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Original article

Traumatic Versus Post-Osteomyelitic Limb Amputations: Clinical Burden, Surgical History and Antimicrobial Resistance Patterns

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Abstract

Limb amputation in trauma and orthopedic practice is performed both in the acute post-traumatic setting and as a consequence of long-standing chronic osteomyelitis. These scenarios differ substantially in pathogenesis, surgical burden, and microbiological profile; however, comparative data within a single tertiary trauma center remain limited. The aim of this study was to compare clinical characteristics and microbiological patterns of traumatic and post-osteomyelitic limb amputations.

Methods. A retrospective analysis was conducted on 34 patients who underwent limb amputation in 2025. Twenty-three cases were classified as traumatic amputations and eleven as post-osteomyelitic amputations. Demographic variables, amputation level, length of hospital stay, number of previous surgical procedures, microbiological findings, and antimicrobial resistance patterns were evaluated.

Results. Traumatic amputations predominantly involved the upper extremity and were mainly limited to digit-level injuries. Post-osteomyelitic amputations more frequently affected the lower limb and were associated with a prolonged surgical history and multiple prior interventions. Positive intraoperative cultures were identified in one-third of osteomyelitis cases. Methicillin-resistant Staphylococcus aureus (MRSA) was the most common pathogen, followed by Pseudomonas aeruginosa; all isolates demonstrated multidrug resistance. No pathogens were isolated in traumatic cases.

Conclusions. Traumatic amputations in the present cohort were associated with a relatively favorable clinical course, characterized by predominantly distal levels of amputation, minimal infectious burden, and a high likelihood of primary stump healing. In contrast, post-osteomyelitic amputations reflected advanced stages of chronic infection and were associated with prolonged disease history, repeated surgical interventions, and the presence of resistant microbial flora.

Keywords: limb amputation, osteomyelitis, microbiological profile, antimicrobial resistance.

1. Introduction

Limb amputation remains one of the most devastating ends in trauma and orthopedic practice, leading to permanent disability, reduced quality of life, and increased mortality. Complicated infections of bone and soft tissues constitute a major cause of major limb amputation, particularly chronic osteomyelitis, which frequently develops following severe trauma, open fractures, and repeated surgical interventions on the affected limb [1-6].

Clinical and epidemiological data indicate that postoperative and post-traumatic forms account for up to 80% of all osteomyelitis cases. Furthermore, 10–30% of acute episodes progress to chronic disease, characterized by persistent infection foci, sequestra formation, and sinus tracts [2,3]. Chronic osteomyelitis is marked by impaired local vascularization, necrotic bone tissue, and biofilm formation, all of which substantially limit the effectiveness of systemic antimicrobial therapy and necessitate repeated surgical procedures [1,7,8]. Even with contemporary reconstructive strategies, including the use of local antibiotic carriers and staged treatment protocols, infection may persist for years, maintaining a significant risk of limb loss [1,7,9].

Global data highlight the considerable burden of major amputations on healthcare systems. In France, for example, approximately 7,800 major lower limb amputations are performed annually, with uncontrolled infection representing the primary direct cause in more than half of cases, rather than critical limb ischemia alone [10]. In several clinical series, infectious complications - including osteomyelitis and purulent-necrotic lesions of the foot and lower leg - constituted the leading indication for amputation in 60–65% of patients [10]. The presence of osteomyelitis has also been independently associated with increased rates of hospitalization, repeat surgical procedures, and subsequent amputations during long-term follow-up [11].

An additional concern is the relationship between chronic osteomyelitis and the rising prevalence of antimicrobial resistance. Studies of limb infections and diabetic foot syndrome consistently identify *Staphylococcus aureus*, *Pseudomonas aeruginosa*, and Gram-negative Enterobacteriaceae as the predominant pathogens. Methicillin-resistant *S. aureus* (MRSA) accounts for approximately 30% of isolates, while multidrug-resistant (MDR) strains of *Pseudomonas* and other Gram-negative bacteria comprise 20–30% [8,12]. The presence of MDR organisms is associated with more severe clinical courses, repeated exposure to broad-spectrum antimicrobial therapy, increased risk of reconstructive failure, and a higher likelihood of eventual amputation [7,8,12].

