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Adult osteoarticular infections at Kara University Hospital

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Abstract
Introduction: Bone infections is a bacterial implant in bone matrix. The aim of this study was to describe the clinical, therapeutic and evolutionary aspects of osteoarticular infections at Kara University Hospital.
Patients and Methods: This was a retrospective, descriptive study conducted at Kara University Hospital (Togo) over a three-year period, from 1 January 2020 to 31 December 2022. It included the records of all patients over 15 years of age treated for an acute or chronic bone or joint infection in the traumatology-orthopaedics department of the said centre. The parameters studied were age, sex, clinical form and site of infection, germs isolated, treatment administered and evolution. Evaluation was carried out after a minimum follow-up of one year.
Results: Osteoarticular infections accounted for 3.4% of hospital admissions. The average age of the patients was 39, with extremes of 17 and 82. 36 were men (82%) and 8 women (18%). Osteoarticular infections were dominated by acute post-traumatic infections: osteitis (52%), gangrene (16%) and surgical site infections (14%). The risk factor for post-traumatic infections was late consultation, due to the patient's stay with a traditherapist. Surgical site infections occurred in patients operated on after at least 2 weeks, with an operating time of more than 2 hours. Most of the osteoarticular infections were in the lower limbs. *Staphylococcus aureus* was present, isolated or associated with other bacteria, in 56% of cases. In 65% of cases, there were at least two germs. A single germ was isolated in 35% of cases. The germs isolated were multi-resistant in the majority of cases (85%, n=29). Surgical treatment combined with antibiotic therapy resulted in a 44% success rate.
Conclusion: Post-traumatic osteitis is the most common osteoarticular infection at Kara University Hospital. Their management is difficult, with disappointing results.

Keywords: Infection, osteoarticular, open fractures, *Staphylococcus aureus*, lower limb

Introduction
Bone infections is a bacterial implant in bone matrix. This graft is either of haematogenous origin, or of exogenous origin in the context of open trauma resulting in septic orthopaedic surgery, planned surgery or seeding from a contiguous infectious site [1]. They are common due to the increasing number of road accidents, the development of orthopaedic and prosthetic surgery and the occurrence of nosocomial osteitis in osteosynthesis devices or prostheses. The seriousness of these conditions lies in their progression to chronicity, with the functional and sometimes vital prognosis at stake. They constitute a serious public health problem because of their high cost to the patient and the community [2]. They pose a real therapeutic problem because of the selection of resistant mutants, which leads to therapeutic failure and a loss of chance of a definitive cure [3]. As a result, hospital stays are often prolonged, with high costs for the community and the patient [4]. In sub-Saharan Africa, treatment difficulties are greater for a number of reasons, including open fractures that are neglected or treated by traditional therapists, patients' financial difficulties and the scarcity of infectious diseases specialists. The aim of this study was to describe the clinical, therapeutic and evolutionary aspects of these osteoarticular infections at Kara University Hospital.

Patients and Methods

This was a retrospective, descriptive study conducted at Kara University Hospital (Togo) over a three-year period, from 1 January 2020 to 31 December 2022. It included the records of all patients over 15 years of age treated for acute or chronic bone or joint infection in the trauma-orthopaedics department of the said centre. The clinical criteria for acute bone infection (Osteitis) were the presence of a neglected traumatic wound (Post-traumatic infection) or surgical wound (Surgical site infection) adjacent to a fracture site, whether or not stabilised by osteosynthesis, and less than 3 weeks old, the discharge of pus or the externalization of a bone fragment through this wound, whether or not associated with general signs (Fever, altered general condition, septic shock); acute septic arthritis is characterised by joint pain, the presence of a squinty or purulent joint fluid noted by a joint puncture, with or without general signs dating back less than 3 weeks. Chronicity was defined as the presence of one or more healed fistulae or fistulae giving rise to purulent fluid, which had been evolving for more than 4 weeks, associated with the presence of a sequestrum on standard X-ray or CT scan. The parameters studied were age, sex, clinical form and site of infection, germs isolated, treatment administered and outcome.

