[P16] MEDICAL IMAGING AND LABORATORY ANALYSIS OF DIAGNOSTIC ACCURACY IN 107 CONSECUTIVE HOSPITALIZED PATIENTS WITH DIABETIC FOOT OSTEOMYELITIS AND PARTIAL FOOT AMPUTATIONS

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Aim: The aim of this study was to compare the preoperative diagnostic accuracy of plain radiographic (X-ray) findings for diabetic foot osteomyelitis to the accuracy of magnetic resonance imaging (MRI) findings for osteomyelitis in the patients with confirmed histopathological specimens showing osteomyelitis. Secondly, it was desired to determine whether certain variables within the initial clinical presentation and preoperative laboratory findings were associated with more accurate diagnosis of diabetic foot osteomyelitis in this study population. Lastly, it was desired to determine the most common bacterial organisms found in bone and soft tissue cultures which were taken intraoperatively, and to determine how often the same organisms were found in both.

Method: Retrospective electronic chart review of 107 consecutive diabetic patients hospitalized at a single institution for first incidence of partial foot amputation based on initial clinical presentation from January 2012 through December 2014. Data collected from the charts included preoperative foot X-ray result, preoperative MRI result, preoperative laboratory results [white blood cell count (WBC), erythrocyte sedimentation rate (ESR), C-reactive protein (CRP)], bacterial organisms found on intraoperative soft tissue and bone cultures, and histopathology results of specimens obtained intraoperatively. Each subject was categorized according to anatomical location on preoperative clinical presentation. Statistical analysis included descriptive distribution, contingency analysis, bivariate scatter plots, simple and multiple logistic regressions, ANOVA or Welch's *t*-test, and Tukey-Kramer's HSD as a post-hoc method.

Results/Discussion: Utilizing the logistic regression model based on the MRI results without considering the X-ray findings, it was found to be marginally significant (p-value = 0.0556; n = 80) with generalized R^2 = 0.1803. Only the effect of ESR was found to be statistically significant in this model (p-value = 0.0280) while the effect of the MRI findings was not statistically significant at all in diagnosing the foot osteomyelitis (p-value = 0.8886). In contrary, by utilizing the logistic regression model based on the X-ray findings without considering the MRI results it was found to be statistically significant (p-value = 0.0076; n = 79) with generalized R^2 = 0.2661, which was higher than that of the model based on the MRI findings. Among all the possible models examined, this was also the best fit (optimal) model considering all the variables in the study. Both the effects of ESR and of X-rays were found to be statistically significant in diagnosing the diabetic foot osteomyelitis (p-value = 0.0099 for ESR; p-value = 0.0403 for X-rays). It was found that the higher ESR was, the higher the chance of the diabetic foot osteomyelitis was (unit odds ratio = 1.0326). Also, with positive radiographic findings, more likely the diabetic foot osteomyelitis was (odds ratio = 5.2291; p-value = 0.0253). Although it was not found statistically significant, it was also observed that with abnormal CRP, the foot osteomyelitis was more likely (odds ratio = 3.8814; p-value = 0.1475).

The six bacteria most frequently found in both soft tissue and bone cultures were *Peptostreptococcus* species, *Staphylococcus aureus*, coagulase negative *Staphylococci*, Group B *Streptococci*, methicillin resistant *Staphylococcus aureus*, and *Enterococcus* species. In addition, the relative frequencies of the bacterial organisms found in the specimens with positive histopathology (*viz*., diabetic foot osteomyelitis) and the specimens with negative histopathology were almost identical. This explains the fact that even though the site was infected based on intraoperative bacteriological analysis, the sample sent for a histopathologic analysis sometimes showed negative results. Thus, this indicates that diagnosis of true diabetic foot osteomyelitis cannot be made based on the bacteriologic analysis of the bone and/or soft tissue cultures alone.

Conclusion: It has been known that initial X-rays of the foot sometimes delay in showing evidence of osteomyelitis while MRI is more sensitive and specific even for early foot osteomyelitis. However, the results of this retrospective study in a diabetic population with partial foot amputations states otherwise. After adjusting for the effects of covariates (such as age, ESR, and CRP), X-rays seem to have significantly more significant power than MRI in predicting/diagnosing the diabetic foot osteomyelitis. More research and randomized prospective studies can provide further significant results in confirming the diagnostic accuracy of preoperative medical imaging and laboratory testing in patients with diabetic foot osteomyelitis and partial foot amputations.