In recent years, the principles of a comprehensive orthoplastic approach to post-traumatic osteomyelitis have gained increasing acceptance. This strategy integrates radical debridement, restoration of skeletal stability and load-bearing capacity, soft tissue defect coverage, and targeted antimicrobial therapy within a multidisciplinary framework [4,7,9]. Nevertheless, even in specialized centers, amputation remains unavoidable in a subset of patients presenting with recurrent infection, unstable fixation constructs, severe deformities, and intractable pain. Contemporary series of post-traumatic osteomyelitis of the lower extremity report amputation rates ranging from 1% to 12.5%, and functional outcomes, even in remission, remain significantly inferior to population norms [9].

Against this background, particular clinical interest is directed toward trauma and orthopedic patients in whom the decision to amputate is made either during the acute post-traumatic period or after years of repeated limb-salvage attempts in the setting of chronic osteomyelitis. In countries characterized by high rates of road traffic and occupational injuries, limited access to early specialized care, and an elevated baseline prevalence of antimicrobial resistance - such as those in Central Asia - this issue is especially pressing [13]. However, the literature provides scarce data directly comparing traumatic and post-osteomyelitic amputations within a single trauma center, including detailed evaluation of infectious history, microbiological profiles, antimicrobial resistance patterns, and prior surgical interventions.

2. Materials and Methods

A retrospective cross-sectional analysis was conducted using clinical data from patients who underwent upper or lower limb amputation at a tertiary trauma and orthopedic inpatient center. The study period extended from late 2024 to late 2025, based on medical records (first hospitalization: December 2024; last discharge: November 2025) (Table 1).

All patients who underwent limb amputation due to acute trauma or post-traumatic osteomyelitis were included in the analysis. Patients whose amputations were performed for other indications (e.g., malignancies, primary vascular diseases) or who had incomplete medical documentation were excluded.

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Data were obtained from inpatient medical records and discharge summaries, which included detailed information on medical history, diagnosis, mechanism of injury or clinical course of osteomyelitis, microbiological findings, and treatment regimens.

The following variables were extracted:

- Demographic variables: age and sex;
- Clinical variables: length of hospital stay, indication for amputation, level of amputation, and number of surgical interventions;
- Paraclinical variables: microbiological culture results from the amputation stump, antimicrobial resistance patterns, antibiotic therapy regimens, and comorbid conditions.

Table 1 - Criteria's of the study

Category	Criteria
Inclusion criteria	• Patients who underwent upper or lower limb amputation in 2024–2025. • Amputation performed due to trauma or post-traumatic osteomyelitis. • Complete medical documentation (inpatient medical record, discharge summary, operative reports). • Age ⩾18 years.
Exclusion criteria	• Amputations performed for reasons unrelated to trauma or osteomyelitis (vascular diseases, diabetic foot syndrome, malignancies, frostbite, congenital malformations). • Incomplete clinical data (missing discharge summaries, absence of microbiological culture data, missing operative documentation). • Repeated hospitalizations of the same patient after a previously performed amputation (duplicate records). • Patients younger than 18 years.

Patients were stratified into two groups: Group A - traumatic amputations (n=23) and Group B – post-osteomyelitic amputations (n=11).

Statistical analysis included descriptive and comparative methods. Continuous variables were presented as means ± standard deviations, while categorical variables were expressed as frequencies and percentages. Between-group comparisons of continuous variables were performed using the Student's t-test following assessment of normality. Proportions were compared using the chi-square (χ^2) test or Fisher's exact test when expected cell counts were small. A p-value < 0.05 was considered statistically significant. Data analysis was conducted using SPSS (IBM Corp., Armonk, NY, USA) and standard statistical software packages.

Use of clinical records was authorized by institutional licensing and conducted in accordance with applicable sanitary and regulatory standards.

The study protocol was approved by the Local Ethics Committee of the National Center of Traumatology and Orthopedics named after Academician N.D. Batpenov.

