

Research Article

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Epidemiological and Clinical Profile of Urinary Tract Infections in Patients with Percutaneous Nephrostomy Tubes, About 117 Cases

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Introduction: The installation of a nephrostomy is one of the elementary gestures in urology often carried out within the framework of the emergency for a vital indication. Nephrostomy carries a number of risks and complications. Among these complications, we describe the frequently reported infection that may be secondary to poor hygiene care.

Goals : Describe the epidemiological aspects of urinary tract infections in patients with nephrostomy catheters in the urology department of chu Ibn Rochd, determine their clinical characteristics, establish their bacteriological profile and then study the sensitivity of the bacterial strains isolated to antibiotics.

Materials and methods: This is a retrospective work on 117 cases with nephrostomy catheters and presenting a urinary tract infection during their follow-up at the urology department of the chu ibn rochd casablanca from January 1, 2019 to December 31, 2019.

Results: The average age of patients is 50.5 years (17–84 years). There was a male predominance with Sex ratio M / F 1.55. The main indication was acute obstructive renal failure secondary to bladder tumor in 34 patients, or 29%, followed by ARIO secondary to cervical cancer in 29 cases, or 25%. main germs Escherichia coli (32%), Proteus mirabilis (12%) and Enterobacter fecalis (7%). The sensitivity study showed alongside natural resistance, low sensitivity to Ampicillin (32%), Amoxicillin + Clavulanic acid (39%), moderate sensitivity to Quinolones 78%, nitrofurans 62% and trimethoprim 51% and a high sensitivity to aminoglycosides 92% (amikacin and gentamicin), to imipenem 96% and Colistin 98%.

Conclusion: This study suggests the need for the implementation of rigorous nephrostomy procedures ensuring compliance with good practices and thus limiting the risk of urinary tract infection which can endanger renal function.

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Introduction

After Goodwin's first publication in 1955 [1], percutaneous urinary diversion techniques were neglected. It was only around 1975 that they took off, especially thanks to the improvement of the therapeutic arsenal, in parallel with technological progress [2]. The indications for the installation of

a nephrostomy are numerous and varied and it can be indicated in first intention especially in an emergency situation or secondly when the attempt at endoscopic drainage has failed. In our context, percutaneous nephrostomy is the technique of choice for upper urinary tract diversion in certain

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advanced tumor situations and due to the unavailability of endoscopic means in an emergency situation. Drainage by nephrostomy is an invasive act and can be associated with complications including urinary tract infection which can be life-threatening and the function of the derived kidney. These infections affect the quality of life of patients, increase the costs of treatment, delay the continuation of certain treatments such as chemotherapy and lead to the repeated use of antibiotics, promoting the emergence of resistant strains. Despite the frequent use of NPC in our current practice, few studies which dealt with this subject, among these rare studies, we noted that of Dassouliet al where NPC proved their role as an effective means of drainage in 45 patients with obstructive anuria. obstructive [3]. There are no studies that specifically address this topic,

Materials and Methods:

This is a retrospective study, involving 117 patients with nephrostomy catheters complicated by bacterial infection consultants to the urology department of chu Ibn Rochd in Casablanca from January 1, 2019 to December 31, 2019. This study only concerned patients consultant patients and would exclude hospitalized patients and therefore nosocomial infections.

The quantitative and qualitative variables studied have been summarized in Table 1. The data was collected on the basis of an exploitation sheet containing all the parameters to be studied, in order to meet the objectives of our study.

The ECBU constituted the fundamental paraclinical examination in this work, comprising: a uroculture with enumeration of germs (bacteriuria); a direct examination allowing to appreciate the leukocyturia and the figured elements of the urine (red blood cells, crystals, ... The urine sample was taken from NPC probes after disinfection of the probe with Betadine.

A fluid and electrolyte check-up was systematically requested to demonstrate renal insufficiency and thus adapt the dosage of antibiotics.

During the data collection, we insisted on the strict respect of the ethical rules of the ethics committee of the Ibn Rochd hospital by taking the consent of the patients, keeping the confidentiality of the collected data and respecting the anonymity of the patients concerning the patient. infection and underlying pathology. The discontinuous values were expressed as number and percentage and compared with a Chi2 test. The differences were considered significant for a p value <0.05.

