INTRODUCTION

The urinary system is physiologically a sterile site, but colonization or infection of different parts of the system is quite common, due indications of surgical treatment, or urinary drainage.

The execution of a surgical gesture on infected urines led before to a high incidence of perioperative infections, leading to an elevated morbidity and mortality. The realization of this risk as well as preoperative systematic urine sterilization, when possible, is probably one of the biggest developments of this field.

This work made by Urology a department of the IBN SINA hospital in RABAT, will report the bacteriological profile of pre-operative urinary infections in endoscopic urology.

The purpose of our work is
To know the germs accountable for urinary infections of these patients
To know their antibiotic sensitivity

Equipment and process
It’s a retrospective study that took 6 months from January 1st 2019 to June 31st 2019. It included 200 patients from Urology a department in the IBN SINA hospital RABAT, who undertook an endoscopic urology intervention.

We have studied their epidemiologic features: age, sexe, antecedents, executed gestures, clinical signs of urinary infection, results of preoperative cytobacteriological urine examination (CBUE) as part of the preanesthesic assessment (direct examination, culture and antibiogram), preoperative antibiotherapy, bladder drainage, cystostomy or nephrostomy as well as the duration of their instalment, antibiotherapy, or perioperative anti-inhibitory.
38% of our patients were smokers, 13.5% with a hypertension, 11% with diabetes, and 5% had a cardiopathy.

**Intervention type**

| Intervention type                          | number | %  |
|-------------------------------------------|--------|----|
| TURB                                      | 72     | 36 |
| TURP                                      | 56     | 28 |
| Placement or change of double J stent      | 34     | 17 |
| Uretrotomy                                | 19     | 9.5|
| Ureteroscopy                              | 11     | 5.5|
| cystoscopy                                | 8      | 4  |

**C-Incidence of microorganisms**

On 200 UCBE executed before the surgical gesture, 107 were positive with a germ identification (53.5%). 43 cases had a positive leukocyturia without bacteriuria (21.5%) and 3 UCBE were polymorphous (1.5%).

**D-Isolatedgerms**

| Gram Negative Bacilli | Germ          | Number | percentage |
|-----------------------|---------------|--------|------------|
|                        | E. Coli       | 57     | 53.2%      |
|                        | Klebsiella    | 11     | 10.2%      |
|                        | P. Aerugenosa | 7      | 6.5%       |
|                        | Enterobacter cloacae | 9 | 8.4% |
|                        | Serratia      | 4      | 3.7%       |
|                        | Proteus mirabilis | 2 | 1.8% |

| Gram Positive Cocci | Staphylococcus | 9 | 8.4% |
|                     | Streptococcus  | 3 | 2.8% |
|                     | Enterococcusfaecalis | 4 | 3.7% |

| Gram Negative Cocci | AcinetobacterBaumani | 1 | 0.9% |
| Total               | 107               | 100% |