3. Results

The study included 34 patients (23 men and 11 women) who underwent limb amputation. The mean age was 40.4±12.4 years. Men comprised 67,6% of the overall cohort (80% in Group A and 78% in Group B; the difference was not statistically significant, p > 0.05).

The mean duration of hospitalization across the entire cohort was 20.7±44.6 days, with a median of 12 days (range, 4–249 days). Median hospital stay was slightly longer in Group B (14.0 days) compared with Group A (10.0 days); however, this difference did not reach statistical significance (p>0.05).

Table 1 summarizes the baseline characteristics of the cohort. The majority of patients underwent upper limb amputations (79,4%, n=27), while lower limb amputations accounted for 20,6% (n=7). The mean length of inpatient stay ("bed-days") was 18.1±12.3 days.

Nearly all patients had a documented history of either domestic or occupational trauma. Fifteen patients (52%) sustained work-related injuries, 11 (38%) experienced domestic trauma (e.g., lacerations caused by tools or road traffic accidents without major skeletal destruction), and three cases (10%) were attributed to street-related injuries. Comorbid conditions were generally mild and included moderate anemia (n=2) and minor chronic diseases such as gastritis and asthma (Table 2).

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Table 2 - Overall characteristics of the patient cohort (n=34)

Parameter	Value (overall cohort)
Number of patients	34
Men, n (%)	23 (67,6)
Women, n (%)	11 (32,4)
Mean age, years (SD)	40.4 (±12.4)
Length of hospitalization, days	20.7 (±44.6)*
Upper limb amputations, n (%)	27 (79,4)
Lower limb amputations, n (%)	7 (20,6)
Bed-days (mean ± SD)	18.1 (±12.3)

**Due to a significant outlier (249 days), the mean value exceeds the median for several variables*

Comparison of Groups A and B

No significant differences were observed between the two groups in terms of baseline demographic characteristics. The mean age was 40.3±12.9 years in Group A and 40.6±11.3 years in Group B ($p \approx 0.97$). Sex distribution was also comparable: men accounted for 82,6% of patients in Group A and 81,8% in Group B (χ^2 test, $p>0.05$). The mean length of hospital stay did not differ significantly between groups (Group A: 25.0±52.4 days; Group B: 15.9±6.7 days; $p \approx 0.47$).

In the traumatic amputation group (Group A), upper limb involvement predominated. All cases (100%, n=23) involved amputations of the hand or fingers. Twenty-two procedures were limited to the hand/fingers, and one case involved a more proximal amputation.

In contrast, the post-osteomyelitic group (Group B) demonstrated a different anatomical distribution. Lower limb amputations (below- or above-knee) were performed in 54,5% of patients (n=6), while 45,5% (n=5) underwent upper limb amputations, primarily involving the fingers.

The difference in anatomical distribution between groups was statistically significant ($p \approx 0.001$). Notably, no traumatic patient underwent lower limb amputation, whereas 6 of 11 patients in Group B required below- or above-knee amputation.

Similarly, the level of amputation differed substantially between groups. In Group A, the overwhelming majority of procedures were digit amputations (22/23), with only one high-level amputation (proximal upper limb). In Group B, digit amputations accounted for five cases, below-knee amputations for four cases, and one patient underwent an above-knee amputation.

Overall, the traumatic cohort was characterized predominantly by distal, limited upper limb amputations, whereas the osteomyelitis cohort included a significantly higher proportion of major lower limb amputations (χ^2=11.23, $p \approx 0.003$) (Table 3).