Table 1: Clinical and paraclinical elements studied in patients

Epidemiological	age, sex, socioeconomic status;
Clinics	Indications for nephrostomy, medical and surgical history, clinical signs and examination data;
Paraclinics	The cytobacteriological examination of the urine (ECBU): germ and sensitivity to antibiotics

Results:

Our study identified 117 patients with a bacterial infection in patients with SNP followed by the urology department of the chu ibn rochd in Casablanca. The mean age of the patients was 50.5 years with extremes of 17 and 84 years old. A male predominance was noted with 71 men (sex ratio M / F at 1.55). 78% of patients had a low socioeconomic level while 22% of patients had an average level.

Regarding the indications for nephrostomy, the main indication was acute obstructive renal failure (ARIO) on bladder tumor in 29% of cases followed by ARIO on cervical tumor in 25% of cases, ARIO and retention purulent on lithiasis obstacle in 21% of cases, ARIO on prostate cancer in 15% of cases, compression by retroperitoneal mass in 6% of patients and compression by digestive tumor in 4% of cases (Figure 1).

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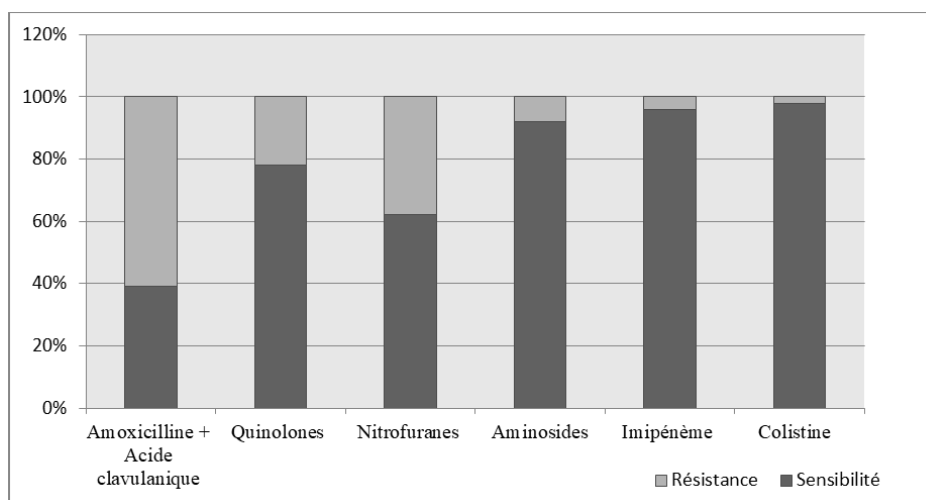


Figure 1: Distribution of patients according to the indications for nephrostomies

Clinically, transureteral bladder resection (UVR) was the main antecedent found in 32 patients, i.e. 27.35%, followed by a history of radiotherapy (RTH) and / or chemotherapy (CTH) in 23 cases, i.e. 19.65% , the history of surgical cure for renal lithiasis in 13 cases, i.e. 11% and the history of hysterectomy in 3 patients, i.e. 2.5% (Table 2). Clinically, 91 patients or 78% had presented with low back pain and 12 patients or 9.75% had fever.

The clinical examination found a dirty local state (dressing and care) of the nephrostomy in the majority of patients, i.e. 78% of cases, while 22% of patients had a clean state and the appearance of the urine in the catheter was purulent in 46%. of cases, cloudy in 39% of cases and clear in 15% of cases.

Table 2: Distribution of patients by main history

Antecedent	Number of cases	Percentage	P
RTUV	32	27.35%	0.152
RTH and / CTH	23	19.65%	0.039
Surgical cure for renal lithiasis	13	11%	0.041
Hysterectomy	3	2.5%	0.221

From a bacteriological point of view, cytobacteriological examination of the urine (ECBU) found Gram - bacilli as the main germs in 88% of the strains isolated with a predominance of *Escherichia coli* (64.10%), followed by

Klebsiellapneumoniae (11%) and *Pseudomonas aeruginosa* (5%). Gram + bacilli were isolated in 12% of cases with predominance of *Enterococcusfaecalis* (6%) (Table 3).

