Clinical audit of prosthetic joint infection diagnosis and treatment at Cork University Hospital

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Prosthetic joint infection (PJI) is an infrequent but serious complication of joint arthroplasty. Adherence to international guidelines is essential for identifying the causative pathogen and appropriate use of antibiotics. In this quality improvement project, we conducted a retrospective audit of PJI. We compared The Infectious Diseases Society of America clinical practice guidelines (2013) and the UK Standards for Microbiology Investigations (2016) were used as the quality benchmark. The aim of the audit was to assess pre-operative, operative and laboratory processes for diagnosis of PJI. The results will inform a local policy for PJI diagnosis and treatment. We are planning a multi-modal educational intervention for Orthopaedic and laboratory staff to ensure compliance with best practice. A repeat audit is planned to assess the effect of this intervention.

AUDIT STANDARDS

Diagnosis and management of prosthetic joint infection: Clinical practice guidelines by the Infectious Diseases Society of America (2013)

- I-6. 'In PJI where the patient is medically stable, withholding antimicrobial therapy for at least 2 weeks prior to collection of synovial fluid for culture increases the likelihood of recovering an organism).
  - I-7. Blood cultures for aerobic and anaerobic organisms should be obtained if fever is present
  - II-10. At least 3 and optimally 5 or 6 periprosthetic intraoperative tissue samples

UK Standards for Microbiology Investigations: Investigation of orthopaedic implant associated infections (2016)

- Incubate the enrichment broth for 5 days (culture may be extended to 14 days in certain situations)

METHODS

Patients were identified from theatre records. We included patients who met consensus criteria (presence of sinus, positive culture, or strong clinical suspicion) and underwent procedure for PJI between September 2020 and September 2021. We collected demographic data and culture results to characterise local microbiology and antimicrobial resistance. We collected data on diagnostic procedures at the pre-operative, operative and laboratory stages.

RESULTS

Fifty unique episodes of PJI were identified. There were 27 hip PJI, 20 knee PJI, 3 shoulder PJI and 1 case of polyarticlular PJI. Pataients were mostly male (54%) with a median age of 71. Co-morbidities include diabetes (10%), previous PJI (19%) and rheumatoid arthritis (4%). Onset of infection was categorised as late acute/haematogenous (27%), chronic (12%), early post-op (8%) and unclear (53%). The majority of patients were undergoing a staged procedure (71%) or debridement and retention (DAIR) (21%).

	Cork (n=50)	Patel et. al
Staphylococcal	64% (31)	68%
MSSA	27% (13)	25% (MSSA+MRSA)
MRSA	2% (1)	
CoNS	35% (17)	43%
GNB	25% (12)	11%
Streptococcal	2.6% (2)	14%
C. Striatum	2.6% (2)	5%
Enterococcal	1.3% (1)	8%
VRE	1.3% (1)	

Figure 1: Microbiology of PJI cases

RESULTS

Pre-operative

Over a third (38%) of patients are on antibiotics at time of procedure.

67% underwent aspirate prior to surgery

- 8 received antibiotics pre aspirate (75% deemed appropriate indication)
- 4 received antibiotics post aspirate (25% deemed appropriate indication)

26% did not have 'antibiotic holiday' before re-implantation.

Operative

16% < 3 specimens
30% 3-4 specimens
54% > 4 specimens

61% patients received antibiotics in theatre, but before sampling.

Of the 11 culture-negative cases, 3 received antibiotics before sampling and 7 received pre theatre antibiotics.

Laboratory

Of 46 patient-episodes with lab specimens:

- 32% enrichment, 23% underwent extended (> 5 days) incubation, 8% sent for PCR (25% positivity rate, but no additional yield compared to culture)

75% of culture negative episodes did not have extended incubation.

INTERVENTION

This audit will inform a local policy for PJI diagnosis and treatment. A formal policy with diagnostic algorithms is under development. (Figure 2).

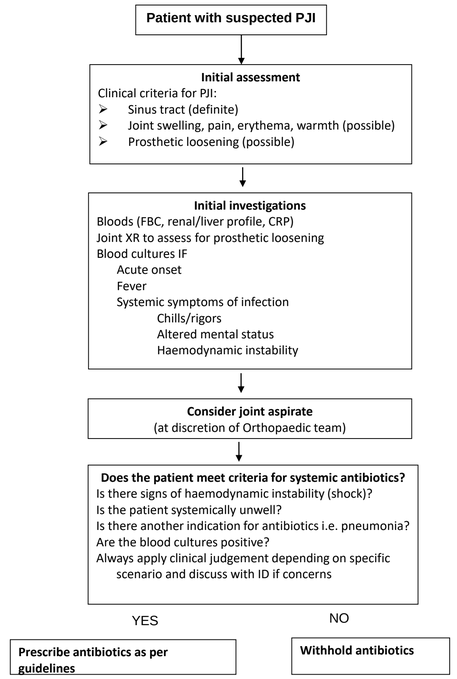

Figure 2: Diagnostic pathway for PJI

CONCLUSION

We found higher rates of gram-negative and culture-negative infections in our audit compared to previous reports. We identified opportunities to enhance our sampling methods with respect to tissue type, enhance intra-operative methods to reduce risk of contamination and improve laboratory processing.