

Bacteriological Profile in Endoscopic Urology: Urology A Departement Experience Over 6 Months

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Abstract

Original Research Article

This work is a retrospective study that took 6 months from January 1st 2019 to June 31st 2019. It included 200 patients from Urology A and B departments in the IBN SINA hospital RABAT that undertook an endoscopic urology intervention. The objective of this work is to describe the bacteriological profile of the preoperative urinary infection within these patients. The median age of our study is 61 years old, with the extremes of 16 and 93. The males were highly predominant with a sex ratio of 4,8. Smoking is the most found antecedent with a percentage of 38%, followed by hypertension (18%) and diabetes (11%). The TURB was the most executed endoscopic gesture with a percentage of 36%, followed by the TURP (28%) and the instalment or changing of a double J stent (17%). 53,5% of the CBUE were positive with a germ identified, gram negative bacilli were the dominant ones with a percentage of 83,8%, E.Coli is the germ most commonly found in urinary infections (53,2%) followed by Klebsiella with 10,2% and then enterobacteroclocae and staphylococcus with the same percentage of 8,5% each.

Keywords: Bacteriological profile, endoscopy, antibiotics.

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INTRODUCTION

The urinary system is physiologically a sterile site, but colonization or infection of different parts of the system is quite common, due to 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, sex, antecedents, executed gestures, clinical signs of urinary infection, results of preoperative cyto-bacteriological urine examination (CBUE) as part of the pre-anesthetic assessment (direct examination, culture and antibiogram), preoperative antibiotherapy, bladder drainage, cystostomy or nephrostomy as well as the duration of their instalment, antibiotherapy, or perioperative antibioprohylaxis.

The data exploration of each result and file was analysed through a pre-established data sheet (Annex 1).

RESULTS

Epidemiologic profile of the studied population

The median age of our patients was 61 years old, with extremes of 16 and 93 years old.

166 patients were men (83% of the cases) and 34 were women (17% of the cases) with a sex ratio male/female of 4, 8.

38% of our patients were smokers, 13.5% with a hypertension, 11% with diabetes, and 5% had a cardiopathy.

74% of the patients were ASA class I and 26 % were ASA class II.

Intervention type

Table-1: Distribution by 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-Isolated germs

Table-2: Distribution by isolated germs

Gram Negative Bacilli	Germ	Number	percentage
	<i>E. Coli</i>	57	53.2 %
	<i>Klebsiella</i>	11	10.2 %
	<i>P. Aeruginosa</i>	7	6.5 %
	<i>Enterobacter cloacae</i>	9	8.4%
	<i>Serratia</i>	4	3.7%
	<i>Proteus mirabilis</i>	2	1.8%
Gram Positive Cocci	<i>Staphylococcus</i>	9	8.4%
	<i>Streptococcus</i>	3	2.8%
	<i>Enterococcus faecalis</i>	4	3.7%
Gram Negative Cocci	<i>Acinetobacter Baumannii</i>	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	%	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
Cephalotin	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
Ceftazidime	51	89,4	6	10,5	0	0	0	0
Ceftriaxone	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
ciprofloxacin	27	47,3	30	42,7	0	0	0	0
Norfloxacin	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	
	nibr	%	nibr	%	nibr	%	nibr	%
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
Cefipime	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 Aeruginosa:(7 UCBE)

ATB	sensitive		resistant		intermediate		Untested	
	nibr	%	nibr	%	nibr	%	nibr	%
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	
	nibr	%	nibr	%	nibr	%
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	
	nمبر	%	nمبر	%
Amiklin	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 10^2 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 10^5 UFC ml^{-1} . [37] a leukocyturia of 10^2 to 10^5 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*...), enterococcus, 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 antibioprophyllaxis 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 antibioprophyllaxis around the lower urinary system surgery was brought up in a multitude of studies, with contradictory results [10].

Concerning the TURP, the benefit of antibioprophyllaxis 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

enterococcus 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 antibioprophyllaxis [12]. It suggests covering the perioperative period by a second generation cephalosporin (cefuroxime or cefamandole 1.5g in a single preoperative intake). These recommendations 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 antibioprophyllaxis concluded that extracorporeal lithotripsy, cystoscopy or urethral fibroscopy, urinary incontinence surgery and clean scrotal surgery don't need an antibioprophyllaxis. Concerning open surgery, a total cystectomy is an indication of antibioprophyllaxis similar to that of Altemier stage II abdominal surgery. For radical prostatectomy and nephrectomy; the antibioprophyllaxis 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 nosocomial 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 antibioprophyllaxis. 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: antibioprohylaxis in urology depending on the protocols.

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 N°:

I-Identity:

- Name:
- Age:
- Sexe:
- ATCDs:

-ASA:

II-Preoperative CBUE:

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

III-Risk factors

- | | | | |
|-------------------|------------------------------|-----------------------------|------------------------------------|
| -urinary drainge: | Yes <input type="checkbox"/> | No <input type="checkbox"/> | Duration: <input type="checkbox"/> |
| -Nephrostomy: | Yes <input type="checkbox"/> | No <input type="checkbox"/> | Duration: <input type="checkbox"/> |
| -Cystostomy: | Yes <input type="checkbox"/> | No <input type="checkbox"/> | Duration: <input type="checkbox"/> |
| -double J stent: | Yes <input type="checkbox"/> | No <input type="checkbox"/> | Duration: <input type="checkbox"/> |

- IV-Prior antibiotherapy:** Yes No

V- Urologic gesture:

- TURP TURB JJ

- URETEROSCOPY Cystoscopy Urethrotomy

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