Necrotizing Fasciitis
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Case: 40ish yo M with PMH HTN, DMII p/w severe right knee pain and inability to ambulate and nausea/vomiting for one day. Patient with greater than 20 episodes of non-bloody, non-bilious emesis and severe right knee pain acutely came on that morning. On presentation patient appeared non-toxic and had an unimpressive cellulitis of the right knee. On exam vitals showed a low-grade temperature, tachycardia and hypotension, his right knee was tender to palpation but he had normal ROM and there was induration that spread up his proximal thigh. Fluid resuscitation was immediately started and patient would later require a central line and pressors after not responding to 4L of crystalloid. Labs showed a lactate of 6.9, elevated CK, but no leukocytosis, normal ESR and CRP. Early antibiotics were started with vancomycin, zosyn, and clindamycin. MICU was consulted and patient had a CT of his right lower extremity on the way to the unit. I had a strong index of suspicion and was extremely concerned for necrotizing fasciitis when I initially saw this patient but was unsure if my management was appropriate to effectively address this fatal disease. I felt I needed to know more about this disease and how to better approach it.

Necrotizing fasciitis is one of the "can't miss diagnoses" in Emergency Medicine but its **subtle findings and rarity** often cause it to be missed. The incidence is reported to be 0.40 cases/100,000 population. The infection spreads along the subcutaneous tissues, fascial planes, and into muscles usually from a direct extension of a skin lesion in 80% of cases. These infections progress rapidly and are often fatal even with aggressive treatment. Most cases are **polymicrobial and include *group A beta-hemolytic streptococcus, S. aureus, Enterococcus,* and anaerobes *Bacteroides and Clostridium***. Of these, **GAS** is most common and the most aggressive. There are two types of necrotizing fasciitis: type 1 is **polymicrobial**, more commonly seen in the **immunocompromised or diabetics**. It can also be seen in newborns as omphalitis. Type II is a **monomicrobial** infection, most often GAS and found in any age group with **healthy** patients.

Clinical symptoms are often **vague** including fever, myalgias, fatigue, nausea, and diarrhea; can easily be mistaken for a simple cellulitis thus making the diagnosis difficult. Early diagnosis is missed in 85-100% of cases in a large published series. The affected region may have some diffuse swelling but **pain out of proportion** is the most consistent finding. As the infection progresses the skin may develop crepitus, anesthesia, bullae, and necrosis. However these late findings are observed in only 10-40% of patients.

The diagnostic "gold standard" for necrotizing fasciitis is **via surgery** and appearance of the tissues but that obviously cannot be done in the ED. Lab findings are generally **nonspecific** and include leukocytosis, elevated CK, hyponatremia, hypoalbuminemia, and elevated PT/PTT. The Laboratory Risk Indicator for Necrotizing Fasciitis (**LRINEC**) score [*figure 1*] developed by Wong et al utilizes lab values to predict probability of necrotizing fasciitis. A score less than 6 is low risk, 6-7 is intermediate, and >7 is high. The scoring system has been found to have a PPV 92% and

NPV of 96% (see reference below for missed case). However, the correlation between LRINEC scores and outcomes has not been effectively studied and thus caution should be taken when using this scoring system. In regards to imaging, MRI is the best imaging study for differentiating between necrotizing and a simple soft tissue infection. Subcutaneous gas is a common finding on X-ray or CT but is very specific and **not sensitive**. CT is more sensitive than radiographs because it is able to show fascial thickening and abscesses, which are 80% sensitive for necrotizing fasciitis.

If necrotizing fasciitis is suspected, **aggressive resus**citation should be immediately instituted. Coagulation studies and a type and screen should be included in work-up in preparation for OR. **Early empiric antibiotics including vancomycin to cover for MRSA, a broad-spectrum beta-lactam like zosyn, and clindamycin** should be started. Clindamycin is more effective when *GAS* is considered a possible agent as it works to inhibit M protein and exotoxin synthesis. An **emergent surgery consult** should be placed so that if needed, debridement and fasciotomies can be performed expeditiously (**time to debridement is most important prognostic factor**). Other theoretical therapies include IVIG and post-surgical HBO therapy but there is no definitive data to support use of either.

It is important to have a high index of suspicion for necrotizing fasciitis as its mortality rates have remained consistently around 25-30% based on a case series from 1924-1988. The one main factor acknowledged as a predictor of poor prognosis is late surgical debridement.

Based on this review, I feel the early management of my patient was appropriate given it was basically early goal directed therapy for sepsis. My patient had a LRINEC score of 4 and therefore had a low probability. However, after reviewing this topic, I believe I should have consulted surgery even earlier given their role is vital in management of this clinical entity. This patient would go to the OR the next day and no signs of necrotizing fasciitis were found but if they were, maybe this patient's prognosis would have been better had I involved surgery sooner. Surprisingly this patient was in septic shock from just a cellulitis but I know feel more comfortable in managing such a fatal disease.

References // Further Reading:

- Lacerotto, L et al. Necrotizing fasciitis: Classification, diagnosis and management. J Trauma. 2012;72. 560-566
- Rosen, P et al. "Necrotizing Skin and Soft Tissue Infections." *Rosen's Emergency Medicine Concepts and Clinical Practice.* 8th Ed. Vol 1, Philadelphia, PA: 2013. 1860-1861.
- http://www.ncbi.nlm.nih.gov/pubmed/23287745 (clinical gestalt trumps scoring)
- http://www.ncbi.nlm.nih.gov/pubmed/22158285

Figure 1

TABLE 4. Laboratory Risk Indicator for Necrotizing Fasciitis (LRINEC) Score System

LRINEC Score

Variable	Value	LRINEC Score Points
C-reactive protein (mg/L)	<150	0
	>150	4
WBC (cells/mm^3)	<15	0
	15–25	1
	>25	2
Hemoblobin (g/dL)	>13.5	0
	11–13.5	1
	<11	2
Sodium (mmol/L)	≥135	0
	<135	2
Creatinine (mg/dL)	≤1.6	0
	>1.6	2
Glucose (mg/dL)	≤180	0
	>180	1

LRINEC Score Points, Sum	Risk Category	NF Probability
≤5	Low	<50%
6–7	Intermediate	50–75%
≥8	High	≥75%

LRINEC score system by Wong et al.; for intermediate- and high-risk patients, the model has positive predictive value of 92% and negative predictive value of 96%.[40]