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Short versus long course antibiotic in acute osteomyelitis and arthritis in children: A prospective study

THESIS

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

"رب أوزعني أن أشكر نعمتك

التي أنعمت عليّ وعلى والديّ

وأن أعمل صالحاً ترضاه

وأصلح لي في ذريّتي

إنّي تبت إليك و إنّي من المسلمين"

صدق الله العظيم



Hippocratic Oath

I swear to fulfill, to the best of my ability and judgment, this covenant:

I will respect the hard-won scientific gains of those physicians in whose steps I walk, and gladly share such knowledge as is mine with those who are to follow.

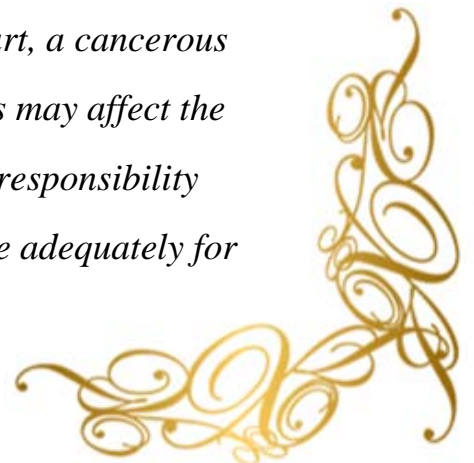
I will apply, for the benefit of the sick, all measures [that] are required, avoiding those twin traps of overtreatment and therapeutic nihilism.

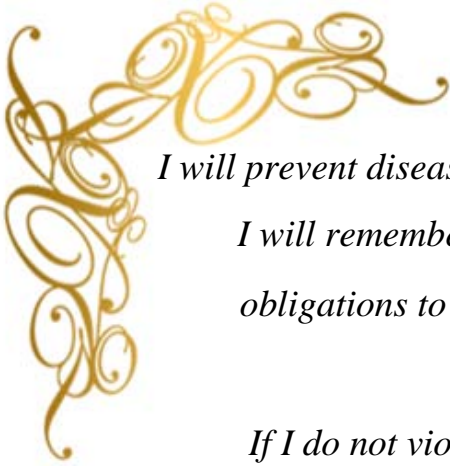
I will remember that there is art to medicine as well as science, and that warmth, sympathy, and understanding may outweigh the surgeon's knife or the chemist's drug.

I will not be ashamed to say "I know not," nor will I fail to call in my colleagues when the skills of another are needed for a patient's recovery.

I will respect the privacy of my patients, for their problems are not disclosed to me that the world may know. Most especially must I tread with care in matters of life and death. If it is given me to save a life, all thanks. But it may also be within my power to take a life; this awesome responsibility must be faced with great humbleness and awareness of my own frailty. Above all, I must not play at God.

I will remember that I do not treat a fever chart, a cancerous growth, but a sick human being, whose illness may affect the person's family and economic stability. My responsibility includes these related problems, if I am to care adequately for the sick.





I will prevent disease whenever I can, for prevention is preferable to cure.

I will remember that I remain a member of society, with special obligations to all my fellow human beings, those sound of mind and body as well as the infirm.

If I do not violate this oath, may I enjoy life and art, respected while I live and remembered with affection thereafter. May I always act so as to preserve the finest traditions of my calling and may I long experience the joy of healing those who seek my help.

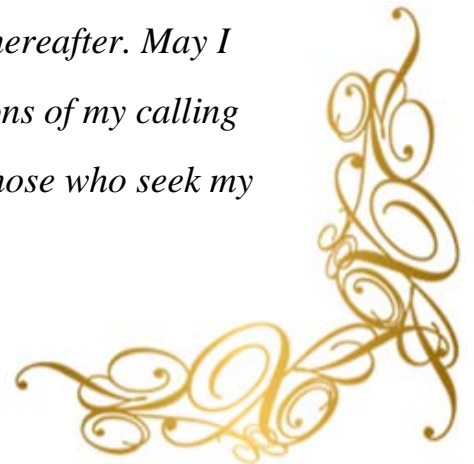
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DEDICATIONS





In the memory of
My Grandfather

HAMMOU AMARAGH OUFQUIR

رَحْمَةُ اللَّهِ عَلَيْهِ

If it wasn't for you I would have never been here.

Your life was a blessing, Your memory is a treasure that I hope I honor

I love you beyond words and miss you beyond measure.

Thank you for everything you have done for us and for this nation



I will hold you in my heart until I can hold you again in heaven



To my beloved Mom

IDYOUSSEF FATIMA

The person I cherish the most in life, my sunshine, my best friend, my reason to thrive, work hard and always do better.

To the one who gave me life, who shared every moment of my existence with her inexhaustible tenderness, to the one to whom I owe the best of myself.

No words can express my immense affection for you, and my gratitude for your constant support and precious advices.

Your countless sacrifices, your dedication and your support in my difficult times allowed me to move forward, and to overcome all the tests.

It is to you mom, that I dedicate today the fruit of your devotion hoping to beat the height of your sacrifices.

May Allah give you health, happiness and long life.

I love you mom.





To my dear Dad

OUFQUIR JAMAL

No dedication can express my respect, my eternal love and my consideration for the efforts you have made for my education and my well-being.

Today I dedicate to you the fruit of years of work and continuous efforts, and I wish that it brings you joy and pride seeing your hopes come to fruition.

May Allah grant you health and long life so that I can render you even a small part of what you have done for me.

I love you dad.





To my siblings

CHAKIB, MAJDA, SARA and MERIEM

I thank you, for all the moments of fulfillment that we shared, your love and support. It is with unconditional love and deep care that I offer you this modest work.

I wish you from the bottom of my heart a future full of happiness and success. I hope to forever stay your beloved sister.

May Allah protect you and bless you.

Brother and sisters,

I love you immensely






To my family and friends

*To my family members and friends that I care
about immensely.*

*I dedicate this modest work to you all, wishing you
health, peace of mind, and a long life where we
would share a lot of moments of pure happiness.*



I love you all.



*To **Jinane**, my sister from another mother, we both know that seasons change but some things always stay the same and our sisterhood will forever be one of them. You eternally hold a place in my heart.*

*To **Marwane**, my happy pill, you speak my language so you get my mind right and my soul at ease. You will always be that person I roll the dice with and never think twice with.*

*To **Hanane**, my lovely sister, your warm heart and unique presence are unmatched. I got your back forever and always.*

I dedicate this work to you all, wishing you lots of happiness, immense success and good health.



اللَّهُ أَكْبَرُ

*Praise be to Almighty God,
Which allowed me to see this long awaited day.*



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*Thank you granting me a great honor by accepting the presidency
of this
honorable committee.*

*I thank you for your presence despite all your
commitments.*

*Please accept, through this work, the expression of my
appreciation, gratitude and my deepest respect.*






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*I sincerely thank you for the interest you gave to this
thesis.*

*Thank you for accepting to be part of this committee
and evaluate my work.*

*Please find here the assurance of my respectful and
dedicated feelings.*





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ABBREVIATIONS



BJI: Bone and joint infection

SA: Septic arthritis

OM: osteomyelitis

BA: Bone abscess

DGC: Deterioration of general condition

WBC: White blood count

CRP: C- reactive protein

IV : Intra-venous

MSSA : Methicillin sensitive staphylococcus aureus

***P.aeruginosa* :** *Pseudomonas aeruginosa*

Strepto A: *Streptococcus A*

M: Mean



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INTRODUCTION



Short versus long course antibiotic in acute osteomyelitis and arthritis in children: A prospective study

Bone and joint infections present frequently in pediatric emergency departments. They require an urgent medical treatment with possible need of a surgical intervention by orthopedic specialists such as aspiration in arthritis cases or debridement for osteomyelitis.

Early diagnosis of acute osteomyelitis and arthritis is difficult, treatment should always be started rapidly when clinical signs are suggestive.

The modalities of antibiotic therapy have long been the subject of a consensus on the molecules, doses and duration of antibiotic therapy.

Optimal empiric therapy after appropriate cultures continues to be intravenous treatment. The treatment of pediatric BJI before 1980 consisted of a prolonged IV antimicrobial treatment course. Clinical experience and case series documented success with IV plus oral treatment courses of 4 to 6 weeks.

Since Peltola et al provided a retrospective analysis of 131 children with BJI receiving treatment courses as short as 20 days in 2009, the idea of reducing the duration of antibiotic therapy without endangering the health of the patient had emerged. This new perspective, as effective as it is, would also offer more advantages such as reducing the hospitalization days and the cost of healthcare.

Therefore, the aim of this study is to compare effectiveness, safety of short versus long duration antibiotic treatment for bone and joint infections, along with its benefits for the patient and the health system.



PATIENTS AND METHODS



I. Type of study:

This is a prospective comparative study between two groups, conducted in pediatric orthopedic department of Mohamed the VIth university hospital of Marrakesh.

II. Target population:

We included in this study all the children admitted for acute bone and joint infection in pediatric orthopedic surgery department.

III. Sampling:

III.1. Inclusion criteria:

We included in this study every child from age 0 to 16 years old admitted in pediatric orthopedic department during the included period for uncomplicated bone or joint infection.

III.2. Exclusion criteria:

We excluded from this study:

- Patients presenting signs of sepsis or multifocal infections.
- Patients with underlying chronic pathology.
- Patients presenting signs for more than 2 weeks.
- Infections caused by metal rods or plates (osteosynthesis).
- Rib infections, infections of the skull, vertebrae and the bones of the face.
- Patients who presented complications during hospitalization (multi-resistant germ, secondary location, revision surgery...).
- Patients lost of sight

Adopted protocols:

Treatment for the first patient was randomly chosen.

a. Short course treatment:

- IV treatment: 2 to 6 days.
- Oral antibiotic: 3 weeks.

b. Long course treatment:

- IV treatment: 7 to 10 days.
- Oral antibiotic: 4 to 6 weeks

The sample consisted of 61 patients, including two groups:

- **Group (A):** Consisted of 31 patients who received short course treatment.
- **Group (B):** Consisted of 30 patients who received long course treatment.

IV. Progress of the study:

This study was conducted from February 2019 to May 2021.

IV.1. Recruitment of patients and data collection:

After informed consent, we interviewed parents of patients during their hospital stay and called them for ulterior consultations after discharge. With the help of department residents, we programmed follow ups at 1 month, 3 months, 6 months and 1 year. We examined them and checked up their paraclinical results during each follow up. Others who could not come for their 1 year consultation were checked up upon by phone calls.

The responsible bodies of the department ethically approved data collection from medical files.

V. Measurement indicators and variables of the questionnaire:

- Socio-demographic characteristic.
- Clinical data.
- Paraclinical parameters.
- Medical and surgical management.
- Evolution and complications.

VI. Considerations:

We kept the questionnaire anonymous to protect the patients' confidentiality.

VII. Statistical analysis:

The collected data was checked for accuracy and completeness then entered into Statistical package for social science (SPSS version 23) for data analysis.



