POST CESAREAN SECTION URINARY TRACT INFECTIONS, RISK FACTORS AND PROPHYLACTIC ANTIBIOTIC TREATMENT

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SUMMARY

Two hundred and seventy eight women undergoing Cesarean section were evaluated retrospectively to determine the value of prophylactic antibiotic treatment on post-operative urinary tract infection morbidity. One hundred eight women who received no prophylactic treatment, and ninety eight treated prophylactically with ampicillin and colistin (colliracin). The effect of various obstetrics parameters including parity, previous Cesarean section, duration of labor and maternal anemia on the rate of infection was studied.

Significant difference in the rate of infection after the introduction of prophylactic treatment was found. Morbidity rate was reduced to 6.1% in patients treated with ampicillin and collistin compared to 16.1% in the control group ($P < 0.001$). The risk group for developing urinary tract infection were those who stayed more than two hours in the delivery room or with hemoglobin blood level less than 12 gr/D.L.

INTRODUCTION

The efficacy of prophylactic administration of antibiotics in the prevention of post cesarean section infections has been already assessed ([1, 3, 4, 5, 8, 12]).

Some studies have shown that prophylactic antibiotics are effective in reducing the incidence of endometritis. However, some Authors raised the possibility of developing resistant infections following prophylactic treatment ([9]) and in the general surgical procedures prophylactic treatment failed to influence significantly the incidence of wound, pulmonary or other infections ([7]).

Obstetrics and maternal risk factors predisposing to post cesarean section endometritis have been identified, as duration of labor number of vaginal examinations ([14]), duration of labor and premature rupture of membranes prior to surgery ([10, 15]). The incidence of urinary tract infection following this procedure has been reported to be according to different studies between 10 to 50 per cent of the patients ([6, 13, 15, 17]). The aim of the present study was to determine the value of prophylactic treatment with ampicillin and collistin in preventing post cesarean urinary tract infection and to evaluate some obstetrical risk factors on increased morbidity.

MATERIAL AND METHODS

The hospital records of 278 patients were evaluated retrospectively for the occurrence of urinary tract infection (UTI) post-cesarean sections. All these patients attended a prenatal clinic. During this period they were evaluated for silent bacteruria and found to have negative urine culture.

The indications for cesarean scetion are presented in table 1. Cesarean section was performed under general anesthesia. All operations were performed by residents under the supervision of attending staff. A pre-operative catheterization was done by the house physician, and a Foley catheter was left to drain the bladder during the operative procedure. Patients were evaluated for urinary tract infection; if they were symptomless at the fourth post-poerative

day, a mid stream voided urine was sent for culture. Those complaining of dysuria urgency or had febrile morbidity were evaluated earlier.

The patients included in this study were subdivided into two groups:

1) 180 patients with no prophylactic treatment.
2) 98 patients received Ampicillin 1 gr and Colistin 1 mil/IV after surgery and every 8 hours for 48 h.

All patients were maintained on IV therapy during the period of antibiotic treatment.

The diagnosis of UTI was established following those criteria:

a) Fever and positive urine culture.
b) Symptoms and positive urine culture.

All patients having positive urine culture (10^6 bacteria/cc) had elevated temperature or clinical symptoms.

Table 1. — *Main indication for caesarean section.*

Indication	No treatment	Treatment Ampicillin-collistin
Previous scar	56	28
Fetal distress	36	34
Presentation (*)	23	8
Obstructed labor	12	9
Bad obstetric history	16	3
CPD (**)	7	4
Placenta previa	8	2
Abruptio placenta	3	2
Rh incompatibility	4	1
Diabetes mellitus	4	1
Preeclampsia	4	1
PROM (***)	2	3
Post maturity	2	1
IUGR (****)	2	0
Prolapse of cord	1	1
	180	98

(*) Pathological presentation.
(**) Cephalo pelvic disproportion
(***) Premature rupture of membranes.
(****) Intrauterine growth retardation.

The relationship of the following obstetric risk factors were studied, including parity, previous cesarean section, duration of labor and maternal anemia. In general, patients having a previous uterine scar, were eligible for a trial of labor if no obstetrical contraindications were found. The effect of risk factors and antibiotic treatment on infeciton rate was evaluated using a $2 \times n$ χ^2 test.

RESULTS

Prophylactic treatment with ampicillin and colistin is effective in reducing the morbidity rate due to urinary tract infection. From 16.1% to 6.1% in the treated group ($P < 0.001$) (table 2).

Table 2. — *Effect of Phophylactic treatment on the rate of urinary tract infection.*

	Control group	Prophylactic treatment
NED (*)	151 (83.9%)	92 (93.9%)
UT Inf.	29 (16.11%)	6 (6.1%)
Total	180	98

(*) No evidence of disease.

Repeated cesarean section

The rate of urinary tract infection was similar in the untreated group both in primary and repeat cesarean section, prophylactic treatment significantaly ($P < 0.001$) reduced infection in the primary operation ground (table 3).

Table 3. — *Effect of repeated Cesarean Section on post Section UTI.*

Number of Cesarean Section	Control group		Prophylactic treatment	
	NED	UTI	NED	UTI
1	87 (80.6%)	21 (19.4%)	63 (97%)	2 (3%)
2	45 (90%)	5 (10%)	20 (91%)	2 (9%)
⩾3	19 (86.3%)	3 (13.6%)	9 (82%)	2 (18%)

Parity

The rate of UTI was evaluated in three different groups; 1: Primipara; 2: 2-4; 3: 5. No significant difference in the

Table 4. — *Effect of duration of labor prior to surgery on post cesarean UTI* (***).