Table 3 - Comparison of Groups A and B

Parameter	Group A (trauma), n = 23	Group B (osteomyelitis), n = 11	p-value
Mean age (years)	40.3 ± 12.9	40.6 ± 11.3	0.97 (t-test)
Men, n (%)	19 (82,6%)	9 (81,8%)	>0.05 (χ^2)
Length of hospitalization (days)	25.0 ± 52.4	15.9 ± 6.7	0.47 (t-test)
Upper limb amputations, n (%)	23 (100%)	5 (45,5%)	— (boundary value)
Lower limb amputations, n (%)	0	6 (54,5%)	0.001 (χ^2)
Hand/finger amputations	22 (95%)	5 (45,5%)	0.003 (χ^2)
Below-knee (transtibial)	0	5 (45,5%)	0.003 (χ^2)
Above-knee (transfemoral)	1 (5%)	1 (9,1%)	NS

The anatomical localization (upper vs. lower limb) and level of amputation differed significantly between groups ($p<0.01$), consistent with differences in underlying pathogenesis. Group B was characterized by late-stage osteomyelitis involving the talus and tibia, whereas Group A predominantly included acute hand trauma.

Clinical Observations

Clinical Case 1. Occupational traumatic finger amputation

A 51-year-old female sustained an occupational injury to the left hand following contact with the rotating mechanism of an industrial dough-mixing machine. The diagnosis was complete traumatic amputation of digits II–IV at the level of the middle phalanges (ICD-10 code S68.2).

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Emergency microsurgical replantation of the amputated segments was performed 8 hours after injury, including restoration of skeletal fixation and vascular anastomoses. In the early postoperative period, progressive ischemia of the distal segments developed despite ongoing anticoagulant and vasoactive therapy. On postoperative day 13, revision surgery was performed with formation of functionally adequate stumps of digits II–IV (Figure 1).

Figure 1 - (A) Radiograph of the left hand at initial hospital admission. (B) Follow-up radiograph of the left hand after surgical treatment (replantation of digits II–IV)

The postoperative course was uneventful, with no infectious complications. The stumps healed satisfactorily and were functionally adequate. This case illustrates the unfavorable prognosis of digital replantation following crush injuries caused by rotating machinery, even when timely microsurgical intervention is performed.

Clinical Case 2. Chronic post-traumatic osteomyelitis of the lower leg resulting in amputation

A 44-year-old male presented with a long-standing history of right lower leg trauma sustained in 1998 and multiple subsequent surgical interventions, including osteotomy, intramedullary fixation, hardware removal, external fixation, and sequestrectomy.

At the time of admission, the patient exhibited a chronic wound located in the distal third of the lower leg (6×3 cm) with exposed bone, pronounced cicatricial deformity, and significant impairment of weight-bearing function (Figure 2).

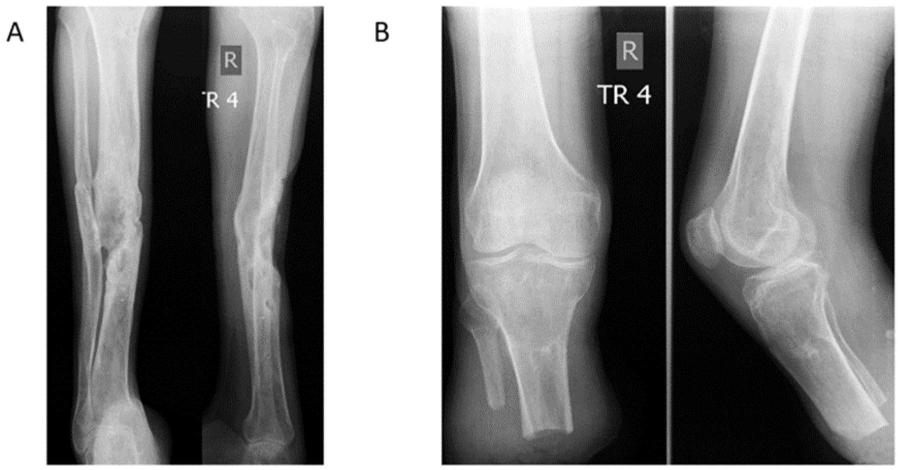

Figure 2 - (A) Radiographs of the right lower leg (anteroposterior and lateral views) at admission, demonstrating radiographic signs consistent with chronic osteomyelitis of the tibia. (B) Follow-up radiographs of the right lower leg (anteroposterior and lateral views) after amputation at the level of the proximal third. The bone transection surface appears regular; the stump is well formed, with no radiographic evidence of residual bone destruction

Chronic osteomyelitis of the tibia was radiographically confirmed. Given the prolonged, recurrent course of infection, functional insufficiency of the affected segment, and high risk of further relapse, a decision was made to proceed with definitive surgical management. Amputation of the right lower extremity was performed at the level of the proximal third of the leg.

