percutaneous catheter drainage. Other contraindications are interposed viscera, high subphrenic abscesses and coagulopathy.

Most patients become a pyrexial after 24-28 hours. Our mean period of drainage of 19 days is longer than the 14 days described by Gerzof et al. and the 9.8 days described by MacErlane et al. The longer period in our series may have been due to the presence of an infected haematoma in case 3 (Fig. 9). Another explanation for the rather protracted drainage is the poor general condition of many of the patients (Nos 2, 6, 7, 8, 9, 10 and 11), who were regarded as being poor operative risks. Furthermore, 3 patients (Nos 1, 3 and 11) were discharged and their drains were removed after 10 - 20 days out of hospital.

Recorded major complications are a case of intra-abdominal bleeding and jejunal fistula in a series of 58 patients with 6 recurrences and bleeding and empyema in a series of 24 patients with no recurrences. In both series 2 patients had transient bacteraemia. In 39 other patients there were no complications or recurrences.

Comparison with formal surgical drainage is difficult because of patient selection. In a series of 540 intra-abdominal abscesses there were patients who required long periods of hospitalization, and mortality rates ranged from 2% to 44%. Both the significant morbidity and mortality were related to the site of the abscess and the patient's age. Furthermore, surgical drainage has been associated with recurrence rates of up to 49%. In most cases it therefore seems that a trial of percutaneous catheter drainage is worth while when diagnostic aspiration of an abdominal collection of fluid reveals the presence of pus.
Conclusion

Percutaneous drainage of abdominal abscesses is a safe and effective alternative to formal surgical drainage. The advantages include the fact that drainage takes place under local anaesthesia, which is beneficial especially when the patient's general condition is too poor for the administration of a general anaesthetic. The closed collecting system makes nursing easier, and patient acceptance of the procedure is good. Liaison between the attendant surgeon and the radiologist is essential before percutaneous drainage is attempted.

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REFERENCES


Assessment of a geriatric exercise programme using ambulatory electrocardiography

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Summary

The purpose of this study was to assess the efficacy as well as the immediate possible cardiovascular risk of a geriatric exercise programme, administered without prior medical screening or evaluation of the exercise capacity of the participants, in improving cardiorespiratory fitness.

Ambulatory electrocardiography performed during exercise on 6 randomly selected male participants in a physiotherapist-controlled geriatric exercise programme revealed heart rates of 72 - 97/min, values unlikely to produce significant improvements in cardiorespiratory fitness. This low-intensity exercise session did not induce any ischaemic ST-segment displacements, or arrhythmias displaying the generally accepted criteria for premonitory arrhythmias known to precede the development of ventricular fibrillation. However, subsequent stress testing, performed at the lower threshold intensity of exercise needed to elicit a significant physiological training effect, resulted in an adverse cardiac response in 3 subjects, of whom 2 were asymptomatic.

We conclude that the geriatric exercise programme under investigation would be unlikely to result in improved cardiorespiratory fitness in the majority of participants, but if such a programme is to be implemented in a safe manner in a geriatric population, prior medical screening including exercise testing is mandatory.


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The value of regular physical activity in relation to physiological, psychological, and social variables in the elderly is well known.1,2 Relatively low-grade exercise may provide benefits by preserving adequate joint flexibility, muscle tone, and co-ordination up to an advanced age. In contrast, significant improvements in cardiorespiratory fitness are thought to arise only from constant, repetitive use of the skeletal muscles at an intensity above a threshold level of metabolic activity.1 Since the cardiovascular hazard of such exercise theoretically becomes greater as the age...