**E-sensitivity profile of different microorganisms**

**The bacteriologic profile of Echerchia Coli: (57 UCBE)**

| Antibiotic       | Sensitive | Resistant | Intermediate | Untested |
|------------------|-----------|-----------|--------------|----------|
|                  | Nmbr      | %         | Nmbr         | %        | Nmbr | %   |
| Amikacin         | 56        | 98,3      | 0            | 0        | 1    | 1.7 | 0   | 0   |
| Genta            | 45        | 78,9      | 11           | 19,2     | 0    | 0   | 1   | 1.7 |
| Ertapenem        | 57        | 100       | 0            | 0        | 0    | 0   | 0   | 0   |
| Imipenem         | 57        | 100       | 0            | 0        | 0    | 0   | 0   | 0   |
| Cephaloramin     | 4         | 7         | 27           | 47,3     | 26   | 45,6| 0   | 0   |
| Cefoxitin        | 45        | 78,9      | 2            | 3,5      | 0    | 0   | 10  | 17,5|
| Cefixime         | 52        | 91,2      | 5            | 8,7      | 0    | 0   | 0   | 0   |
| Cefazidime       | 51        | 89,4      | 6            | 10,5     | 0    | 0   | 0   | 0   |
| Ceftriazone      | 52        | 91,2      | 5            | 8,8      | 0    | 0   | 0   | 0   |
| cefipime         | 52        | 91,2      | 5            | 8,8      | 0    | 0   | 0   | 0   |
| Ampicillin       | 17        | 29,8      | 40           | 70,2     | 0    | 0   | 0   | 0   |
| Ticarcillin      | 17        | 29,8      | 40           | 70,2     | 0    | 0   | 0   | 0   |
| Amox-clav        | 20        | 35        | 37           | 65       | 0    | 0   | 0   | 0   |
| Ticar-clav       | 21        | 36,8      | 36           | 63,2     | 0    | 0   | 0   | 0   |
| Pipé-tazo        | 52        | 91,2      | 5            | 8,8      | 0    | 0   | 0   | 0   |
| Trim-sulf        | 32        | 56,1      | 25           | 43,9     | 0    | 0   | 0   | 0   |
| fosfomycin       | 56        | 98,2      | 1            | 1,8      | 0    | 0   | 0   | 0   |
| Nitrofurantoin   | 56        | 98,2      | 1            | 1,8      | 0    | 0   | 0   | 0   |
| ciproflaxacin    | 27        | 47,3      | 30           | 42,7     | 0    | 0   | 0   | 0   |
| Norflaxacin      | 29        | 50,8      | 28           | 49,2     | 0    | 0   | 0   | 0   |
| Nalidixicacid    | 25        | 43,8      | 32           | 46,2     | 0    | 0   | 0   | 0   |
B-Bacteriologic profile of Klebsiella P: (11 UCBE)

| Antibiotic | sensitive | resistant | intermediate | Untested |
|------------|-----------|-----------|--------------|----------|
|            | nmbr | %    | nmbr | %    | nmbr | %    | nmbr | %    | nmbr | %    | nmbr | %    |
| Amikacin   | 9 | 81.8 | 0 | 0 | 1 | 9 | 1 | 9 |
| Genta      | 8 | 72.7 | 2 | 18.1 | 0 | 0 | 0 | 0 |
| Ertapenem  | 8 | 72.7 | 0 | 0 | 1 | 9 | 2 | 18.1 |
| Imipenem   | 10 | 90.9 | 0 | 0 | 0 | 0 | 1 | 9 |
| cephalotin | 2 | 18.1 | 7 | 63.6 | 0 | 0 | 2 | 18.1 |
| Ceftazidime| 5 | 45.4 | 5 | 45.4 | 1 | 9 | 0 | 0 |
| Ceftriaxone| 6 | 54.5 | 3 | 27.2 | 0 | 0 | 2 | 18.1 |
| Cefepime   | 4 | 36.3 | 5 | 45.4 | 0 | 0 | 2 | 18.1 |
| Ampicillin | 0 | 0 | 11 | 100 | 0 | 0 | 0 | 0 |
| Ticarcillin| 0 | 0 | 10 | 90.9 | 0 | 0 | 1 | 9 |
| Amox-clav  | 0 | 0 | 11 | 100 | 0 | 0 | 0 | 0 |
| Ticar-clav | 2 | 18.1 | 8 | 72.7 | 0 | 0 | 1 | 9 |
| Pipe-tazo  | 3 | 27.2 | 4 | 36.3 | 0 | 0 | 4 | 36.3 |
| Bactrim    | 4 | 36.3 | 6 | 54.5 | 0 | 0 | 1 | 9 |
| Ciprofloxacin| 5 | 45.4 | 5 | 45.4 | 0 | 0 | 1 | 9 |
| Norfloxacin| 5 | 45.4 | 5 | 45.4 | 0 | 0 | 1 | 9 |

C-Bacteriologic profile of Pseudomonas Aerugenosa: (7 UCBE)

