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Original article

Microbiological Analyses and Sensitivities of Germs to Antibacterials in Dacryocystitis at the IOTA University Hospital, Bamako

Analyses microbiologiques et sensibilités des germes aux antibactériens dans les dacryocystites au CHU IOTA, Bamako

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Résumé

Introduction : La dacryocystite est une inflammation le plus souvent infectieuse du sac lacrymal, liée à une stase intra-sacculaire de larmes en rapport avec une sténose de la portion verticale des voies lacrymales, le plus souvent le canal lacrymo-nasal.

Méthodologie : Il s'agissait d'une étude prospective, descriptive et analytique, allant du 1er avril au 30 septembre 2024.

Résultat : Nous avons colligé 32 cas soit une fréquence de 0,15%. L'âge moyen était de 23,78 ans avec des extrêmes qui variaient entre 03 mois et 67 ans. Le sex-ratio H/F était de 1,13. La majorité des dacryocystites était infectieuse soit 90,62%. Les germes à Gram+ (59%) prédominaient par rapport aux germes à Gram– (41%). Les staphylococcus aureus (41,37%) étaient les plus représentés parmi les germes à Gram+, tandis que chez les germes à Gram– les pseudomonas aeruginosa (13,79%) prédominaient. L'amikacine, l'imipenème, la levofloxacine, la netilmicine, la quinipristine et la tobramycine étaient les antibiotiques qui avaient une meilleure sensibilité. Les germes à Gram– étaient plus sensibles à l'amikacin tandis que les germes à Gram+ étaient plus sensibles à l'amikacine, la netilmicine, la quinipristine, la tobramycine et la vancomycine.

Conclusion : La présente étude a montré que les germes des patients atteints de dacryocystite étaient divers en termes de distribution, de prévalence et de schéma de résistance et/ou de sensibilité aux antimicrobiens.

Mots-clés : Dacryocystite, microbiologie, Antibiogramme.

Abstract

Introduction: Dacryocystitis is an inflammation, most often infectious, of the lacrimal sac, linked to an intra-saccular stasis of tears related to a stenosis of the vertical portion of the lacrimal pathways, most often the nasolacrimal duct.

Methodology: This was a prospective, descriptive and analytical study, running from April 1 to September 30, 2024.

Results: We collected 32 cases, representing a frequency of 0.15%. The mean age was 23.78 years, with a range from 3 months to 67 years. The male-to-female ratio was 1.13. The majority of dacryocystitis cases were infectious (90.62%). Gram-positive bacteria (59%) predominated over Gram-negative bacteria (41%). Staphylococcus aureus (41.37%) were the most represented among Gram-positive bacteria, while among Gram-negative bacteria, Pseudomonas aeruginosa (13.79%) predominated. Amikacin, imipenem, levofloxacin, netilmicin, quinipristine, and tobramycin were the antibiotics with the highest susceptibility. Gram-negative bacteria were more susceptible to amikacin, while Gram-positive bacteria were more susceptible to amikacin, netilmicin, quinipristine, tobramycin, and vancomycin.

Conclusion: The present study has shown that the germs in patients with dacryocystitis were diverse in terms of distribution, prevalence and pattern of resistance and/or sensitivity to antimicrobials.

Keywords: Dacryocystitis, microbiology, Antibiogram.

Introduction

Dacryocystitis is an inflammation, most often infectious, of the lacrimal sac, linked to intra-saccular stasis of tears related to stenosis of the vertical portion of the lacrimal pathways, most often the nasolacrimal duct. It can be acute or chronic [1].

Dacryocystitis can be congenital or acquired, occurring spontaneously following an infection of the lacrimal ducts, which often results in a narrowing at the entrance to the nasolacrimal duct . It can also be iatrogenic or secondary to facial trauma, an ocular tumor, a foreign body, or an ENT condition [2]. The main cause remains infection of the lacrimal sac, which perpetuates the inflammation [3]. The most common causative agents are Gram-positive bacteria (69%), followed by Gram-negative bacteria (20%) and anaerobes (13%) [4].

The frequency of nasolacrimal duct obstruction is unevenly distributed in the population; it is much more common in women than in men [2, 5, 6].