RESULTS



We included in this study 61 patients, who met the inclusion criteria within the study period. Prescription of medical treatment was randomly chosen for the first patients admitted in the period of the study, we then obtained two groups: group (A) with 31 patients who received the short course treatment, and group (B) with 30 patients who received long course treatment. For the purpose of the present study, the two groups were analyzed individually.

I. Socio-demographic results among our study:

I.1. Group (A):

The mean age was 6,9 years. Sex ratio was 1,05 with a percentage of 51,6% of males versus 48,9% of females, patients were mostly from Marrakesh (64,5%), There was no difference observed in income, 16 families had average income and 15 were low income families.

I.2. Group (B):

The mean age was 6,05 years. Sex ratio was 1,8: 63,3% were males and 36,7% were females. 56,7% of the patients were from Marrakesh and 43,3% from rural areas. Low income families predominated the group with a percentage of 60%.

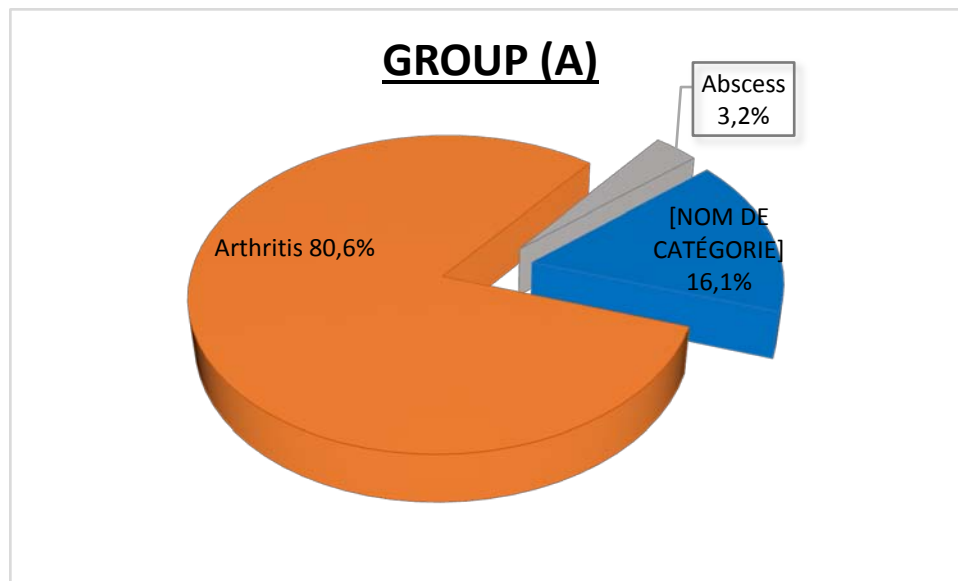
Table I: Socio-demographic characteristics among group (A) and group (B).

	Group (A)	Group (B)	P value
Age (mean)	6,91(±0,8)	6,05(±0,9)	NS
Sex (%)			
Male	51,6%	63,3%	NS
Female	48,4%	36,7%	
Origin (%)			
Marrakesh	64,5%	56,7%	NS
Other	35,5%	43,3%	
Income (%)			
Average	51,6%	40%	0,049
Low	48,4%	60%	

II. Clinical results among children with acute BJI:

II.1. Group A:

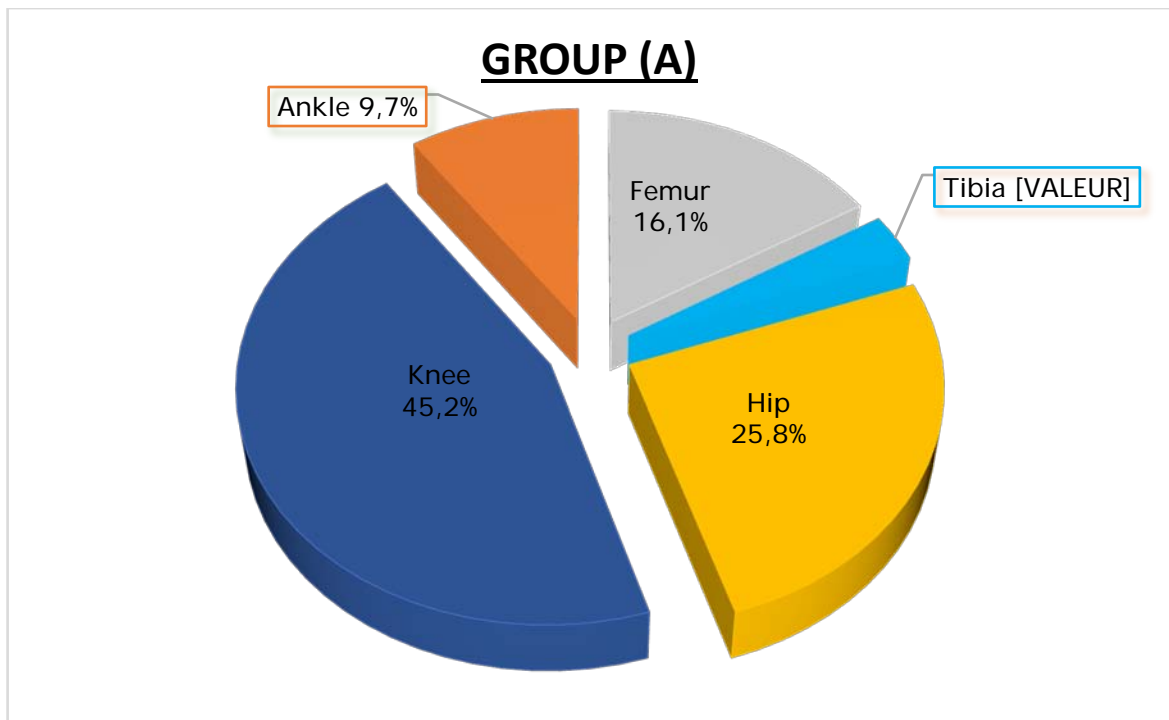
80,6% of this group were diagnosed with SA, 16,1% were diagnosed with acute OM and 3,2% were diagnosed with bone abscess (Graph1). The mean range before diagnosis of 3,5 days and the mean range of hospitalization was 3,5 days (Table 2).



Graph 1: Diagnosis within group (A).

The most affected joint in SA was the knee affecting 14 patients, 8 children had a hip SA and 3 had ankle SA.

On the other hand, 5 patients had OM, 4 of them in the femur and one tibia OM. One patient had bone abscess located in the femur. (Graph 2)

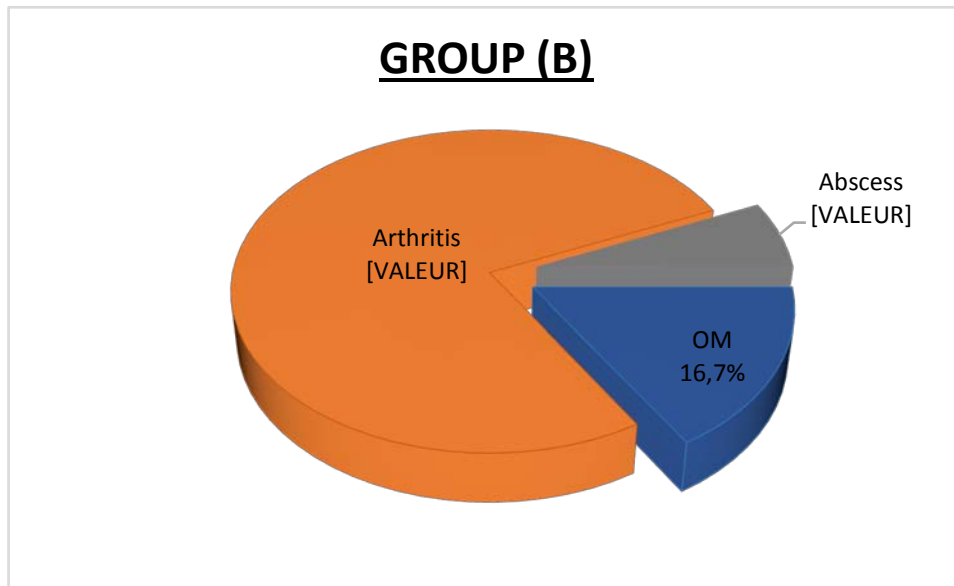


Graph 2: Affected bone or joint distribution among group (A).

Among this group, 30 children had pain, 27 patients presented lameness and 4 patients under the walking age presented a reduced limb mobility, also fever was present within 20 patients and 18 patients had swelling,

II.2. Group B:

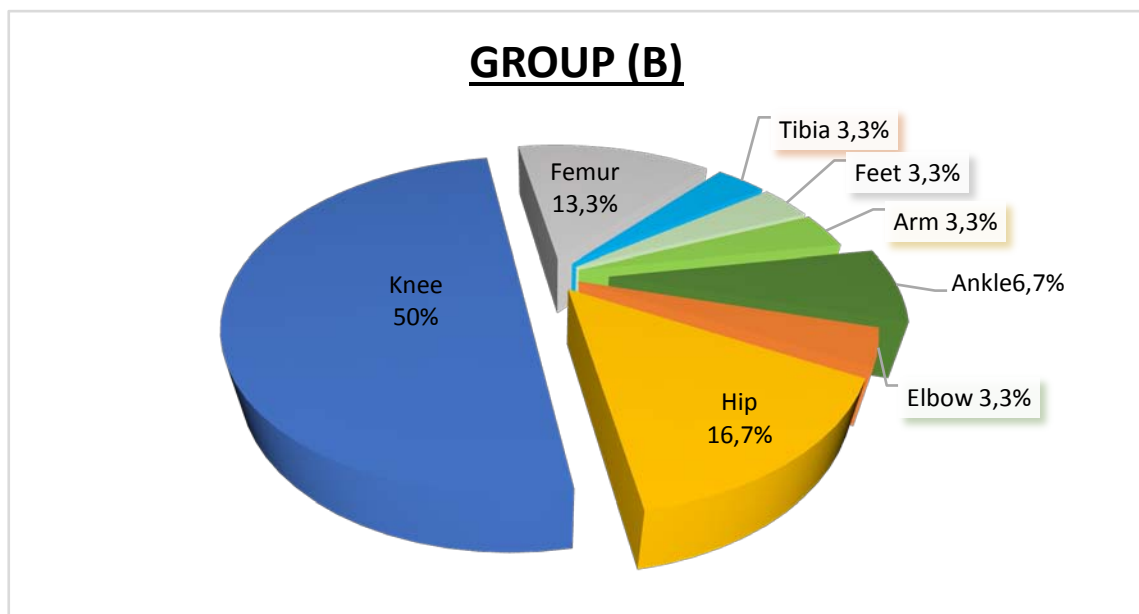
Among this group, 76,7% of the patients were diagnosed with SA, 16,7% were diagnosed with OM and 6,7% had bone abscess. The mean range before consulting was 4 days and the mean range of hospitalization days was 8 days.



Graph 3: Diagnosis within group (B).

