

The Undesired Outcomes of Bodybuilding: An Intra-Deltoid Abscess Caused by *Eikenella corrodens* after Licking the Needle

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Eikenella corrodens is a fastidious Gram-negative facultative anaerobic pleomorphic bacillus that is a normal inhabitant of the human mouth and upper respiratory tract. It is occasionally isolated in human bite infections, especially "reverse bite," "fight bite," or "clenched fist injuries," and from skin, soft tissue, and bone infections secondary to saliva contamination, such as in intravenous (IV) drug users who lick their needles ("needle-licker's osteomyelitis") [1]. In addition, it may cause intra-abdominal abscesses, sub-acute endocarditis, brain abscesses, and respiratory tract infections [2].

Muscle abscesses are most commonly caused by *Staphylococcus aureus*. Bacterial infections of muscle usually occur after a penetrating wound, prolonged vascular insufficiency in an extremity, or a contiguous infection. The deltoid muscle is an uncommon site for abscesses.

Bodybuilders occasionally perform intramuscular injections of various muscle mass-building compounds, including anabolic steroids, erythropoietin, and paraffin-oil injections. These practices may be associated with local muscle or nerve damage or at times might even cause localized or generalized life threatening infections or other adverse effects [3].

We present a case of an intradeltoid abscess in a bodybuilder who self-injected a muscle-building compound after opening

the ampule with his teeth and licking the needle. This is the first report of *E. corrodens* infection in a bodybuilder, highlighting the potential harms of illegally used muscle building products and of incorrect and non-sterile injection techniques.

PATIENT DESCRIPTION

A 27-year-old previously healthy bodybuilder arrived in the emergency department (ED) of our medical center with complaints of pain and swelling in his right shoulder. Two weeks before, he had received an online purchased injectable agent for increasing muscle mass. He had opened the ampule with his teeth and then used a non-sterile needle, which he licked prior to injecting the solution into his deltoid muscle. A few days later, rapidly progressive swelling and redness appeared around the injection site, with accompanying severe local pain rendering him unable to abduct his arm. There was a single episode of 40°C fever.

On arrival at the ED his vital signs were: blood pressure 110/60 mmHg, oxygen saturation at room air 98%, heart rate 95 beats per minute, and fever 37.0°C. Physical examination of the right shoulder demonstrated warmth, swelling, redness, and extreme tenderness of the deltoid muscle on palpation, and an area of skin necrosis measuring 0.2 cm where the injection was performed. Range of motion of the right shoulder joint was restricted. There was no regional lymphadenopathy and

neurovascular status was intact. Laboratory studies revealed leukocytosis $23.6 \times 10^9/L$ (normal range $3.54\text{--}9.06 \times 10^9/L$), 82% were polymorphonuclear. C-reactive protein was > 100 mg/L. Other blood exams were within normal limits. Plain radiography of the right shoulder demonstrated soft tissue prominence with no subcutaneous air, foreign bodies, or osteomyelitis [Figure 1].

The patient was admitted to the orthopedic ward and treatment with intravenous cefazolin 2 grams three times daily was initiated. Twelve hours later, due to worsening of clinical condition and appearance of a large fluctuant mass, he underwent incision and drainage of an abscess with extraction of >100 ml of thick green malodorous pus from the deltoid muscle. Aerobic and anaerobic cultures of pus were performed and 3

Figure 1. Plain radiograph of right shoulder



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days later Gram negative rods grew that were identified by MALDI-TOF mass spectrometry (Bruker, UK) as *E. corrodens*. The bacterium was susceptible to penicillin, cefazoline, cefuroxime, ceftriaxone, and trimethoprim-sulfamethoxazole, but was found resistant to clindamycin and erythromycin. Antibiotic treatment was switched to IV penicillin G 4 million units, four times daily, and the patient gradually improved until he was discharged a few days later in good clinical condition with almost complete disappearance of swelling. The patient expressed his consent to the publication of this case study.

COMMENT

E. corrodens is a Gram negative, facultative anaerobic, non-motile, non-spore-forming pathogenic bacillus. *E. corrodens* is a periodontopathogen that normally inhabits the human oral cavity, upper respiratory tract, and gastrointestinal tract, and has been described as a cause of skin and soft tissue infections, osteomyelitis, and septic arthritis secondary to saliva contamination [1]. It has been commonly isolated from human bite infections, “clenched-fist injuries,” toothpick injuries, and infections among chronic finger or nail biters [3]. *E. corrodens* has also caused infection in insulin-requiring diabetic patients and IV drug abusers who lick their needle prior to injection. Other clinical manifestations include intra-abdominal abscesses, sub-acute endocarditis, brain abscesses, and respiratory tract infections [2]. *E. corrodens* infections typically follow an indolent course with clinical manifestations requiring a number of days to develop. Suppuration due to *E. corrodens* infection is foul-smelling, mimicking an anaerobic process. It is most commonly recovered as part of a polymicrobial infection involving mostly streptococcal organisms. Aerobic growth requires

hematin-containing medium (blood or chocolate agar) in the presence of 5% to 10% CO₂. *E. corrodens* grows slowly on blood and chocolate agar, forming small colonies that emit a bleach-like odor, and yield a characteristic pitting of the agar for which the organism was given its name. *E. corrodens* is resistant to macrolides, aminoglycosides, and antimicrobials traditionally used against anaerobes, such as clindamycin and metronidazole, and infections caused by this organism should be treated with penicillins, second or third generation cephalosporins, or tetracyclines.

Bacterial infections in muscle tissue usually occur secondary to a penetrating wound, prolonged vascular insufficiency in an extremity, or a contiguous infection as opposed to pyomyositis, which is a primary muscle abscess that occurs in the absence of a predisposing site of infection, from bacteremic spread. The most common pathogen that is isolated from muscle abscesses is *Staphylococcus aureus*. The deltoid muscle is an uncommon site for abscesses. Clinically, muscle abscesses are characterized by fever, localized muscle pain and stiffness, swelling, and tenderness. Once diagnosed, deep musculoskeletal abscesses are treated aggressively with incision and drainage, and debridement of the infection in the operating room, or percutaneous computed tomography or ultrasound-guided drainage with catheter placement in conjunction with antibiotic therapy.

Among bodybuilders, many controversial and potentially damaging muscle-building practices are commonly used. Some of these involve self-injection of various compounds in intramuscular locations [3]. Agents commonly used for muscle building are anabolic steroids, erythropoietin, and paraffin-oil injections. Few case reports have described infectious and non-infectious complications of these practices, such as recurrent infections at injection sites,

pyogenic granuloma-like lesions (“body-building acne”) from steroid injections, and even life threatening hypercalcemia from combined use of steroids and erythropoietin [4]. There was a previous report of a bodybuilder who developed localized rhabdomyolysis of the deltoid muscle after injection of steroids into the shoulder region.

CONCLUSIONS

We describe, to the best of our knowledge, the first case of a body builder with an intradeltoid abscess due to *E. corrodens*, probably because he licked the needle to clean it prior to injection of steroids. This report highlights the potential harms of illegally used muscle-building products and of incorrect and non-sterile injection techniques with potential infectious complications and muscle damage.

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Education must not simply teach work – it must teach life.

W.E.B. Du Bois (1868–1963), American sociologist, historian, civil rights activist, and author