| ATB         | sensitive | resistant | intermediate | Untested |
|-------------|-----------|-----------|--------------|----------|
|             | nmbr | %    | nmbr | %    | nmbr | %    | nmbr | %    | nmbr | %    |
| Tobramycin  | 3 | 42.8 | 3 | 42.8 | 0 | 0 | 1 | 14.2 |
| Amikacin    | 6 | 85.7 | 1 | 14.2 | 0 | 0 | 0 | 0 |
| Genta       | 5 | 71.4 | 2 | 28.5 | 0 | 0 | 0 | 0 |
| Imipenem    | 4 | 57.1 | 1 | 14.2 | 2 | 28.5 | 0 | 0 |
| Ceftazidime | 5 | 71.4 | 2 | 28.5 | 0 | 0 | 0 | 0 |
| Cefepime    | 5 | 71.4 | 2 | 28.5 | 0 | 0 | 0 | 0 |
| Ticarcillin | 2 | 28.5 | 5 | 71.4 | 0 | 0 | 0 | 0 |
| Ticar-clav  | 1 | 14.2 | 4 | 57.1 | 0 | 0 | 3 | 42.8 |
| Piperacillin| 2 | 28.5 | 4 | 57.1 | 0 | 0 | 1 | 14.2 |
| Pipe-tazo   | 3 | 42.8 | 3 | 42.8 | 0 | 0 | 1 | 14.2 |
| Bactrim     | 0 | 0 | 6 | 85.7 | 0 | 0 | 1 | 14.2 |
| Ciprofloxacin| 1 | 14.2 | 3 | 42.8 | 2 | 28.5 | 1 | 14.2 |
| Levofloxacin| 1 | 14.2 | 3 | 42.8 | 0 | 0 | 3 | 42.8 |
| Colistin    | 5 | 71.4 | 1 | 14.2 | 0 | 0 | 1 | 14.2 |

D-bacteriologic profile of staphylococcus: (9 UCBE)

| Antibiotic | sensitive | resistant | Untested |
|------------|-----------|-----------|----------|
|            | nmbr | %    | nmbr | %    | nmbr | %    |
| Tobramycin | 6 | 66.6 | 2 | 22.2 | 1 | 11.1 |
| Gentamycin | 7 | 77.7 | 2 | 22.2 | 0 | 0 |
| Vancomycin | 9 | 100 | 0 | 0 | 0 | 0 |
| Teicoplanine| 8 | 88.8 | 0 | 0 | 1 | 11.1 |
| Clindamycin| 8 | 88.8 | 1 | 11.1 | 0 | 0 |
| Erythromycin| 6 | 66.6 | 3 | 33.3 | 0 | 0 |
| Daptomycin | 7 | 77.7 | 0 | 0 | 2 | 22.2 |
| PeniG      | 1 | 11.1 | 7 | 77.7 | 1 | 11.1 |
| Oxacillin  | 5 | 55.5 | 4 | 44.4 | 0 | 0 |
| Fucidicacid| 2 | 22.2 | 7 | 77.7 | 0 | 0 |
| Levofloxacin| 2 | 22.2 | 5 | 55.5 | 2 | 22.2 |
| Bactrim    | 6 | 66.6 | 1 | 11.1 | 2 | 22.2 |
| Fosfomycin | 6 | 66.6 | 2 | 22.2 | 1 | 11.1 |
**E-bacteriologic profile of Enterobacter cloacae: (9 UCBE)**

| Antibiotic       | sensitive | resistant |
|------------------|-----------|-----------|
|                  | nbmr     | %        | nbmr    | %        |
| Amikin           | 9         | 100      | 0       | 0        |
| Genta            | 8         | 88,8     | 1       | 11,2     |
| Ertapenem        | 9         | 100      | 0       | 0        |
| Emipenem         | 9         | 100      | 0       | 0        |
| Cephalotin       | 0         | 0        | 9       | 100      |
| Cefixime         | 6         | 66,6     | 3       | 33,3     |
| Ceftazidime      | 6         | 66,6     | 3       | 33,3     |
| Ceftriaxone      | 6         | 66,6     | 3       | 33,3     |
| Cefepime         | 6         | 66,6     | 3       | 33,3     |
| Ampicillin       | 0         | 0        | 9       | 100      |
| Ticarcillin      | 6         | 66,6     | 3       | 33,3     |
| Amox-clav        | 0         | 0        | 9       | 100      |
| Ticar-clav       | 6         | 66,6     | 3       | 33,3     |
| Pipé-tazo        | 7         | 77,7     | 2       | 28,5     |
| Bactrim          | 6         | 66,6     | 3       | 33,3     |
| Ciprofloxacin    | 5         | 55,5     | 4       | 44,5     |
| Norfloxacin      | 5         | 55,5     | 4       | 44,5     |
| Nalidixicacid    | 5         | 55,5     | 4       | 44,5     |

**DISCUSSION**

The execution of a surgical gesture on infected urines led before to a high incidence of perioperative infections, leading to an elevated morbidity and mortality. The realization of this risk as well as preoperative systematic urine sterilization, when possible, is probably one of the biggest developments of this field.

