Characterization of necrotizing soft tissue infection in patients with obesity

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The prevalence of obesity has risen steadily over the last several decades. Patients with necrotizing soft tissue infections (NSTI) commonly exhibit obesity as a comorbidity. This patient group poses a unique challenge from both a clinical and pathophysiologic standpoint. Obesity is associated with a chronic inflammatory state that not only weakens the immunologic response to common infectious insults but also lead to altered wound healing and recovery following sepsis. Therefore, the goal of this study was to characterize differences in NSTI infections between patients with and without obesity

We hypothesize that obese patients with NSTI will demonstrate unique patterns of microbial pathogology and anatomic location.

A retrospective analysis of institutional data for patients diagnosed with NSTI requiring surgical intervention were identified (2011-2020). All cases were reviewed to ensure the diagnosis of rapidly progressive necrotic infection with positive cultures. Patients were divided into obese (OB; BMI >30) and non-obese (NOB: BMI 18.5 – 29.5). Primary outcomes compared included NSTI location, microorganisms from operative cultures, and basic clinical data obtained at the time of presentation and in-house mortality. A p value <0.05 was considered statistically significant.

Of the 605 patients who met inclusion criteria, 64.4% (n=389) were classified as obese. This cohort was significantly more likely to be female, have congestive heart failure, type 2 diabetes (T2DM), and a higher Charlson Comorbidity Index (3 (1-4) vs 2 (1-4), p = 0.04) at presentation. Compared to NOB, NSTIs in the OB cohort were more likely in the torso and perineum (55.3% vs. 38.6%, p<0.005) and polymicrobial (56.0% vs. 44.7%, p=0.006). Obese patients were less likely to have MRSA (19.3% vs. 26.9%, p=0.03) or group A strep infections (2.6% vs. 6.5%, p=0.02). Torso infections seen in the OB cohort were more likely to be gram positive infections (83.5% vs. 59.4%, p=0.006), with higher rates of enterococcal species (28% vs 15%). The in-house mortality NOB and OB groups was comparable (10.3% vs 10.2%).

NSTIs in patients with obesity were more often localized to the torso and perineum with decreased prevalence of MRSA or group A strep infections. However, infections of the torso were more likely to be gram positive, potentially driven by higher rates of enterococcal species. Further studies are underway to characterize the impact of obesity related comorbidities on NSTIs, such as T2DM and peripheral vascular disease.

Negative Pressure Wound Therapy With and Without Instillation in Necrotizing Soft Tissue Infections

Erin Andrade, LJ Punch, Kelly Vallar, Washington University in St. Louis

Necrotizing soft tissue infections (NSTI) are rare but deadly infections that require early and often extensive surgical debridement. After debridement, patients are left with large, open wounds representing a significant source of morbidity. No guidelines currently exist for wound management in NSTI after wide debridement.,Necrotizing soft tissue infections (NSTI) are rare but deadly infections that require early and often extensive surgical debridement. After debridement, patients are left with large, open wounds representing a significant source of morbidity. No guidelines currently exist for wound management in NSTI after wide debridement.,Necrotizing soft tissue infections (NSTI) are rare but deadly infections that require early and often extensive surgical debridement. After debridement, patients are left with large, open wounds representing a significant source of morbidity. No guidelines currently exist for wound management in NSTI after wide debridement.,Necrotizing soft tissue infections (NSTI) are rare but deadly infections that require early and often extensive surgical debridement. After debridement, patients are left with large, open wounds representing a significant source of morbidity. No guidelines currently exist for wound management in NSTI after wide debridement.,Necrotizing soft tissue infections (NSTI) are rare but deadly infections that require early and often extensive surgical debridement. After debridement, patients are left with large, open wounds representing a significant source of morbidity. No guidelines currently exist for wound management in NSTI after wide debridement.

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A prospectively maintained Acute and Critical Care Surgery database spanning 2008-2018 was queried for patients with a diagnosis of necrotizing fasciitis, Fournier’s gangrene or gas gangrene. Data was collected on patient co-morbidities, operative management, and clinical outcomes. Patients were stratified by use of no NPWT, traditional NPWT, or NPWTi. Data were analyzed using ANOVA, chi-squared, and logistic regression.,A prospectively maintained Acute and Critical Care Surgery database spanning 2008-2018 was queried for patients with a diagnosis of necrotizing fasciitis, Fourniers gangrene or gas gangrene. Data was collected on patient co-morbidities, operative management, and clinical outcomes. Patients were stratified by use of no vac, traditional NPWT, or NPWTi. Data were analyzed using ANOVA, chi-

