SHORT REPORT

Diagnostic value of sinus tract culture versus intraoperative bone culture in patients with chronic osteomyelitis

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Abstract

To compare the organisms isolated from the sinus tract culture and intraoperative bone culture in patients with chronic osteomyelitis. This cross sectional prospective study was conducted from February 2015 to March 2016. Ninety consecutive patients were enrolled in study (n=90). Inclusion criteria were patients with either sex, any age, chronic osteomyelitis having discharging sinus. Sample from sinus tracts and bone were taken through standardized aseptic technique and organism were cultured. There were 62 males and 28 females, male to female ratio 3:1, mean age was 40 years. 23 patients had primary osteomyelitis and 67 had secondary osteomyelitis. 68 patients had orthopaedic implant infections. In 61/90 (67%) patients the same organism was isolated on both sinus tract and intraoperative cultures.In our scenario we found that within the limitations of this study, there was a high ratio of agreement between the sinus tract and intraoperative cultures. We conclude that if used judiciously, sinus tract cultures can yield accurate results in the majority of cases.

Keywords: Chronic osteomylitis, Sinus tract culture, Bone culture.

Introduction

Osteomyelitis is defined as an inflammation of bone caused by an infecting organism.[1] Primary chronic osteomyelitis results as a sequel of longstanding acute hematogenousosteomyelitis. Traumatic insult to bone, open fractures or postoperative infections induce what is called as secondary chronic osteomyelitis. Staphylococcus Aureus is by far the most common organism which is most commonly involved in patient of any age.[2] However, the spectrum continues to expand with increasing atypical organisms especially in immune deficient patients and those in endemic areas of tuberculosis for example

Chronic osteomyelitis is characterized by necrosis and death of bone with formation of sequestrum, undulating low grade inflammation and formation of sinus tracts connecting bone to the externalskin.Young patient population is most commonly effected by this prolonged condition requiring long treatment periods and affecting function, mobility and negatively influencing their social and economic wellbeing.[3]

Definitive diagnosis of causative pathogen is of utmost importance in treatment of chronic osteomyelitis. Ideal tissue specimen for isolation of causative microorganism has been debatable between clinicians. There are mainly two schools of thought, one says that the organisms isolated from the sinus tract swabs and those isolated from deep bone cultures are the same.[4] Whereas others believe that material taken from an open sinus tract can yield misleading results because the isolates may be the normal skin commensals and not the infecting agent.[5] Most experts do believe that bone culture results are gold standard for the isolation of causative agent in chronic osteomyelitis.[6]

The aim of our study is to prospectively compare the diagnostic value of the sinus tract swabs versus deep bone cultures in chronic osteomyelitis.

Material and Methods

This cross sectional prospective study was conducted from February 2015 to March 2016 at Liaquat National Hospital and Medical College, Karachi. Ninety patients were enrolled using consecutive sampling technique. All patients had a sinus tract swab taken in outpatient clinic or ward setting using standardized sterile technique. Subsequently they had intra-operative cultures taken during definitive surgical debridement. All antibiotics patients were taking already were stopped for at least one week before taking samples.

The inclusion criteria werepatients of either gender, any age, with chronic osteomyelitis as defined above, with an externally discharging sinus tract or pin tract. Deep cultures from bone, intramedullary canal or sub-periosteal abscesses were taken during surgery in all patients. Patients with open fractures, osteomyelitis secondary to diabetic foot infections, patients without any external sinus tract were excluded. Informed consent

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was sought from all patients prior to enrolling in the study. Our institutional IRB approved the study.

Standardized technique was used in OPD setting as well as in ward where sterile preparation and draping of the surrounding skin was done prior to obtaining sinus tract cultures. Prepacked sterile culture swab (CITOSWAB®) was used for sample collection. Specimen was labeled and transported immediately as per hospital infection control workgroup protocols to the microbiology lab. Bone,soft tissue and intramedullary cultures were obtained during surgical debridement. Proper guidelines of surgical scrubbing, preparation and draping was done prior to all debridement in operation theatre as per defined protocols of World Health Organization practicle guidelines for prevention of hospital acquired infections Guidelines Cited In December 2002.[7] Samples were transported in sealed sterile containers to the microbiology lab.

In 44(48.9%) patients incision during surgery was made through intact skin and in 46(51.1%) incision was made through sinus tract.

Results

There were 61 (68%) males and 29 (32%) females, male to female ratio was 3:1. Mean age of patients was 39.78±18.25 (Range 9-77 years). 28 (31.1%) patients had co-morbids like diabetes myelitis and hypertension.

Primary chronic osteomyelitis was found in23 (25.6%) patients where as 67 (74.4%) had secondary chronic osteomyelitis. Time duration of disease in 35 patients (38.8%) was under two months, in 40 patients (44.4%)wastwo to six months and in 15 patients (16.4.%) was more than six months. 68 patients (75.6%) had orthopaedic implant related infection. In 12 patients (13.3%) chronic osteomyelitis was a sequel of acute haematogenous osteomyelitis. Contagious spread of infection to bone from septic arthritis, soft tissue abscesses and closed soft tissue trauma occurred in 10 patients (11.1%). Most commonly involvedbone was Femur in 36patients (40%), Tibia in 30 patients (33.3%), pelvis 10(11.1%) and Humerus in 8 patients (8.9%).

In sinus tract cultures, 58 patients (64.4%) patients had single organism, 18 patients (20%) had more than one organism and in 14 patients (15.6%) no organism was found. The most common organism found in sinus tract cultures was Staphylococcus Aureus. In deep bone, soft

Table-1: Agreement between both cultures and drug sensitivity.