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The postoperative course was uneventful, and the stump healed satisfactorily. This case illustrates the typical outcome of long-standing chronic osteomyelitis when limb-salvage strategies prove ineffective.

Microbiological Findings and Antimicrobial Therapy

In Group B, positive intraoperative stump cultures were obtained in 4 of 11 patients (36,4%), whereas no pathogens were isolated from stump cultures in Group A ($\chi^2 \approx 4.28$, $p \approx 0.04$).

Three isolates were identified as methicillin-resistant Staphylococcus aureus MRSA (S. aureus), and one as Pseudomonas aeruginosa EBSL (P. aeruginosa). No positive cultures were detected among patients with traumatic amputations. The predominance of S. aureus as a leading pathogen in chronic osteomyelitis is consistent with existing literature; in our cohort, MRSA accounted for two-thirds of all isolated strains.

All identified isolates demonstrated multidrug resistance. The MRSA strains were resistant to beta-lactam antibiotics (including penicillins and cephalosporins) as well as chloramphenicol. The P. aeruginosa isolate exhibited resistance to most commonly used cephalosporins and ampicillin. Detailed antimicrobial susceptibility profiles are presented in Table 4.

Antimicrobial therapy was selected based on microbiological findings and clinical presentation. The majority of patients - particularly in Group A - received first- or second-generation cephalosporins (cefazolin or cefuroxime), administered intramuscularly either as monotherapy or in combination regimens.

In one case of confirmed MRSA infection, vancomycin was prescribed following serial susceptibility testing that demonstrated resistance to first-line agents. Overall, empirical therapy predominantly consisted of cephalosporins, while glycopeptides (vancomycin) were used in cases involving MRSA.

Table 4 - Main microbiological findings and treatment (isolated pathogens in Group B patients)

Pathogen	No. (n)	Antimicrobial resistance*	Antibacterial therapy
S. aureus (MRSA)	3	β-lactams (penicillins, cephalosporins, chloramphenicol)	Vancomycin (1 g IV)
P. aeruginosa	1	Cefepime, cefotaxime, ceftazidime, ampicillin	Ceftazidime (1 g IM)

Complete antimicrobial susceptibility data (see institutional laboratory reports) demonstrated multidrug resistance in all three cases (drug classes to which resistance was documented are underlined). MRSA refers to Staphylococcus aureus strains resistant to oxacillin/methicillin.

The proportional distribution of isolated pathogens: two-thirds were attributed to S. aureus MRSA and one-third to P. aeruginosa. In international literature, S. aureus and coagulase-negative staphylococci are most frequently reported as leading causative agents of chronic osteomyelitis. Our findings further emphasize the substantial contribution of S. aureus to post-traumatic bone infections.

Frequency and Causes of Amputation

Amputations resulting from acute trauma (Group A) accounted for approximately two-thirds of all cases (67,6%). The majority were related to domestic or occupational incidents. Twelve patients sustained digital injuries in the workplace (e.g., entrapment in tools or machinery, lacerations), while eight injuries occurred in domestic settings, including three road traffic accidents without major skeletal destruction. One male patient sustained a severe occupational injury involving entrapment of the hand in a meat-processing machine. Overall, domestic trauma represented the leading cause (60%) of traumatic amputations, followed by industrial accidents (40%).

In the post-osteomyelitic group (32.4% of the cohort), the primary underlying factor was chronic purulent-inflammatory bone disease. Most of these patients (7 of 11) had a remote history of limb trauma or prior surgical intervention that progressed to chronic osteomyelitis (disease duration ranging from 4 months to 14 years). The remaining three patients underwent amputation following exacerbation of acute osteomyelitis, typically within 2–4 weeks after an infected injury.

