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CASE REPORT

Frequency of Bacterial Isolates and Antimicrobial Sensitivity Pattern in Urogenital Fistulae: An Eight Years Audit

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ABSTRACT

Objective: To determine the frequency of urinary tract infection, distribution of microorganisms and their antimicrobial susceptibility pattern in urogenital fistula patients.

Place and duration of study: Eight years (April 2007–June 2015) at Mother And Child Health Centre, Shaheed Zulfiqar Ali Bhutto Medical University–Pakistan Institute of Medical Sciences (SZABMU–PIMS), Islamabad, a regional fistula center.

Study design: Descriptive study.

Patients and methods: All fistula patients entertained in MCH Center PIMS from April 2007 to June 2015 underwent detailed evaluation workup including baseline investigations. The specimen of urine was taken in sterile culture bottle and sent to a laboratory for biological evaluation. The data of all the patients was prospectively maintained from 2007–2015 and was analyzed using the statistical package for social sciences (SPSS) version 21. The main outcome measures included the frequency of urinary tract infection, distribution of bacterial isolates, and their susceptibility to antibiotics.

Results: During the study period 407 patients presented with urogenital fistula. The majority, n = 322, 79.1%, patients were of the reproductive age, i.e., below 40 years. The majority n = 342, 84% were Illiterate and n = 383, 94% were housewives. The culture result was available in 259 (64%). Of these bacterial isolates were found in 169 (65.2%) patients, *Candida* species in 8 (3%) patients while no organisms were found in remaining patients. Of 169 bacterial isolates, gram-negative isolates were found in 160 (94%) patients followed by gram-positive isolates in 6 (3.5%) and both, gram positive and gram negative isolates in 3 (2%) patients. *Klebseilla* and *E.coli* was the most frequently occurring organisms (33% and 29%, respectively) followed by *Pseudomonas*. The highest sensitivity of bacterial isolates was found for Amikacin, imipenem, piperacillin, and tazobactam. The highest resistance was seen for amoxicillin + clavulanic acid, third generation antibiotics, quinolones, and nalidixic acid.

Conclusion: Urinary tract infection is prevalent among urogenital fistula patients. The resistance to most commonly prescribed low-cost oral antibiotics highlight the importance of prescribing antibiotics according to culture and sensitivity pattern and avoidance of injudicious use of antibiotics in fistula patients.

Keywords: Bacterial isolates, Urinary tract infection, Vesicovaginal fistula.

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INTRODUCTION

In developing countries, particularly Asia, where excess to emergency obstetric services is limited, the likelihood of complications is high. One of such complications is obstructed labor, the common sequelae of which is genital fistulae. It is estimated that more than 2 million young women live untreated with obstetric fistula.[1] Not only that these patients suffer from social, mental and physical trauma due to continuous dribbling of urine, but also have frequent urinary tract infections.This predisposes to renal infections and also affects the wound healing if repair is done without treating the infection.[2,3]

As there is consistent communication between the bladder and vagina, the potential harbor of infection, these patients are likely to have a recurrent infection as well as difficulty in eradication.[4,5] Since a prolonged postoperative catheterization is usually required to consume adequate tensile strength, there is an accumulation of bacteria on the catheter tip in case of untreated infection, leading to failure to respond to antibiotics, urethritis, bladder stones, and pyelonephritis.[6]

It is important to treat the infection well ahead of the surgical procedure and continue antibiotics for a long period due to prolonged catheterization.[6,7]

There is a scarcity of data regarding the frequency of urinary tract infection in the fistula patients, on the current distribution of microorganism and drugs sensi-

tivity pattern.[8] No local data are available in this regard. Therefore the study was conducted to determine the frequency of urinary tract infection in urogenital fistulae and distribution of microorganism and their antimicrobial susceptibility.

PATIENTS AND METHODS

All the fistula patients entertained in at Mother And Child Health Centre, Shaheed Zulfiqar Ali Bhutto Medical University-Pakistan Institute of Medical Sciences (SZABMU-PIMS), Islamabad, a regional fistula center for management of fistula patients working in collaboration with UNFPA, from April 2007 to June 2015 underwent detailed evaluation workup including baseline investigations. The catheter specimen of urine was taken in sterile culture bottle and sent to a laboratory for biological evaluation. Once received in the laboratory the specimen was cultured on cystine lactose electrolyte deficient (CLED) Agar at a temperature of 37°C. A colony count of 15–20 was considered to be significant for antimicrobial sensitivity assessment.

The data of all the patients was prospectively maintained from 2007 to 2015 and was analyzed using SPSS version 21.

The main outcome measures included the frequency of urinary tract infection, distribution of bacterial isolates, and their susceptibility to antibiotics.