Organism of Both Cultures	Frequency	Percentage
Same organisms	61	67
Different organisms	29	33
Total	90	100
Drug Sensitivity	Frequency	Percentage
Multiple drug sensitivity	65	72.2
MRSA	22	24.4

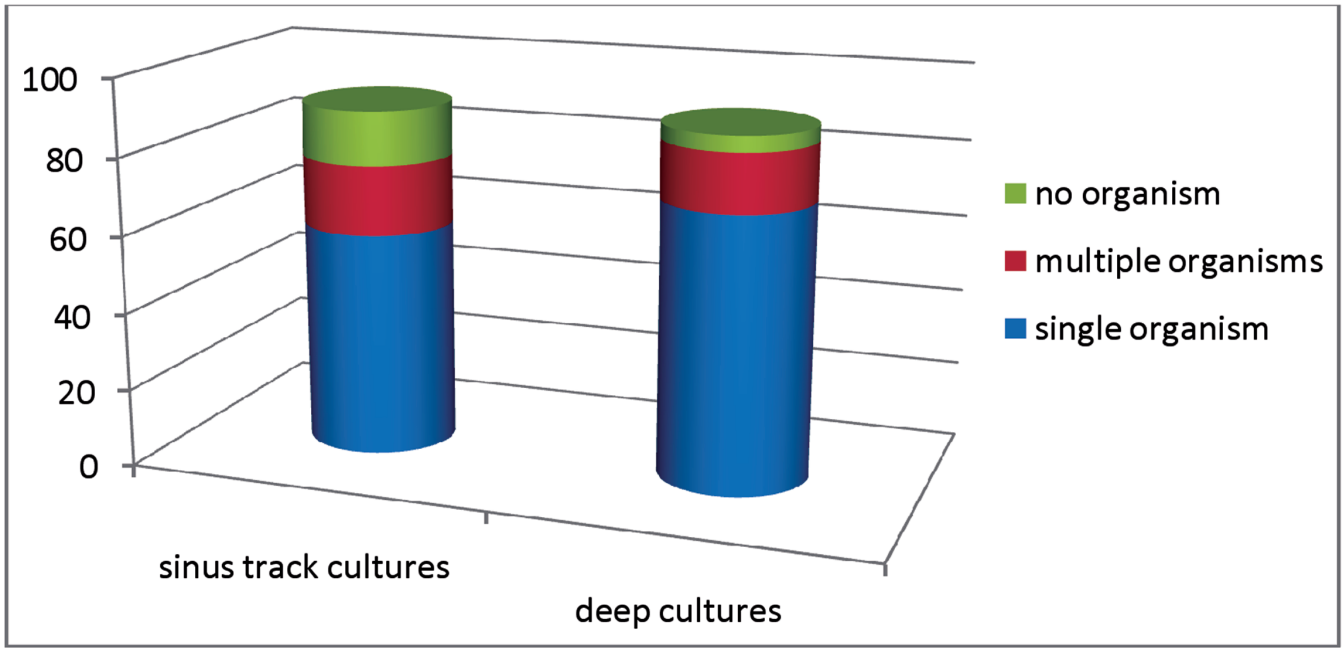

Figure-1: Percentage of organisms(n=90).

tissue and intramedullary cultures, we found single organism in 71 patients (78.8%), poly-microbial infection in 15 patients (16.6%) and no growth of organisms in 4patients (4.4%) patients. Most common organism found in deep cultures was also Staphylococcus Aureus (Figure-1).

In 61 patients (67%) there was agreement in isolates from preoperative sinus tract cultures and intra-operativedeepcultures. In 65 patients (72.2%) organism multi-drug sensitive organisms were isolated and in 22 patients (24.4%) Methicillin Resistant Staphylococcus Aureus (MRSA) was isolated. Appropriate antimicrobial therapy was instituted in all patients according to culture and sensitivity results by hospital infectious disease specialist (Table-1).

Discussion

Chronic osteomyelitis in patients of any age remains a diagnostic and management challenge to all orthopaedic surgeons around world since itcausesmajormorbidity and disability. It is very difficult to treat it and has high rate of recurrence even after apparent complete cure. Many cases of relapse after prolong period of convalescence have been reported in literature and costs of diagnosis, treatment, rehabilitation and loss of productivity are very high. Confirmation of infection and identification of causative organism by microscopy and culture and sensitivity analysis of tissues, bone, pus, exudate, and reaming material obtained under sterilized condition is the most important step, so that proper antibiotics can be selected for treatment.[2] In many cases sinus tracts frequently develop from infected bone to skin. Several authors have described taking samples from sinus tracts to identify the pathogens. Studies have been conducted to compare accuracy of sinus tract cultures versus the established gold standard of intra-operative cultures with varying results. Accuracy ranging from 40% to as high as 88.7% has been reported by these previous studies.[8] The results of our study are in agreement with accuracy reported by Perry et al.[9] Onuminya et al[10] and Bernard et al.[11]

Our results can be interpreted in light of the limitations of the study. Firstly, our study represents a single center experience and results cannot be generalized to the whole population. A large multicentre prospective randomized trial would be required to validate the results which are precluded mostly due to lack of registry or infrastructure to document infections in Pakistan. The strengths of our study are strong adherence to technical protocols and data collection.

Conclusion

In our scenario we found that within the limitations of this study, there was a high ratio of agreement between the sinus tract and intraoperative cultures (67%). We conclude that if used judiciously, sinus tract cultures can yield accurate results in the majority of cases.

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