Dacryocystitis is a common eye condition and a leading cause of ocular morbidity in patients. The literature reports that approximately 1% of young children in the French population present with unilateral or bilateral obstruction of the lacrimal ducts. The prevalence of imperforate lacrimal duct varies between 1.2% and 20% according to different authors [7]. It is generally accepted that dacryocystitis due to developmental anomalies is present in 5% to 6% of newborns, with 20% of cases being bilateral [8].

In the DRC, the frequency of dacryocystitis was 0.3% in 2015 [2].

At IOTA, the incidence of excretory lacrimal duct pathologies was 0.38% in 2017. Chronic dacryocystitis (36.6%) was the most diagnosed pathology, with a female predominance [5].

Early identification of the bacteria responsible for dacryocystitis and knowledge of their sensitivity to available antibiotics are important for effective treatment [9].

Dacryocystitis has been the subject of several studies and publications worldwide, especially its microbiological aspect [9, 10, 11, 12, 13]. Given that few studies have been conducted on this topic in the sub-region, and particularly in Mali, we proposed to carry out this study, the aim of which was to identify the different germs associated with chronic dacryocystitis at the IOTA University Hospital in Bamako.

Methodology

This was a prospective descriptive and analytical study, which took place from April 2024 to September 2024.

We included all patients diagnosed with dacryocystitis and excluded those who were not examined, lost to follow-up, did not have a sample taken, or did not consent. The sampling method used was non-probability, and its size was determined by the number of patients collected during the study period.

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- *Examination Method*

After the interview, all subjects underwent an ophthalmological examination including measurement of visual acuity, objective refraction, biomicroscopic examination of the anterior segment, measurement of intraocular pressure by applanation, examination of the fundus (if the media allow) and additional assessments were given to them.

Following a complete ophthalmological examination, all subjects underwent a biopsy performed by the same operator based on clinical characteristics in a designated room. Before any sampling, the operator washed their hands with soap and donned sterile gloves.

The sample is taken by swabbing or by aspiration puncture in case of encystment, then kept in a swab that each subject brought from the INSP for the occasion.

For patients who had received treatment, a therapeutic abstention of 05 days was made before proceeding with the sampling.

Finally, the swab sample is sent the same day to the INSP for cytobacteriological examination. At the INSP, the samples are analyzed by the same team using the following techniques: a first Gram stain is performed to identify the organism, then a culture is carried out in a medium (Chapman or Hektoen) appropriate for the identified organism. A second Gram stain is performed, before concluding with the antibiotic susceptibility testing.

At the end of the patient examination, a previously prepared investigation form was completed.

The data was collected using a pre-established questionnaire.

Data entry was performed using CDC Atlanta's EPI info 7.0 software.

After obtaining informed consent, patient recruitment was carried out using the pre-established direct-administration questionnaire.

Results

A total of 32 samples from the contents of the lacrimal sac of 32 patients with dacryocystitis out of 21482 consultations were obtained during our study period (06 months), representing a frequency of 0.15%.

- *Sociodemographic characteristics*

Table I: Distribution of patients according to age.

Age range (years)	Number (n)	Percentage (%)
< 1	3	9.37
1 to 10	11	34.38
11 to 20	5	15.63
21 to 30	1	3.12
31 and over	12	**37.5**
Total	32	100.00

The average age was 23.78 years. The extremes ranged from 3 months to 67 years.

The 31 and over age group was the most represented with 37.5%.

- *Clinical characteristics*

Table II: Distribution of patients according to visual acuity.

Visual acuity	Number (n)	Percentage (%)
Light perception	1	3.12
1 to 5/10	7	21.88
6/10 to 10/10	12	37.50
Undetermined*	12	37.50
Total	32	100.00

NB: * Undetermined visual acuity referred to children under 05 years of age whose visual acuity could not be assessed using the Snellen scale.

Table III: Distribution of patients according to medical history

Medical history	Number (n)	Percentage (%)
Ophthalmologists		
Conjunctivitis	29	90.63
Episode of dacryocystitis	2	6.25
Trauma	6	18.75
None	1	3.12
Total	38	118.75
Generals		
HTA	5	15.63
Glaucoma	1	3.12
None	26	81.25
Total	32	100

Note: Each patient had more than one prior ophthalmological condition. (n=32).

Table IV: Distribution of patients according to prior treatment

Previous treatment	Number (n)	Percentage (%)
Yes	13	40.62
No	19	59.38
Total	32	100

Table V: Distribution of patients according to laterality.