Outcome evaluation allowed a distinction to be made between good and poor therapeutic results [5]. Good results are defined by the following criteria:

- **In acute forms:** All cases with disappearance of clinical signs after 3 weeks, with no radiographic signs of chronicity.
- **In chronic forms:** All cases with fistulas subsiding (for fistulised forms), regression of radiological lesions after 4 months.

All other results were considered poor.

The evaluation was made after a minimum follow-up of one year.

The data were processed and analysed using SPSS software (IBM SPSS Statistics 26).

Results

Socio-demographic data

During the study period, we selected 50 cases from a total of 1,470 patients. Osteoarticular infections accounted for 3.4% of hospital admissions. The average age of the patients was 39, with extremes of 17 and 82, and there were 36 men (82%) and 8 women (18%).

Clinical data

Osteoarticular infections were dominated by acute post-traumatic infections: osteitis (52%), gangrene (16%) and surgical site infections (14%). Table 1. Shows the different forms of osteoarticular infection.

Table 1: Clinical forms of osteoarticular infections

	Number	Percentage (%)
Acute post-traumatic osteitis	26	52
Post-traumatic gangrene	8	16
Surgical site infections	7	14
Chronic osteomyelitis	5	10
Arthritis	4	08
Total	50	100

The risk factor for post-traumatic infections was late consultation (Figure 1). After open trauma, 21 patients had stayed with a traditional practitioner for an average of 7 days (2-16 days). Eight others had not consulted immediately because of a lack of financial resources. Most of these post-traumatic infections were in the lower limb (Table 2). Surgical site infections occurred in patients operated on after at least 2 weeks, with an operative delay of more than 2 hours. Chronic osteomyelitis had been present since childhood, and in one case there was sickle cell disease.

The arthritis occurred in patients being treated for rheumatic diseases. Septic arthritis would have developed following joint punctures.

