

Anaerobic infections: causes and treatment



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INTRODUCTION:

Anaerobic infections; these common infections are caused by the most common, natural occurring organism found in and on the human body – anaerobic bacteria.

In their natural state they are harmless, and only cause infection as a result of injury or body trauma. The infections commonly occur/affect the genitals,
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bone, heart, abdomen, joints, respiratory tract, mouth, skin and the central nervous system (*CNS*) .

Anaerobic infections are often difficult to treat and are therefore a cause for concern. Common infections include:

- Abscess.
- Appendicitis.
- Lemierre's syndrome.
- Periodontitis.
- Peritonitis.
- Pneumonia.
- Sinusitis.
- Tetanus.

CONTENTS:

SYMPTOMS:

The most common symptoms that suggest the presence of an anaerobic infection include:

- Discoloration of infected area.
- Gangrene.
- Infection near the skin.
- Pus-filled abscesses.
- Smelly discharge.
- Tissue damage.

Other symptoms are location specific depending on where the infection is in the body:

- Cough and chest pain – caused by lung infections.
- Redness, pain and swelling – caused by skin infections.
- Tender gums, pain and bad breath – caused by mouth and throat infections.

CAUSES:

Anaerobic infections are caused when deeper tissues of the body are either exposed to the outside environment or injured.

Injury; bites, trauma and/or surgery – root canals – are the more common ways to acquire the bacteria. Patients with weak immune systems, low blood supply and diabetes are at a higher risk of infection.

PATHOPHYSIOLOGY:

A break in the mucocutaneous barrier – skin or any epithelial exposed to the external environment – resulting in the disturbance of the local tissues and allows easy access to the anaerobic bacteria.

Infection is caused when endogenous bacteria are leaked from the site of entry to the adjacent tissues; spreading the infection.

DIAGNOSIS:

Anaerobic bacteria are relatively difficult to diagnose, but time can be spared if the physician can recognize certain clinical signs.

Diagnosis of anaerobic infections generally follows two (2) steps; one (1) a physical examination performed by the doctor and two, laboratory tests done on the infected tissue to help identify the bacteria responsible.

During the physical exam the doctor looks for common anaerobic infection symptoms and asks about or observes predisposing conditions – low blood supply and tissue necrosis – that favor the growth of anaerobic bacteria.

Therefore; malignancy, trauma, edema, foreign bodies, surgery, colitis, shock and vascular disease – which all lower the blood supply to parts of the body, can be seen as a predisposing conditions. An X-ray may be needed for internal infections.

PREVENTION:

With proper prevention anaerobic infections are easy to avoid; whether the infection occurs in the oral cavity, on the skin/soft tissues or has a chance of presenting itself during surgery.

- During surgery; Proper antimicrobial prophylaxis reduces the risk/chance of infection.
- Oral; Improve oral hygiene.
- Lower the stomach pH – this can aid in the prevention of aspiration pneumonia.
- Constantly rid the mouth of oral secretions.
- Skin and soft tissue; Flush and clean out the open wound and necrotic tissue.
- Constantly drain pus from the area.
- Increase the blood supply to the area.

TREATMENT:

Antibiotics and other medications coupled with drainage of the infection site; is the most common treatment for anaerobic infections. In other cases surgery is required to remove the infection and/or abscess.

Due to the slow growth of the bacteria, treatment for the infection is delayed – because diagnosis of the bacteria can only occur after several days in the laboratory.

PROGNOSIS:

If not treated quickly or properly, infections caused by anaerobic bacteria are serious and can lead to death. However, most patients – who receive proper treatment – often make a full recovery.

EPIDEMIOLOGY:

Most anaerobic infections are caused by normal, everyday anaerobic bacteria found in and around your body. These infections – as stated above; under the *CAUSE* heading – are caused when these bacteria either contaminate a sterile body site or enter the body from an external source; cuts, scraps, bites and contamination of wounds. A patient whose immune system is compromised has a higher risk of contamination/infection.

With all these factors at hand, anaerobic infections can lead to epidemics in a majority of places – from hospitals to schools – as the bacteria can be passed from one individual to the next through touch on an open wound.

NAME	CHARACTERISTICS	DISEASE SYMPTOMS	TREATMENT
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- Clostridia
- Obligate anaerobes.
 - Gram positive.
 - Rod-shaped.
 - Capable of producing endospores.
 - Commonly found in aquatic sediments.

