

Dental/Periapical Abscess in Adults – Microbiology Full Clinical Guideline

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Introduction

- Microorganisms - including bacteria - may colonise parts of the oral cavity and establish microbial niches within the mouth.
- Viridans streptococci (e.g. the *Streptococcus sanguinis* group) and anaerobes (e.g. *Peptostreptococcus* species and *Veillonella* species) are commonly identified bacterial constituents of the oral microbiota.
- Modifications to the local environment - for example, dietary exposure to sucrose - may disrupt microbial homeostasis:
 - Bacterial colonisation of the tooth surface may then evolve into host inflammation, with the formation of dental caries:
 - Thereafter, microbial invasion of the pulp may next cause pulpitis:
 - Bacterial penetration into alveolar bone may enable the formation of a dental/periapical abscess.
- Viridans streptococci (e.g. the *Streptococcus mutans* group) and anaerobes (e.g. *Fusobacterium* species) are commonly identified bacterial causes of polymicrobial dental/periapical abscesses.
- Symptoms and signs of dental/periapical abscess may include odontalgia, sensory (temperature) deficit, tenderness, swelling, and purulent discharge.
- Trismus, stridor, and/or dysphagia can denote localised extension of infection.
- 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](#) or septic shock.

Differential diagnosis

- The symptoms and signs of dental/periapical abscess may overlap with other infective and non-infectious pathologies.
 - Infective: parotitis, pulpitis, and/or sinusitis (maxillary).
 - Non-infectious: giant cell arteritis, sialolithiasis, temporomandibular disorder, trauma, and/or trigeminal neuralgia.

Investigation

Radiology

- First line:
 - X-ray:
 - Periapical ± orthopantomogram.
- ± Second line:
 - If clinical concerns re infection of the deep fascial spaces of the head and neck:
 - In general, computed tomography (CT) with contrast.

Microbiology

- In general, the commonly identified bacterial causes of polymicrobial dental/periapical abscesses overlap with the microorganisms that colonise the oral cavity.

- The microbiology investigations outlined herein can be considered, case by case:
 - If episode(s) of fever, or if the differential diagnosis includes bloodstream infection/[sepsis](#)/septic shock, or if for initiation of treatment with intravenous antibiotics:
 - Before starting antibiotics: blood cultures x 2, drawn approximately 1-15 minutes apart, from 2 locations/venepunctures.
 - If the maxillofacial team intervenes:
 - Extraoral needle aspirate for microscopy, culture, and susceptibility (MC&S); and/or
 - Intraoperative fluid, pus, or tissue for MC&S.

Blood sciences

- ± Full blood count (FBC), C reactive protein (CRP), lactate, urea and electrolytes (U&Es), and liver function tests (LFTs):
 - E.g. if admitted for inpatient management.

Treatment

Surgical opinion ± intervention

- Maxillofacial interventions may include: (i) incision and drainage; (ii) root canal; or (iii) extraction.
- Discussion with the maxillofacial registrar/consultant on call is recommended.
- Surgical intervention could enable: (i) elimination of the origin(s) of the infectious episode; (ii) reduction of the microbial inoculum; and (iii) identification of the causative agent(s).

Empiric, per oral antibiotic options

	No drug history of recent (in the past 2 weeks) amoxicillin chemotherapy	Drug history of recent (in the past 2 weeks) amoxicillin chemotherapy
First line	Phenoxymethylpenicillin 500 mg 6 hourly or amoxicillin 500 mg 8 hourly; ±* Metronidazole 400 mg 8 hourly	Co-amoxiclav 625 mg 8 hourly
Second line, if penicillin allergy	Clindamycin 300 mg 6 hourly	Clindamycin 300 mg 6 hourly
Third line, if penicillin allergy and if clindamycin is contraindicated	Metronidazole 400 mg 8 hourly and Clarithromycin 500 mg 12 hourly	Metronidazole 400 mg 8 hourly and Clarithromycin 500 mg 12 hourly
Fourth line, if penicillin allergy and if clindamycin and clarithromycin are contraindicated	Metronidazole 400 mg 8 hourly and Levofloxacin 500 mg 12 hourly	Metronidazole 400 mg 8 hourly and Levofloxacin 500 mg 12 hourly
Fifth line, if penicillin allergy and if clindamycin, clarithromycin, and levofloxacin are contraindicated	Metronidazole 400 mg 8 hourly and Linezolid 600 mg 12 hourly	Metronidazole 400 mg 8 hourly and Linezolid 600 mg 12 hourly

* The National Institute for Clinical Excellence (NICE) states " Consider concomitant treatment with metronidazole if the infection is severe or spreading (lymph node involvement, or systemic signs such as fever or malaise)".