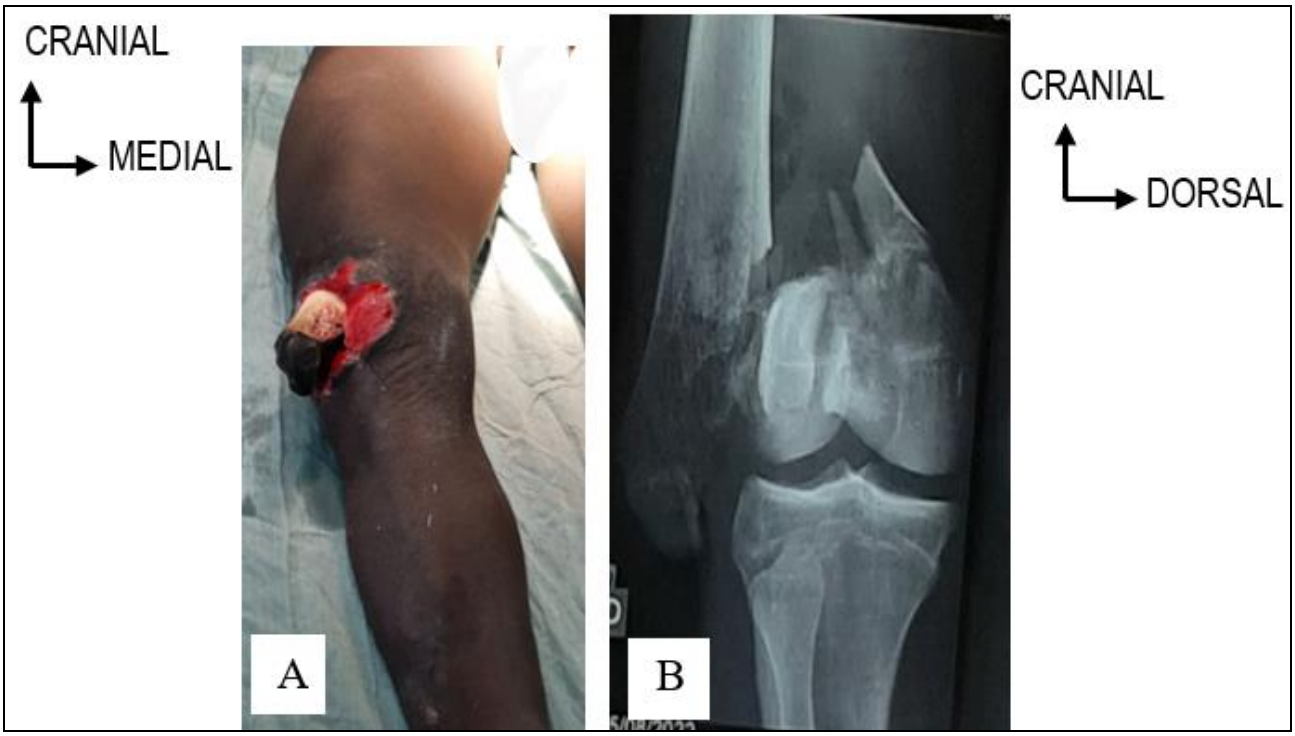


Fig 1: Neglected open supracondylar and intercondylar fracture of the right femur. A: Clinical aspect; B: Profile X-ray of the knee

Table 2: Site of infection

	Number	Percentage (%)
Post-traumatic osteitis, gangrene		
Elbow	01	02
Thigh	04	08
Knee	05	10
Leg	15	30
Ankle and foot	09	18
Surgical site infection		
Thigh	02	04
knee	03	06
Leg	02	04
Chronic osteomyelitis		
Arm	01	02
Thigh and knee	03	06
Leg	01	02
Arthritis		
Knee	03	06
Ankle	01	02
Total	50	100

Paraclinical data

All patients had a standard X-ray. This revealed a fracture in cases of recent trauma. Bone sequestration was also found in cases of chronic osteomyelitis. Images of micro lacunar osteolysis giving a mitted appearance to the bone were found in 3 cases. CT scans were carried out in cases of chronic osteomyelitis and helped to better localization of the bone sequestration. Samples were taken before and during surgery in 39 patients for cytobacteriological examination. The results are shown in Table 3.

Table 3: Germs isolated

	Number	Percentage (%)
Staphylococcus aureus	22	56
Proteus mirabilis	05	13
Klebsiella pneumoniae	02	05
Escherichia coli	02	05
Pseudomonas aeruginosa	02	05
Prevotella sp	01	03
Negative result	05	13
Total	39	100

Staphylococcus aureus was present, isolated or associated with other bacteria in 56% of cases. At least two germs were present in 65% of cases. A single germ was isolated in 35% of cases.

The germs isolated were multi-resistant in the majority of cases (85%, n=29).

Treatment and outcome

Arthritis was treated with Surgical wash, drainage and immobilisation for 15 days.

Bone sequestration were removed in cases of chronic osteomyelitis.

For surgical site infections, surgical washing was performed in 3 cases.

Regarding post-traumatic infections, there were eight cases of lower limb amputations (16%, n=8). The other patients (52%, n=26) underwent debridement, trimming, removal and resection of devitalized bone fragments, and washing. Bone stabilisation was achieved using an external fixator (36%, n = 18) (Figure 2).