**EPIDEMIOLOGY**

On sterile urine, and aside from its indication for obstructive pyelonephritis, nephrostomies expose the patient to a septic risk comparable to that of cystoscopies, meaning less than 5%. However, in case of preexisting infection [1], cystoscopy causes bacteraemia in 15 to 20% of the cases.

The risk linked to the setup of endo-ureteral prosthesis (ureteral catheters, double J stent) is poorly known. In 2002, Kehinde et al. showed that the risk of bacteriuria and the colonization of the double J stent, increases with the duration of the catheterization and that it is more important for females or patients with diabetes or chronic kidney failure [2].

A recent meta-analysis showed that the resort to antibioprophylaxis during a TURP lowers the postoperative bacteriuria from 26 to 9, 1% and septicemia from 4, 4% to 0,7%. Moreover, the mortality linked to a severe sepsis after a TURP, with a sterile preoperative cytobacteriological urine test, is 0.1% [3].

For the TURP, the 3 main factors recognized in the promotion of postoperative infections are: urinary drainage, preoperative bacteriuria, and no antibioprophylaxis.

**II-therapeutic attitude**

The screening and the systematic treatment of a preoperative urinary tract infection are now a common practice, they decrease the perioperative morbidity.

**II-1-Infected preoperative urine**

It can either be an asymptomatic bacteriuria or a parenchymal infection.

**Asymptomatic bacteriuria**

It is extremely frequent in patients with a urinary drainage (vesical catheter, sus-pubic catheter, nephrostomy tube) and even with a detection threshold of 10² UFC ml⁻¹, many teams still take it into consideration because 95% of untreated patients, if catheterized, will develop in 24 to 72h a bacteriuria greater than 10⁵ UFC ml⁻¹, [37] a leukocyturia of 10² to 10⁵ cells mm⁻³ [4] is present in 85% to 90% of infections on a catheter, but it is not mandatory for the diagnosis [4, 5].

The risk of bacteriuria in catheterized patients increases linearly with the duration of the vesical catheterization from 3 to 8 % per day during the first 10 days [59]. After a month of the vesical catheterization, the prevalence of the bacteriuria is practically 100% [6]. Although it’s not generally recommended to treat an asymptomatic bacteriuria with antibiotics because it promotes the emergence of resistance, in a surgical context, the sterilization of urines with an adapted preoperative antibiotherapy is a commonly adopted attitude by different teams [3]. The surgical gesture should be framed with a curative antibiotherapy, usually a monotherapy adapted to the isolated germ in a cytobacteriological urine test done as closely as possible to the intervention [7]. The main objective is to obtain sterile urine in the 48 hours prior to the intervention.
The most commonly found germs are: enterobacteria (E. coli, Klebsiella, Proteus Mirabilis…), entrococcus, staphylococcus, (especially S. epidermidis). The surgery is only allowed if the control CBUE is negative (germ detection). The antibiotherapy is then continued after the intervention until the catheter is removed.

Parenchymal infections
A fever as well as hyperleukocytosis in a patient with a positive CBUE should evoke a parenchymal infection (pyelonephritis or prostatitis or Epididymo-orchitis for male patients).

Aside from an emergency urologic surgery (obstacle removal, abscess) parenchymal infection will be medically treated before surgery for 2 to 3 weeks. The intervention can’t be performed unless the urine is sterile and the treatment duration is respected. Antibiotherapy will be continued after surgery for a duration that depends on the etiology and the presumed efficiency of the surgical gesture on the infection cause. For example, patients who have a prostatitis with an acute urinary retention who need to undergo a TURP should benefit from an adapted antibiotic treatment during 3 weeks minimum before surgery. The emergency bladder drainage will be performed with a sus-pubic catheter. The perioperative samples’ culture (fragments, adenoma) is possible; it allows an eventual antibiotherapy adaptation in case of septic complications after intervention [8].

Concerning kidney stone surgery, the isolated germs in the urine could be different from the germs colonizing the calculi. The postoperative antibiotherapy should then be adapted to the germs found in the culture of the stones [9].

II-2-Sterile preoperative urine
An antiobio prophylaxis will be prescribed mainly for interventions including the opening of hollow viscera, especially those normally colonized by commensal bacteria such as the genital tract and the lower urinary system.