Table 3: Distribution of bacterial species isolated in ECBUs

	Bacterial Species	Number	Percentage (%)	P
Gram bacilli -	<i>Escherichia coli</i>	75	64.10	0.071
	<i>Klebsiellapneumoniae</i>	13	11.11	0031
	<i>Pseudomonas aeruginosa</i>	6	5.12	0045
	<i>Proteus mirabilis</i>	5	4.27	0012
	<i>Enterobactercloacae</i>	4	3.41	0062
Gram + bacilli	<i>Enterococcusfaecalis</i>	8	6.83	0084
	<i>Staphylococcus aureus</i>	4	3.41	0152
	<i>Enterococcusfaecium</i>	2	1.70	0.011

The sensitivity study showed alongside natural resistance a low sensitivity to Ampicillin (32%),

Amoxicillin + Clavulanic acid (39%), a moderate sensitivity to Quinolones 78%, nitrofurans 62%

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and trimethoprim 51% and a high sensitivity to aminoglycosides 92% (amikacin and gentamicin), to imipenem 96% and Colistin 98% [figure 2].

The evolution was favorable (sterile control ECBU after 5 days of antibiotic treatment) in 82% of cases against 18 % presented with recurrence.

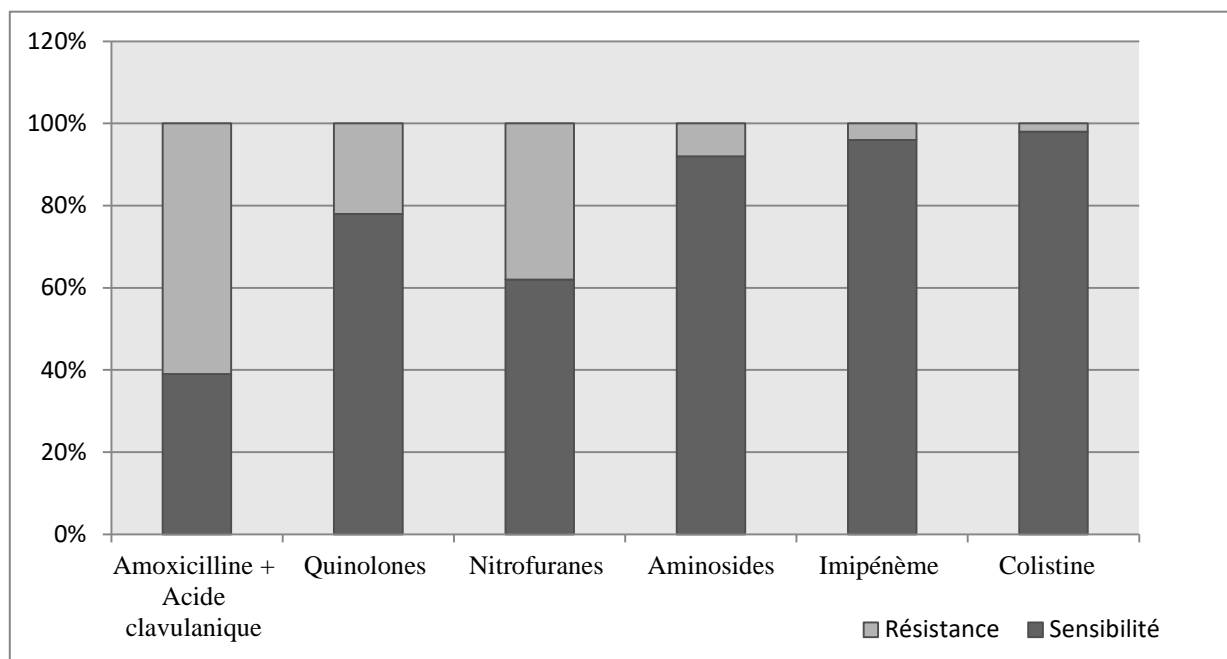


Figure 2: Resistance and susceptibility profile of bacteria isolated to antibiotics

Discussion:

Percutaneous nephrostomy (PCN) consists of a diversion of renal urine via a lumbar-localial path. This technique has benefited from the advent of percutaneous surgery, the indications of which were of a diagnostic and therapeutic nature allowing the derivation of the upper urinary tract for obstacle or lesion of an upper excretory pathway [9]. While the main indication for the placement of an NPC is the derivation of an intrinsic or extrinsic obstacle in 85 to 90% of cases [3]. Our study, the main indication was acute renal failure due to neoplastic obstacle in 74% of cases with predominance of bladder tumors (29%), this result is close to that of certain studies where bladder tumor predominated in 47% of cases [2] allowing the improvement of renal function constituting a saving solution, effective but the source of serious complications (2 to 5% of cases) which can occur during the installation of the NPC [9]. The overall mortality is of the order of 0.2% compared to 6% of surgical N [9]. Like any medical device, the NPC probe is colonized by the host [4], leading to the formation of a complex three-dimensional biofilm [5] which contains a high concentration of microorganisms protected from both the immune system and antimicrobials. In addition, biofilm and