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During the ten-year study period, 380 patients were treated for NSTI; 174 were managed with no NPWT, 158 with NPWT, and 48 with NPWTi. Patients were similar in terms of demographics, BMI, DM, and smoking rates. Intravenous drug use was significantly more frequent in NPWTi cases (24.4% vs 7.8% NPWT vs 5.07% no vac, p=0.001). Overall, 30-day complication rates were not significantly different, but mortality was significantly higher in the no NPWT group (14.4% vs 8.9% NPWT vs 2.1% NPWTi, p=0.03). In the no NPWT group, 79.2% of patients had an open wound at discharge compared to 50.3% of NPWT group and only 14.6% of the NPWTi group (p<0.001). On multivariate regression, NPWT was associated with closure rates five times higher than the no NPWT group (OR=5.37, 95%CI:2.63-10.94, p<0.0001), while the NPWTi was associated with closure rates 22 times higher (OR 22.17, 95%CI: 7.53-65.26, p<0.0001) than the no NPWT group after controlling for BMI, smoking status, number of operations, and involvement of an extremity.
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Negative pressure wound therapy with instillation is associated with higher rates of wound closure without increasing surgical site infections in patients with NSTI compared to traditional NPWT or no NPWT. While prospective studies are needed, this indicates the potential to improve patient quality of life through reduced pain and outpatient home health needs.
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Diagnosing Necrotizing Soft Tissue Infections (NSTIs): Revisiting the Utility of the LRINEC Score

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Early diagnosis of NSTIs is paramount for better patient outcomes. The Laboratory Risk Indicator for Necrotizing Fasciitis (LRINEC) score, as originally described by Wong, was developed to aid in the diagnosis of NSTIs. The purpose of this study was to revisit the predictive value of the LRINEC score and to assess its utility for immunocompromised patients.

We hypothesize that the LRINEC score will have a high predictive value for the general NSTI population, but a lower predictive value for the immunocompromised patients.

A retrospective cohort study of NSTI patients admitted to two academic institutions from January 1995 to June 2019 was conducted. Operative and pathology reports were reviewed to confirm all cases. The control group included patients with infections not meeting the criteria for NSTIs, such as cellulitis or abscess. Immunocompromised status was defined by corticosteroid use, active malignancy, receipt of chemotherapy or radiation therapy, diagnosis of human immunodeficiency virus or AIDS, or prior solid organ or bone marrow transplantation with receipt of chronic immunosuppression. Diagnostic accuracy of the LRINEC score was measured by sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV). A subgroup analysis was performed to determine the utility of the score in immunocompromised patients.

241 NSTI patients with complete laboratory data were included. Median age was 59 (IQR47–67), 134 (55.6%) were male, 45 (18.7%) patients were categorized as immunocompromised. There were no significant differences in demographics between the NSTI and control groups. For the overall cohort, using a cutoff score of 6, the LRINEC score had a sensitivity of 0.48 (95% confidence interval [CI] 0.41-0.54) and a specificity of 0.71 (CI 0.62-0.79). The PPV was 0.69(CI 0.63-0.73) and the NPV was 0.38(CI 0.34 to 0.42). After subgroup analysis, results were similar for the immunocompromised NSTI patients: PPV was 0.68 (CI 0.54-0.82), and NPV was 0.50 (CI 0.40-0.57).

Overall, the LRINEC score revealed a low predictive value in our NSTI cohort and in the subset of immunocompromised NSTI patients. The utility of LRINEC in the diagnosis of NSTI needs to be used with caution and may be less useful that originally described.

Does Anti-Fungal Therapy in Fungal Necrotizing Soft Tissue Infection Improve Outcome?

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The elevated mortality rate associated with Fungal Necrotizing Soft Tissue Infections (FNSTIs) has been recently recognized. To our knowledge, there have been few studies evaluating the benefits of anti-fungal therapy in this population.

We hypothesize that the use of anti-fungal therapy improves clinical outcomes in patients with FNSTIs.

Patients with Necrotizing Soft Tissue Infections (NSTI) were identified from a prospectively maintained Acute and Critical Care Surgery (ACCS) database from 2008-2018. Patients were initially categorized by intra-operative cultures into FNSTIs and Non-FNSTIs. The FNSTI cohort was further subdivided into two groups based on anti-fungal usage. Patients who received anti-fungal therapy prior to culture collection were excluded. Microbiologic data, demographics, Charlson Comorbidity Index (CCI), infection site, number of surgical procedures, anti-fungal regimen, and clinical outcomes were compared using Pearson's chi-squared test (χ2), Fisher's Exact Test, and Student’s t-test

A total of 368 patients were diagnosed with NSTI [FNSTIs= 26 (7.1%), Non-FNSTIs= 342 (92.9%)]. Patients with FNSTI had a significantly higher mortality rate (19.2% vs 8.2%) and a longer Hospital Length of Stay (LOS) than Non-FNSTIs (21.1 vs 14.2; p= 0.004). The 26 patients with positive cultures for FNSTIs were more likely to be female (61.5%; p= 0.034). The most commonly identified fungal pathogen was Candida Albicans (46.2%). Anti-fungal therapy was used in 14 of the 26 patients (53.8%) and Fluconazole was the most common (64%) antifungal used. No significant differences were found in regards to outcome including ICU and hospital days as well as mortality.

