Non-operative treatment of abscesses—are there limits or limitations

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Introduction

- The management of abscesses is to gain source control in order to reduce the production of endotoxins.
- Standard
  - Antibiotics
  - Drainage

- Some abscesses have been successfully treated non-operatively
  - Antibiotics only
  - antibiotics and needle aspiration
  - antibiotics and Percutaneous catheter drainage (PCD)

- PCD prevents the morbidity of an operation.
- Successful PCD:
  - decrease of >90% of the original abscess size
  - if septic patients recover from the sepsis².

- There are certain limiting factors that will not allow the manage abscesses non-operatively.
Type and Site of abscesses

- PCD is not always suitable
  - abscesses lying in difficult locations e.g. intra-abdominally
- Diverticular abscesses when amenable to PCD has a reported failure rate of 15 to 30 percent\(^4\).
- PCD of renal abscesses
  - Pyopneumothorax
  - Bacteraemia
  - Fistula in the gastrointestinal tract\(^5\)
Type and Site of abscesses

- In a retrospective review of 114 patients with intra-abdominal abscesses.
- Antimicrobial therapy without drainage was successful in 86 percent of cases.
- Pelvic abscesses
  - usually associated with a worse prognosis
  - often require surgery
- *In this study, the management of pelvic abscesses were no different than abscesses in the other locations.*
Type and Site of Abscesses

- Muscle abscesses can usually be treated conservatively,
- The presence of concurrent bone involvement limits the success rate.
- A retrospective study of 94 patients showed the success of PCD for muscle abscesses
- The presence of skeletal infection was associated with drainage failure².
  - Osteomyelitis
  - Diskitis
  - Epidural abscess
- Musculoskeletal infection was statistically significantly more likely to undergo surgery (p =0.0001).
Type and Site of abscesses

- Amoebic liver abscesses: antibiotics > aspiration > surgery\(^\text{16}\)
- Skin abscesses are **not** usually treated successfully with non-operative intervention.
- A prospective study of 101 patients with skin abscesses
  - All patients had a sonar at initial presentation
  - 54 were randomized for I&D and 47 U/S guided needle aspiration
  - 60% of needle aspirations yielded little or no purulence, despite:
    - U/S visualization of an abscess cavity
    - U/S guidance during the procedure.
- Success of U/S guided needle aspiration: 26%
- Success in patients with I&D: 80%\(^\text{7}\)
**Type and Site of abscesses**

- In endoscopic pancreatic abscess drainage, access to the abscess cavity is gained through an incision made in the stomach wall or duodenum.
- With or without endoscopic ultrasound (EUS) guidance.
- In non-EUS-guided drainage:
  - the abscess cavity must be in close apposition to the gastrointestinal wall (1 cm)
  - there must be a bulge either in the stomach or duodenum marking the location of the abscess.
- The advantage of using EUS:
  - does not rely on bulging to locate the site of the abscess
  - excludes the presence of interposed blood vessels and reduces the risk of procedure-related bleeding.21
**Size of the Abscess: Intra-abdominal**

- Intra-abdominal abscesses >5 cm has a less favourable outcome with antibiotic treatment alone.
- According to the retrospective study by Kumar, high failure rate with:
  - large intra-abdominal abscesses (>6.5 cm)
  - temperature >38.4 degrees.
### Table 1

<table>
<thead>
<tr>
<th></th>
<th>Clinical Improvement With Antibiotic Management</th>
<th>Failed Conservative Management</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of patients</td>
<td>61</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>Age (yr)</td>
<td>39 (25–48)</td>
<td>39 (29–50)</td>
<td>0.5694</td>
</tr>
<tr>
<td>Tmax-Admission (F)</td>
<td>100.8 (99.3–101.5)</td>
<td>101.2 (100.6–101.9)</td>
<td>0.0067</td>
</tr>
<tr>
<td>Admission WBC (×10^9/μl)</td>
<td>13.7 (10.7–16.8)</td>
<td>15.2 (13.1–18.5)</td>
<td>0.0622</td>
</tr>
<tr>
<td>Maximum abscess diameter (cm)</td>
<td>4 (3–6)</td>
<td>6.5 (5–10)</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>

WBC = white blood cell.
Size of the Abscess: Pyogenic Liver Abscesses

- A retrospective study of 58 patients with pyogenic hepatic abscess
- Antibiotics alone for the smaller abscesses (<3.5cm in diameter)
- Percutaneous drainage for abscesses >3.5cm
Size of the Abscess: Crohn’s disease

- Carvalho: 
  - >4 cm 
  - usually would not respond to medical treatment alone 
  - require drainage 
- The American College of Radiology recommends imaging-guided PCD for Crohn’s disease related abdominal fluid collections greater than 4cm.³
Size of the Abscess: Breast

- Studies have shown the success of sonar guided needle aspiration of lactating breast abscesses.
- Abscesses >3cm to 5cm, needle aspiration is unlikely to be successful and will require PCD under sonar guidance8, 14,15.
- A larger than average volume of pus is a risk for failure to treat with needle aspiration.
- Eryilmaza reported from a prospective study that the mean volume of pus from successful needle aspiration was 44.3ml and in the unsuccessful aspiration was 70.55ml9.
**Size of the Abscess: Renal**

- 3cm to 5cm is the maximum diameter between treating with antibiotics only or a drainage procedure (percutaneous or surgical).
- <3cm: antibiotics only
- 3cm to 5cm: antibiotics only or antibiotics with drainage
- >5cm: antibiotics and drainage\(^5\).
Table 25
Reported Primary Treatment of Renal or Perinephric Abscesses by Size