In 6 of 11 cases (54.5%), the pathological focus was located in the lower extremity (chronic osteomyelitis of the tibia or calcaneus), while in 5 (45.5%) cases it involved the upper extremity (distal phalanges of the hand). Recognized contributing factors such as skin necrosis and impaired circulation were documented in three patients, including those with type 2 diabetes mellitus or obliterative arterial disease of undetermined severity.

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Table 5 - Causes of amputation and surgical burden in Groups A and B

Parameter	Group A (trauma), n = 20	Group B (osteomyelitis), n = 9	p-value
Primary cause of amputation	Acute mechanical injury	Chronic/recurrent osteomyelitis	—
Domestic injuries, n (%)	9 (39.1%)	—	—
Occupational injuries, n (%)	14 (60.9%)	—	—
Chronic osteomyelitis, n (%)	—	7 (63.6%)	—
Acute osteomyelitis, n (%)	—	4 (36.4%)	—
Median number of surgeries prior to amputation	1.0	4.0	<0.01
Mean number of surgeries (± SD)	1.3 ± 0.6	3.4 ± 1.9	<0.01
Repeat stump revision, n (%)	1 (4.3%)	3 (27.3%)	0.04

Table 5 summarizes the frequency and underlying causes of amputations. In the traumatic group, amputations were predominantly isolated digital procedures following acute mechanical injuries. In contrast, Group B was characterized by repeated and staged surgical interventions for long-standing osteomyelitis, often preceded by multiple debridements and stump revisions (median number of procedures in Group B: 4.0 vs. 1.0 in Group A, *p*<0.01).

Clinical Course of Osteomyelitis

Analysis of Group B revealed marked heterogeneity in disease course. In three patients, amputation was performed during the acute phase of osteomyelitis (ICD-10 code M86.1), 14–30 days after the initial injury. In the remaining cases, amputation was indicated for chronic osteomyelitis (M86.4), with disease duration ranging from 4 months to 14 years.

The mean number of surgical procedures prior to amputation in Group B was 3.4 (SD≈1.9; median 4), whereas most patients in Group A required only a single surgical stage (1.35±0.75; median 1; p<0.001). These findings are consistent with the well-established need for repeated debridement and staged reconstruction in chronic osteomyelitis.

The high prevalence of multidrug-resistant organisms (MRSA and Pseudomonas aeruginosa) in Group B likely reflects repeated antibiotic exposure and prior hospitalizations. Eradication of these infections is complicated by biofilm formation and fluctuating polymicrobial colonization.

Outcomes and Complications

According to medical records, all patients were discharged with a well-formed stump suitable for prosthetic fitting or complete healing, including those who underwent revision procedures for osteomyelitis. No in-hospital mortality was recorded. No major early postoperative complications (sepsis, massive hemorrhage) were observed.

In three cases (27.3% of Group B), additional surgical intervention on the stump was required within 1–3 months after amputation to improve stump contour or address residual inflammation; all of these patients belonged to Group B. Thus, amputations performed in the setting of post-osteomyelitic infection were more frequently associated with subsequent corrective or revision procedures, whereas in acute traumatic cases, stump formation was typically completed in a single stage.

4. Discussion

The findings of the present study reflect contemporary patterns in limb amputation and demonstrate clear differences between traumatic amputations and those performed in the context of chronic or recurrent osteomyelitis.

Although trauma remains the leading indication for amputation in orthopedic practice, post-osteomyelitic amputations are associated with a substantially more complex clinical course. In our cohort, these cases were characterized by prolonged disease duration, repeated surgical interventions, and the presence of resistant microbial flora.

This observation is consistent with the established concept of osteomyelitis as a chronic, relapsing condition, particularly in the presence of biofilm-forming pathogens [14,15].

In the osteomyelitis group, resistant pathogens were identified in a subset of patients, including methicillin-resistant Staphylococcus aureus (MRSA) and Pseudomonas aeruginosa. Although positive cultures were obtained only in a limited number of cases, the predominance of MRSA among identified isolates is in line with published data indicating that S. aureus remains the leading pathogen in chronic post-traumatic osteomyelitis [16,17].