Laterality	Number (n)	Percentage (%)
unilateral	32	100.00
bilateral	0	0.00
Total	32	100

Table VI: Distribution of patients according to functional signs.

Functional Signs	Number (n)	Percentage (%)
Epiphora	32	100.00
BAV	3	9.38
Pain	13	40.63
Swelling of the inner corner of the eye	15	46.88
Eye redness	13	40.63
Total	76	237.52

Note: Each patient had more than one functional sign. The percentages are obtained from the total number of cases in our sample (n=32).

Table VII: Distribution of patients according to physical signs.

Physical Signs	Number (n)	Percentage (%)
Conjunctival hyperemia	13	40.63
open inferior lacrimal meatus	32	100.00
Swelling of the lacrimal sac	15	46.88
Lacrimal sac fistulization	9	28.13
Reflux upon pressure from the lacrimal sac	31	96.88
Total	100	312.52

Note: Each patient had more than one physical sign. The percentages are obtained from the total size of our sample (n=32).

- *Paraclinical characteristics*

Table VIII: Distribution according to the result of the samples.

Result of the sampling	Number (n)	Percentage (%)
Positive	29	90.62
Negative	3	9.38
Total	32	100

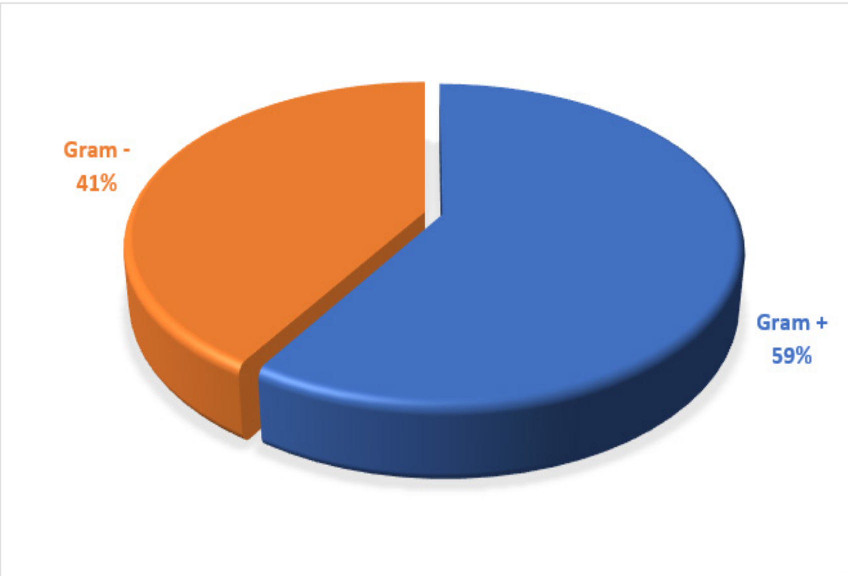

Figure 1: Distribution of patients according to the gram staining of isolated germs.

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Table IX: Distribution of patients according to the germs isolated.

	Isolated Germs	Number (n)	Percentage (%)
Gram +	Streptococcus pneumoniae	5	17.24
	Staphylococcus aureus	12	41.37
Gram -	acinetobacter calcovar	1	3.45
	Klebsiella oxytoca	1	3.45
	Klebsiella pneumoniae	1	3.45
	Escherichia coli	2	6.90
	Enterobacter	1	3.45
	Pseudomonas aeruginosa	4	13.79
	Haemophilus ducreyi	1	3.45
	Morganella morganii	1	3.45
	Total	29	100