	Control group		Prophylactic treatment	
	NED (*)	UTI (**)	NED (*)	UTI (**)
Less than two hours	56 (90.4%)	6 (9.6%)	19 (90.5%)	2 (9.5%)
Longer than two hours	87 (90.6%)	21 (19.4%)	64 (94.2%)	4 (5.8%)

(*) No evidence of disease.
(**) Urinary tract infection.
(***) The exact duration of stay was reported in 259 patients.

rate of infection was detected between primiparous and multiparous women.

Hemoglobin blood level

Hemoglobin blood level following surgery is associated with UTI morbidity. The rate of UTI was significantly higher in patients with level less than 12 gr/DL. 20.4% vs 6.3% ($P<0.01$).

Duration of stay in the labor room

Duration of labor prior to surgery had a significant effect in the untreated group (patient staying more than 2 h had higher morbidity than the control 19.4% vs 9.7% (table 4) while in the treated group no significant difference was detected.

Causative microorganism

The microorganism encountered in our department was Escherichia-coli, proteus mirabilis klebsiella and streptococcus fecalis. The use of prophylactic treatment eliminated infections caused by proteus mirabilis, klebsiella and streptococcus fecalis (table 5).

There were still some resistant strains of escherichia coli in the group receiving prophylactic treatment which were treated later successfully, according to drug sensitivity.

DISCUSSION

It has been undoubtedly clarified that an obstetric patient would benefit from prophylactic treatment with antibiotics, if she undergoes cesarean section.

Post cesarean section urinary tract infection is influenced by obstetrical parameters, as if patient had an elective cesarean section, or remained a long time in labor with multiple examination and frequent catheterization or emergency surgery requiring all too rapid preparation ([6]).

It is shown in the present study that the rate of post cesarean urinary tract infection is significantly reduced from 16.1% to 6.1%, as was already demonstrated in post cesarean endometritis in a previous study ([2]).

Using the combination of ampicillin and Collistin, the microorganism commonly associated with urinary tract infection are Escherichia coli, Klebsiella, Proteus mirabilis and rarely pseudomonas aerugeriosa or staphylococcus ([13, 15, 16]). We preferred the use of ampicillin and collistin from our previous experience of sensitivity of causative microorganism, in puerperal morbidity. In the combination we used, ampicillin is known to be effective against proteus mirabilis and most strains of Escherichia coli and gram positive cocci, but ineffective against Kleb-

Table 5. — *Urinary tract infection causative microorganism (percent).*

	E. Coli	Proteus hirabilis	Klebsiella	Strep. fecalis
Control group	66%	17%	10%	7%
Prophylactic treatment	100%			

siella and also may be effective against anaerobic bacteroids. Collistin acts on most species of gram negative bacilli with exception to proteus.

Our study, as well as previous studies, showed a significant reduction of post operative UTI treated with ampicillin and collistin, mainly in patients with long stay in labor and delivery room.

The first study to consider prophylactic antibiotic administration in cesarean section with ampicillin was by Miller and Crichton (1968). They reported a decrease in infection rate from 64 to 26%. Our clinical study showed that ampicillin and collistin as a combination, is more effective in eliminating infections with Proteus mirabilis, Klebsiella or streptococci, and only resistant E-coli strains were the causative microorganism in the treated group. This microorganism was sensitive to other antibiotics and was treated with no sequelae.

Although based on retrospective data, this study point to an effective combination for prophylactic treatment, with minimal side effects which was already found to be effective in reducing morbidity for endometritis.

It is therefore suggested that prophylactic antibiotic treatment be given to all patients undergoing cesarean section. In institutions where prophylactic treatment is not yet adopted, high risk patients such as those with prolonged stay in labor or those with low hemoglobin level may benefit from this treatment.

BIBLIOGRAPHY

1) Apuzzio J. J.: *Obst. Gyn., 59*, 693, 1982.
2) Birkenfeld A., Anteby S. O.: *Australian and New Zealand J. Obst. Gyn.*, 1983 (In press).
3) Dizerega G. S.: *Obst. Gyn., 55*, 587, 1980.
4) Gibbs R. S., Decherney A. H., Schwarz K. H.: *Am. J. Obst. Gyn., 114*, 1048, 1972.
5) Gordon H., Phelps D., Blanchard K.: *Obst. Gyn., 53*, 151, 1979.
6) Green S. L., Sarubbi F. A. Jr.: *Obst. Gyn., 49*, 686, 1977.
7) Karl R. C.: *New Engl. J. Med., 275*, 305, 1966.
8) Ledger W. J.: *Obst. Gyn., 43*, 490, 1974.
9) Mead P. B.: *Semin. Perinatol., 1*, 101, 1977.
10) Middletown J.: *Am. J. Obst. Gyn., 137*, 144, 1980.
11) Miller R. D., Chrichton D.: *S. Afr. J. Obst. Gyn., 6*, 69, 1968.
12) Moro M., Andrews M.: *Obst. Gyn., 44*, 688, 1974.
13) Phelan J. P., Pruyn S. C.: *Am. J. Obst. Gyn., 133*, 474, 1979.
14) Rehu M., Nillson C. G.: *Obst. Gyn., 56*, 269, 1980.
15) Rothbard M. J.: *Obst. Gyn., 45*, 421, 1975.
16) Sabath L. D., Charles D.: *Obst. Gyn., 55*, 162, 1980.
17) Weissberg S. M., Edwards N. L., O'Leary J. A.: *Obst. Gyn., 38*, 290, 1971.