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Perspective

A Brief Note on Clostridial Infections

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ABOUT THE STUDY

Clostridial infection is a term used to describe a variety of infectious diseases in animals and people caused by *Clostridium* species. Bacteria prevalent in soil that enters the body through puncture wounds or contaminated food. Exotoxins are harmful chemicals synthesised and released by these microorganisms. Enterotoxins which act on the enteric cells of the gastrointestinal tract and neurotoxins which cause neurological dysfunction are the two main forms of exotoxins generated by *Clostridium*.

C. perfringens enterotoxins induce a variety of gastrointestinal problems in sheep including lamb dysentery, shock and pulpy kidney. Human diseases caused by *C. perfringens* exotoxins include gas gangrene, enteritis necroticans and food poisoning. The neurotoxins generated by *C. botulinum* induce botulism; a kind of poisoning caused by inadequately sterilised foods or wound infection. Tetanus, often known as lockjaw is caused by the release of neurotoxins from *C. tetani*, a bacteria that can enter the body *via* a cut. It affects sheep, swine, cattle, horses, humans and in rare cases, dogs.

Disease symptoms are caused by pathogenic species producing tissue-destructive and neurological exotoxins. When tissue oxygen tension and pH are low, Clostridia can become pathogenic. In ischemic or devitalized tissue such as in primary vascular insufficiency or after severe penetrating or crushing traumas, an anaerobic environment can develop. The patient is more susceptible to clostridial infection the deeper and more severe the lesion, especially if there is even minor contamination by foreign matter. Clostridial illness can also emerge as a result of drug injections on the street. Ingestion of toxins produced by clostridia in home-canned foods can cause serious noninfectious sickness.

Self-limited gastroenteritis caused by *Clostridium perfringens* type A is the most common clostridial illness. Serious clostridial illnesses are uncommon but they can be deadly. *C. perfringens*, *C. ramosum* and other bacteria can cause cholecystitis, peritonitis, ruptured appendix and intestinal perforation in the abdomen. *C. perfringens* can induce muscle necrosis and soft-tissue infection which is characterised by crepitant cellulitis, myositis and clostridial myonecrosis. Bloodborne *C. septicum* from the colon can cause skin and tissue necrosis. Clostridia can also be found as part of the mixed flora in typical mild wound infections; however, their significance in these infections is unknown. Clostridial infection acquired in hospitals is on the rise especially among postoperative and immunocompromised patients. Intestinal perforation and blockage can be complicated by severe clostridial sepsis. CSI (necrotizing Clostridium Septicum Infections) has a strong link to cancer and immunosuppression. Humans and animals can be affected by a variety of enteric clostridial illnesses.

Clostridium perfringens and *Clostridium difficile* related intestinal infections are among the most common and they are discussed here. Many animal mammalian species have gastrointestinal sickness caused by *C. perfringens* type A strains that encode alpha toxin (CPA), but their involvement in these diseased mammals is unknown. *C. perfringens* type B, which produces the CPA, beta (CPB) and epsilon (ETX) toxins, causes necro-hemorrhagic enteritis in sheep, and these strains have been linked to multiple sclerosis in people however proof for this is limited. Type C strains of *C. perfringens* produce CPA and CPB and cause necrotizing enteritis in humans and animals, whereas type D strains generate CPA and ETX and induce enterotoxemia in sheep, goats and cattle but are not known to cause disease in humans.

The function of *C. perfringens* type E in animal or human disease is unknown. CPA and enterotoxin, the latter of which causes food poisoning in humans as well as the less common antibiotic-associated and sporadic diarrhoea are encoded by the newly updated toxinotype F. The role of these strains in animal sickness is not well understood and remains a point of contention, a recently discovered toxinotype that encodes CPA and Necrotic Enteritis Toxin B-like (NetB) that is responsible for avian necrotic enteritis but not human disease is responsible for avian necrotic enteritis. In humans and a variety of animal species, *C. difficile* causes colitis and/or enterocolitis.

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Toxins A and B as well as an ADP-ribosyltransferase are the microorganism's key virulence factors. *Clostridium spiroforme*, *Clostridium piliforme*, *Clostridium colinum*, *Clostridium sordellii*, *Clostridium chauvoei*, *Clostridium septicum*, *Clostridium botulinum*, *Clostridium butyricum* and *Clostridium neonatale* are other clostridia that cause gastrointestinal disorders in people and/or animals. IDU, particularly non-intravenous "skin-popping" of heroin appears to create ideal circumstances for Clostridial infection and toxin synthesis. IDU continues to be connected to incidences of tetanus and is a key risk factor for wound botulism and Clostridial Necrotizing Soft Tissue Infections (NSTI). Case clusters of all three diseases have been reported among IDUs in the Western United States and Europe.

Medical personnel who treat IDUs must be well-versed in the clinical presentation and treatment of these disorders. Wound botulism has bulbar symptoms and indications that are easy to miss. Antitoxin can be acquired and administered quickly to prevent neuromuscular respiratory collapse. *Clostridium sordellii* and *Clostridium novyi* in addition to *Clostridium perfringens* can induce IDU-related NSTIs; however they have different clinical presentations. Early definitive NSTI care which reduces mortality necessitates a low index of suspicion among emergency physicians and a low surgical exploration and debridement threshold among surgeons.