
Needle tract infection

A case report

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When local anesthetic agents are injected through the integument of the body, surface microorganisms may be introduced into the underlying tissues. Pathogenic microorganisms of the oral cavity, for example, may be introduced by the injection needle into deeper tissue. A case of needle tract infection was documented and is presented in this article.

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The local anesthetics that are used in the modern dental practice have few undesirable side effects when they are used according to the manufacturer's instructions, when the patient's health history has been carefully evaluated, and when the operator is mindful of the physiologic principles involved with their use.¹ Deep penetration of tissues by the needle may, however, carry with it a medical liability that is not associated with the pharmacology of the drug being used.²⁻⁵

Pathogenic microorganisms may be inoculated along with the drug that is being administered.^{6,7} These bacteria may cause an infection in the tissues into which they are introduced. The term *needle tract infection* is used to describe this clinical entity. Symptoms of this infection range from prolonged myalgia and muscle dysfunction after an injection to acute infection of tissue spaces and septicemia.^{2,7-9}

The bacteria that cause a needle tract infection may come from three sources: the injected substance itself, the office environment, or the patient's own microflora.^{4,7} Needle contamination by endogenous microflora was demonstrated by Whyte and coworkers.⁶ In their study, 2.4% of the interior surfaces and 3.8% of the exterior surfaces of the needles were found to be contaminated with microorganisms after penetrating the skin in the antecubital fossa of 32 volunteers. Contamination occurred despite skin preparation with isopropyl alcohol.

The risk of introducing bacteria into deeper tissues is certainly increased in the oral cavity, where

sterility is impossible¹⁰ and where a variety of potentially pathogenic microorganisms constitute normal oral flora.¹¹ Development of a needle tract infection depends on the status of the host defense mechanisms and the number and virulence of the inoculated bacteria.^{7,12}

This article reports a needle tract infection in which overwhelming sepsis followed a routine injection of local anesthetic. *Bacteroides asaccharolyticus*,^{7,13} a resident of the normal oral flora, was isolated as the causative organism.

CASE REPORT

The patient was a 33-year-old well-developed, well-nourished white man. He was in good general health with no known allergies or significant medical history. The maxillary right canine and lateral incisor teeth were fractured in an automobile accident in 1971 and were removed several years later because of "nonrestorable caries." These teeth were replaced by a porcelain-fused-to-metal fixed partial denture double abutted on the maxillary right first and second premolar teeth and on the maxillary central incisors. The fixed partial denture had been cemented in place for 4 years without incident when the patient noticed that the prosthesis was loose. He reported to the dental clinic for recementation at approximately 8 a.m.

The fixed partial denture was removed and cleaned of remaining cement. The abutment teeth were sensitive to air so a cotton applicator with a topical anesthetic gel of 5% benzocaine was placed in the mucobuccal fold. This was followed by the administration of 1.8 cc of 2% lidocaine with epinephrine 1:100,000. A sterile, disposable, 27-gauge needle and aspirating syringe were used for the procedure. Examination of the abutment teeth revealed no caries or periodontal disease. The edentulous ridge was free of ulceration and obvious pathosis. No sign of devitalization of the abutment teeth was present clinically or

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radiographically. The fixed partial denture was recemented with temporary dental cement, and the patient was scheduled for reevaluation. Excess cement was removed from the periphery.

The patient noticed "fullness" of the right canine space and an increase in temperature beginning at approximately 10 hours after the injection. He reported to the dental clinic, where erythromycin, 500 mg every 6 hours, was prescribed by the attending dentist. On the next day, he complained of general malaise, slept intermittently, and reported episodes of fever. On the evening of the second day, he had a drastic rise in temperature with emesis and chills. The patient came to the hospital emergency room at 1:30 a.m. on day 3 in obvious distress with an temperature of 106.5° F taken orally. Moderate facial cellulitis was the only clinical finding.