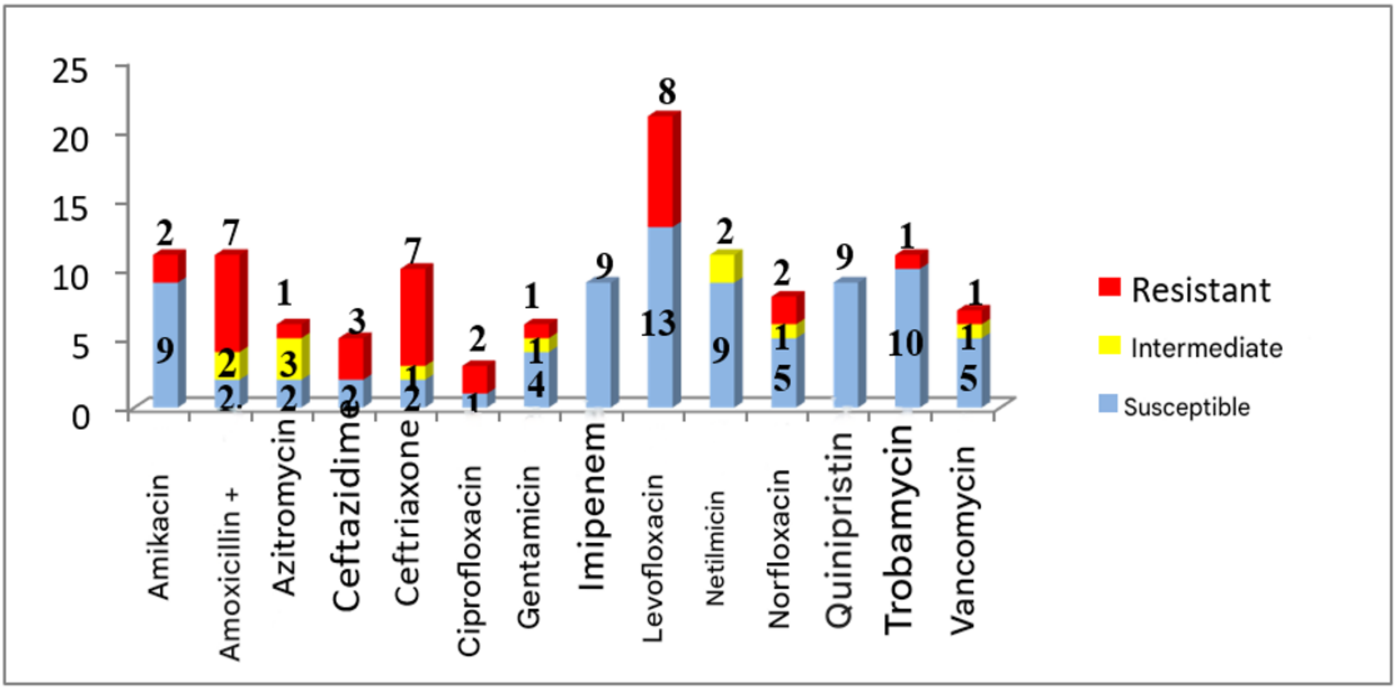

Figure 2: Distribution of germs according to the antibiogram

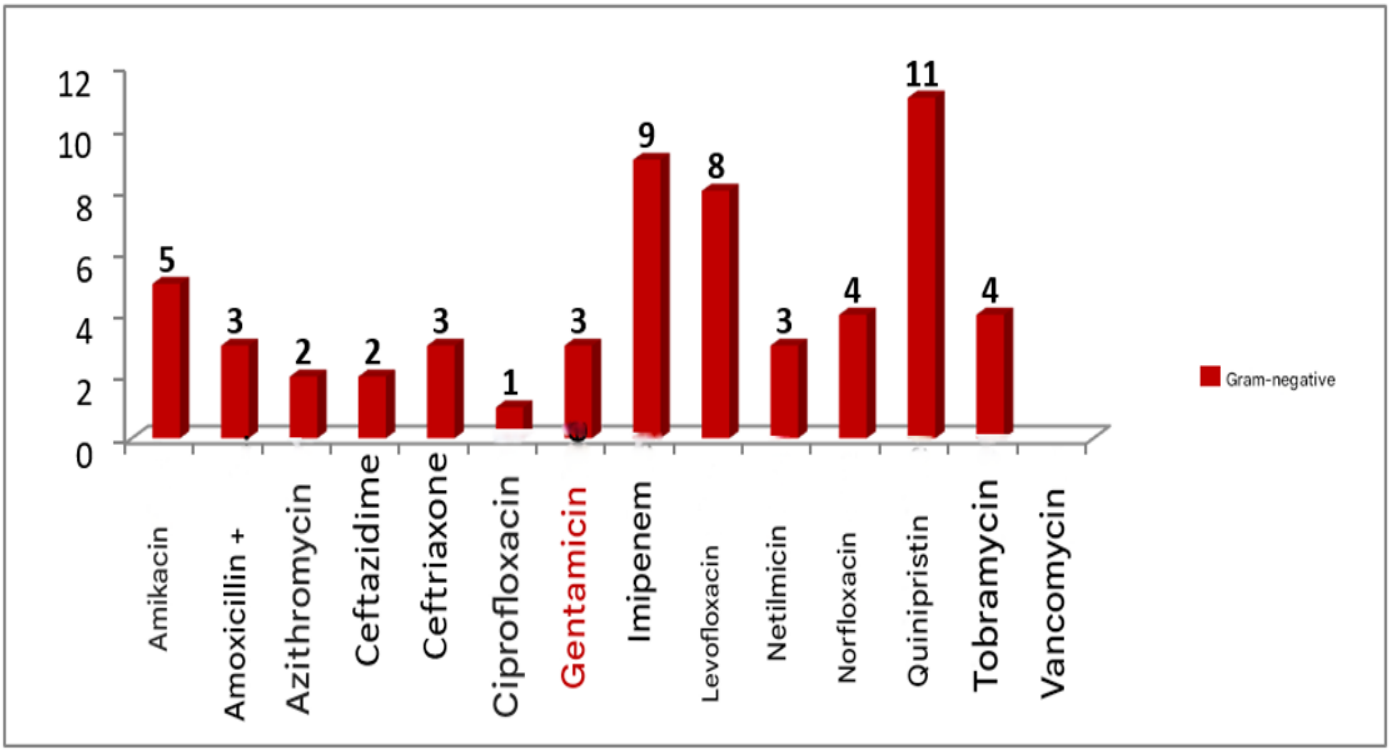

Figure 3: Distribution of Gram-negative germ sensitivity according to the antibiogram .