However, a sterile CBUE can’t formally rule out a urinary infection upstream a complete obstacle. The perioperative bacteriological samples will redress the diagnosis and will allow an adaptation of the antibiotic treatment.

The benefit of antiobio prophylaxis around the lower urinary system surgery was brought up in a multitude of studies, with contradictory results [10].

Concerning the TURP, the benefit of antiobio prophylaxis is proved [2]. The choice of the antibiotic used should consider the presence, in 27 to 40% of the cases, of gram positive cocci especially entrococcus isolated in postoperative infectious complications [11].

The factors implicated in this risk elevation aren’t totally elaborated but can include an endogenous colonization of the lower urinary system, the uncontrolled use of antibiotics such as cephalosporins and extended bladder drainage.

A consensus seems to be reached in favor of a short duration antiobio prophylaxis [12]. It suggests covering the perioperative period by a second generation cephalosporin (cefuroxime or cefamandole 1.5g in a single preoperative intake). These recommandations are applicable for vesical tumors resection as well as endoscopic treatment of kidney and ureteral calculi.

The periodic evaluation of the bacterial ecosystem of the department, allows, if necessary, to change the antibiotic used. The consensus conference of 1999 about perioperative antiobio prophylaxis concluded that extracorporeal lithotripsy, cystoscopy or urethral fibroscopy, urinary incontinence surgery and clean scrotal surgery don’t need an antiobio prophylaxis. Concerning open surgery, a total cystectomy is an indication of antiobio prophylaxis similar to that of Altemier stage II abdominal surgery. For radical prostatectomy and nephrectomy; the antiobio prophylaxis isn’t advised [12].

III-Germs responsible of urinary infections:
Many studies have shown the predominance of gram negative bacilli in nosocomial urinary infections: 63.6% for Hally and Coll [13], 48% for Stamm and coll [14], 74% for Krieger and coll [15], 56% for Platt and coll and 84, 5% for Yao [16].

In our study, we have found 83.8% of gram negative bacilli. E.coli is the germ most commonly found in nosooomical infections. Stam and Coll [14] found 38, 6%, 30, 7 % from the american study N.N.I.S [17] and Yopi Abidjan [18] found 31, 7%.

In our study, E. coli was found in 53.2% of the cases, in second place comes Klebsiella with 10.2% and then enterbactercloacae and staphylococcus with 8.5% and 8.4% respectively.

CONCLUSION
The urinary system surgery concerns older and older patients, prostate surgery covers older patients with a susceptibility to have a preexisting cardiovascular or respiratory disease.

The infectious risk is as important to consider because its a clean but contaminated surgery that needs a urine sterilization before an intervention and also the use of antiobio prophylaxis. All that is due to the high
risk of peri and postoperative bacteremia (as well as the risk of pyelonephritis) during instrumental gestures.

In the preoperative phase, the screening and systematic treatment of urinary infections way before the intervention is used with an objective of having steril urine 48h before the gesture.

If preoperative urine is infected: peri and postoperative antibiotherapy.

If preoperative urine is sterile: peri and postoperative antibiotherapy.

Our work had a goal to identify the different bacterial species responsible of urinary infections in endoscopic urology.

And also to study their sensitivity and resistance profile to commonly used antibiotics.

Annex

**BACTERIOLOGICAL PROFILE IN ENDOSCOPIC UROLOGY**

**PATIENT SHEET**

| I-Identity: |
| --- |
| -Name: |
| -Age: |
| -Sexe: |
| -ATCDs: |

| II-Preoperative CBUE: |
| --- |
| -Aspect: |
| -Direct examination: |
| -Color: |
| -Culture: |
| -Leukocytes: |
| -Antibiogram: |
| -Red blood cells: |
| -PH: |

| III-Risk factors |
| --- |
| -urinary drainage: Yes ☐ No ☐ Duration: |
| -Nephrostomy: Yes ☐ No ☐ Duration: |
| -Cystostomy: Yes ☐ No ☐ Duration: |
| -double J stent: Yes ☐ No ☐ Duration: |

| IV-Prior antibiotherapy: |
| --- |
| Yes ☐ No ☐ |

| V- Urologic gesture: |
| --- |
| TURP ☐ | TURB ☐ | JJ ☐ |
| URETEROSCOPY ☐ | Cystoscopy ☐ | Urethrotomy ☐ |

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