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The ability of MRSA to form biofilms on bone surfaces and implants significantly complicates eradication and contributes to treatment failure [18]. At the same time, given the small number of microbiologically confirmed cases in our cohort, these findings should be interpreted with caution.

In contrast, traumatic amputations demonstrated a comparatively low infectious burden, with no pathogens isolated from stump cultures. This is consistent with clinical observations that isolated acute trauma, in the absence of established infection, is associated with a lower risk of secondary osteomyelitis and a higher likelihood of uncomplicated stump healing [19]. Similar trends have been reported in large cohort studies, where infectious complication rates following primary traumatic amputations remain substantially lower than in infection-related amputations [20].

A key distinguishing feature of the osteomyelitis group was the cumulative surgical burden. Patients underwent multiple procedures prior to definitive amputation, with a median of four interventions. This aligns with international data showing that management of chronic osteomyelitis often requires staged treatment strategies, including repeated debridement and reconstruction [21]. The prolonged disease duration observed in our cohort, ranging from several months to more than a decade, further supports the concept of osteomyelitis as a persistent and difficult-to-eradicate condition [22].

Another notable finding was the difference in the level of amputation. Proximal amputations, including below-knee and above-knee procedures, were observed exclusively in the osteomyelitis group, whereas traumatic amputations were predominantly limited to the digits. This pattern has been widely described in the literature and is typically associated with extensive soft tissue damage, chronic infection, and structural bone destruction that preclude limb-salvage strategies [23]. Previous studies report that a considerable proportion of patients with advanced or recurrent osteomyelitis ultimately require major amputation, particularly in cases of delayed presentation or inadequate initial management [24].

The antimicrobial treatment strategies observed in this study generally correspond to current clinical recommendations. In cases of MRSA infection, glycopeptides such as vancomycin were used, consistent with international guidelines. For Gram-negative pathogens, including P. aeruginosa, therapy was based on antipseudomonal agents such as cephalosporins or aminoglycosides [25]. The use of first- and second-generation cephalosporins in traumatic cases reflects standard perioperative prophylaxis in clean or contaminated injuries.

Study Limitations. This study is based on data from a single specialized center and covers a one-year period, which may limit the generalizability of the findings. In addition, the relatively small sample size restricts the statistical power of subgroup analyses, particularly for microbiological outcomes and less common clinical scenarios.

5. Conclusion

Traumatic amputations in the present cohort were associated with a relatively favorable clinical course, characterized by predominantly distal levels of amputation, minimal infectious burden, and a high likelihood of primary stump healing.

In contrast, post-osteomyelitic amputations reflected advanced stages of chronic infection and were associated with prolonged disease history, repeated surgical interventions, and the presence of resistant microbial flora. These findings emphasize the importance of early diagnosis, timely radical surgical management, and targeted antimicrobial therapy, as chronic osteomyelitis remains a major risk factor for limb loss.

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Жарақаттық және остеомиелиттен кейін аяқ-қол ампутациялары: Клиникалық жүктеме, хирургиялық анамнез және антимикробтық резистенттілік құрылымы

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Түйіндеме

Травматологиялық-ортопедиялық тәжірибеде аяқ-қол ампутациялары жедел жарақат салдарынан да, ұзаққа созылған созылмалы остеомиелит аясында да орындалады. Бұл клиникалық жағдайлар патогенезі, хирургиялық ауыртпалығы және микробиологиялық ерекшеліктері бойынша едәуір айырмашылықтарға ие. Алайда бір мамандандырылған орталық шеңберінде жүргізілген салыстырмалы деректер шектеулі.

Зерттеу мақсаты: жарақаттық және остеомиелиттен кейінгі ампутациялардың клиникалық және микробиологиялық ерекшеліктерін салыстыру.

