

**Agricultural Trauma Causing Open Fractures:
Is Antibiotic Coverage Against Anaerobic Organisms Indicated?**

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Purpose: Open fractures resulting from agricultural trauma are historically associated with high rates of infection. Prophylactic antibiotic coverage for anaerobic organisms is generally recommended because of the environment in which injuries occur. However, little is known about deep infection rate and causative organisms. The aim of this study was to compare deep infection rate and causative organisms in open fractures of the lower extremity from agricultural trauma to similar injuries in non-agricultural trauma.

Methods: Open lower extremity fractures sustained between 2003 and 2018 by agriculture-related trauma in adult patients from two tertiary-care institutions were retrospectively reviewed. A non-agriculture open fracture control group was identified for comparison. Patient demographics and injury characteristics were assessed. Outcomes included occurrence of deep infection and causative organism.

Results: 178 patients were identified in the agriculture (AG) (n = 89) and control (NAG) (n = 89) groups. Among agricultural injury patients, farm machinery was the most common mechanism in 69 patients (77.5%). Average age was 44.4 years in the AG and 39.7 years in the NAG group (P = 0.07). Open injuries of the foot (38.2%) were most common in the AG group and tibial shaft (25.8%) in the NAG group. Deep infection was seen in 21% of the AG group compared to 10% in the NAG group (P<0.05). AG group anaerobic infection occurred in 44% of patients with deep infection versus 9.1% in NAG group (P<0.05). The most common anaerobic organisms included Enterococcus, Pseudomonas aeruginosa, and Clostridium perfringens.

Conclusion: This study supports that open fractures due to agricultural trauma have a high infection rate, with anaerobic infection occurring at higher rates than in non-agricultural trauma. Prophylactic treatment with antibiotics directed against anaerobes is indicated in these injuries.

Table 1| Bacterial profile of deep infections in agriculture and non-agriculture related injury groups.

Infection Organism	AG* # of Infections	NAG** # of Infections	p-value
Anaerobic			
Enterococcus‡	11	1	0.0002
Pseudomonas‡	5	1	
Clostridium	3	0	
perfringens‡	3	0	
Aerobic	7	8	0.0002
MSSA‡	2	5	
MRSA‡	2	1	
Streptococcus	2	0	
No growth/Unknown	2	4	
Klebsiella	1	0	
Serratia	1	1	
Citrobacter	1	0	
Proteus	1	0	
Bacillus cereus	1	0	
Enterobacter	1	0	

*AG=agriculture related injury group; **NAG=non-agriculture related injury group; ‡MSSA=methicillin-sensitive staphylococcal aureus; †MRSA=methicillin-resistant staphylococcal aureus; ‡=anaerobic bacteria

The FDA has stated that it is the responsibility of the physician to determine the FDA clearance status of each drug or medical device he or she wishes to use in clinical practice.