As shown in graph 4, the most affected joint in SA was the knee affecting 15 patients; followed by the hip among 5 patients, then 2 cases of ankle SA and one case of elbow SA.

Five cases of OM were reported: 2 patients had femur OM, also tibia, arm and feet were located within one patient each. Two patients had femur bone abscess.



Graph 4: Affected bone or joint distribution among group (B).

Among this group, 24 patients presented lameness and 6 patients under the walking age had a reduced limb mobility, 24 patients had fever, 25 had pain in the affected limb, 20 children presented joint swelling and one patient had general condition deterioration. 3 patients reported having a recent trauma (Table 2).

Table II: clinical characteristics among short and long course treatment groups.

	Group (A)	Group (B)	P value
Symptoms (%)			
<i>Pain</i>	96,8%	83,3%	NS
<i>Fever</i>	64,5%	80%	0,049
<i>Swelling</i>	58%	66,7%	NS
<i>Lameness</i>	87,1%	86,7%	NS
Recent trauma (%)	6,4%	10%	NS
Days before diagnosis (mean)	3,5	4	NS
DGC (%)	3,2%	3,3%	NS
Open wound (%)	12,9%	10%	NS
Previous treatment (%)	9,7%	10%	NS
Hospitalization days (mean)	3,5	8	<0,001

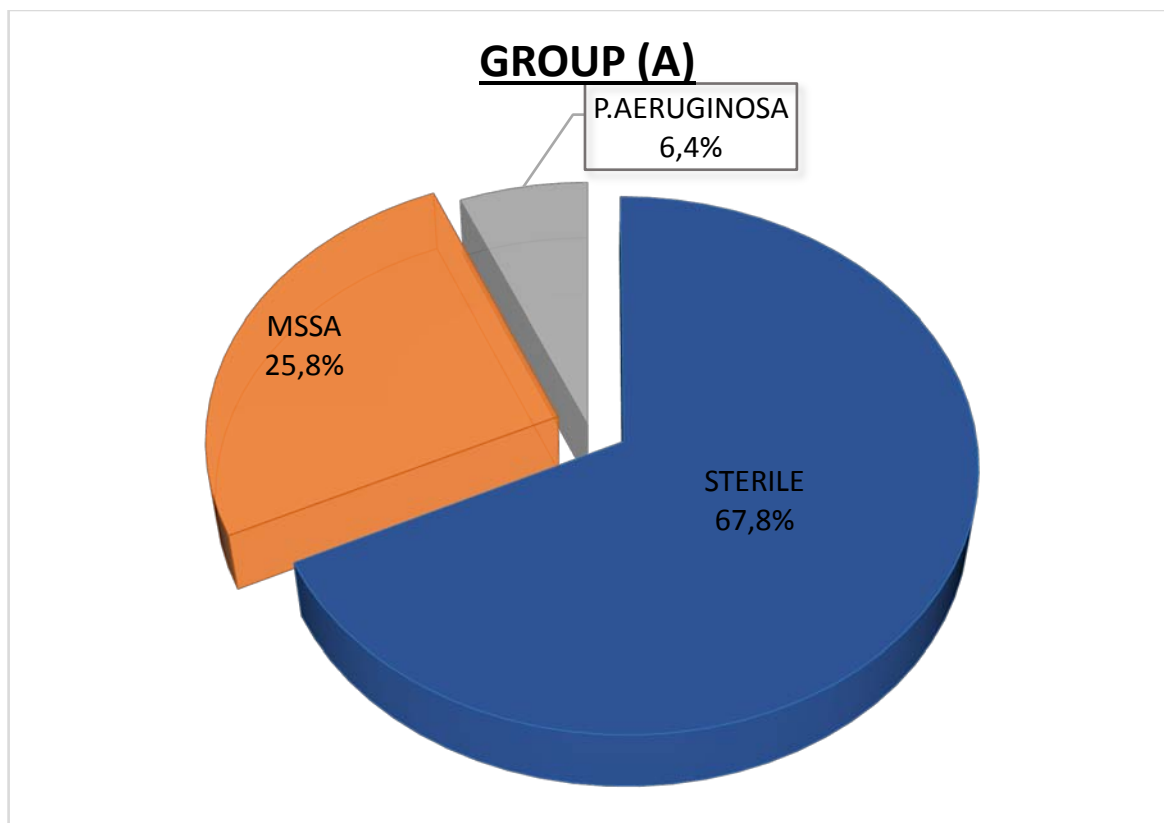
III. Para-clinical results:

III.1. Group A:

Inflammatory indicators were high in 24 cases with a maximal rate of WBC of 24500/mm³, a maximal rate of neutrophils of 17460/mm³ and CRP level was high in 21 cases out of 31 with a mean of 12,1 mg/l and a maximum of 207 mg/l. Seven patients had a normal CBC and 10 patients had CRP < 20/mm (Table 3).

X-ray deemed normal for 27 patients. Ultrasound was performed on all patients presenting hip SA (8 patients), all showing joint effusion, it was also performed on 3 patients with knee SA (Table 3).

Responsible germs were isolated within 10 patients with a predominance of MSSA related infections, whereas culture redeemed sterile in 21 cases (Graph 5).



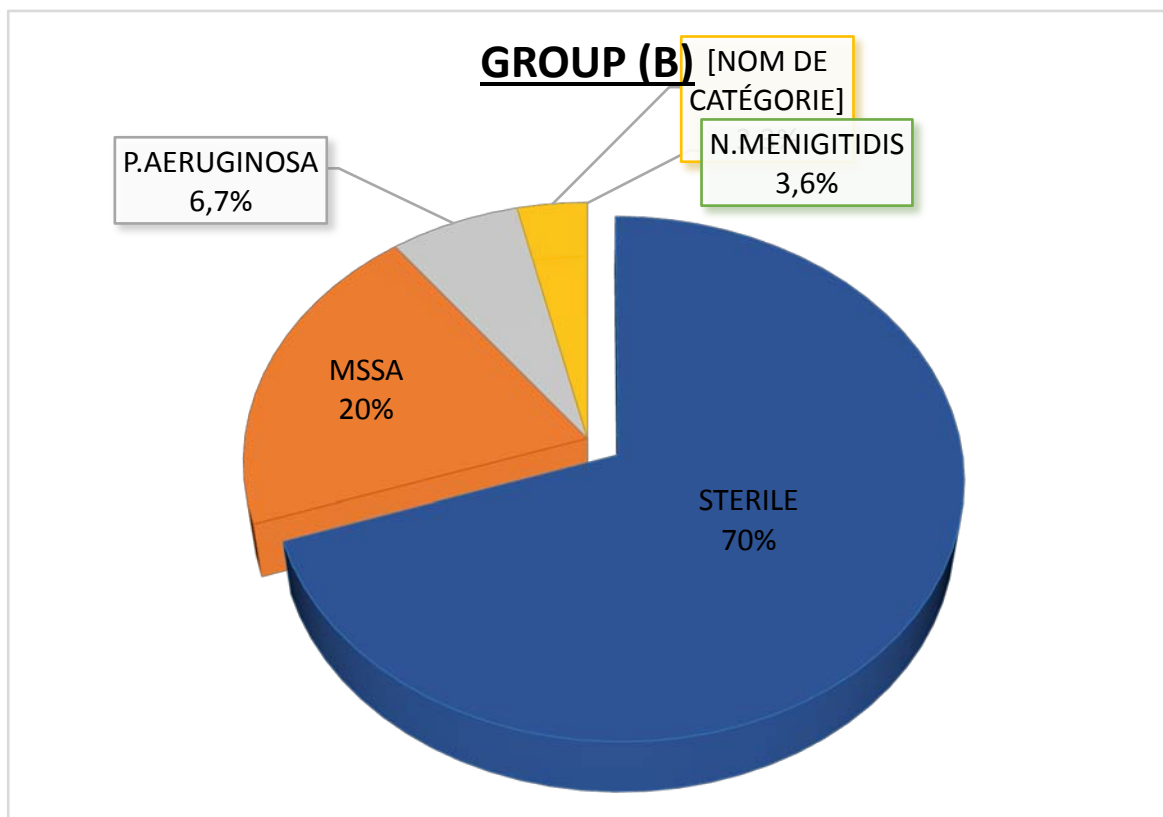
Graph 5: Culture results within group (A).

III.2. Group B:

Inflammatory indicators were high in 22 cases with a maximum of 23860/mm³, a maximum neutrophils count of 17453/mm³; CRP was high within 20 patients with a mean range of 87,4 mg/l and a maximum of 198mg/l. Eight patients had normal CBC and 10 patients had CRP<20 (Table 3).

Abnormalities in X-ray were observed within 9 patients. All patients with hip SA got an ultrasound in admission (5 patients), they all showed joint effusion. Ultrasound was also performed on 4 patients with knee SA (Table 3).

Among this group, MSSA-related infections predominated positive cultures, however culture redeemed sterile among 21 patients (Graph 6).



Graph 6: Culture results among long group (B).

Table III: Paraclinical results among group (A) and group (B).

	Group (A)	Group (B)	P value
Radiology			
<i>Abnormal X-ray (%)</i>	12,9%	20%	NS
<i>Soft tissue edema</i>	9,7%	13,3%	
<i>Periosteal reaction</i>	-	-	
<i>Adipose fascia repression</i>	3,2%	6,7%	
Abnormal ultrasound (%)	35,5%	30%	NS
<i>Joint effusion</i>	25,8%	16,7%	
<i>Soft tissue infiltration</i>	9,7%	13,3%	
<i>Periosteal detachment</i>	-	-	
Biology			
<i>WBC (mean)</i>	12858	12116	NS
<i>Neutrophils (mean)</i>	8204	8839	NS
<i>CRP (mean)</i>	112,1	87,4	NS
Microbiology			
<i>Isolated germ (%)</i>	32,2%	30%	
<i>Sterile culture (%)</i>	67,8%	70%	NS

IV. Therapeutic approach:

IV.1. Duration and type of medical treatment:

When admitted in emergency department, every suspected bone or joint infection is treated right after a blood withdrawal.

Unless allergic to the medication, every patient received empiric antibiotic and analgesic treatment counting amoxicillin clavulanate (150 mg/kg/day) for SA in addition to gentamicin (3mg/kg/day with a maximal of 90mg/day). Bone abscess and acute OM were treated with amoxicillin clavulanate. Paracetamol (60mg/kg/day) was always given when fever occurred and to relief pain along with bone plastered immobilization or limb traction. After culture results, treatment is switched from empiric to direct therapy adapted to antibiotic sensitivity testing.

In group (A), all patients received empiric treatment. The mean range of IV treatment was 3,5 days (2 to 6 days). After discharge, a 3 weeks oral antibiotic was prescribed to all the patients.

In group (B), all the patients received empiric treatment except one patient with OM who was allergic to penicillin and got third generation cephalosporin. Patients received IV treatment for 7 to 10 days, then discharged with 4 to 6 weeks of oral antibiotic prescription.

