Sterile Pyuria

Sterile pyuria is the presence of elevated numbers of white cells (>10 white cells/mm$^3$) in urine which appears sterile using standard culture techniques.

- Sterile pyuria is not an uncommon laboratory finding.[1]
- Sterile pyuria is often found in female patients with symptoms of urinary tract infection (UTI). However, these results may be misleading for various reasons:
  - Standard laboratory culture conditions may not be optimal for growth of atypical organisms.
  - Laboratory may not report significant growth either because it was not a single organism or a recognised urinary pathogen.
  - Fewer than 100,000 colony-forming units (cfu) per mL reported - eg, it may be that urine was diluted by high fluid intake or an organism may be slow-growing. Studies have shown that approximately half of women presenting with symptoms and counts of 100-10,000 cfu/mL have genuine bladder infections.
- The presence of pyuria increases the significance of a low bacterial count in the urine.
- Cell count per high power field is inaccurate and use of a counting chamber or similar gives more accurate results.

Aetiology

- A recently (within preceding two weeks) treated urinary tract infection (UTI) or inadequately treated UTI.
- UTI with ‘fastidious’ organism (an organism that grows only in specially fortified artificial culture media under specific culture conditions) - eg, Neisseria gonorrhoeae.
- Renal tract tuberculosis.[2]
- Chlamydial urethritis.
- False negative culture due to contamination with antiseptic.
- Contamination of the sample with vaginal leukocytes.
- Interstitial nephritis: sarcoidosis (lymphocytes not neutrophils).
- Urinary tract stones.
- Renal papillary necrosis: diabetes, sickle cell disease, analgesic nephropathy.
- Urinary tract neoplasm, including renal cancer and bladder cancer.
- Polycystic kidneys.
- Interstitial cystitis.
- Prostatitis.
- Kawasaki disease.[3]
- Other reported associations include appendicitis and systemic lupus erythematosus.

Investigations

- Urinalysis: initial test to identify likely infection but a urine sample needs to be sent to the laboratory. See the separate article on Urine Dipstick Analysis. Positive nitrite test +/- positive leukocyte esterase test. Haematuria and proteinuria occur in UTI but are also present in other conditions.
- Urine microscopy, culture and sensitivities; ask the laboratory to culture under conditions allowing identification of fastidious or slow-growing organisms.
- Consider the possibility of sexually transmitted disease; take a sexual history and consider sending swabs for chlamydia and N. gonorrhoeae.
- Polymerase chain reaction (PCR) testing of sterile pyuria has been recommended for the detection of Chlamydia trachomatis, mycoplasma and ureaplasma infections.[4]
- Always consider tuberculosis; culture for AFBs (three early morning urine samples).
- With urine obtained direct from the bladder, any organism grown is significant and should be treated with a prolonged course of appropriate antibiotics.
- Cystoscopy may be required to exclude non-infective causes.

Management

- Management of any identified underlying cause.

Further reading & references