The patient's temperature decreased to 103° F after intravenous infusion of 1 L of normal saline solution in the emergency room. He was admitted to the hospital for antibiotic therapy and supportive care with a diagnosis of facial cellulitis. A complete blood count showed 4300 white blood cells (WBCs) and 143,000 platelets per milliliter at the time of admission. Blood cultures were obtained and 5 million units of aqueous penicillin G was administered intravenously. At 8 o'clock that same morning, an area of fluctuance was observed in the mucobuccal fold at the previous injection site. An incision was made into the area with the patient under local anesthesia, and purulent material was drained. A specimen for culture and Gram stain was taken, and a surgical drain was placed.

The patient's temperature increased approximately ½ hour after the incision and drainage procedure. A temperature of 104° F that was taken orally was accompanied by chills and rigors. A complete blood count done immediately revealed neutropenia (900 WBCs) and thrombocytopenia (107,000 platelets). The test was repeated with similar results. The drastic reduction of WBCs and platelets caused concern that the patient may have had an underlying hematologic disorder. The patient was placed in reverse isolation to protect him from nosocomial infection. A cooling blanket, aspirin, and acetaminophen were ordered to reduce his fever.

Consultation with the internal medicine service was undertaken, and a bone marrow biopsy of the iliac crest was performed to rule out hematologic disease. The causative microorganism had not been identified at that time, so intravenous amikacin (425 mg every 8 hours), carbenicillin (2 gm every 6 hours), and sterile cephapirin sodium (Cefadyl) (1 gm every 6 hours) were ordered to cover a broad spectrum of potential pathogens, including anaerobes.¹⁴

The bone marrow biopsy showed normal cellularity with a left shift in the myeloid series (normal granulocytes and megakaryocytes were present). These findings were consistent with peripheral consumption of the blood elements caused by the infection. The causative organism was not identified until day 5 of the patient's hospitalization. An anaerobic blood culture identified *B. asaccharolyticus*, a gram-negative rod, which is a resident of normal oral microflora.

The patient's condition improved over the next several days; repeated blood tests showed a gradual return to normal numbers of WBCs and platelets. The patient was discharged from the hospital on day 13 after the injection after completion of the 10-day regimen of antibiotic therapy. His course was followed on an outpatient basis for the next several months, and he showed no evidence of recurrence of the original symptoms.

DISCUSSION

Differential diagnosis of the facial cellulitis included endodontic radicular or periodontal infection. These diagnoses were eliminated by careful clinical and radiographic examination. The infection was associated by time and location with the administration of the local anesthetic. The isolation of *B. asaccharolyticus* from the blood confirmed the diagnosis of needle tract infection.

Conditions that predispose to infection in general were not present in this patient, that is malnutrition, severe debilitating disease, or corticosteroid or other immunosuppressive therapy.¹⁵ The patient was robust and physically fit. He gave no history of occupational exposure to toxic chemicals or substances. The pronounced neutropenia and thrombocytopenia, which originally caused suspicion of hematologic disease, proved to be symptoms of the infection rather than a predisposing condition. It is speculated that the uncemented condition of the fixed partial denture caused a local increase in the number of anaerobic bacteria at the injection site. The bacteria that were injected were sufficiently virulent to cause infection and subsequent septicemia.

This infection had three potentially life-threatening sequelae. Hyperthermia, especially in adults, can result in central nervous system damage.¹⁵ Septicemia can metastasize to the brain, the spleen, the liver, the bones, or the joints.⁷ Finally, a canine space infection of such virulence may spread by direct extension to the cavernous sinus.¹⁶

CONCLUSION

A case has been presented in which infection and septicemia followed the administrations of a local anesthetic. Review of techniques for the administration of local anesthetics is in order to minimize the possibility of accidental injection of pathogenic bacteria. Recommended techniques include drying of the mucosa and wiping of the area with an antiseptic solution before injection.^{1,9,10}

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