Psoas Abscess in Adults – Microbiology Full Clinical Guideline

Reference number: CG-MIC/3669/23

Introduction

- The pathogens of psoas abscess can be inoculated through various mechanisms of transmission:
    - Haematogenous:
        - Another focus of infection culminates in bacteraemia; the microorganism disseminates via the blood and inoculates the skeletal muscle.
    - Contiguous:
        - Another focus of infection (e.g. native vertebral osteomyelitis and discitis, prosthetic joint [hip] infection, mycotic aortic aneurysm, vascular graft infection, urinary tract infection, ileocolitis, pancreatic abscess, or appendicitis) disseminates locally and invades the musculature.
- The commonest cause of psoas abscess – from haematogenous transmission – is *Staphylocccus aureus*.
- Psoas abscess, emanating from contiguous transmission, can be:
    - Monomicrobial or polymicrobial.
    - Associated with *Enterobacterales*.
- Symptoms and signs of psoas abscess include back/flank pain, limp, an inguinal mass, and a reduced range of hip movement.
- Temperatures > 38 ° C or < 36 ° C, a respiratory rate > 20 breaths/minute, a heart rate > 90 beats/minute, and hypotension can denote progression of localised infectious disease into sepsis and septic shock.

Differential diagnosis

- The symptoms and signs of psoas abscess can be mimicked by other infectious and non-infectious pathologies:
    - Septic (hip) arthritis, retrocecal appendicitis, psoas muscle hematoma, malignancy, iliopsoas bursitis, herniated disc fragments, and calcium pyrophosphate deposition pseudo-abscess.

Investigation

Radiology

- If the origin of infectious disease is unknown:
    - First line: computed tomography (CT).
- If a spinal origin (e.g. discitis) of infectious disease is suspected:
    - First line: if available*, magnetic resonance imaging (MRI).
    - Second line: if MRI is not available, CT.
- * NB1 Within the Queen's Hospital Burton (QHB) and Royal Derby Hospital (RDH), the MRI service operates 0900-1700 Mondays to Fridays.
- * NB2 In the QHB, there is no MRI service out-of-hours.
- * NB3 In the RDH, discussion with the medical consultant and – if the senior physician deems MRI essential – liaison with the on call radiology consultant is required 1700-0900 Mondays to Fridays, and all-day Saturdays and Sundays.

Microbiology

- With the range of bacterial pathogens, variations in resistance and susceptibility profiles, contraindications, and side-effects, microbiological investigation enables best antibiotic practice:
    - Before starting antibiotics: blood cultures × 2, drawn approximately 1-15 minutes apart, from 2 locations/venepunctures.
    - If surgery or radiology intervene:
        - Fluid, pus, or tissue for microscopy, culture, and susceptibility (MC&S); ± *Mycobacterium* investigations.

Histology

- With the infectious and non-infectious differential diagnosis including malignancy:
    - If surgery or radiology intervene:
        - Biopsy for histopathology.

Blood sciences

- Full blood count (FBC), international normalised ratio (INR), C reactive protein (CRP), lactate, urea and electrolytes (U&Es), and liver function tests (LFTs).

Treatment

Surgical opinion ± intervention

- Psoas abscess can be secondary to diverse aetiologies (native vertebral osteomyelitis and discitis, prosthetic joint (hip) infection, mycotic aortic aneurysm, vascular graft infection, urinary tract infection, ileocolitis, pancreatic abscess, appendicitis, etc.) and can progress from localised infectious disease into sepsis.
- Early discussion with the relevant surgical registrar/consultant (spinal, orthopaedics, vascular, urological, upper/lower gastrointestinal tract, etc.) on call is recommended.
- Surgical intervention could enable: (i) elimination of the origin(s) of the infectious episode; (ii) reduction of the microbial inoculum; (iii) identification of the causative agent(s); and, (iv) restoration of host physiological function.
- Equally, source control via radiological intervention can be considered.
- If the surgical team consider radiological intervention, consultant to consultant discussion is recommended.

Radiological opinion ± intervention

- Interventional radiology with:
    - Ultrasound (US)- or CT-guided:
        - Percutaneous drainage via insertion of a pigtail catheter drain; or
        - Percutaneous needle aspiration

  can be considered for psoas abscesses, especially if surgical drainage is contraindicated.
- Drainage could enable: (i) reduction of the microbial inoculum; (ii) identification of the causative agent(s); and, (iii) restoration of host physiological function.
- However, psoas abscesses can be complex; varying from single to multifocal, from superficial to deep, and relative proximity to anatomy that could be cross-contaminated.
- Consultant to consultant discussions - regarding the specific patient, contraindications, and complications – are recommended.