V. Surgical procedures:

V.1. Group A:

Among SA cases, all patients got puncture along with aspiration and 9 of them underwent arthrotomy: 4 patients had hip arthritis, 4 patients had knee SA and one patient had ankle SA. One child with femur BA needed puncture and bone trepanation

V.2. Group (B):

In this group, all patients with SA got puncture and aspiration, arthrotomy was performed on 10 patients: 4 patients had hip SA, 5 patients had knee SA and one patient had ankle SA. 2 patients with BA encountered puncture and bone trepanation.

Table IV: Surgical approach among group (A) and group (B).

	Group (A)		Group (B)	
	SA	BA	SA	BA
Puncture/aspiration	25	1	23	2
Arthrotomy	9	-	10	-
Bone trepanation	-	1	-	2

VI. Evolution and complications:

We monitored the short- term evolution of patients based on clinical and paraclinical criteria:

- Clinical criteria: apyrexia, decreasing of pain and resolution of swelling.
- Paraclinical criteria: decreasing in CRP kinetic and normalized WBC.

Mid and long term evolution was monitored during follow up (1 month, 3 months, 6 months and 1 year), we examined all the patients, searched for complications and sequelae, we also checked their radiography and lab results (CBC and ESR).

VI.1. Group A:

a. Short-term evolution:

The mean range of apyrexia before discharge was 1,5 days, clinical improvement was marked at a mean range of 3,5 days. CRP decreased by 54% on the second day,

When the patients had no fever and a decreased CRP kinetic, they were discharged. 67,7% of the patients were discharged by day 3; 22,5% by day 4 and 9,5% by day 6.

b. Mid and long-term evolution:

At first month follow up, a ten years old patient diagnosed with ankle arthritis, relapsed with pain in the same joint, elevated WBC and ESR after cutting off oral antibiotic within 10 days. The patient was re-admitted in our department, received IV antibiotic for 3 days, undertook puncture and aspiration then was discharged after a normal CBC and CRP < 20. Apart from this case, all the patients presented a normal ESR rate at their first month check-up. Two patients diagnosed with knee arthritis complained during their first month check up with joint pain without any functional disability.

At 3 months check-up, the 3 patients' clinical exam and lab result were normal, the pain was progressively decreasing and was gone within their 6 months checkup.

The mean range of follow-up was 9 months, patients did not show any sign of recidivism, nor chronic complications in the long term.

VI.2. Group B:

a. Short-term evolution :

The mean range of apyrexia before discharge was 4,5 days. Clinical improvement was observed at a mean range of 4 days. CRP decreased by 55,1% on day 2.

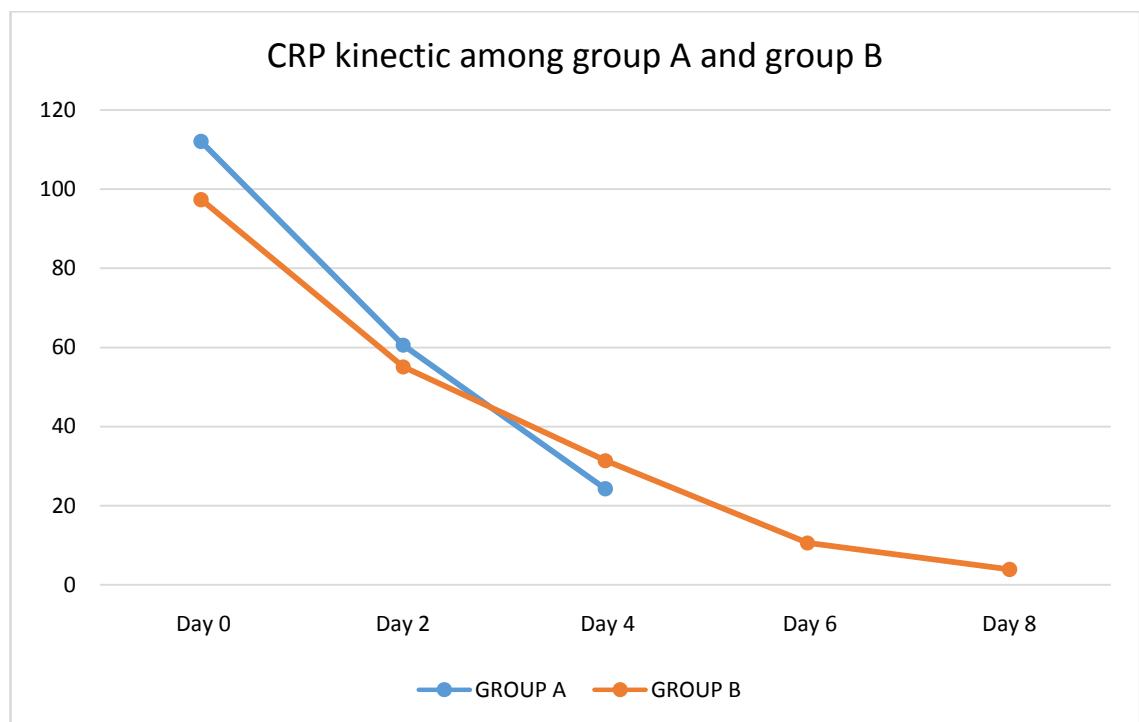
All the patients were discharged when their CRP < 20 after a minimum of 7 days of hospitalization and a maximum of 10 days.

b. **Mid and long-term evolution:**

At first month follow up, 2 patients diagnosed with hip SA were still recovering and complained from occasional pain in the affected joint with no functional disability. One patient developed an allergy to amoxicillin clavulanate that manifested with a general rash. One patient with knee SA relapsed with pain in the same joint and high inflammatory indicators. All the other patients from this group had normal ESR level at their first month check-up.

At 3 months follow up, all the patients showed full remission.

The mean range of follow-up was 9 months, patients did not show any sign of recidivism, nor chronic complications in the long term.



Graph 7: CRP kinetic among group (A) and group (B) by days.

VII. Results recap in terms of delay before consultation:

VII.1. Group (A):

a. <72h before consultation:

- 12,9% of the patients were toddlers and 64,5% were older than 2 years. 74,2% had lameness, 70,9% had pain and 45,2% had fever. 6,4% reported a recent trauma and 3,2% had open wound.
- SA was diagnosed among 63% of the cases and OM among 16,1%. The most affected joint was the knee (32,2%) followed by the hip (22,5%) then the ankle (6,4%). The most affected bone was the femur with 12,9%.
- The mean range of WBC in this group was 13800/mm³ with a maximum of 23120/mm³, the mean range of neutrophils was 8500/mm³ with a maximum of 15890/mm³, the mean of CRP was 94,5mg/l with a maximum of 199mg/l.
- Regarding radiological essays, X-ray was abnormal within one patient, and abnormalities in ultrasound was objectified among 25,8% of the patients.
- Culture redeemed sterile in 58% of the cases and was positive in 19,4% of the cases.
- During hospital stay, the mean range of apyrexia before discharge was 1,5 day and CRP rates decreased in a mean of 2 days. The mean range of hospitalization was 2,5 days.

b. >72h before consultation:

- Only one patient was a new born and 19,3% were older than 2 years. 12,9% had lameness, 22,5% had pain and 19,3% had fever. No patient reported a recent trauma and 9,7% had open

wound. No patient took previous treatment. Deterioration of general condition was observed within one patient with hip SA.

- SA was diagnosed among 19,3% of the cases, no case of OM and one case of bone abscess. The most affected joint was the knee (12,9%) followed by the hip and the ankle (3,2% each). The only case of bone abscess occurred in the femur.
- The mean range of WBC in this group was 14709/mm³ with a maximum of 24500/mm³, the mean range of neutrophils was 9029/mm³ with a maximum of 17460/mm³, the mean of CRP was 129,9mg/l with a maximum of 207mg/l.
- Regarding radiological essays, X-ray was abnormal within 9,7% of the patients and abnormalities in ultrasound was objectified among 9,7% of the patients .
- Culture redeemed sterile in 9,7% of the cases and was positive in 12,9% of the cases.
- During hospital stay, the mean range of apyrexia before discharge was 2 day and CRP rates decreased in a mean of 3 days. The mean range of hospitalization was 3,5 days.

VII.2. Group (B):

a. <72h before consultation:

- Only one patient was an infant, 16,7% were 3 months to 2 years old and 46,7% were older than 2 years. 63,3% had lameness, 66,7% had pain and 46,7% had fever. 10% reported a recent trauma and 3,3% had open wound.
- SA was diagnosed among 46,7% of the cases and OM among 16,7%. The most affected joint was the knee (23,3%) followed by the hip (16,7%) then the ankle (6,7%). The most affected bone was the femur with 12,9%.

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- The mean range of WBC in this group was 12103/mm³ with a maximum of 22670/mm³, the mean range of neutrophils was 9078/mm³ with a maximum of 15500/mm³, the mean of CRP was 83,9mg/l with a maximum of 217mg/l.
- Regarding radiological essays, X-ray was abnormal within 6,7%of the patients, and abnormalities in ultrasound was objectified among 16,7% of the patients.
- Culture redeemed sterile in 50% of the cases and was positive in 16,7% of the cases.
- During hospital stay, the mean range of apyrexia before discharge was 4 day and CRP rates decreased in a mean of 4 days. The mean range of hospitalization was 8,5 days.

b. >72h before consultation:

- Only one patient was a new born, 6,7% were toddlers and 23,3% were older than 2 years. 23,3% had lameness, 16,7% had pain and 33,3% had fever. No patient reported a recent trauma and 6,7% had open wound. 6,7% of the patients took previous treatment. Deterioration of general condition was observed within one patient with bone abscess.
- SA was diagnosed among 30% of the cases, no case of OM and two cases of bone abscess. The most affected joint was the knee (26,7%) followed by the ankle (3,2%). Both cases of bone abscess occurred in the femur.
- The mean range of WBC in this group was 13930/mm³ with a maximum of 23860 /mm³, the mean range of neutrophils was8990/mm³ with a maximum of 17453/mm³, the mean of CRP was 90,1mg/l with a maximum of 198mg/l.
- Regarding radiological essays, X-ray was abnormal within 13,3%of the patients and abnormalities in ultrasound was objectified among 13,3% of the patients .

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- Culture redeemed sterile in 20% of the cases and was positive in 13,3% of the cases.
- During hospital stay, the mean range of apyrexia before discharge was 4 day and CRP rates decreased in a mean of 5 days. The mean range of hospitalization was 9 days.