- Clostridium tetani
- Obligate anaerobes.
 - Heat sensitive.
 - This anaerobe is found in soil and as parasites in the gastrointestinal tracts (*GIT*) of animals.
 - The endospores produced by these bacteria are antiseptic, chemical agent and heat resistant

Tetanus The symptoms depend on what type of tetanus the patient has;

- Local: persistent muscle contraction in region of injury.
- Generalized: lockjaw, elevated blood pressure, sweating, elevated temperature,

- Control of muscle spasms.
- Antitoxins stop the toxin production and neutralize its effects.
- Antibiotics

- can survive autoclaving at 121C for 10-15min.
- The endospores are prevalent in manure treated soils and on human skin.
- rapid episodic heart rate, spasms
- continue for 3-4 weeks.
- Neonatal: born without passive immunity.

NAME	CHARACTERISTICS	DISEASE	SYMPTOMS	TREATMENT	PP
Clostridium botulinum	<ul style="list-style-type: none"> • Heat resistant • Found in soil, sediments of lakes, ponds, coastal waters, decaying vegetation, and the GIT of birds, mammals and fish. • Usually seen in canned foods 	Botulism; when foods are ingested that has spores either growing or germinating in.	<p>The symptoms start to present themselves 8-36 hours after ingestion.</p> <ul style="list-style-type: none"> • Weakness. • Dizziness. • Dryness of the mouth. • Nausea. • Vomiting. 	<ul style="list-style-type: none"> • Antitoxin in circulation. 	
Clostridium perfringens	<ul style="list-style-type: none"> • Gram positive • Rod-shaped 	Cellulitis and Gas	<ul style="list-style-type: none"> • Stomach aches, diarrhea 	<ul style="list-style-type: none"> • Penicillin and other antibiotics 	

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- Non-motile
- Found in soils, sediments, human and animal GIT's as well as their feces.
- Optimal growth is between 42. 78 C - 47. 22 C (109-117°F).

Gangrene.

- Mistaken for the "24 hour" flu.

are used for gas gangrene.

- Surgery is used for cases in which severe tissue damages occur.
- Keep hydrated.

NAME	CHARACTERISTICS	DISEASE	SYMPTOMS	TREATMENT
Other clostridial diseases:	<ul style="list-style-type: none"> • Gram-positive. • Anaerobic. • Spore-forming. 	Pseudomembranous Colitis	<ul style="list-style-type: none"> • Abdominal pain. • Dehydration. • Diarrhea. 	<ul style="list-style-type: none"> • Fecal Bacteriotomy; infusion of bacterial flora

difficile

- Rod shaped.
- Resistant to most antibiotics.
- Found in soils, marine sediments and the GIT of humans and animals.

- Fever.
- Tachycardia; rapid heart rate.
- Toxic megacolon; increased abdominal pain, abdominal bloating, abdominal tenderness.

(Probiotic acquired from the feces of a healthy donor to combat the bacterial imbalance a result of the infection)

- Two specific antibiotics can be used as treatment: Metronidazole and Vancomycin

NAME CHARACTERISTICS DISEASE

Non-spore forming

4 categories exist;

- Gram Positive bacilli;
- Actinomyces spp.; actinomycosis.
- Propionibacterium spp.; acne, lacrimal

canalculitis and opportunistic infections.

- Mobiluncus spp.; bacterial vaginosis and opportunistic infections.
- Lactobacillus spp.; endocarditis and opportunistic infections.
- Eubacterium spp. and bifidobacterium spp.; opportunistic infections.

Positive:

- Bacilli.
- Cocci.

anaerobes

- Gram

Negative:

- Bacilli.
- Cocci.

- Gram Positive cocci;

- Peptostreptococcus; brain abscess, sinusitis, endocarditis, pleuropulmonary infection, osteomyelitis, intrabdominal infection, pelvic infection and soft tissue infections.

- Gram Negative;

- Chronic sinusitis, chronic otitis, periodontal diseases, brain abscess, pleuropulmonary infections, intraabdominal infections, pelvic inflammatory disease, pelvic abscesses, endometritis, gynecological wound infections, skin and soft tissue infections, bacteremia.

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