- Interventional radiology requires:
    - An electronic request; and
    - Informed consent for the procedure (https://derby.koha-ptfs.co.uk/cgi-bin/koha/opac-detail.pl?biblionumber=774); and
    - An up-to-date platelet count and clotting (https://derby.koha-ptfs.co.uk/cgi-bin/koha/opac-detail.pl?biblionumber=1577)

  to be completed by the referring team.
- Please note, in general, local Trust policy requires omission of antiplatelets (e.g. clopidogrel for 5-7 days) and anticoagulants (e.g. warfarin for 5 days, apixaban or rivaroxaban for 48 hours) before radiological intervention.
- Possible exceptions – wherein the clinical condition dictates drainage or antiplatelet/anticoagulant omission is contraindicated – require surgical consultant to interventional radiologist consultant discussion, regarding potential benefits and risks of intervention.

Empiric, intravenous antibiotics

	Community acquired	Hospital acquired
First line	Co-amoxiclav 1.2 g 8 hourly	Piperacillin tazobactam 4.5 g 8 hourly
Second line, if non-immediate without systemic involvement penicillin allergy	Metronidazole 500 mg 8 hourly **and** Cefuroxime 1.5 g 8 hourly	Metronidazole 500 mg 8 hourly **and** Ceftriaxone 2 g 12 hourly
Third line, if immediate rapidly evolving or non-immediate with systemic involvement penicillin allergy	Metronidazole 500 mg 8 hourly **and** Co-trimoxazole 960 mg 12 hourly	Metronidazole 500 mg 8 hourly **and** Co-trimoxazole 960 mg 12 hourly

Directed, intravenous antibiotics (with susceptibilities)

- Methicillin susceptible *Staphylococcus aureus* (MSSA), according to susceptibilities:
    - First line:
        - Flucloxacillin 2 g 6 hourly.
    - Second line, if non-immediate without systemic involvement penicillin allergy:
        - Cefuroxime 1.5 g 8 hourly.
    - Third line, if immediate rapidly evolving or non-immediate with systemic involvement penicillin allergy:
        - Vancomycin or teicoplanin, dose as per hospital guidelines, vancomycin target pre dose level 15-20 mg/l, teicoplanin target pre dose level 15-30 mg/l.
- Methicillin resistant *Staphylococcus aureus* (MRSA), according to susceptibilities:
    - First line:
        - Vancomycin or teicoplanin, dose as per hospital guidelines, vancomycin target pre dose level 15-20 mg/l, teicoplanin target pre dose level 15-30 mg/l.
    - Second line:
        - Clindamycin 600 mg 6 hourly.
    - Third line:
        - Linezolid 600 mg 12 hourly (or per oral [absorption 100%]).
- *Streptococcus* species, according to susceptibilities:
    - First line:
        - Benzylpenicillin 1.2 g 6 hourly.

    - Second line, if non-immediate without systemic involvement penicillin allergy:
        - Cephalosporin; narrowest spectrum of cefuroxime 1.5 g 8 hourly or ceftriaxone 2 g 24 hourly.
    - Third line, if immediate rapidly evolving or non-immediate with systemic involvement penicillin allergy:
        - Vancomycin or teicoplanin, dose as per hospital guidelines, vancomycin target pre dose level 15-20 mg/l, teicoplanin target pre dose level 15-30 mg/l.
- *Enterobacterales* (e.g. *Escherichia coli*) according to susceptibilities:
    - First line:
        - Penicillin; narrowest spectrum of amoxicillin or co-amoxiclav or piperacillin tazobactam standard dosage.
    - Second line, if non-immediate without systemic involvement penicillin allergy:
        - Cephalosporin; narrowest spectrum of cefuroxime 1.5 g 8 hourly or ceftriaxone 2 g 24 hourly.
    - Third line, if immediate rapidly evolving or non-immediate with systemic involvement penicillin allergy:
        - Ciprofloxacin 400 mg 12 hourly (consider per oral [absorption 60-80%]).

Multi-disciplinary meeting, intravenous to per oral step down, and outpatient parenteral antimicrobial therapy

- After 7-14 days of intravenous antimicrobial chemotherapy, if the patient is afebrile, observations stable, and inflammatory markers downward trending, collaborate with the medical/surgical consultant regarding their preference for:
    - Referral to the University Hospitals of Derby and Burton (UHDB) orthopaedic multi-disciplinary meeting (1200-1300 Fridays); or
    - Per oral step down; or
    - Outpatient parenteral antimicrobial therapy (OPAT).

  NB If for orthopaedic multi-disciplinary meeting discussion, please liaise with the clinical audit team of the orthopaedic department, of the Royal Derby Hospital, regarding the pro forma and the Microsoft Teams meeting hyperlink.
- After 7-14 days of intravenous antimicrobial chemotherapy, if the patient is febrile, observations unstable, and/or inflammatory markers upward trending, collaborate with the surgeons/radiologists regarding ± further intervention, update the microbiologist, and continue intravenous therapy.