Table V: Comparison between groups (A) and (B) by delay before consultation

		Group (A)		Group (B)	
Delay before consulting		<72 h	>72h	<72h	>72h
Age	<3months	-	3,2%	3,3%	3,3%
	3-24 months	12,9%	-	16,7%	6,7%
	>2 years	64,5%	19,3%	46,7%	23,3%
Symptoms	Pain	70,9%	22,5%	66,7%	16,7%
	Fever	45,2%	19,3%	46,7%	33,3%
	Swelling	38,7%	19,3%	33,3%	33,3%
	Lameness	74,2%	12,9%	63,3%	23,3%
Recent trauma		6,4%	-	10%	-
Open wound		3,2%	9,7%	3,3%	6,7%
DCG		-	3,2%	-	3,3%
Previoustreatment		9,7%	-	3,3%	6,7%
Diagnosis:	SA	61,3%	19,3%	46,7%	30%
	OM	16,1%	-	16,7%	-
	BA	-	3,2%	-	6,7%
Affected joint:	Hip	22,5%	3,2%	16,7%	
	Knee	32,2%	12,9%	23,3%	26,7%
	Ankle	6,4%	3,2%	6,7%	-
	Elbow	-	-	-	3,3%
Affectedbone:	Femur	12,9%	3,2%	6,7%	6,7%
	Tibia	3,2%	-	3,%	-
	Feet	-	-	3,3%	-
	Arm	-	3,2%	3,3%	-
Biology:	WBC	13800	14709	12103	13930
	Neutrophils	8500	9029	9078	8990

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	CRP	94,5	129,9	83,9	90,1
Abnormal X-ray		3,2%	9,7%	6,7%	13,3%
Abnormalultrasound		25,8%	9,7%	16,7%	13,3%
Microbiology : Sterile		58%	9,7%	50%	20%
	Positive	19,4%	12,9%	16,7%	13,3
Decreased CRP (M)		2	3	4	5
apyrexiabeforedischarge (M)		1,5	2	4	4,5
hospitalizationdays (M)		2,5	3,5	7,5	9
Recidivism (1 month)		-	3,2%	-	3,3%
Long term sequelae (last check-up)		-	-	-	-

(M): mean



DISCUSSION



The last recommendations of early transitioning to oral therapy were studied in several articles since firstly recommended by Peltola in 2009. Although the recommended period of IV and oral therapy may vary between the studies, they all agreed that the IV treatment should be less than 7 days followed by 3 to 4 weeks of oral antibiotics.

Le Saux et al. carried out a systematic review of the literature comparing the results of a short intravenous treatment (7 days) to those of a longer treatment (> 7 days). They had selected 12 prospective studies with a minimum follow-up of 6 months.

Our department adopted a therapy protocol for uncomplicated BJI consisting of 2 to 6 days of IV antibiotics followed by 3 weeks of oral antibiotic for group (A), and long course treatment consisting of 7 to 10 days of IV treatment followed by 4 to 6 weeks of oral antibiotic.

In the following sections, we are going to discuss the effectiveness and safety of short-term treatment and its cost-effectiveness compared to the long course protocol.

◆ Epidemiological characteristic:

Overall, the socio-demographic results of both short and long course treatment were with no significant difference showing a male predominance, the mean age of 6,91 for group (A) and 6,05 for group (B). In group (A) most patients were from Marrakesh, whereas in group (B) percentage of rural areas was higher. Low income families were more present in group (B) [60%] than group (A) [48,4%].

Peltola et al.[1] objectified in their prospective study, a male predominance for both groups, and a mean age of 6,2 years. In El Hamri's study [2], sex ratio was 1,78 (M/F), the mean of

age was 6,96, patients from rural areas represented 53,8% of the sample and low income families predominated with a percentage of 70,5%.

Generally, low income families are more prone to bone and joint infections. In addition to that, boys are more susceptible than girls, which is explained by physical activity leading to repeatedminitraumata.

◆ **Clinical and paraclinical characteristics:**

❖ **Clinical characteristics:**

The mean range of days before diagnosis was: 3,5 days for group (A), with 77,4% consulting before 72 hours, and 4 days for group (B) with 66,7% consulting before 72 hours, Patients consulting early are frequently older, whereas infants tend to drag before diagnosis. The mean range of hospitalization was 3,5 days in group (A) versus 8 days in group (B).

Among all the children included in the study, the most frequent diagnosis was acute septicarthritis with a percentage of 80,6% in group (A) and 76,7% in group (B). Similar percentage were observed among OM cases: 16,1% in group (A) and 16,7% in group (B) had OM. 3,2% of group (A) had evolved to bone abscess and 6,7% in group (B) with no significant difference.

No significant difference was observed regarding SA locations where the predominant joint was found to be the knee in both groups, followed by the hip then ankle, in addition to one case of elbow SA in group (B) only (Table 6).

Regarding OM and bone abscess the predominant location observed in group (A) was the femur, in group (B) femur represented 57,1% of the OM cases along with other location such as tibia, feet and arm with 14,3% each (Table 7).

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Although Peltolaseries found that long course treatment group was mostly diagnosed with a hip septic arthritis and the other group had a predominating percentage of knee septic arthritis, the difference was reported non-significant.

Two equal groups of osteomyelitis and septic arthritis were included in a prospective study conducted by Vinod and lower limb infections were predominant with no precision for the affected bone or joint.

Table VI: comparison of affected joint in SA.

		Hip	Knee	Ankle	elbow
Our series	GROUP (A)	32%	56%	12,00%	-
	GROUP (B)	19%	67%	9,50%	4,80%
Peltola	Short treatment	30,2%	33,3%	22,2%	4,6%
	Long treatment	43,4%	16,4%	23,9%	7,5%

Table VII: comparison of affected bone in OM.

		Femur	tibia	Feet	arm
Our series	GROUP A	66,7%	33,3%	-	-
	GROUP B	57,10%	14,30%	14,30%	14,30%

Pain, lameness and fever are the main symptoms reported within all patients, which was also the case in previous studies [2,7]. However, fever was more present among the group (B) than group (A) (P value<0,05).

❖ Biology:

Inflammatory indicators among both groups were with no significant difference, however higher indicators were observed within patients consulting after 72h as shown in the table below.

Table VIII: Comparison of inflammatory indicators between group (A) and group (B)

	Group (A)		Group (B)	
	<72 h	>72h	<72h	>72h
Delay before consulting				
WBC maximum rate (/mm	18320	24500	17500	23860
Neutrophils maximum rate (/mm	12350	17460	10740	17453
CRP maximum rate (mg/l)	159,8	207	136	198,8

❖ Radiology:

Radiological characteristics of both groups were analyzed and abnormal X-rays in group (A) represented 12,9% of the cases versus 20% in group (B) with no significant disparity. We observed that X-rays redeemed normal in most cases consulting before 72h: 3,2% in group (A) and 6,7% in group (B) versus 9,7% in group (A) and 13,3% in group (B) who consulted after 72h of symptoms.

When suspecting a hip arthritis, a soft tissue ultrasound is always performed to confirm the diagnosis, however in bone and joint infections affection other location, we perform ultrasound when suspecting an associated subperiosteal infection.

Ultrasound results among patients with hip SA were not significantly different all the patients had joint effusion. In addition to that ultrasound showed soft tissue infiltration within 9,7% in group (A) and 13,3% in group (B).

Other studies did not include the type of abnormalities shown in patients' radiographies and ultrasound. However, pathological ultrasound represented 90% of the total in Calvo's study; they also used MRI as a key diagnostic exam, which was performed in 88% of the cases. Given our circumstances, it is not possible to perform MRI in Bone and joint infections.

❖ Microbiology:

Percentage of sterile culture was significantly higher (P value<0,05) in group (A) (67,7%) and group (B) (70%). MSSA was the most common germ in both groups, especially among older children. Gram-negative organisms were also isolated within group(A) with a percentage of 6,4% and within group (B) with a percentage of 6,7%, mostly within infants.

In the table below, we did a comparison of isolated germs between studies. The type of infecting pathogens for BJI depends on the age of the child. MSSA remains the most common pathogen responsible for OAI in older children.

Since the use of penicillin in the early 1940s, BJI caused by MRSA has become an increasingly common problem [11,12].

Apart from *S.aureus*, BJI with gram-negative organisms are common in neonates [6].

In children younger than 4 years, the reported number of cases of Kingellakingae-associated BJI has markedly increased since the 1980s. Indeed, several studies have demonstrated that Kingellakingae has been revealed to be the major bacterial cause of BJI in children aged between 6 and 48 months [8-10]. This brings a coherent explanation to BJI cases where culture redeems negative, despite the suggestive clinical exam, collection of blood and joint fluid [2,9,11, 14], it also highlights the importance of polymerase chain reaction (PCR) essays.

	H.Peltola, Finland 2009		Bouchoucha, Tunis 2013		Our series	
	Short course	Long course	Group 1	Group 2	Group A	Group B
<i>S.aureus</i>	55%	61%	44,4%	57%	25,8%	20%
<i>Strepto A</i>	14,2%	10,5%	7,4%	-	-	3,3%
<i>S.pneumoniae</i>	7,9%	10,5%	-	-	-	-
<i>K.kingae</i>	-	-	-	-	-	-
<i>P.aeruginosa</i>	-	-	-	-	6,4%	6,7%
<i>N.meningitidis</i>	1,6%	1,5%	-	-	-	-
<i>S.acidominimus</i>	-	-	3,7%	-		

Table IV: Germ isolation evolution among the years.

Other	21,3%	16,5%	-	-	-	-
Sterile culture	Not included	Not included	44,4%	42,3%	67,8%	70%

◆ Therapeutic approach:

❖ Medical treatment:

The treatment of pediatric BJI before 1980 consisted of a prolonged IV antimicrobial treatment course. Clinical experience and case series after 1980 documented success with IV followed by 4 to 6 weeks of oral treatment.

In 2009, Peltola provided for a first time a prospective, randomized trial of short antimicrobial and a retrospective analysis of 131 children with acute BJI, they adopted 10 days of antibiotic as a short treatment versus 30 days (with 2 to 4 days of IV treatment). In 2013, Bouchoucha adopted in their series a short treatment consisting of 7 days of IV antibiotic and 14 days as a long course treatment. Thus, no consensus was made about the duration of neither the short or long course treatment between previous studies [1,5,7].

However, based on our department experience and archives, we adopted empiric treatment for group (A) counting a maximum of 6 days of IV treatment with a mean of 3,5 days, with a discharge off the hospital as soon as possible, discharge criteria were: decreasing symptoms, afebrile and CRP < 20 or significant decrease in CRP kinetic, followed by 3 weeks of oral therapy. For group (B), we adopted a 7 to 10 days of IV treatment with a mean of 8 days, despite their quick response to treatment, followed by 4 to 6 weeks of oral antibiotic.

❖ Surgical treatment:

Surgical approach was kept to a minimum, arthrotomy was performed on 29% in group (A)

and 33,3% in group (B). All the patients presenting a bone abscess encountered bone trepanation.

♦ **Evolution and complications:**

The slightest flaw in the management of BJI in children can lead to irreversible sequelae. For this reason, we insist on close and strict follow up for all our patients and program a checkup at 1 month, 3 months, 6 months and 1 year.

During the included period, we searched for relapse, stiffness, residual dysfunction, growth disturbance, ankylosis, chronic BJI or other clinically significant sequelae. Immediate complications occur during hospitalization, complications that occur before 3 months checkup were considered mid-term sequelae and the ones occurring after 3 months were considered long-term sequelae.