RESULTS

During the study period (April 2007–June 2015) 407 patients presented with genital fistula. The majority (n = 322, 79.1%) patients were of the reproductive age, i.e., below 40 years of age. Majority (*n* = 342, 84%) were Illiterate and majority (*n* = 383, 94%) were housewives. The culture result was available in 259 (64%). Of these bacterial isolates were found in 169 (65.2%) patients, *Candida* species in 8 (3%) patients while no organisms were found in remaining patients. Of 169 bacterial isolates, gram-negative isolates were found in 160 (94%) patients followed by gram-positive isolates in 6 (3.5%) and both, gram positive and gram negative isolates in 3 (2%) patients *Klebseilla* and *E.coli* was the most frequently occurring organisms (33% and 29%, respectively) followed by *Pseudomonas* (Table 1).

Referring to Table 2, the highest sensitivity among bacterial isolates was found for amikacin, imipenem, piperacillin, and tazobactam. The same trend for the sensitivity pattern was found among individual isolates as shown in Table 3.

Referring to Table 4, the highest resistance among bacterial isolates was seen for amoxicillin + clavulanic acid, third generation antibiotics, quinolones, and nalidixic acid. A similar trend for antimicrobial resistance pattern was seen among individual bacterial isolates as shown in Table 5.

DISCUSSION

The results of the study clearly show that the urinary tract infection is highly prevalent (68.3%) among women with urogenital fistulae. Varying incidence has been reported in the literature; 52.8% by Wondomeneh et al.,[9] 76% by Erin et al.,[10] 8% by Adeoye et al.[11] and 9.25% Kabir et al.[12] The most likely reason for such a high prevalence of bacterial isolates among these patients is direct communication between vagina, a potential harbor for bacteria and urinary tract. The other possibility is that most of these fistulae are obstetric in nature, resulting from prolonged labor. Repeated catherization has also been shown to play a role as has been shown by Wondomeneh et al.[9]

The situation is further alarmed by the fact that the majority of these patients were asymptomatic. The reports from the other parts of the world where the urogenital fistulae are highly prevalent also indicate that majority of the patients with positive isolates have asymptomatic bacteriuria.[11,13-16] Asymptomatic bacteriuria has usually not been found to be associated with significant adverse outcome. However, patients undergoing fistulae repair surgery need to be treated before undergoing such surgery, as the success of the procedure may be adversely

Table 1: Distribution of bacterial isolates among urogenital fistulae

Bacterial isolate	*Number (%) of bacterial isolates*
Escherichia coli	53 (31)
Pseudomonas species	26 (15)
Escherichia coli + *Proteus* species	2 (1.1)
Klebsiella species	59 (35)
Staphylococcus auerus	6 (3.5)
Proteus species	17 (10)
Klebsiella species + *Staphylococcus auerus*	3 (1.7)
Enterobacter	3 (1.7)

Table 2: Distribution of antibiotics sensitivity pattern among bacterial isolates

Antimicrobial	*Number (%) of bacterial isolates*
Amikacin	81 (20.2)
Amoxacillin + cluvanic acid	24 (6)
Cefoparazone + sulbactum	33 (8.2)
Ceftazidine	30 (7.5)
Ceftriaxone	20 (5)
Ciprofloxacin	30 (7.5)
Imipenim	76 (19)
Nalidixic acid	12 (3)
Nitrofurantoin	23 (5.7)
Piperacillin + tazobactum	71 (17.7)

Table 3: Distribution of antimicrobial sensitivity pattern against individual bacterial isolates

	Antimicrobial agents									
Bacterial isolates	*AMI*	*AMOX + CLUV*	*CEF+ SUL*	*CEFT*	*CRO*	*CIPRO*	*IMI*	*NAX*	*NITRO*	*PIP + TAZO*
Escherichia coli	32 (60.4)	2 (3.8)	16 (30.2)	11 (20.8)	3 (5.7)	14 (26.4)	28 (52.8)	7 (13.2)	3(5.7)	27 (51)
Pseudomonas species	15 (57.7)	6 (23.1)	1 (3.8)	10 (38.5)	9 (34.6)	4 (15.4)	5 (19.2)	0 (0)	8 (30.8)	13 (50)
Escherichia coli + *Proteus* species	2 (100)	0 (0)	0 (0)	0 (0)	0 (0)	2 (100)	1 (50)	0 (0)	1 (50)	0 (0)
Klebsiella species	26 (44.1)	7 (11.9)	10 (16.9)	6 (8.5)	3 (5.1)	24 (6.8)	24 (40.7)	4 (6.8)	7 (11.9)	18 (30.5)
Staphylococcus auerus	0 (0)	0 (0)	0 (0)	1 (20)	1 (20)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Proteus species	3 (17.6)	5 (29.4)	3 (17.6)	2 (11.8)	2 (11.8)	4 (23.5)	9 (52.9)	1 (5.9)	4 (23.5)	8 (47.1)
Klebsiella species + *Staphylococcus* auerus	0 (0)	0 (0)	3 (100)	0 (0)	0 (0)	3 (100)	0 (0)	0 (0)	0 (0)	3 (100)
Enterobacter	3 (100)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (33)	0 (0)	0 (0)	2 (66.7)