The presence of a positive fungal soft tissue culture in NSTIs had over a 3-fold increase in mortality. Yet, contrary to our hypothesis, the use of anti-fungal therapy did not decrease mortality or improve other clinical outcomes in patients with FNSTIs. The use of empiric anti-fungal regimes in FNSTIs should be carefully evaluated. A further prospective randomized study is warranted to confirm this finding.

Mortality of Necrotizing Fasciitis - Effects of Patient, Insurance, and Hospital Factors

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Necrotizing soft-tissue infections (NSTI) are rare, life-threatening infections characterized by rapid spread and necrosis of fascial planes and surrounding tissue. The most important determinant of mortality is time to surgical débridement. Multiple factors may influence access to and delay in obtaining emergency general surgery (EGS) consultation for NSTI and therefore increase mortality.

We hypothetized that patient, hospital and insurance factors are associated with increased NSTI mortality.

A retrospective analysis of the US 2016 Nationwide Inpatient Sample was done, analyzing patients admitted with an International Classification of Diseases version 10 code for necrotizing fasciitis (NF) and a code for an excisional procedure for skin, subcutaneous tissue or muscle. Patient data (age, sex, comorbidities, estimated costs, zip income quartile, insurance status) and hospital data (region, rural, urban, teaching and volume of NSTI admissions) were collected. Analyses were performed to identify independent predictors of hospital mortality using logistic regression. Estimated median costs were compared by quantile regression.

There were 2740 unweighted NSTI admissions representing 13700 weighted cases. 1466 were male (53.5%) with a median age of 53.4 years (I.Q.R. 44-63), admitted to 1274 hospitals, including rural (146, 11.5%), urban non-teaching (366, 28.7%) or urban teaching hospitals (792, 59.8%). 54% of hospitals admitted < 3 NSTI cases/year. Overall, 197 (7.2%) patients died. There were 439 patients transferred; these patients had higher unadjusted mortality (10.0% vs. 6.7%, P=0.012). Adjusted median costs were significantly higher in teaching hospitals (+$2690.57, 95% CI: 1276-4104; P<0.001). Regression analysis is shown at Table 1.

There is decreased NSTI survival for MEDICAID patients. Transfers and geographic factors also influence outcome. Time to surgery in hospital may influence survival. Adjusted costs are higher in teaching hospitals indicating the burden NSTI management places on these facilities. EGS registries may determine additional factors affecting survival after NSTI.

Evaluation of Antibiotic Duration After Surgical Debridement of Necrotizing Soft Tissue Infection

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Necrotizing soft tissue infections (NSTIs) are a medical emergency with high morbidity and mortality, with the two pillars of management being prompt surgical debridement and antimicrobial therapy. The optimal duration of antibiotics after the completion of surgical debridement of NSTIs is unknown, which has led to considerable practice variation.

We hypothesized that patients with NSTIs who receive less than 48-hours of post-operative antibiotics after final debridement have similar rates of subsequent intervention or infection recurrence.

This was a retrospective cohort study including adults with NSTIs, identified through ICD9 codes, ICD10 codes, and CPT codes who were admitted to one academic institution between 1/1/2010 to 7/31/2020. Adults who required at least one surgical debridement and post-operative antibiotics for a NSTI were included. Patients were excluded if they transferred from an inpatient unit of another hospital, had another concomitant infection during index NSTI, had an amputation as the index procedure, or died within 48 hours. The primary outcome was infection recurrence, defined as an unexpected surgical debridement after initial debridements were completed or re-initiation of antibiotics for the NSTI during index hospitalization. Secondary outcomes included a description of antibiotic practices, rate of inpatient mortality, and operative management of NSTIs.

Three-hundred and twenty-two patients were included, of which 60% were male and the mean age was 50 years. The mean (SD) LRINEC score was 5.2 (2.6), and mean (SD) SOFA score was 6.6 (5.0). The primary outcome of infection recurrence occurred in 1.4% of patients who received less than 48 hours after final debridement versus 3.6% of patients who received greater than 48 hours (p=0.697). There was no difference in inpatient mortality (1% vs 4% p=0.476). Patients who received greater than 48 hours of antibiotics after final debridement had a longer duration of inpatient antibiotics (4.7 vs 7.9 days; p<0.001) and were more likely to be discharged on oral antibiotics (0% vs 24%; p<0.001).

Inpatient infection recurrence rates were not different in patients with NSTI who received less than 48 hours of antibiotics after final debridement as compared to those who received greater than 48 hours. This indicates that an antibiotic duration of less than 48 hours after final debridement may be appropriate in patients with NSTI without additional antibiotic indications.