❖ **Immediate complications:**

All the patients responded well to the treatment without any complication during their stay at the hospital.

The mean range of apyrexia before discharge was 1,5 day in group (A) and 4 days in group (B), clinical improvement was marked at a mean range of 3,5 days in group (A) and 4 days in group (B). CRP decreased by 54% on the second day in group (A) and by 55,1% in group (B). 67,7% of the patients were discharged by day 3; 22,5% by day 4 and 9,7% by day 6. All the patients in group (B) were discharged after normal CRP rate.

❖ **Mid and long term follow up:**

The mean range of follow up for all the patients was 9 months, with a minimal follow up of 6 months after discharge. Given the period of the study, we couldn't include a 1 year checkup to 12 patients.

All the patients included came back for a first and third month check-up with a recent CBC, ESR levels and radiography; for the following check-ups, given our circumstances, patients were seen first for clinical examination, then para-clinical essay is demanded if needed.

In the first month follow up, one 10 years old patient from group (A) diagnosed with ankle arthritis relapsed with pain and swelling in the same joint previously treated, they admitted cutting off oral antibiotic. In group (B), one patient diagnosed with knee SA relapsed in the same joint. Occasional joint pain was reported by patients from both groups without any functional disability. In addition to that, one case of treatment allergy was reported in group (B) that needed an antibiotic swap.

All the patients, both groups combined, showed complete remission during their last check up and no complication was observed.

In Peltola's series that includes 114 cases, follow ups were programmed at 2 weeks, 3 months and 1 year. At 3 months, two patients mentioned local pain during exercise. One patient in the long course treatment relapsed in the same joint and recovered fully after a second short treatment. At 1 year checkup, three patients had complications. Apart from the patients who relapsed, there was no precision at whether those patients had short or long course treatment. Peltola et al reported that the patients had full remission during their last checkups.

Timsit carried a study in infant orthopedic department in Rabat in 2005, in their series 5

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patients relapsed: One with femur OM while on antibiotic treatment, 3 patients whom had knee SA and one patient with ankle SA that evolved to a tibia bone lysis. An irregularity of the superior epiphyseal femoral nucleus has been observed following hip arthritis in a child with sickle cell disease. Long-term sequelae in El Hamri's study [2] were observed within 5 patients, 2 cases of SA and 3 cases of OM.

Overall, our groups appear to be homogenous, which allowed us to compare the groups without bias. We can deduct that low rates of sequelae are observed among several studies regardless of the duration of treatment, and the short course treatment is as effective and safe as the long course treatment.

Table X: comparison of sequelae between our series and Peltola's studies.

	Immediate sequelae	Mid-term sequelae (<3 months)	Long-term sequelae (>3 months)	Full remission At 1 year follow-up
Peltola	-	2,63%	3,50%	100%
Our series				
<i>Group (A)</i>	-	9,7%	-	100%
<i>Group (B)</i>	-	10%	-	100%

◆ Cost-effectiveness comparison:

To evaluate the cost-effectiveness of short versus long course treatment, we compared the hospitalization and medication costs for both protocols.

Hospitalization for one patient costs 150 dirhams per day. The total expense for short stay (2 to 6 days) costs from 300 dirhams to 900 dirham, whereas a long stay (7 to 10 days) costs between 1050 dirhams to 1500 dirhams. Thus the short protocol can save 600 to 750 dirhams. In addition to that, short hospitalization allows to release hospital beds rapidly.

The cost of IV treatment can cost from 50 dirhams per day for a newborn to 223 dirhams per day for a 16 years old patient. For a short stay, the cost of IV medication may vary from 100 to 1338 dirhams, whereas for long stays (7 to 10 days) it may vary from 350 to 2330 dirhams. Other than that, an average of two CBC (70 dhs) and CRP (110 dhs) are demanded for short course treatment versus 4 for long course treatment. There are other expenses on behalf of the patient's family (accommodation for the other parent, hygiene, personal needs...) that could not be exactly calculated. Therefore, the total cost of short hospital stay can save from 610 to 1352 dirham per patient.

Regarding oral antibiotic, and depending on the weight and age of the child, the price of amoxicillin clavulanate may vary from 70 to 168 dirhams. A 3 weeks treatment costs the family 210 to 504 dirhams, while a 4 to 6 weeks treatment can cost up to 280 to 1008 dirhams. The cost difference between the two protocols varies from 70 to 504 dirhams.

Overall, it is evident that shorter hospitalization is less expensive than long stays, not only for the patient's family but also on behalf the hospital and that can only confirms the cost effectiveness of short course treatment.



RECOMMENDATIONS



Although BJI is no longer associated with significant mortality, it may lead to severe complications if not treated well; for this reason, aggressive treatment was adopted both medical and surgical. However, the relevance of these recommendations are questioned, also previous studies demonstrated the effectiveness and safety of short course treatment. The finding of our present study is consistent with the reported series where it appears to be:

Firstly, a short course treatment is as effective as a long course treatment and does not cause more complications. In addition to that, short course treatment allows a significant cost saving, as well as more hospital room disposal and psychological comfort for the children along with their families, it also allows to avoid healthcare-associated infections (HAI). Therefore, we recommend a short treatment approach with early transitioning to oral therapy as soon as the fever is gone and $CRP < 20$ or a significant decrease in CRP kinetic.

Secondly, the key remains to be prevention by early recognition and treatment, this can only be achieved by educating the families, continuous training of health professionals, along with promoting family medicine besides easy access to health care especially in isolated and rural areas.



CONCLUSION



Bone and joint infections of childhood are frequent in low-income countries, and even though they are no longer related to high mortality risk, OM and SA can be devastating if not treated well. In our country, they still pose a major diagnostic and therapeutic problem due to late consulting, self-medicating and resorting to traditional medicine. A continuous challenge is to introduce simple, affordable and effective treatments especially for resource-poor settings. Along with that, promoting and providing easy access to health care is a major key to early diagnosis that will result in better outcomes.

Therefore, in the past few years and following the recommendations of early transitioning to oral antibiotics, we adopted a protocol consisting in a short IV treatment, we discharged the patient as soon as the fever was gone and CRP < 20 mg/l with a maximum of 6 days, followed by 3 weeks of oral therapy and close follow up. Patients treated for short courses had good outcomes.

Contrary to expectations and local protocols, many patients are still treated with conventional long course treatment, this prolongation is indeed multifactorial.

The low rate of complications within our series along with literature review increases evidence of the efficacy and safety of short course treatment for acute, uncomplicated OM or SA in children suggests that this could be accepted as the standard treatment.

As a conclusion, we must say that short course treatment of uncomplicated cases of bone and joint infections of childhood is as effective and safe as long course; adopting this protocol has now become evident besides careful clinical monitoring and close follow up. However, for resistant germ associated infections, complicated cases or those with underlying illness, treatment must be tailored individually.



ANNEXES



Questionnaire

1. Identity

IP adress: _____ Admission date: _____
Last name: _____ First name: _____
Age : _____
Sex: M F
Origin: _____
Income: _____
Hospitalizationdays : _____

2. Motive of consultation

	YES	NO
Pain :	<input type="checkbox"/>	<input type="checkbox"/>
Lamenes :	<input type="checkbox"/>	<input type="checkbox"/>
Fever :	<input type="checkbox"/>	<input type="checkbox"/>
Recent trauma :		
other :		
Delay before consultation :		
Diagnosis : SA	<input type="checkbox"/>	
OM	<input type="checkbox"/>	
BA	<input type="checkbox"/>	

3. Medicalhistory :

Vaccinal statut _____
Medical history _____
Similar history _____
Surgical procedure _____
Medicationintakebefore admission : _____

4. Clinical exam :

Affected bone and or joint :.....
Infection route :.....

Clinicalsigns : Collection DGC :

5. Paraclinical exams :

- **Radiology :**

<u>X-ray:</u>	YES	NO
Normal	<input type="checkbox"/>	<input type="checkbox"/>
Observed anomalies		
Soft tissues edema	<input type="checkbox"/>	
Demineralization	<input type="checkbox"/>	
Metaphyseal geods	<input type="checkbox"/>	
Joint pinching	<input type="checkbox"/>	
periosteal reaction	<input type="checkbox"/>	
Others.....	

	YES	NO
<u>Ultrasound :</u>		
Normal	<input type="checkbox"/>	<input type="checkbox"/>
Observed anomalies		
Joint effusion	<input type="checkbox"/>	
Periostealdetachment	<input type="checkbox"/>	
Soft tissue infiltration	<input type="checkbox"/>	

<u>Scintigraphy :</u>		
Not performed	<input type="checkbox"/>	
Normal	YES <input type="checkbox"/>	NO <input type="checkbox"/>
Observed anomalies.....	

<u>MRI:</u>		
Not performed	<input type="checkbox"/>	
Normal	YES <input type="checkbox"/>	NO <input type="checkbox"/>
Observed anomalies.....	

• biology :

*Hématology			
WBC :	PN :	CRP :	Procalcitonin :
*Microbiology			
Puncture	<input type="checkbox"/>		
Synovial biopsy	<input type="checkbox"/>		
Hemoculture	<input type="checkbox"/>		
Other foyer:			
*Responsible Germ			
Not isolated	<input type="checkbox"/>		
Isolated :.....		

Antibioticsensitivity test :.....

6. Treatment

a- Médical :

*Antibiotic
 Monothérapie : Dose.....

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Bithérapie : Dose.....
Transition to oral therapy in day :.....
antibiotic : Dose.....

*Immobilization : plaster traction

*surveillance of medical treatment
Clinical improvement :.....
Local signs :.....
Apyrexia delay:.....

Biology : CRP 1 CRP 2
CRP 3 CRP 4

b- Surgical approach :

Joint puncture	<input type="checkbox"/>	<input type="checkbox"/>
Arthrotomy	<input type="checkbox"/>	<input type="checkbox"/>
Drainage chirurgical	<input type="checkbox"/>	<input type="checkbox"/>
Bonetrepanation	<input type="checkbox"/>	<input type="checkbox"/>

7. Evolution

Clinical examination	WBC	ESR	X-ray
1 month			
3 months			
6 months			
1 year			
Recidivism			



SUMMARIES

Abstract

Bone and joint infections present frequently in pediatric emergency departments and occur most commonly in toddlers and young children, it is potentially deadly and may cause functional disabilities. Early diagnosis of acute osteomyelitis and arthritis is difficult and should always be suspected when clinical signs are suggestive. BJI require an urgent medical treatment with possible need of a surgical intervention

Optimal empiric therapy after appropriate cultures continues to be intravenous treatment. After the patient has clinically improved and has decreasing inflammatory markers, conversion to oral antibiotics should occur. Current recommendations are 3 weeks of oral antibiotic treatment compared to the 4 to 6 weeks previously adopted.