<table>
<thead>
<tr>
<th>Investigator</th>
<th>Country</th>
<th>Year</th>
<th>n</th>
<th>Mean abscess size</th>
<th>Mean hospital stay</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>&lt; 3 cm</td>
<td>3 - 5 cm</td>
</tr>
<tr>
<td>Dalla Palma, et al.⁵</td>
<td>Italy</td>
<td>1984-1997</td>
<td>16</td>
<td>Antibiotics alone</td>
<td>Antibiotics</td>
</tr>
<tr>
<td>Coelho, et al.¹¹</td>
<td>Brazil</td>
<td>1992-2002</td>
<td>65</td>
<td>Antibiotics alone</td>
<td>PCD or SD</td>
</tr>
<tr>
<td>Lin, et al.⁹</td>
<td>Taiwan</td>
<td>2001-2006</td>
<td>73</td>
<td>Antibiotics alone</td>
<td>Antibiotics alone</td>
</tr>
<tr>
<td>Present study</td>
<td>Korea</td>
<td>2001-2008</td>
<td>41</td>
<td>Antibiotics alone</td>
<td>Antibiotics alone</td>
</tr>
</tbody>
</table>

PCD, percutaneous drainage; SD, surgical drainage.
Type of infections

- Antibiotics
  - penetrate abscesses poorly
  - have poor activity in this environment in which bacteria are not rapidly dividing\(^6\)
  - No diagnostic drainage
  - Empirical regimens are used without knowledge of the infective organisms and their antimicrobial susceptibilities\(^5\).
- A multivariate analysis showed that MRSA is an independent risk factor for failure of therapy regardless of the drainage procedure.
- Gaspari reported in a prospective study of superficial abscesses
  - U/S guided needle aspiration of abscesses with MRSA were less likely to be successful compared to I&D (8% versus 61%)\(^7\).
- The growth of yeast in liver abscesses is an independent risk for failure of non-operative treatment\(^{19}\).
Concurrent use of other medications

- Concurrent use of medications that may influence the immunological response
- Retrospective studies on patients with Crohn’s disease associated abscesses have success rate of 60\% using IVI antibiotics alone.
- Unfortunately, over 50\% of those patients eventually required operative drainage.
- These patients were on corticosteroid treatment for their inflammatory bowel disease\(^3\).
- Another study by Cronin on muscle abscesses also demonstrated a higher failure rate with PCD when the patients were on chemotherapy\(^2\).
- Mezhir also showed failure with chemotherapy to treat liver abscesses non-operatively. 19
Characteristics of abscesses: viscosity, loculations and capsule

- Thickened abscess contents, i.e. increased viscosity may obstruct abscess drainage\(^6\).
- Washing out to decrease the viscosity of purulent discharge
  - normal saline
  - sterile water.
- Studies have compared normal saline and lytic agents
  - Urokinase
- There was no difference in the success or failure of the draining abscess\(^2\).
- Small-caliber catheters
  - necrotic tissue
  - blood coagulates
  - thick purulent fluid\(^3\).
Characteristics of abscesses: viscosity, loculations and capsule

- Loculations or septations, even with the use of U/S-guided needle aspiration, may fail\(^7,\,10\).
- In multi-septated abscesses PCD drainage may not access all of the individual compartments, thereby preventing a complete drainage\(^11\).
- The capsule:
  - Too firm-resist penetration
  - Too soft-evade penetration
  - E.g. Endorectal ultrasound-guided aspiration and drainage of pelvic fluid collections\(^22\).
- Esther also demonstrated in patients with any breast abscess:
  - Uncapsulated abscesses are usually inadequately drained and requires the insertion of a PCD\(^11\).
Hospital and patient factors

- The local expertise of the hospital influences management.
- Carvalhoa: intra-abdominal abscesses admitted to a teaching hospital were associated with an increased likelihood of PCD\(^3\).
- Eryilmaza reported that delayed access to medical facilities is associated with a higher failure rate of needle aspiration for breast abscesses\(^9\).  
- Independent patient factors also influences outcome:
  - age over 65 years
  - Thrombocytopenia
  - underlying comorbidity such as Diabetes Mellitus\(^5\).
- Worsening of sepsis when treating conservatively indicates that management needs to progress to operative treatment.
Distorted anatomy

- PCD in patients with previous abdominal surgery has a high risk of complication
  - Bleeding
  - perforated viscus
  - solid organ injury.
- Minor complications occur more frequently
  - catheter obstruction
  - migration
Complicated abscesses

- Complicated abscesses indicates surrounding tissue damage
- Highly unlikely to be treated successfully with non-operative measures.
- Crohn’s disease associated abscesses + strictures + fistulae >>> operative intervention.
- Conversely, small abscess without concurrent fistula >>> antibiotics alone.
- Pyogenic liver abscesses with fistula’s with the biliary tree is an independent predictor of non-operative management failure.¹⁹
- The presence of strictures and abdominal fistulas >>> surgical treatment (since there might be already an irreversible structural damage in the bowel wall)³.
Non-resolving

- clinical deterioration
- imaging that demonstrated failure of abscess resolution.
Summary of limits/limitations

- Type and Site of abscesses
- Size of the Abscess
- Type of infections
- Concurrent use of other medications
- Characteristics of abscesses
- Hospital and patient factors
- Distorted anatomy
- Complicated abscesses
- Non-resolving
Conclusion

- There are many factors that influence the most appropriate management of abscesses.
- The treatment of one abscess is not always the same for another.
- Health professionals need to be aware of the non-operative options available to manage abscesses and the limits and limitations thereof; and when to progress to operative management.
References


References