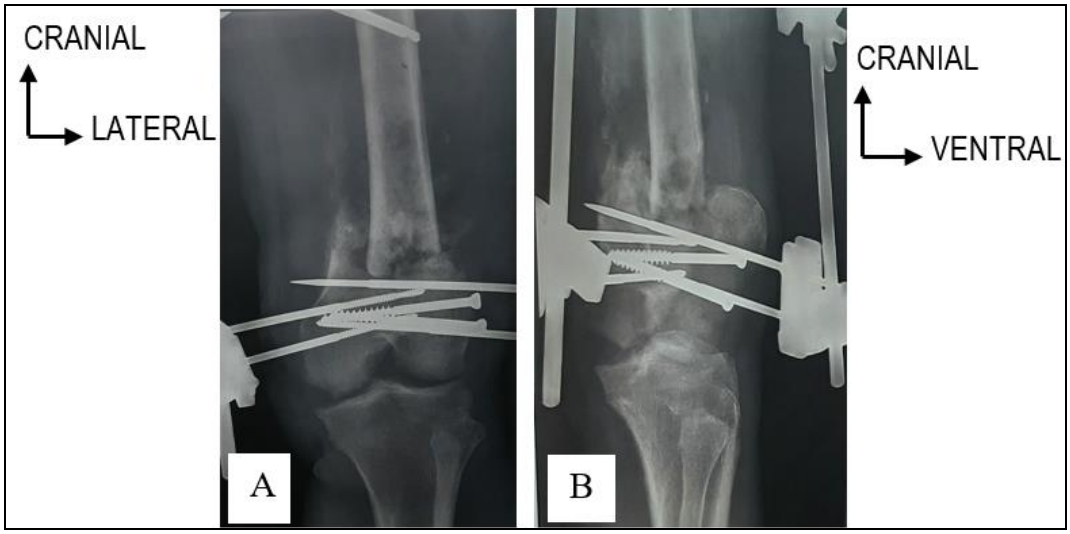


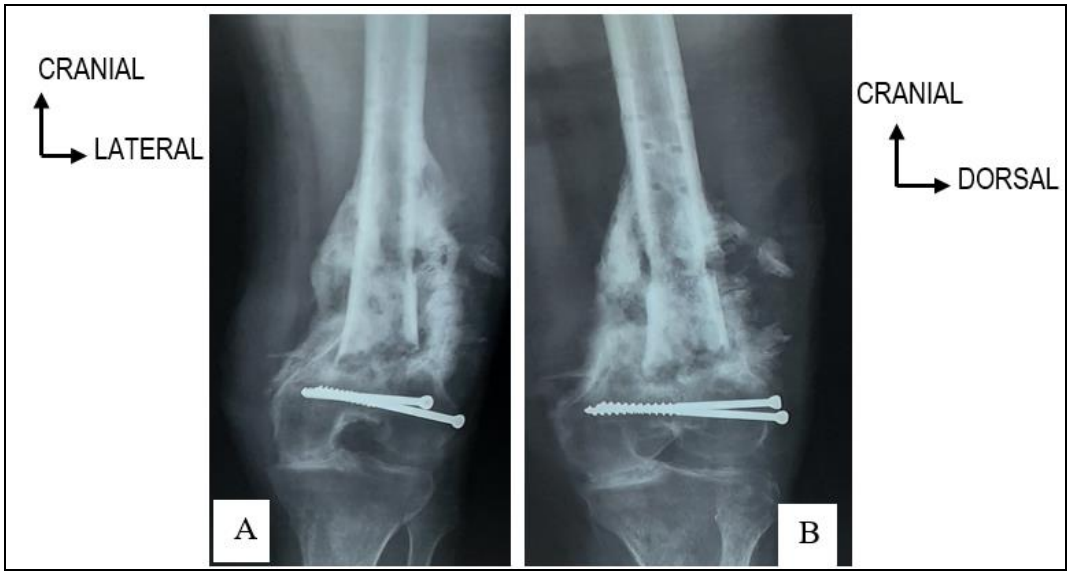
Fig 2: Osteosynthesis by external fixator. A. Front X-ray; B. Profile X-ray

Empirical antibiotic therapy was done systematically after initial sampling. Antibiotic therapy was subsequently adapted according to the results of the antibiogram.

The results are shown in Table 4. Figure 3 shows an example of a poor result

Table 4: Treatment results

	Number	Percentage (%)
Amputations	08	16
Clinical healing, Good results	22	44
Chronic osteitis, recurrence, Vicious callus	15	30
Septic nonunion	05	10
Total	50	100



Fug 3: Osteitis on a consolidated fracture. A. Front X-ray; B. Profile X-ray

Discussion

In this study, the frequency of infection was 3.4%, and included both acute and chronic infections. These infections are common in young males. The high frequency of osteoarticular infections in orthopaedic surgery in young males was reported by Benyass and Ayouba [6, 7]. This male predominance can be explained by the development of the car fleet, the fact that most men are involved in road accidents.

