Bone and Joint Infections : Looking Beyond Gram Positive Bugs, A Case Series from Mumbai, India

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Background

- Bone and joint infection (BJI) is a dreadful complication of arthroplasties and orthopaedic trauma.
- Infection with non traditional organisms is a trade off for medical advances such as newer immunosuppressants and implants.
- Complex BJIs, may be complicated by longer hospitalizations and higher costs due to the virulence of organisms, growing resistance to antibiotics and patient comorbidities, especially immunocompromised status.

Purpose

- The purpose of this study was to analyze the various characteristics of BJIs with emphasis on the organisms cultured.

Methods

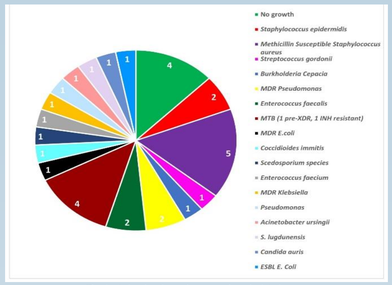
- 21 consecutive patients of BJIs were prospectively included from June 2021 to March 2022.
- Demographic features, comorbidities, anatomic site involved, previous surgical intervention, presence of implant, infecting organism, their susceptibility patterns, inflammatory markers, surgical procedure performed, antibiotics given, their route, duration and the outcome were noted.

Table 1

Total patients (n = 21)	Males 9 (42.85%)	Females 12 (57.14%)
Comorbidities : 17/21 (80.95%)		**Immunosuppressed : 7/21 (33.33%)**
1. Severe anemia, Asthma		11. Diabetes, hypothyroidism, atrial fibrillation
2. Hypertension		**12. Diabetes, hypertension, chronic kidney disease**
3. Diabetes and Hypertension		13. Severe anemia
4. Parkinson's disease and knee osteoarthritis		14. Diabetes, hypertension, ischaemic heart disease
5. Diabetes and Hypertension		**15. Post bone marrow transplantation, recent CMV syndrome**
6. Severe anemia and Hypertension		**16. Drug addict, chronic steroid abuse, COVID 19**
7. Small cell carcinoma of the lung, COVID 19		**17. Systemic lupus erythematosus on steroids**
8. Chronic liver disease		
9. Hypertension		
10. Autoimmune hepatitis and primary sclerosing cholangitis on steroids & azathioprine		

Table 2 (BJIs Bone and Joint Infections)

(A) Spondylodiscitis 12/21 (57.14 %)	a) Bacterial b) Mycobacterial c) Fungal d) No growth	6 3 (1 INH monoresistant) 1 (Coccidioides immitis ; expatriate residing in California) 2
(B) Knee joint involvement 4/21 (19.04 %)	a) Bacterial b) Mycobacterial c) Fungal	2 1 (pre XDR) + bacteria 1 (scedosporium)
(C) Hip joint involvement 3/21 (14.29 %)	a) PJI b) Arthritis c) Arthritis	MDR E.coli Culture negative MTB
(D) Orthopaedic trauma 3/21 (14.29 %)	a) Non union fracture of right femur shaft b) Right tibia post traumatic osteomyelitis c) Right subtrochanteric fracture with infected implant	(Staphylococcus epidermidis) (Culture negative) (ESBL E. coli, Enterococcus faecalis, and Staphylococcus aureus)
(E) Ankle joint septic arthritis (diabetic)	1/21 (4.76%)	MDR Kleibsella pneumonia
(F) Sternal osteomyelitis (post keloid surgery)	1/21 (4.76%)	Staphylococcus aureus
• 3 patients had more then 1 site involved		