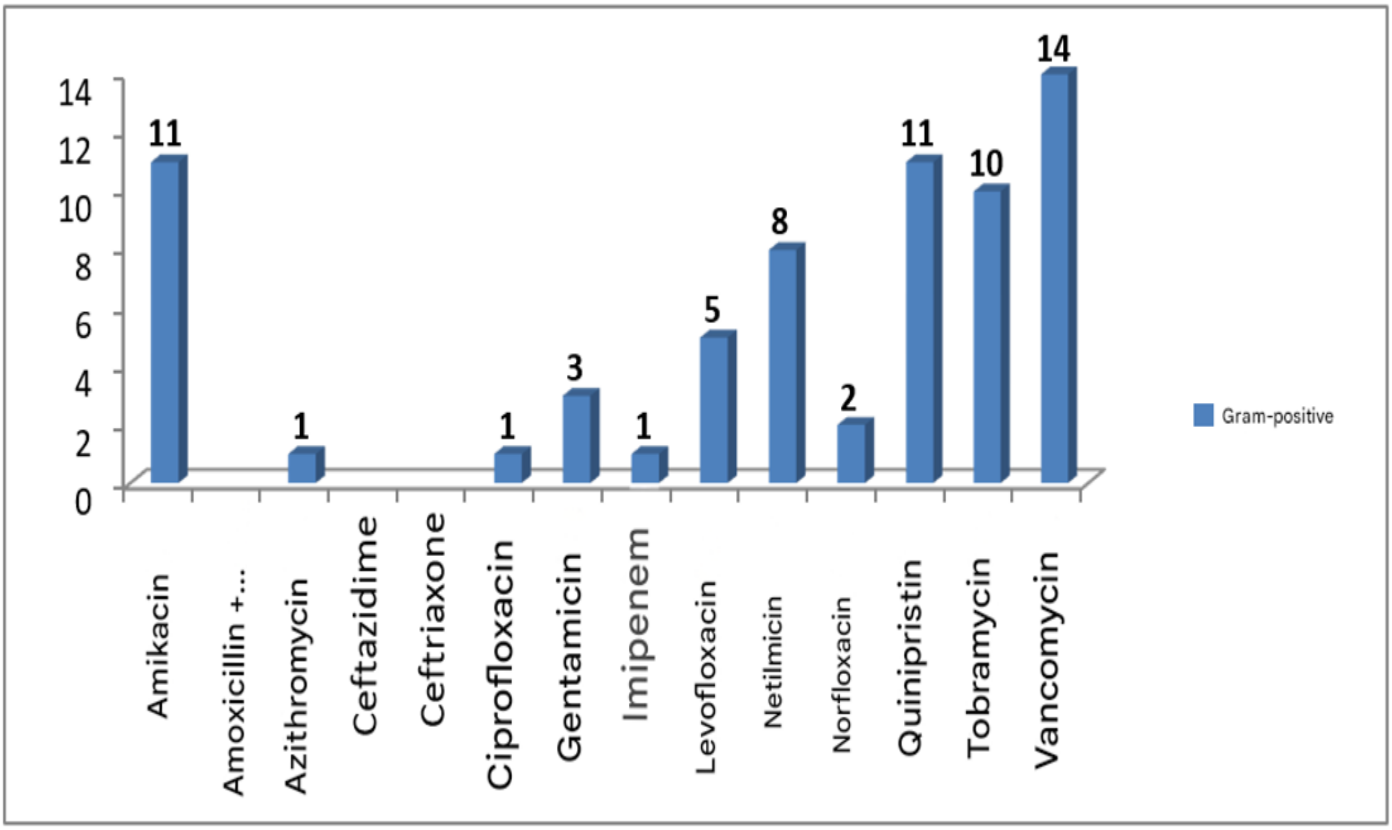

Figure 4: Distribution of Gram+ germ sensitivity according to the antibiogram.

