Case 003: Death from a puncture wound by the dorsal fin of salt water fish.

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An 83 year-old woman had a puncture wound to her left palm by the dorsal fin of a fresh fish (tilapia) from the coastal water of Tai Po in Hong Kong. She had a history of type 2 diabetes, hypertension and ischemic heart disease. In the next 2 days, she noticed increasing redness, pain and swelling in her left palm and forearm. She also had fever and rigors. On admission to the medical ward on day 3, she was in septicemic shock (systolic blood pressure 60 – 70 mmHg) and coma (Glasgow Coma Score 8/15) with high fever. She was in atrial fibrillation (ventricular rate 120 beats/minute). There were blisters over her left palm with extensive surrounding erythema and edema. The wound became necrotic within 24 hours after admission. Despite antibiotic therapy and debridement, she died from septicemia 17 days after admission.

1. What is the differential diagnosis of her skin condition?

The differential diagnosis includes erysipelas, cellulitis, and necrotizing fasciitis. *Erysipelas* is superficial infection of the skin, almost always caused by group A streptococcus. *Cellulitis* is deeper infection involving subcutaneous tissue. It is also caused by group A streptococcus usually and sometimes by Staphylococcus aureus or other organisms. *Necrotizing fasciitis* is a rapidly progressive life-threatening infection of the subcutaneous and fascial layers of the skin, resulting in necrosis of fascia and fat as its name implies. While type 1 necrotizing fasciitis is caused by mixed aerobic and anaerobic bacteria, the type 2 variety is caused by group A streptococcus.

2. Is it possible to differentiate the 3 conditions on clinical grounds?

The 3 conditions have many common clinical signs, including fever and erythema, tenderness, edema, increase in skin temperature, and presence of vesicles or bullae over the affected area. But the following distinguishing features may be helpful:

- Erysipelas infection is more superficial: resulting in a raised indurated plaque of skin that is sharply demarcated from adjacent normal skin. The swollen skin has an orange-peel appearance and there is prominent lymphangitis with red streaks coursing towards regional lymph nodes.
- Cellulitis involves deeper tissue and the thickened skin is less well demarcated, with the affected area merging imperceptibly with the surrounding normal skin. Lymphatic involvement is also less prominent.
- In the early stage of necrotizing fasciitis, appearance of the affected area may be confused with cellulitis but the red discolored skin will change quickly to take on a dusky hue, become necrotic, and slough. Another distinguishing feature is pain – pain that is unrelenting and out of proportion to the skin appearance. It is a life-threatening infection and the patient will look sick and toxic right from the beginning.
3. What did our patient have?

The diagnosis in our patient was unmistakably necrotizing fasciitis. Judging from her history, puncture wound from the dorsal fin of salt water fish, the offending organism is *Vibrio vulnificus*.

4. What is *Vibrio vulnificus*?

*Vibrio vulnificus* is a gram-negative bacillus from the same family as *Vibrio cholerae*. It thrives naturally in warm shallow coastal waters of temperate zones and in oysters and other bivalve shellfish, some crabs, and finfish from these waters. It can cause illness through 2 portals of entry: exposure of open wounds to sea water and ingestion of raw oysters.

In the first instance, wound submerged in contaminated water or skin punctured by the fin of contaminated fish, as in our patient, is enough to set off a fulminant necrotizing fasciitis with the infection spreading rapidly to the blood stream, causing septicemia, multi-organ failure and death.

In the second instance, *Vibrio vulnificus* can cause septicemia with little gastrointestinal symptoms after ingestion of contaminated raw oyster by susceptible individuals. Erythematous skin lesions then appear secondarily through bacteremic metastasis and progress rapidly to a picture consistent with necrotizing fasciitis with formation of hemorrhagic bullas and skin necrosis. While normal healthy individuals have little risk of contracting infection in consuming raw oysters, patients who have the following conditions are at risk:

- Cirrhosis or other liver disease;
- Alcohol abuse;
- Iron overload states (e.g. hemochromatosis);
- Immunosuppression treatment following organ transplantation;
- Human immunodeficiency virus (HIV) infection;
- Diabetes mellitus;
- Chronic renal failure;
- Metastatic malignancies;
- Achlorhydria.

5. What is the treatment for *Vibrio vulnificus* infection?

*Vibrio vulnificus* infection is life-threatening. The mortality rate, once septicemia has set in, is between 30 to 50%. Doctors should have a high degree of suspicion so that treatment can be started at the earliest time possible. Proper management should include the following elements:

*Antibiotics.* Tetracycline is the antibiotic of choice: Doxycycline 100 mg IV or PO, depending on severity, twice daily should be give for 7 to 14 days. Equivalent doses of cefotaxime and ciprofloxacin are alternatives if tetracycline is contraindicated.
**Surgical debridement.** Necrotizing fasciitis should not be treated with antibiotic alone. Aggressive debridement of necrotic tissue leaving behind a margin of healthy tissue is required. If necessary, amputation of affected limb may have to be considered.

**Supportive care.** Septicemia and shock, as it was in our patient, sets the stage for the Systemic Inflammatory Response Syndrome (SIRS) with multi-organ dysfunction. Afflicted patients should be admitted to an Intensive Care Unit where aggressive measures can be instituted to support dysfunctional organs until recovery.

Further Readings


Chan WL et al. *Vibrio vulnificus* septicaemia and necrotizing fasciitis after a prick from the dorsal fin of a tilapia. Transactions of the Royal Society of Tropical Medicine & Hygiene. 1999;93:174