Bone infections following neglected trauma were the most common in our series (68%) and were due to late consultation in the case of open trauma. Because of ancestral beliefs and financial difficulties, patients consult traditional healers or use empirical methods at home. This results in complications such as gangrene and osteitis. These complications were found in the series by Lamah in Guinea and Mensah in Benin [8, 9]. Post-traumatic infections predominated in the pelvic limbs, due to the exposure of these parts of the body to trauma [10].

Surgical site infections were 16% in our series. The risk factors identified were the delay in consultation, the long waiting time for surgery and the long duration of operations (More than 2 hours). This frequency is high compared with that reported by Ayouba *et al*. in Lomé, where the rate of surgical site infection fell from 23.3% in 2010 to 9.9% in 2022 [7, 11]. This lower rate is the result of the control of certain risk factors, namely the reduction of the long waiting time for surgery from 21 days to 14 days on average, as well as the reduction in operating time, staff awareness and the gradual improvement in technical resources [7]. Idé in Benin reported a frequency of surgical site infections of 9.59% [12].

The frequency of chronic osteomyelitis and osteitis in our series seems to be lower than in reality, due to the reluctance of patients to consult conventional hospitals, combined with financial difficulties.

Bacterial ecology in osteoarticular infections remains dominated by *Staphylococcus aureus* [12, 13, 14, 15]. *Staphylococcus aureus* was the bacterial agent most frequently found in osteitis and osteoarthritis in our series, with a frequency of 56%. Its frequency seems to be better justified by the molecular mechanisms of adhesion to metallic material and necrotic tissue [16, 17], and also by its particular adaptation to bone infection due to the presence of surface receptors for fibrinogen, collagen, fibronectin and type II sialoprotein [13].

The multi-resistant nature of germs is linked to several factors. But the misuse of antibiotics in our context must be taken into account. Unqualified medical and paramedical staff over-prescribe antibiotics.

Treatment is based on a therapeutic strategy adapted to each case. The aim is to heal the infection, consolidate the bone, heal the skin and correct the orthopaedic sequelae. On the one hand, it must respect a certain number of long-standing rules [18]:

- Attempt to obtain bacteriological documentation prior to starting an antibiotic treatment (Blood culture, sampling of pus or other biological fluids).
- Systematic surgical treatment of the portal of entry whenever possible, and of septic metastases.
- Symptomatic treatment of signs of severe infection.

On the other hand, it must be based on antibiotic treatment

- Probabilistic, before the antibiogram is known, which must take into account the anamnestic arguments of bacterial epidemiology and sensitivity profiles.
- The choice of molecule(s) used should be in line with consensus recommendations, in order to obtain effective concentrations at the site of infection.
- The doses administered must take account of the site of infection to be reached, the patient's weight, renal function at the start of treatment and changes therein, in order to adapt the doses to the serum concentrations obtained.

This approach to treatment is not always obvious in our context, due to financial difficulties and limited technical resources. Cytobacteriological examination is not always carried out, and suitable antibiotics are not always available.

The results are often disappointing, with 16% of amputations and only 44% of good results in our series.

Conclusion

Osteoarticular infections at Kara University Hospital are dominated by post-traumatic osteitis, due to delayed consultation. Management of these lesions is hampered by patients' financial difficulties, the unavailability of certain specific antibiotics, and the lack of multidisciplinary consultation between infectious diseases specialists, biologists and orthopaedic surgeons. The results are disappointing, with

discharge often persisting or recurring. Efforts must continue to raise public awareness of the need for early consultation, and to control the risk factors associated with the technical resources.

Conflict of Interest
Not available

Financial Support
Not available

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