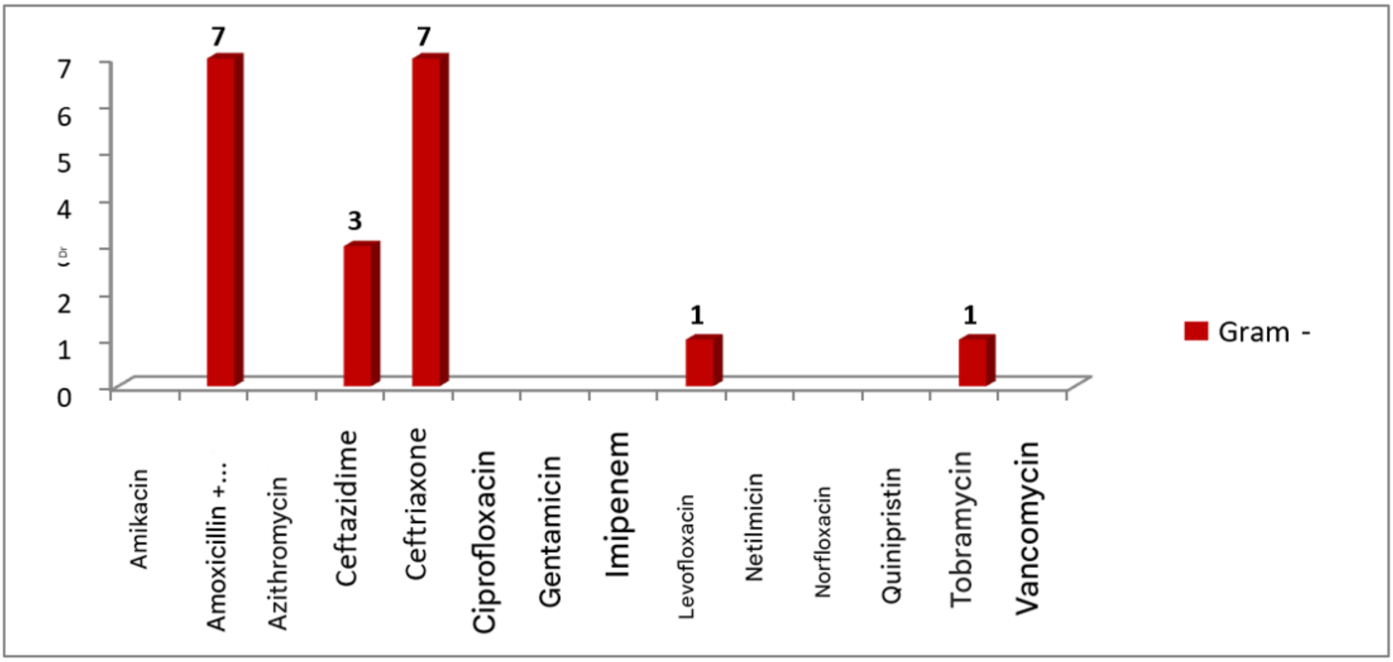

Figure 5: Distribution of resistance of gram- negative germs according to the antibiogram.