Empiric, intravenous antibiotic options

- If there is no clinical concern re [sepsis](#) and no history of immunocompromise:

First line, if there is no drug history of recent (in the past 2 weeks) amoxicillin chemotherapy	Metronidazole 500 mg 8 hourly and Benzylpenicillin 1.2 g 6 hourly
Second line, if there is drug history of recent (in the past 2 weeks) amoxicillin chemotherapy	Co-amoxiclav 1.2 g 8 hourly
Third line, if non-immediate without systemic involvement penicillin allergy	Metronidazole 500 mg 8 hourly and Cefuroxime 1.5 g 8 hourly
Fourth line, if immediate rapidly evolving or non-immediate with systemic involvement penicillin allergy	Metronidazole 500 mg 8 hourly and 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
Fifth line, if immediate rapidly evolving or non-immediate with systemic involvement penicillin allergy	Clindamycin 600 mg 8 hourly

- If there are clinical concerns re [sepsis](#) or history of immunocompromise:

First line	Piperacillin tazobactam 4.5 g 6 hourly ± If there are clinical concerns regarding the risk of MRSA, glycopeptide (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, if non-immediate without systemic involvement penicillin allergy	Metronidazole 500 mg 8 hourly and Glycopeptide (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; and Ceftazidime 2 g 8 hourly
Third line, if immediate rapidly evolving or non-immediate with systemic involvement penicillin allergy	Metronidazole 500 mg 8 hourly; and Ciprofloxacin 400 mg 8 hourly; and Glycopeptide (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
Fourth line, if immediate rapidly evolving or non-immediate with systemic involvement penicillin allergy and if metronidazole is contraindicated	Clindamycin 600 mg 8 hourly; and Aztreonam 2 g 6 hourly

Duration of antibiotics

- If source control: 3-5 days from the maxillofacial intervention.
- If no source control: 5-7 days (5 days if no evidence of invasive bacterial disease [e.g. bacteraemia]; ≥ 7 days if bloodstream infectious disease).

Management

Clinical concerns re dental/periapical abscess (symptoms and signs include odontalgia, temperature deficit, tenderness, swelling, and purulent discharge)

Investigation

- Radiology:
 - First line: x-ray (periapical ± orthopantomogram)
 - ± Second line: if clinical concerns re infection of the deep fascial spaces of the head and neck, in general, CT with contrast
- ± Microbiology:
 - If episode(s) of fever, or if the differential diagnosis includes bloodstream infection/[sepsis](#)/septic shock, or if for initiation of treatment with intravenous antibiotics:
 - Before starting antibiotics: blood cultures × 2, drawn approximately 1-15 minutes apart, from 2 locations/venepunctures
- ± Blood sciences:
 - ± FBC, CRP, lactate, U&Es, and LFTs:
 - E.g. if admitted for inpatient management

Treatment

- Surgical opinion ± intervention:
 - Consult with the maxillofacial registrar/consultant on call if a dental/periapical abscess has been diagnosed:
 - Surgical interventions may include: (i) incision and drainage; (ii) root canal; or (iii) extraction
- Empiric antibiotics (re per oral and intravenous options, please note pages 2 and 3)

Investigation (if maxillofacial intervention)

- Microbiology:
 - Extraoral needle aspirate for MC&S; and/or
 - Intraoperative fluid, pus, or tissue for MC&S

Treatment

- Empiric antibiotics:
 - If source control: 3-5 days from the maxillofacial intervention
 - If no source control: 5-7 days (5 days if no evidence of invasive bacterial disease [e.g. bacteraemia]; ≥ 7 days if bloodstream infectious disease)

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Document control

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