intraluminal encrustations can give complications such as pyelonephritis, renal abscess, bacteremia,

and septic shock [6]. The overall incidence of urinary tract infections associated with NPC catheter (PNS) has been reported between 1 and 19%, [7,8], The clinical study found low back pain (78%) as the main manifestation, whereas Szvalb et al. The most common clinical manifestations were fever (70%), followed by tenderness at the costovertebral angle (49%), chills (36%) and point-of-release cellulitis (19%) [2].

NPC-related infections are thought to be caused primarily by native skin flora on the patient's flank and the hands of healthcare workers who insert or hold NPC [16]. In one of the earliest studies evaluating bacteriuria associated with NPC (placed for obstructions other than stone disease), microorganisms were primarily uropathogens like *Pseudomonas*, *Enterococcus*, and *Candida albicans*, but there was no description of the presence or no coexisting ureteral stents [17,18,20]. *E. coli* is by far the most frequently isolated germ in our series, followed by *Klebsiella pneumoniae*, this does not agree with Szvalb et al who isolated *Pseudomonas* spp as the main germs. (36%), followed by *Enterococcus* spp.

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(23%) and *Escherichia coli* (17%). These germs are all well known to cause this type of infection [13,20]. This species and the other species of the Enterobacteriaceae family exhibit relatively high levels of resistance to the combination trimethoprim-sulfamethoxazole 51%, the amoxicillin-clavulanic acid combination (39%) and Quinolones 78% and a high sensitivity to 3rd generation cephalosporins, aminoglycosides and imipenem while the resistance rate of *Escherichia coli* to fluoroquinolones is now 3 to 25 % and 3rd generation cephalosporins (C3G) in community UTIs is currently around 5%. The production of extended spectrum beta-lactamase (ESBL) is the main mechanism of resistance. This possibility should be taken into account in severe UTIs and septic shock.

Several preventive strategies have been proposed. Using closed urine drainage bags without internal urinary reflux, as well as keeping the area "clean" with soap, water and antiseptics can help decrease the high rate of infection [14]. The potential impact of the use of chlorhexidine impregnated dressings [15,21] on the entry site of the NCP, as well as the creation of an antimicrobial coated NCS for the provision of extensive antimicrobial coverage [16,19].

Conclusion:

Percutaneous nephrostomy is an emergency and life-saving gesture, its association with urinary tract infection has become more and more demanding which requires the implementation of a rigorous preventive strategy targeting especially hygiene and local care that can be the main risk factors. Hence the interest in raising awareness and educating nursing staff and patients with nephrostomies.

References :

1. Goodwin WE, Casey WC, Woolf W. Percutaneous trocar (needle) nephrostomy in hydronephrosis. *J Am Med Assoc.* 1955; 157: 891–4.
2. Szvalb, AD, El Haddad, H., Rolston, KV, Sabir, SH, Jiang, Y., Raad, II, & Viola, GM (2018). Risk factors for recurrent percutaneous nephrostomy catheter-related infections. *Infection.* doi: 10.1007 / s15010-018-1245-y