Әдістері. 2025 жылы аяқ-қол ампутациясын өткерген 34 науқасқа ретроспективті талдау жүргізілді. Оның ішінде 23 жағдай - жарақаттық, 11 жағдай – жарақаттан кейінгі созылмалы остеомиелитке байланысты. Демографиялық деректер, ампутация деңгейі, госпитализация ұзақтығы, алдыңғы оталардың саны, микробиологиялық нәтижелер және антимикробтық тұрақтылық құрылымы бағаланды.

Нәтижелері. Жарақаттық ампутациялар негізінен жоғарғы аяқ-қол деңгейінде және саусақтармен шектелді. Остеомиелиттен кейінгі ампутациялар төменгі аяқ-қолда жиі орындалып, ұзақ хирургиялық анамнезбен және көпсатылы араласулармен сипатталды. Науқастардың үштен бірінде бактериялық өсінді

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анықталды. Қоздырғыштар арасында метициллинге резистентті алтын түстес стафилококк басым болды. Сирек жағдайда Pseudomonas aeruginosa тіркелді. Барлық штаммдар полирезистентті сипатта болды. Жарақаттық топта микробтық өсім анықталмады.

Қорытынды. Бақыланған когортадағы жарақаттық ампутациялар клиникалық ағымының салыстырмалы түрде қолайлы болуымен, негізінен аяқ-қолдың дистальді деңгейде кесілуімен, минималды инфекциялық жүктемемен және тұқылдың біріншілікті жазылу ықтималдығының жоғарылығымен сипатталды. Керісінше, остеомиелиттен кейінгі ампутациялар созылмалы инфекцияның асқынған сатыларын көрсетті және ауру тарихының ұзақ болуымен, қайталанған хирургиялық араласулармен және резистентті микробтық флораның болуымен байланысты болды.

Түйін сөздер: аяқ-қол ампутациясы, остеомиелит, микробиологиялық профиль, антибиотикке төзімділік.

Травматические и постостеомиелитические ампутации конечностей: Клиническая нагрузка, хирургический анамнез и структура антимикробной резистентности

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Резюме

Ампутация конечностей в травматолого-ортопедической практике выполняется как в остром посттравматическом периоде, так и в качестве последствия длительно текущего хронического остеомиелита. Эти сценарии существенно различаются по патогенезу, хирургической нагрузке и микробиологическому профилю. Однако сравнительные данные в рамках одного травматологического центра третьего уровня остаются ограниченными.

Целью данного исследования было сравнение клинических характеристик и микробиологических особенностей травматических и постостеомиелитических ампутаций конечностей.

Методы. Проведен ретроспективный анализ данных 34 пациентов, перенесших ампутацию конечности в 2025 году. Двадцать три случая были классифицированы как травматические ампутации, одиннадцать — как постостеомиелитические. Оценивались демографические показатели, уровень ампутации, длительность госпитализации, количество предшествующих хирургических вмешательств, результаты микробиологического исследования и профили антибиотикорезистентности.

Результаты. При травматических ампутациях преимущественно поражалась верхняя конечность, и повреждения в основном ограничивались уровнем пальцев. Постостеомиелитические ампутации чаще затрагивали нижнюю конечность и сопровождались длительным хирургическим анамнезом и множественными предшествующими вмешательствами. Положительные интраоперационные посевы были выявлены в одной трети случаев остеомиелита. Метициллин-резистентный золотистый стафилококк (MRSA) оказался наиболее частым патогеном, за ним следовала синегнойная палочка (Pseudomonas aeruginosa); все изолированные штаммы продемонстрировали множественную лекарственную устойчивость. В случаях с травматическими ампутациями патогены выделены не были.

Выводы. Травматические ампутации в исследуемой когорте характеризовались относительно благоприятным клиническим течением, преимущественно дистальным уровнем усечения конечности, минимальной инфекционной нагрузкой и высокой вероятностью первичного заживления культи. Постостеомиелитические ампутации отражали терминальные стадии хронической инфекции и были сопряжены с длительным анамнезом заболевания, повторными хирургическими вмешательствами и наличием резистентной микробной флоры.

Ключевые слова: ампутация конечности, остеомиелит, микробиологический профиль, антибиотикорезистентность.

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