Pie chart showing the various organisms isolated

D9D10 spondylodiscitis and tuberculous paravertebral abscess

Results

TABLE 3

Pt No.	SITE INVOLVED	ORGANISMS	ANTIBIOTICS GIVEN
1.	Prosthetic Hip Joint	MDR E.coli	Amikacin, Tab Trimethprim -Sulfamethoxazole
2.	Knee native joint septic arthritis	MTB (Pre XDR), Enterococcus faecalis	Anti Tuberculosis drugs
3.	Knee native joint septic arthritis	MDR Pseudomonas	Ceftazidime Avibactum + Aztreonam + Polymyxin B
4.	Non union fracture of femur shaft	Staph. epidermidis	Teicoplanin
5.	Spondylodiscitis L4-L5	Methicillin Susceptible Staph. aureus,, B. Cepacia	Teicoplanin, Ceftazidime, Tab Clindamycin
6.	a) Spondylodiscitis L4-L5 b) Knee Joint effusion	a) No growth b) Scedosporium species	Tab Voriconazole
7.	Spondylodiscitis L1-L2	Streptococcus gordonii	Teicoplanin
8.	Spondylodiscitis D9-D10	Methicillin Susceptible Staph. aureus	Ceftriaxone, Co amoxyclav
9.	Spondylodiscitis D8-D9	Staph. epidermidis	Teicoplanin, Tab Trimethprim-Sulfamethoxazole
10.	Spondylodiscitis L3-S1, paravertebral abscesses, epidural extension	Coccidioides immitis	Liposomal Amphotericin B 3 doses, Tab Fluconazole
11.	Right tibia osteomyelitis (post trauma)	No growth	Ceftriaxone, Tab Ampicillin + Sulbactum
12.	Knee joint abscess and osteomyelitis	Acinetobacter ursingii, S. lugdunensis	Tab Levofloxacin + Tab Trimethprim-Sulfamethoxazole
13.	Spondylodiscitis D1-D2, paravertebral abscesses, epidural extension	MTB	Anti Tuberculosis drugs
14.	Spondylodiscitis L3-L4	Staph. aureus on 2nd culture	Cefoperazone Sulbactum+Amikacin , Tab Trimethprim-Sulfamethoxazole, Levofloxacin
15.	a) Spondylodiscitis L3-L4 b) Ankle joint arthritis (diabetic) **(Expired)**	a) No growth b) MDR Pseudomonas+Enterococcus faecium+Candida auris	Ceftazidime Avibactum+Aztreonam, Teicoplanin, Micafungin
16.	Non union subtrochanteric fracture femur	ESBL E. Coli , Enterococcus faecalis, Staph. aureus	Ceftriaxone, Meropenem, Tab Co amoxyclav, Ertapenem
17.	Spondylodiscitis L3-L4 **(Expired)**	MDR Kleibsella	Piperacillin Tazobactum, Polymyxin B, Ceftazidime Avibactum+Aztreonam
18.	Hip joint arthritis	No growth	Meropenem+Teicoplanin+Ceftazidime
19.	Sternal osteomyelitis	Staph. aureus, Pseudomonas	Tab Linezolid, Tab Levofloxacin
20.	Spondylodiscitis L3-L6, hip arthritis, multiple lytic lesions	MTB (Isoniazid monoresistant)	Anti Tuberculosis drugs
21.	Spondylodiscitis L3-L4, multiple lytic lesions	MTB	Anti Tuberculosis drugs

- All organisms were isolated from deep tissue / aspirated pus
- All antibiotics were given according to susceptibility results, except the two culture negatives (empirical) ; All parenteral antibiotics were given for 5-6 weeks, guided mainly by CRP (except patient 12)
- Patient 10 was an expatriate from California who came to India for treatment ; developed acute kidney injury due to chronic NSAIDs ingestion for backache, after receiving liposomal AmB, so shifted to Fluconazole
- Patient 2, 5, 12, 16 and 19 grew more than one organism on different cultures ; patient 15 grew multiple organisms on the same culture
- Patient 18 was post bone marrow transplantation and was treated on the basis of a recent MDR E. Coli blood culture report

- 12/21 (57.14 %) had spondylodiscitis ; 4/21 (19.04 %) knee joint involvement ; 3/21 (14.29 %) orthopaedic trauma ; 3/21 (14.29 %) hip involvement ; 1 ankle joint involvement (diabetic foot) and 1 sternal osteomyelitis.
- 17/21 (80.95 %) had comorbidities; 7/21 (33.33 %) were immunosuppressed; 14/21 (66.67 %) had undergone recent surgery.
- 11 gram positive, 8 gram negative organisms and 3 fungi were isolated . 2 were culture negative and 4 had mycobacterial infection.
- Histopathology revealed pyogenic inflammation in bacterial and granulomatous inflammation in fungal and mycobacterial infections.
- CRP and ESR were elevated in all bacterial infections and were used to guide antibiotic route switchover.
- All bacterial infections were treated with antibiotics for 6 weeks. 14/21 (66.67 %) underwent surgery, whereas the rest underwent diagnostic aspiration and biopsy only. 3/21 (14.29 %) had relapse on stopping antibiotics and responded after restarting antibiotics.

Conclusion

- Though staphylococcus is thought to be the culprit in most cases of BJIs, gram negative organisms, mycobacteria and fungi need to be watched for.
- Histopathology can give important clues in the absence of positive cultures.
- Surgical interventions, implant presence and immunosuppressed states are implicated in a majority of the infections.
- CRP guided switchover to oral antibiotics is a good strategy in bacterial infections.

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Acknowledgements

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