3. Ramchandani P, Cardella JF, Grassi CJ, Roberts AC, Sacks D, Schwartzberg MS, et al. Quality improvement guidelines for percutaneous nephrostomy. *J Vasc Interv Radiol.* 2003; 14: 277–81.
4. Donlan RM, Costerton JW. Biofilms: survival mechanisms of clinically relevant microorganisms. *Clin Microbiol Rev.* 2002; 15: 167–93.
5. Cronan JJ, Marcello A, Horn DL, Robinson A, Dorfman GS, Opal S. Antibiotics and nephrostomy tube care: preliminary observations. Part I. Bacteriuria. *Radiology.* 1989; 172: 1041–2.
6. Pabon-Ramos WM, Dariushnia SR, Walker TG, Othee BJ, Ganguli S, Midia M, et al. Quality improvement guidelines for percutaneous nephrostomy. *J Vasc Interv Radiol.* 2016; 27: 410–4
7. Skolarikos A, Alivizatos G, Papatsoris A, Constantinides K, Zerbas A, Deliveliotis C. Ultrasound-guided percutaneous nephrostomy performed by urologists: 10-year experience. *Urology.* 2006; 68: 495–9.
8. Bahu R, Chaftari AM, Hachem RY, Ahrar K, Shomali W, El Zakhem A, et al. Nephrostomy tube related pyelonephritis in patients with cancer: epidemiology, infection rate and risk factors. *J Urol.* 2013; 189: 130–5
9. Desgrandchamps F., Le Duc A. Provisional or definitive urinary diversions by endoscopic or percutaneous route. Elsevier (EMC) 1994. *Surgical techniques Urology* [41-144].
10. Adamo R, Saad WE, Brown DB. Management of nephrostomy drains and ureteral stents. *Tech Vasc Interv Radiol.* 2009; 12: 193–204.
11. Hooton TM, Bradley SF, Cardenas DD, Colgan R, Geerlings SE, Rice JC, et al. Diagnosis, prevention, and treatment of catheter associated urinary tract infection in adults: 2009 International Clinical Practice Guidelines from the Infectious Diseases Society of America. *Clin Infect Dis.* 2010; 50: 625–63.

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12. Talbot TR, Stone EC, Irwin K, Overholt AD, Dasti M, Kallen A, et al. 2017 recommendations on use of chlorhexidine-impregnated dressings for prevention of intravascular catheter-related infections: an update to the 2011 guidelines for the prevention of intravascular catheter-related infections from the Centers for Disease Control and Prevention. <https://www.cdc.gov/infection-control/guidelines/bsi/ci-dressings/index.html>. Accessed June 3, 2018.
13. Mermel LA, Allon M, Bouza E, Craven DE, Flynn P, O'Grady NP, et al. Clinical practice guidelines for the diagnosis and management of intravascular catheter-related infection: 2009 update by the Infectious Diseases Society of America. *Clin Infect Dis*. 2009; 49: 1–45
14. Adamo R, Saad WE, Brown DB. Management of nephrostomy drains and ureteral stents. *Tech Vasc Interv Radiol*. 2009; 12: 193–204.
15. Venkatesan AM, Kundu S, Sacks D, Wallace MJ, Wojak JC, Rose SC, et al. Practice guidelines for adult antibiotic prophylaxis during vascular and interventional radiology procedures. Written by the Standards of Practice Committee for the Society of Interventional Radiology and Endorsed by the Cardiovascular Interventional Radiological Society of Europe and Canadian Interventional Radiology Association [corrected]. *J Vasc Interv Radiol*. 2010; 21: 1611–30 (quiz 31).
16. Siddiq, DM, & Darouiche, RO (2012). Infectious Complications Associated with Percutaneous Nephrostomy Catheters: Do we know Enough? *The International Journal of Artificial Organs*, 35 (10), 898–907.
17. Cronan JJ, Marcello A, Horn DL, Robinson A, Dorfman GS, Opal S. Antibiotics and nephrostomy tube care: preliminary observations. Part I. Bacteriuria. *Radiology*. 1989; 172 (3 Pt 2): 1041-1042.
18. Adil Kbirou, Hissein Haggui, Amine Moataz, Mohamed Dakir, Adil Debbagh, Rachid Aboutaieb Acute renal failure and bladder tumors, about 106 cases, *Néphrologie & Thérapeutique*.
19. A.Kbirou, M.Sayah, F.Sounni, M.Zamd, M.G. Benghanem, M.Dakir, A.Debbagh, R. About aib. Obstructive oligo-anuria revealing pelvic gynecological cancers, analysis of a series of 102 cases. *Annals of Medicine and Surgery* Volume 75, March 2022, 103332
20. Adil Kbirou, Mahmoud Elafifi, Amine Moataz, Mohamed Dakir, Adil Debbagh, Rachid Aboutaieb, Evolutionary profile of pyonephrosis after surgical treatment, about 23 cases, *International Journal of Surgery Open* Volume 40, March 2022, 100448
21. A.Kbiro, M.Alafifi, M.Sayah, M.Dakir, A.Debbagh, R.Aboutaieb, Acute orchiepididymitis: Epidemiological and clinical aspects: An analysis of 152 cases, *Annals of Medicine and Surgery* Volume 75, March 2022, 103335

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