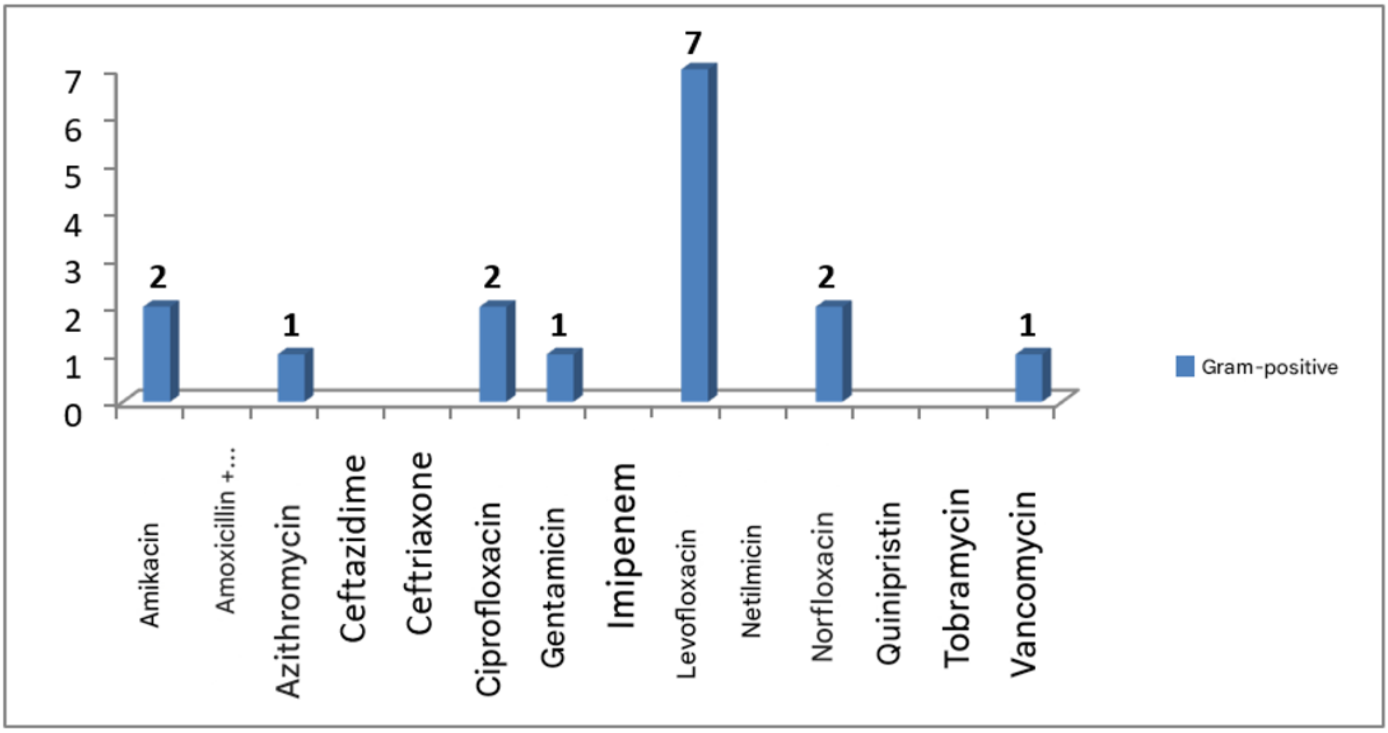

Figure 6: Distribution of resistance of gram + germs according to the antibiogram.

Discussion

In the present study, we examined the results of microbiological analyses in dacryocystitis in patients of all ages seen at CHU-IOTA who underwent microbiological analysis.

The limitations of the study

Like most scientific studies, we have faced certain difficulties:

- Swabs not available at CHU-IOTA.
-The CHU-IOTA laboratory is unable to prepare and analyze the samples.
-No free services for patients.

Epidemiological and sociodemographic characteristics

- *Frequency*

During the study, we collected 32 cases over a 6-month period, representing 0.15%. This rate is lower than that of Ngoie VM et al. in the DRC, which was 0.3% over 2 years [2]. This difference could be explained by the size of our sample and the period of our study.

- *Age*

The mean age in our study was 23.78 years, with a range from 3 months to 67 years. The 31 years and older age group was the most represented. This age group was approximately the same as that reported by Assefa Y et al. in Ethiopia [13], which was 30 years and older.

