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A MICROBIOLOGICAL ASSESSMENT OF THE ROUTINE MIDSTREAM URINE CULTURE TO IDENTIFY URINARY TRACT INFECTION IN PATIENTS WITH LOWER URINARY TRACT SYMPTOMS.

Hypothesis / aims of study

The technique of culturing urine to isolate the pathogen suspected to cause a urinary tract infection (UTI) initially stemmed from Koch's work reported 80 years ago, which focussed on the isolation of pneumococci in blood cultures. The use of quantitative microbiology to detect clinically significant bacteriuria has since been described by Marple in 1940 (1) and Kass (2) in 1956.

Hospital diagnostic laboratories within the UK remain reliant on urine culture standards that were described 60 years ago. The diagnosis of UTI by midstream urine (MSU) culture generally relies on the isolation of 10^5 colony forming units per millilitre (cfu/ml) of a single known urinary pathogen. This criterion described in 1956, was drawn from a study of 74 women with acute pyelonephritis and 337 asymptomatic controls (2). This threshold has nevertheless been ingrained as the reference standard by which we diagnose infection, regardless of the clinical circumstance. Whilst attempts have been made to adjust the quantitative threshold for particular clinical presentations, this is often difficult to achieve in diagnostic laboratories that typically receive hundreds of urine specimens per day.

In this study we scrutinised the criteria currently used to interpret routine MSU cultures, by comparing the culture performed in a hospital laboratory to the microbiological composition of an identical culture conducted in our clinic laboratory, and culture of the spun urinary sediment.

Study design, materials and methods

Clean-catch midstream urine specimens were provided by patients presenting with chronic lower urinary tract symptoms. An aliquot of each specimen was sent off to a hospital Microbiology laboratory, requesting for a routine MSU culture and the results were interpreted and reported as one of the following: "no significant growth", "mixed growth of n types of organisms" and " $\geq 10^5$ cfu/ml of a single organism". An identical culture was performed immediately in our clinic laboratory. The remaining sample was spun down and the cell sediment cultured.

Results

Seventy seven clean-catch MSU specimens were provided by 23 (women=20, men=3) chronic LUTS patients for culture analysis. Pearson's Chi-squared test showed a significant difference between the hospital and clinic routine MSU cultures. ($X^2 = 22$, $df=4$, $p < .001$). A closer scrutiny of the hospital laboratory cultures revealed 17 (25.8%) of these "no significant growth" cultures to grow two or more organisms on the identical culture performed immediately in our clinic laboratory. Isolates identified on the clinic cultures of specimens with a "no significant growth" hospital culture included 12 (15.0%) *Enterococcus*, 8 (10.4%) *Escherichia coli*, 5 (6.49%) *Pseudomonas*, 1 (1.30%) *Klebsiella/Enterobacter/Serratia* coliform and 1 (1.30%) *Proteus*. All 31 (100%) clinic cultures revealing no growth were negative on the corresponding hospital culture. Whilst 24 (31.2 %) clinic routine MSU cultures grew more than one isolate, the spun sediment culture technique grew 53 (68.8%) polymicrobial cultures. Isolates identified from sediment cultures illustrated by Fig. 1, reveal *Enterococcus* to be the most predominant organism, followed by *E. coli*.

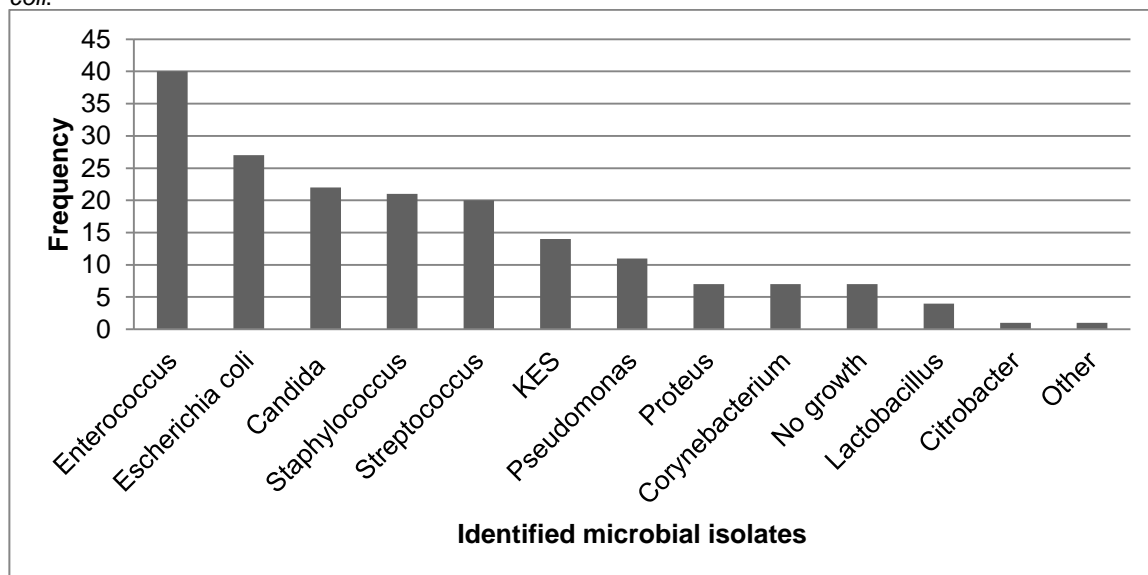


Fig.1

Interpretation of results

These data provide insight into the underlying problems concerning the current guidelines of the routine MSU culture test. The substantial proportion of polymicrobial sediment cultures containing two or more recognised uropathogens suggest polymicrobial infection that may not have been previously considered with the standard MSU culture technique.

Concluding message

Critical microbiological scrutiny of the routine MSU urine culture technique implies the urgent need for a re-evaluation of the guidelines currently used to identify clinically significant bacteriuria in symptomatic patients.

References

1. The Annals of Internal Medicine. 1941 01/06/1941; 14(12):2220-3.
2. Asymptomatic infections of the urinary tract. Trans Assoc Am Physicians. 1956; 69:56-64.

Disclosures

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