We conducted a prospective comparative study of children treated for bone and joint infections. The aim of this study was to evaluate the results of two antibiotic therapy protocols for acute osteomyelitis and arthritis with different durations of treatment. Patients in group (A) received 2 to 6 days of intravenous antibiotics followed by 3 weeks of oral antibiotic, whereas patients in group (B) received 7 to 10 days followed by 4 to 6 weeks therapy. Treatment redeemed effective if there were no signs of recidivism or chronic BJI at the last follow-up. Sixty-one patients were included in the study (Group (A):31, Group (B):30). The mean range of age was 6 years; knee SA was the most common diagnosis among both groups. The mean range of hospitalization in group (A) was 3,5 days versus 8 days in group (B). One patient in each group showed recidivism in first month check-up. However, all the patients showed full remission in their last follow up.

The analysis of the epidemiological, clinical and paraclinical characteristics did not show any

significant difference between two groups, thus allowing us to compare the effectiveness of both protocols.

After a mean follow-up of 9 months (1 month to 1 year), none of the patients in either group showed signs of recidivism nor long-term complications.

In conclusion, a shortened treatment of 2 to 6 days of intravenous antibiotic followed by 3 weeks therapy is as effective and safe as a longer treatment, not only that, but it is also more cost effective and provides several advantages for both the patient and hospital management. Finally, the key remains to be prevention by early recognition and treatment, this can only be achieved by educating the families, continuous training of health professionals, along with promoting family medicine besides easy access to health care especially in isolated and rural areas.

Résumé

Les infections ostéoarticulaires sont fréquentes dans les services d'urgence pédiatriques et surviennent le plus souvent chez les jeunes enfants, elles sont potentiellement mortelles et peuvent entraîner des incapacités fonctionnelles. Le diagnostic précoce de l'ostéomyélite aiguë et de l'arthrite est difficile et doit toujours être suspecté lorsque les signes cliniques sont évocateurs. Les IOA nécessitent un traitement médical urgent avec une éventuelle intervention chirurgicale.

Le traitement empirique optimal après des cultures appropriées continue d'être le traitement intraveineux. Une fois que le patient s'est amélioré sur le plan clinique et que les marqueurs inflammatoires diminuent, la conversion aux antibiotiques oraux doit avoir lieu. Les recommandations actuelles sont de 3 semaines d'antibiothérapie orale contre 4 à 6 semaines précédemment retenues.

Nous avons mené une étude prospective comparative d'enfants traités pour des infections ostéoarticulaires. Le but de cette étude était d'évaluer les résultats de deux protocoles d'antibiothérapie pour l'ostéomyélite aiguë et l'arthrite avec différentes durées de traitement. Les patients du groupe (A) ont reçu 2 à 6 jours d'antibiotiques par voie intraveineuse suivi de 3 semaines d'antibiotiques par voie orale, tandis que les patients du groupe (B) ont reçu 7 à 10 jours de traitement intraveineux suivi de 4 à 6 semaines de traitement. Traitement est déclaré efficace s'il n'y a eu aucun signe de récurrence ou d'infection chronique au dernier suivi. Soixante et un patients ont été inclus dans l'étude (Groupe (A) : 31, Groupe (B) : 30). La moyenne d'âge était de 6 ans; L'arthrite du genou était le diagnostic le plus courant dans les deux groupes. La durée moyenne d'hospitalisation dans le groupe (A) était de 3,5 jours contre 8 jours dans le groupe (B). Un patient

de chaque groupe a récidivé lors de l'examen du premier mois. Cependant, tous les patients ont montré une rémission complète lors de leur dernier suivi.

L'analyse des caractéristiques épidémiologiques, cliniques et paracliniques n'a pas montré de différence significative entre les deux groupes, nous permettant ainsi de comparer l'efficacité des deux protocoles.

Après un suivi moyen de 9 mois (1 mois à 1 an), aucun des patients des deux groupes n'a présenté de signes de récivide ni de complications à long terme.

En conclusion, un traitement raccourci de 2 à 6 jours d'antibiotique intraveineux suivi d'une thérapie de 3 semaines est aussi efficace et sûr qu'un traitement plus long, non seulement cela, mais il est également plus rentable et offre plusieurs avantages à la fois pour le patient et la gestion de l'hôpital. Enfin, la clé sera toujours la prévention par un dépistage et un traitement précoce, cela ne peut être réalisé qu'en éduquant les familles, en formant continuellement des professionnels de la santé, en promouvant la médecine familiale en plus d'un accès facile aux soins de santé, en particulier dans les zones isolées et rurales.

ملخص

تظهر التهابات العظام والمفاصل بشكل متكرر في أقسام الطوارئ للأطفال وتحدث بشكل شائع عند الأطفال الصغار ، ومن المحتمل أن تكون مميتة وقد تسبب إعاقات وظيفية. يعد التشخيص المبكر لالتهاب العظم والنقي الحاد والتهاب المفاصل أمرًا صعبًا ويجب دائمًا الاشتباه به عندما تكون العلامات السريرية موحية. تتطلب التهابات العظام والمفاصل علاجًا طبيًا عاجلاً مع احتمال الحاجة إلى تدخل جراحي. العلاج التجريبي الأمثل لا يزال العلاج عن طريق الوريد. بعد أن يتحسن المريض سريريًا ويقلل من علامات الالتهاب، يجب أن يحدث التحول إلى المضادات الحيوية عن طريق الفم. التوصيات الحالية هي 3 أسابيع من العلاج بالمضادات الحيوية عن طريق الفم مقارنة بـ 4 إلى 6 أسابيع المعتمدة سابقًا. أجرينا دراسة مقارنة مستقبلية للأطفال الذين عولجوا من التهابات العظام والمفاصل. كان الهدف من هذه الدراسة هو تقييم نتائج اثنين من بروتوكولات العلاج بالمضادات الحيوية لالتهاب النقي الحاد والتهاب المفاصل مع فترات علاج مختلفة. تلقى المرضى في المجموعة (أ) من 2 إلى 6 أيام من المضادات الحيوية في الوريد تليها 3 أسابيع من المضادات الحيوية عن طريق الفم ، في حين تلقى المرضى في المجموعة (ب) 7 إلى 10 أيام تليها 4 إلى 6 أسابيع العلاج. يعد العلاج فعالاً إذا لم تكن هناك علامات انتكاس أو التهاب مزمن في المتابعة الأخيرة. تم تضمين واحد وستين مريضاً في الدراسة (المجموعة (أ): 31 ، المجموعة (ب): 30). كان متوسط العمر 6 سنوات. كان التهاب المفاصل في الركبة هو التشخيص الأكثر شيوعاً بين المجموعتين. كان متوسط نطاق الاستشفاء في المجموعة (أ) 3.5 أيام مقابل 8 أيام في المجموعة (ب). أظهر مريض واحد في كل مجموعة انتكاساً في فحص الشهر الأول. ومع ذلك، أظهر جميع المرضى الشفاء التام في آخر متابعة لهم. لم يُظهر تحليل الخصائص الوبائية والسريرية وشبه السريرية أي فرق كبير بين المجموعتين، مما سمح لنا بمقارنة فعالية لكلا البروتوكولين. بعد متوسط متابعة لمدة 9 أشهر (من شهر إلى عام واحد) ، لم يظهر أي من المرضى في أي من المجموعتين علامات انتكاس أو المضاعفات طويلة الأمد.

3 في الختام، فإن العلاج القصير من 2 إلى 6 أيام من المضادات الحيوية في الوريد متبوعاً بعلاج 3 أسابيع يعتبر فعالاً وأمناً كعلاج أطول ، ليس ذلك فحسب ، بل هو أيضاً أكثر فعالية من حيث التكلفة ويوفر العديد من المزايا لكل من المريض وإدارة المستشفى. أخيراً، يظل المفتاح هو الوقاية من خلال التعرف والعلاج المبكرين، ولا يمكن تحقيق ذلك إلا من خلال تثقيف العائلات ، والتدريب المستمر لمهنيي الصحة ، جنباً إلى جنب مع تعزيز طب الأسرة إلى جانب سهولة الوصول إلى الرعاية الصحية خاصة في المناطق المعزولة.



BIBLIOGRAPHY



- 1. Peltola, H., Pääkkönen, M., Kallio, P., Kallio, M. J., & Osteomyelitis–Septic Arthritis (OM- SA) Study Group. (2009).**
Prospective, randomized trial of 10 days versus 30 days of antimicrobial treatment, including a short-term course of parenteral therapy, for childhood septic arthritis. *Clinical infectious diseases*, 48(9), 1201-121.
- 2. El hamri, J., & El fezzazi, R. (2012).**
Les infections ostéoarticulaires de l'enfant: expérience du service de traumatologie pédiatrique au CHU de Marrakech.
- 3. Calvo, C., Núñez, E., Camacho, M., Clemente, D., Fernández- Cooke, E., Alcobendas, R., ... &Saavedra- Lozano, J. (2016).**
Epidemiology and management of acute, uncomplicated septic arthritis and osteomyelitis. *The Pediatric infectious disease journal*, 35(12), 1288-1293.
- 4. Vinod, M. B., Matussek, J., Curtis, N., Graham, H. K., &Carapetis, J. R. (2002).**
Duration of antibiotics in children with osteomyelitis and septic arthritis. *Journal of paediatrics and child health*, 38(4), 363-367.
- 5. Huang, C. Y., Hsieh, R. W., Yen, H. T., Hsu, T. C., Chen, C. Y., Chen, Y. C., & Lee, C. C. (2019).**
Short-versus long-course antibiotics in osteomyelitis: a systematic review and meta-analysis. *International journal of antimicrobial agents*, 53(3), 246-260.
- 6. Ceroni, D., Kampouroglou, G., Anderson dellaLlana, R., &Salvo, D. (2014).**
Osteoarticular infections in young children: what has changed over the last years?. *Swiss medical weekly*, 144, w13971.
- 7. Bouchoucha, S., Gafsi, K., Trifa, M., Saied, W., Ammar, C., Nessib, M. N., ... &Ghachem, M. B. (2013).**
Antibiothérapie intraveineuse des ostéomyélites aiguës: traitement long versus court. *Archives de pédiatrie*, 20(5), 464-469.
- 8. Ceroni, D., Dubois- Ferrière, V., Anderson, R., Combescure, C., Lamah, L., Cherkaoui, A., &Schrenzel, J. (2012).**

Small risk of osteoarticular infections in children with asymptomatic oropharyngeal carriage of *Kingella kingae*. *The Pediatric infectious disease journal*, 31(9), 983-985.

9. Gutierrez, K. (2003).

Bone and joint infection. *Principles and Practice of Pediatric Infectious Disease*. 2nd ed. Philadelphia, PA: Churchill Livingstone, 467-474.

10. Rosey, A. L., Abachin, E., Quesnes, G., Cadilhac, C., Pejin, Z., Glorion, C., ...&Ferroni, A. (2007).

Development of a broad-range 16S rDNA real-time PCR for the diagnosis of septic arthritis in children. *Journal of microbiological methods*, 68(1), 88-93.