Directed, per oral antibiotics (with susceptibilities)

- MSSA, according to susceptibilities:
    - First line:
        - Flucloxacillin 1 g 6 hourly.
    - Second line:
        - Doxycycline 100 mg 12 hourly.
    - Third line:
        - Clindamycin 300-450* mg 6 hourly.
- MRSA, according to susceptibilities:
    - First line:
        - Doxycycline 100 mg 12 hourly.
    - Second line:
        - Clindamycin 300-450* mg 6 hourly.
    - Third line:
        - Linezolid 600 mg 12 hourly**.

- *Streptococcus* species, according to susceptibilities:
    - First line:
        - Amoxicillin 500 mg-1* g 8 hourly.
    - Second line:
        - Doxycycline 100 mg 12 hourly.
    - Third line:
        - Clindamycin 300-450* mg 6 hourly.
- *Enterobacterales* (e.g. *Escherichia coli*), according to susceptibilities:
    - First line:
        - Narrowest spectrum of amoxicillin 1 g 8 hourly, or co-amoxiclav 625 mg 8 hourly plus amoxicillin 500 mg 8 hourly.
    - Second line:
        - Co-trimoxazole 960 mg 12 hourly.
    - Third line:
        - Ciprofloxacin 500 mg 12 hourly.
- * Final dosage to be tailored to specific parameters of the patient (e.g. weight) and the pathogen (e.g. minimum inhibitory concentration) in collaboration with the microbiology consultant responsible for sterile site investigation or within the orthopaedic multi-disciplinary meeting.
- ** In general, maximum duration of treatment 28 days.

Directed, outpatient parenteral antimicrobial therapy

- Collaborate with the OPAT consultant.

Empiric, per oral or outpatient parenteral antimicrobial therapy

- If symptoms/signs/radiology features of psoas abscess, and the microbiology is negative, collaborate with a microbiologist regarding empiric options.

Duration of antibiotics

- Before discharge to the community, medical/surgical team to collaborate with radiology regarding the optimal re-imaging modality and timeframe for follow up imaging.
- If for per oral step down or OPAT, monitor bloods (FBC, CRP, U&Es, and LFTs) weekly-fortnightly.

- 3-6 weeks, from date of drainage.
- Follow up with the medical/surgical team on intravenous or per oral therapy.

Management

Clinical concerns re psoas abscess (symptoms and signs include back/flank pain, limp, an inguinal mass, and a reduced range of hip movement)

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Investigation

- Radiology:
  - If the origin of infectious disease is unknown, first line, CT
  - If a spinal origin (e.g. discitis) of infectious disease is suspected, first line (if available), MRI, second line (if MRI is not available), CT
- Microbiology:
  - Before starting antibiotics: blood cultures × 2, drawn approximately 1-15 minutes apart, from 2 locations/venepunctures
- Blood sciences:
  - FBC, INR, CRP, lactate, U&Es, and LFTs

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Treatment

- Surgical opinion ± intervention:
  - Consult with the relevant surgical senior (spinal, orthopaedics, vascular, urological, upper/lower gastrointestinal tract, etc.) on call
- ± Radiological opinion and intervention:
  - Interventional radiology with US- or CT-guided percutaneous aspiration or drainage can be considered for psoas abscesses, especially if surgical drainage is contraindicated
  - Surgical consultant to radiology consultant discussions - regarding the specific patient, contraindications, and complications – are recommended
- Empiric, intravenous antibiotics (please note, page 3)

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Investigation (if surgery or radiology intervene):

- Microbiology:
  - Fluid, pus, or tissue for MC&S
- Histology:
  - Biopsy for histopathology

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Treatment

- Directed, intravenous antibiotics (please note, pages 3-5)
- ± Referral to the UHDB orthopaedic multi-disciplinary meeting (1200-1300 Fridays)

Appendix: pathophysiology and antibiotics

- In microbial infection with abscess formation, an antibiotic must first traverse the membranes of the endothelium, then diffuse through the interstitium, and then traverse a second membrane, that of the abscess.
    - Infection initiates an inflammatory response; the inflammation renders the interstitial fluid more viscous. The increase in viscosity decreases the amount of antibiotic transferred by diffusion.
    - The abscess is traversed through passive diffusion across the membrane - rather than pores - impairing the delivery of antibiotics. As the abscess forms and matures, the permeation of the membrane decreases, impeding the delivery of antibiotics.
    - In microbial infection with abscess formation, as the abscess matures, bacteria transition from the planktonic to the sessile state. The planktonic state of bacteria is preferable for antibiotics; active bacterial metabolism is integral to the mechanism of action for anti-bacterials and bactericide (e.g. turnover of peptidoglycan enables beta-lactam inhibition of transpeptidases to cause bacterial death). The slow growing bacteria of mature abscesses are less susceptible to antibiotics.

References

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Document control

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