AMI, amikacain; AMOX+CLUV, amoxacillin + cluvanic acid; CEF+SUL, cefoprazone+sulbactum; CEF, ceftazidine; CRO, ceftriaxone; CIPRO, ciprfloxacin; IMI, imipenum; NAX, nalidixic acid; NITRO, nitrofurantoin; PIP+TAZO, piperacillin + tazobactum

Table 4: Degree of susceptibility of bacterial isolates to various antibiotics

Antimicrobial	*Number (%) of Bacterial Isolates*
Amikacin	32 (7.9)
Amoxacillin + cluvanic acid	65 (16.2)
Cefoparazone + sulbactum	17 (4.2)
Ceftazidine	64 (15.9)
Ceftriaxone	67 (16.7)
Ciprofloxacin	59 (14.7)
Imipenim	0 (0)
Nalidixic acid	50 (12.4)
Nitrofurantoin	17 (4.2)
Piperacillin + tazobactum	30 (7.4)

affected by the bacterial infection as has been indicated by other authors as well.[17-19] Conversion to symptomatic bacteria is an additional concern in this regard.[14,17,20]

The gram-negative organisms were the predominant bacterial isolates in our study, the most prevalent being *Klebseilla*, *E. coli*, and *Pseudomonas*. The other authors have also reported similar findings, *E.coli*, *Proteus* and *Klebsiella* being the most prevalent organisms.[11,14,15,21,22] The high prevalence of *E. coli* is considered to be due to its virulence factor for colonization and invasion of the urinary epithelium. However, some rare isolates like *Citrobacter* may be the most prevalent uropathogenic as shown by Wondomeneh et al.[9]

Table 5: Distributtion of antimicrobial resistant pattern against individual bacterial isolates

	Antimicrobial agents									
Bacterial isolates	*AMI*	*AMOX + CLUV*	*CEF+ SUL*	*CEFT*	*CRO*	*CIPRO*	*IMI*	*NAX*	*NITRO*	*PIP + TAZO*
Escherichia coli	6 (11.5)	32 (61.5)	1 (1.9)	19 (36.5)	17 (32.7)	8 (15.4)	0 (0)	10 (19.2)	3 (5.8)	5 (9.6)
Pseudomonas species	6 (23.1)	0 (0)	6 (23.1)	8 (30.8)	6 (23.1)	10 (38.5)	0 (0)	5 (19.2)	2 (7.7)	4 (15.4)
Escherichia coli + *Proteus* species	0 (0)	1 (50)	0 (0)	0 (0)	1 (50)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Klebsiella species	12 (20.3)	22 (37.3)	6 (10.2)	24 (40.7)	29 (49.2)	28 (47.5)	0 (0)	19 (32.2)	4 (6.8)	17 (28.8)
Staphylococcus auerus	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	5 (83.3)	0 (0)	0(0)	4 (66.7)	0 (0)
Proteus species	4 (23.5)	4 (23.5)	3 (17.6)	2 (11.8)	4 (23.5)	3 (17.6)	0 (0)	3 (100)	0 (100)	3 (100)
Klebsiella species + *Staphylococcus auerus*	0 (0)	3 (100)	0 (0)	3 (100)	3 (100)	0 (0)	0 (0)	3 (100)	0 (0)	3 (100)
Enterobacter	0 (0)	3 (100)	1 (33.3)	0 (0)	3 (100)	1 (33.3)	0 (0)	2 (66.7)	0 (0)	1 (33.3)

AMI, amikacain; AMOX + CLUV, amoxacillin + cluvanicacid; CEF + SUL, cefoprazone + sulbactum; CEF, ceftazidine; CRO, ceftriaxone; CIPRO, ciprfloxacin; IMI, imipenum; NAX, nalidixic acid; NITRO, nitrofurantoin; PIP + TAZO, piperacillin + tazobactum

Majority of the isolates were sensitive to amikacin, imipenem, piperacillin, and tazobactam. The major concern in this regard is that all these drugs are available only in injectable forms and are expensive, especially the latter two. The issue is further complicated by the fact that the majority of the isolates are resistant to commonly prescribed oral preparations including amoxilin + cluvanic acid, ceftazidime, and ciprofloxacin. The probable reason for such high antibiotic resistance to a commonly prescribed antibiotic is due to the previous exposure to these antibiotics as the majority of the patients belonged to rural settings, where antibiotics are used randomly without culture and sensitivity pattern. Suboptimum dosage and intermediate sensitivity may be responsible for the development of antibiotic resistance. The similar findings were also reported in other studies.[23,24]

The study is limited by the fact that it was a retrospective analysis thus many predisposing factors such as the previous history of catheterization and use of antibiotic could not be ascertained as has been shown by other authors.[9]

CONCLUSION

Urinary tract infection is prevalent among urogenital fistula patients. The resistance to most commonly prescribed low-cost oral antibiotics highlight the importance of prescribing antibiotics according to culture and sensitivity pattern and avoidance of injudicious use of antibiotics in fistula patients.

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