11. Arnold, S. R., Elias, D., Buckingham, S. C., Thomas, E. D., Novais, E., Arkader, A., & Howard, C. (2006).

Changing patterns of acute hematogenous osteomyelitis and septic arthritis: emergence of community-associated methicillin-resistant *Staphylococcus aureus*. *Journal of Pediatric Orthopaedics*, 26(6), 703-708.

12. Martínez- Aguilar, G., Avalos- Mishaan, A., Hulten, K., Hammerman, W., Mason Jr, E. O., & Kaplan, S. L. (2004).

Community-acquired, methicillin-resistant and methicillin-susceptible *Staphylococcus aureus* musculoskeletal infections in children. *The Pediatric infectious disease journal*, 23(8), 701-706.

13. Moumile, K., Cadilhac, C., Lina, G., Berche, P., Glorion, C., &Ferroni, A. (2006).

Severe osteoarticular infection associated with Panton-Valentine leukocidin-producing *Staphylococcus aureus*. *Diagnostic microbiology and infectious disease*, 56(1), 95-97.

14. Khachatourians, A. G., Patzakis, M. J., Roidis, N., &Holtom, P. D. (2003).

Laboratory monitoring in pediatric acute osteomyelitis and septic arthritis. *Clinical Orthopaedics and Related Research®*, 409, 186-194.

15. Teklali, Y., Ettayebi, F., Benhammou, M., El Alami, Z. F., El Madhi, T., Gourinda, H., & Miri, A. (2002).

Les arthrites septiques du nourrisson et de l'enfant à propos de 554 cas. *Journal de pédiatrie et de puériculture*, 15(3), 137-141.

- 16. Abuamara, S., Louis, J. S., Guyard, M. F., Barbier- Frebourg, N., & Lechevallier, J. (2004).**
Infections osteo-articulaires de l'enfant: etude de deux series consecutives et evaluation d'un protocole de diagnostic et de traitement. *Revue de chirurgie orthopédique et réparatrice de l'appareil moteur*, 90(8), 703-713.
- 17. Timsit, S., Pannier, S., Glorion, C., & Chéron, G. (2005).**
Acute osteomyelitis and septic arthritis in children: one year experience. *Archives de pediatrie: organe officiel de la Societe francaise de pediatrie*, 12(1), 16-22.
- 18. Grimpel, E., Larrot, M., Haas, H., Pinquier, D., Parez, N., Grimpel, E., Larrot, M., Haas, H., Pinquier, D., Parez, N., Grimpel, E., Larrot, M. (2008).**
Infections ostéoarticulaires: Propositions thérapeutiques du Groupe de Pathologie Infectieuse Pédiatrique (GPIP) de la Société Française de pédiatrie. *Archives de pédiatrie*, 15: S74-S80.
- 19. Cohen, R. (2007).**
Traitement raccourci des ostéomyélites aiguës de l'enfant. *Archives de pédiatrie*, 14, S128-S130.
- 20. Barthes, X., Safar, A., & Seringe, R. (1997).**
Traitement des ostéoarthrites infectieuses de l'enfant. *Archives de pédiatrie*, 4(5), 460-463.
- 21. Nade, S. (2003).**
Septic arthritis. *Best Practice & Research Clinical Rheumatology*, 17(2), 183-200.
- 22. Malcius, D., Trumpulyte, G., Barauskas, V., & Kilda, A. (2005).**
Two decades of acute hematogenous osteomyelitis in children: are there any changes?. *Pediatric surgery international*, 21(5), 356-359.
- 23. Odent, T., Péjin, Z., Cadilhac, C., Ferroni, A., & Glorion, C. (2010).**
Infections ostéo-articulaires aiguës de l'enfant: place du traitement chirurgical. *Archives de pédiatrie*, 6(17), 764-765.
- 24. Pääkkönen, M., Kallio, M. J., Peltola, H., & Kallio, P. E. (2010).**
Pediatric septic hip with or without arthrotomy: retrospective analysis of 62 consecutive nonneonatal culture-positive cases. *Journal of Pediatric Orthopaedics B*, 19(3), 264-269.
- 25. Papin, C. (2007).**

Les infections ostéoarticulaires à propionibacteriumacnes: étude rétrospective de 2000 à 2004 au CHU de Nantes (Doctoral dissertation).

26. Betz, R. R., Cooperman, D. R., Wopperer, J. M., Sutherland, R. D., White Jr, J. J., Schaaf, H. W., ... & Gillespie, R. (1990).
Late sequelae of septic arthritis of the hip in infancy and childhood. *Journal of pediatric orthopedics*, 10(3), 365-372.
27. Kao, H. C., Huang, Y. C., Chiu, C. H., Chang, L. Y., Lee, Z. L., Chung, P. W., ... & Lin, T. Y. (2003).
Acute hematogenous osteomyelitis and septic arthritis in children. *Journal of Microbiology, Immunology, and Infection*, 36(4), 260-265.
28. Ramos Amador JT, Lopez Laso E, Romero Blanco I, Alba Romero C, Curto De La Mano A, Gonzalez Del Orbe Get al. (1998).
Septic osteoarthritis in children. *An Esp pediatri*;40:481-486
29. Kanavaki, A., Ceroni, D., Tchernin, D., Hanquinet, S., &Merlini, L. (2012).
Can early MRI distinguish between Kingellakingae and Gram-positive cocci in osteoarticular infections in young children?. *Pediatric radiology*, 42(1), 57-62.
30. Raymond RaymondRaymondJ, BergeretBergeretBergeret, M. (2007).
Résistance aux antibiotiques des syaphylococcus aureus responsables des infections ostéoarticulaires. *Archives de pédiatrie*.14:\$97-S101.
31. Lazzarini, L., Mader, J. T., & Calhoun, J. H. (2004).
Osteomyelitis in long bones. *JBJS*, 86(10), 2305-2318.
32. Rasool, M. N. (2001).
Primary subacute haematogenous osteomyelitis in children. *The Journal of bone and joint surgery*. British volume, 83(1), 93-98.
33. Desplaces, N. (1995).
Place du bactériologiste dans les infections ostéo-articulaires de l'enfant. Morin C &Herbaux B, éd. Monographie du GEOP. Les infections ostéo-articulaires de l'enfant. Montpellier, Saurampsmédical, 65-74.

34. Maier, C. C. (2007).

Résultat de l'utilisation d'une monothérapie probabiliste dans les infections ostéo-articulaires de l'enfant (Doctoral dissertation, Freiburg (Breisgau), Univ., Diss., 2007).

35. Lorrot, M., Doit, C., Ilharreborde, B., Vitoux, C., Le Henaff, L., Sebag, G., ... & Bingen, É. (2011).

Antibiothérapie des infections ostéo-articulaires de l'enfant: ce qui a changé. Archives de pédiatrie, 18(9), 1016-1018.

36. Lazzarini, L., Lipsky, B. A., & Mader, J. T. (2005).

Antibiotic treatment of osteomyelitis: what have we learned from 30 years of clinical trials?. International journal of infectious diseases, 9(3), 127-138.

37. Cohen, R. (2008).

Apport de la pharmacocinétique-pharmacodynamie au traitement des infections bactériennes de l'enfant. Archives de pédiatrie, 15, S53-S58.

38. Trueta, J. (1959).

The three types of acute haematogenous osteomyelitis: a clinical and vascular study. The Journal of Bone and Joint Surgery. British volume, 41(4), 671-680.

39. Ogden, J. A. (1974).

Changing patterns of proximal femoral vascularity. JBJS, 56(5), 941-950.

40. Ogden, J. A. (1979).

Pediatric osteomyelitis and septic arthritis: the pathology of neonatal disease. The Yale journal of biology and medicine, 52(5), 423.

41. Morrissy, R. T. (1982).

Bone and joint sepsis in children. Instructional course lectures, 31, 49-61.

42. Danielsson, L. G., & Gupta, R. P. (1989).

Four cases of purulent arthritis of the shoulder secondary to hematogenous osteomyelitis. Acta Orthopaedica Scandinavica, 60(5), 591-592.

43. Grimpel, E., & Cohen, R. (2007).

Épidémiologie et physiopathologie des infections ostéoarticulaires chez l'enfant (nouveau-né exclu). Archives de pédiatrie, 14, S81-S85.

- 44. Kaplan, S.L. (2005). Osteomyelitis in children. Infect Dis Clin N Am;19:787-97.**
Morrissy, R. T., & Haynes, D. W. (1989).

Acute hematogenous osteomyelitis: a model with trauma as an etiology. Journal of pediatric orthopedics, 9(4), 447-456.

- 45. Lechevalier J, Imbert M, AbouAmara S, Guyard MF., Guyard MF. (1997).**

Arthrites septiques de l'enfant. Encyclo. Med. Chir. Appareil locomoteur 1997;14-178-A-10:10.

- 46. Ader, F., Salomon, J., Perronne, C., & Bernard, L. (2004).**

Origine de l'infection osseuse: endogène ou exogène? Éléments de physiopathologie. Médecine et maladies infectieuses, 34(11), 530-537.

- 47. Sukswai, P., Kovitvanitcha, D., Thumkunanon, V., Chotpitayasunondh, T., Sangtawesin, V., & Jeerathanyasakun, Y. (2011).**

Acute hematogenous osteomyelitis and septic arthritis in children: clinical characteristics and outcomes study. Journal of the Medical Association of Thailand= Chotmai het Thangphaet, 94, S209-16.

قسم الطبيب

أقسم بالله العظيم

أن أراقب الله في مهنتي.

وأن أصون حياة الإنسان في كافة أطوارها في كل الظروف
والأحوال باذلاً وسعي في استنقاذها من الهلاك والمرض

والألم والقلق.

وأن أحفظ للناس كرامتهم، وأستر عورتهم، وأكتم سرهم.

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للصالح والطالح، والصديق والعدو.

وأن أثابر على طلب العلم، وأسخره لنفع الإنسان .. لا لأذاه.

وأن أوقر من علمني، وأعلم من يصغرنني، وأكون أخاً لكل زميل في المهنة الطبية

متعاونين على البر والتقوى.

وأن تكون حياتي مصداق إيماني في سري وعلانيتي، نقيّة مما يشينها تجاة

الله ورسوله والمؤمنين.

والله على ما أقول شهيد



كلية الطب
والصيدلة - مراكش
FACULTÉ DE MÉDECINE
ET DE PHARMACIE - MARRAKECH

أطروحة رقم 206 سنة 2021

المضاد الحيوي قصير الأمد مقابل طويل الأمد في التهاب النقي
والتهاب المفاصل الحادين عند الأطفال :
دراسة مستقبلية
الأطروحة

قدمت ونوقشت علانية يوم 2021/11/15
من طرف

السيدة هدى أوفير

المزودة في 16/04/1995 بمراكش

لنيل شهادة الدكتوراة في الطب
الكلمات الأساسية :

العظام والمفاصل-الأطفال-علاج-قصير الأمد

اللجنة

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أستاذة في جراحة الأطفال

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