Clinical characteristics

- *Reasons for consultation*

Each patient presented with more than one symptom. The majority of patients (100%) had consulted for epiphora. This finding corroborates that of Ngoie VM et al. in the DRC [2], with a predominance of excessive tearing (89%). This result is explained by the obstruction of the lacrimal drainage pathway.

Swelling of the inner corner of the eye represented 46.88%, i.e., 15 eyes.

- *The evolution*

The chronic form was the most prevalent, accounting for 59 % of cases. This aligns with the findings of most studies conducted in various countries, including those by Assefa Y et al. in Ethiopia [13] and China [12, 14], which also showed a predominance of the chronic form. This could be explained by late diagnosis or delayed treatment of dacryocystitis.

Paraclinical characteristics

- *Gram staining of isolated germs*

In our study, among the isolated germs, we noted a predominance of Gram+ germs (59%) over Gram-negative germs (41%). This result corroborates with numerous studies conducted in different countries, including those by Assefa Y et al. in Ethiopia [17], Iran [12, 18], Bharathi MJ et al. in India [6], and Chung SY et al. in the USA [13] and China [14, 16], in which Gram+ germs were the most represented.

- *Isolated germs*

Among the ten isolated bacteria, Staphylococcus aureus (41.37%) was the most represented among the Gram-positive bacteria, and Pseudomonas aeruginosa (13.79%) was the most represented among the Gram-negative bacteria in our study. This result corroborates those of Assefa Y et al. in Ethiopia [17] and Chung SY et al. in the USA [13], in which Staphylococcus aureus (19.4%) [17], (30%) [13] for Gram-positive bacteria; and Pseudomonas aeruginosa (9.7%) [17], (10%) [13] for Gram-negative bacteria were the most represented.

- *Antibiogram*

The antibiotics with the best sensitivity in our study were amikacin, imipenem, levofloxacin, netilmicin, norfloxacin, quinipristin, tobramycin, and vancomycin. Compared to the study by Eslami F et al. in Iran [18], the antibiotics with the best sensitivity were ciprofloxacin, ceftriaxone, vancomycin, chloramphenicol, gentamicin, and erythromycin. This result could be explained by the fact that these antibiotics are rarely used in our setting.

The antibiotics exhibiting the most resistance were amoxicillin + clavulanic acid and ceftriaxone in our study. However, in the study by Chung S et al. in the USA [11], cephalexin and clindamycin were the antibiotics with the highest resistance. This result could be explained by their overuse, often even without antibiogram testing.

Gram-positive bacteria were more susceptible to amikacin, netilmicin, quinipristine, tobramycin, and vancomycin. Gram-negative bacteria were more susceptible to amikacin, imipenem, levofloxacin, and quinipristine. Compared to the study by Chen L et al. in China [14], Gram-positive bacteria were susceptible to erythromycin, vancomycin, cefazolin, and sulfamethoxazole; while Gram-negative bacteria were susceptible to gentamicin, ciprofloxacin, tobramycin, and ceftazidime.

Gram-negative bacteria were more resistant to amoxicillin + clavulanic acid, ceftazidime, and ceftriaxone. Gram-positive bacteria were more resistant to levofloxacin.

Conclusion

This study showed that dacryocystitis was predominantly chronic and that the main symptom was epiphora. The pathogens found in patients with dacryocystitis were diverse in terms of distribution, prevalence, and patterns of resistance and/or susceptibility to antimicrobials. Gram-positive bacteria predominated over Gram-negative bacteria. Staphylococcus aureus was the most common Gram-positive bacteria, while Pseudomonas aeruginosa predominated among Gram-negative bacteria. The majority of dacryocystitis cases (90.62%) were infectious. Amikacin, imipenem, levofloxacin, netilmicin, norfloxacin, quinipristine, tobramycin, and vancomycin were the antibiotics with the highest sensitivity. Gram-negative bacteria were more susceptible to amikacin, imipenem, levofloxacin, and quinipristine, while Gram-positive bacteria were more susceptible to amikacin, netilmicin, quinipristine, tobramycin, and vancomycin. Therefore, these findings are highly significant for optimizing antibiotic prophylaxis and treatment options in our setting.

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Conflict of interest : None

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