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Background

- Infection following an orthopaedic injury or surgery can be detrimental to patients and hospitals alike.
- Proper prevention and treatment is crucial towards minimizing increased morbidity.
- This study aims to determine the efficacy of calcium sulfate beads in both infection prophylaxis and treatment in various locations.



Figure 1: Calcium Sulfate Bead Preparation

Methods

- Retrospective review was conducted on a multi-institutional infection dataset for any patients receiving calcium sulfate beads for infection prophylaxis or treatment.
- Beads were placed either intramedullary, intraarticular, soft tissue or bony defect and mixed with culture specific antibiotics if available.
- Patients were monitored post operative for postoperative complications, and any return to the operating room to determine infection clearance and any related adverse events.

	Intramedullary (n = 135)	Intra-Articular (n = 25)	Bony Defect (n = 9)	Soft Tissue (n = 32)	P-value
Males (% , n)	50.4 (68)	56 (14)	100 (9)	59.4 (19)	0.032
Age (years, SD)	55.66 (17.64)	65.16 (16.70)	47 (18.55)	57.53 (18.20)	0.032
BMI (kg/m ² , SD)	30.36 (8.37)	28.98 (7.27)	27.23 (6.00)	32.99 (10.17)	0.182
ASA (median, IQR)	3 (1)	3 (0)	2 (1)	3 (1)	0.091
CCI (median, IQR)	3 (3)	1 (2)	0 (2)	2 (2.5)	0.163
Smoking (%)	37.78	44.0	11.11	31.25	0.590
HbA1c (SD)	5.66 (0.86)	5.88 (1.15)	5.55 (0.35)	5.80 (0.80)	0.836

Table 1: Patient Demographics and Characteristics

	ED-Visits Related to Surgery (% , n))	ED-Visits Not Related to Surgery (% , n))	Readmission (% , n))	Reoperation (% , n))
30-Days	IM = 16.3 (22) IA = 12 (3) BD = 22.2 (2) ST = 18.8 (6) P = 0.876	IM = 5.2 (7) IA = 12 (3) BD = 11.1 (1) ST = 9.4 (3) P = 0.544	IM = 12.6 (17) IA = 8 (2) BD = 22.2 (9) ST = 12.5 (4) P = 0.746	
90-Days	IM = 12.8 (17) IA = 16 (4) BD = 44 (4) ST = 13 (4) P = 0.078	IM = 16 (22) IA = 8 (2) BD = 22 (2) ST = 7 (2) P = 0.064	IM = 20.1 (27) IA = 12 (3) BD = 33.3 (3) ST = 16.7 (5) P = 0.538	
1-Year	IM = 7.5 (10) IA = 8 (2) BD = 0 (0) ST = 16.7 (5) P = 0.316	IM = 16.4 (22) IA = 8 (2) BD = 22.2 (2) ST = 16.7 (5) P = 0.690		IM = 15.6 (21) IA = 4 (1) BD = 11.1 (1) ST = 12.5 (4) P = 0.480

Table 2: Postoperative outcomes at 30-Days, 90-Days and 1-Year



Figure 2: Calcium Sulfate Beads in Soft Tissue

Results

- 201 patients were followed postoperatively after receiving calcium sulfate beads for 1-2 years.
- 36 patients were treated prophylactically if they had an open fracture or history of prior infection.
- 165 patients were treated due to infection.
- Compared to intramedullary placement, intraarticular beads had an OR of 0.70, bony defect placement OR 1.40, and soft tissue placement OR 1.16 of infection clearance, however **no statistically significant differences**.
- **Fungal infections** were associated with **90-day readmissions (OR 6.0, p = 0.007)**, whereas gram-positive and gram-negative infections were not.
- Overall, 13.4% of patients returned to the operating room within 1 year due to reinfection.

Conclusions

- Calcium sulfate beads are an effective means of both preventing and treating infection following orthopaedic surgery.
- While effective in all settings, we found the **lowest rate of return to the operating room when used in the joint space and soft tissue spaces**.
- More research is needed to understand this relationship.