

Cesarean section: an economic appraisal of infectious complications

M. FRANCHI - S. SALVATORE - M. FASOLA
D. BALESTRERI - E. SCORBATI

Summary: From March 1991 to April 1992, in the Dept. of Obstetrics and Gynecology, University of Pavia - Varese, 107 out of 115 consecutive patients submitted to cesarean section were evaluated for the clinical and economic evaluation of infectious complications. On the grounds of our previous experience we distinguished two groups: a high infection risk group (50 pts), because of labor and/or rupture of membranes, HIV⁺, diabetes; and a low infection risk group (57 pts). Our findings support the choice of these selective criteria both for the infectious event or for the use, and thence for the costs, of antibiotic treatment. In fact, based on this experience we believe that in cesarean sections with high infection risk AP is always recommended whereas in the low risk ones AP should not exceed L. 10.095 to be cost-effective.

Key words: Cesarean section; Infectious complications; Economic appraisal.

INTRODUCTION

Patients delivered abdominally are more likely to develop postoperative infectious complications than those delivered vaginally^(1, 2). The infection risk is mainly due to the easier spreading of microorganisms that are usually present in the genital tract⁽³⁾. Anyway, the frequency of infectious complications depends largely on the indications and on the moment of the surgical procedure⁽⁴⁾.

According to the literature^(5, 6, 7) we distinguished two groups of patients undergoing cesarean section: one group with a high risk and one with low risk of infection.

University Obstetric and Gynecologic Department
Ospedale di Circolo, Varese (Italy)

All rights reserved - No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopy, recording, nor any information storage and retrieval system without written permission from the copyright owner.

The aims of our study were:

1) To determine a uniformity in terminology and parameters necessary to compare different or consecutive experiences of the same group.

2) Facing the problem of infections in surgery, to improve, in general, certain aspects of the organization of our department and, if necessary, our surgical techniques.

3) To evaluate the cost/benefit ratio in the use of antibiotic prophylaxis (AP) in Cesarean Sections.

Recently it has been reported⁽⁸⁾ that the decrease in the infectious complications with AP may not always represent a real advantage for the patient and the community. Therefore an accurate analysis of the economic appraisal can sometimes reverse an acquired result.

MATERIALS AND METHODS

All patients at the Department of Obstetrics and Gynecology, Varese, who were candidates for cesarean section between March 1991 and April 1992, were considered for this study. 107 of the 115 cesarean section patients were included.

The 107 patients included were not submitted to any AP.

On the grounds of our previous experience we distinguished two groups: a high infection risk group (50 pts), because of labor and/or rupture of membranes, HIV⁺, diabetes; and a low infection risk group (57 pts).

Our evaluation criteria were based on laboratory tests required before and after the operation; compulsory cultures in the presence of fever or diarrhoea; post-operative clinical evaluations; economic appraisal. A follow-up was performed 4 weeks after the discharge.

Laboratory tests included:

- a complete blood count;
- uroculture;

in the post-operative period:

- renal, hepatic and haemopoietic function on the 1st and 7th day;
- uroculture at removal of the urinary catheter (if the uroculture was positive upon discharge, a new uroculture was performed at the end of treatment);
- endouterine swab on the 4th or 5th day.

Compulsory cultures in the presence of fever or diarrhoea:

- coproculture if diarrhea occurred (>2 episodes per day) with detection of *C. Difficilis*, repeated daily until all symptoms disappear;
- blood culture (hemoculture) if fever >38°C and/or in the presence of shivering, performed every 6/12 hours if symptomatology persisted. Only after a minimum of 3 blood cultures, a general antibiotic treatment was taken into account.

The post-operative clinical evaluation included:

- post-operative hospitalization (expressed in days);
 - Serious Febrile Morbidity (SFM): 2 consecutive days of fever >38°C apart from the first 24 hours after the operation without other symptoms/signs of infection;
 - in-situ infections:
- a) Abdominal Wound Infection according to Dionigi's Score (?).

- G0 No evidence of infection
 - G1 Erythema, induration and pain w/o serous fluid
 - G2 Same as grade one and/or serous fluid
 - G3 Contaminated fluid in less than half the wound
 - G4 Same as grade three in more than half the wound
 - G5S Suspected fascial dehiscence
 - G5C Certain fascial dehiscence
 - b) Endometritis; at least one of the following points with endouterine positive culture:
 - 1) Swollen uterus
 - 2) Decreased uterine consistency
 - 3) Painful uterus
 - 4) Foul lochia
 - 5) Fever >38°C.
 - Extra-situ infections (according to Dionigi and Dominioni's Score (?)):
 - a) Urinary Tract UTI
 - b) Respiratory Tract (RTI)
 - c) Thrombophlebitis
 - d) Abdominal Cavity
 - e) Infections of other type
- A score for severity has not been created.

Economic appraisal:

To obtain a qualitative datum about the severity of the complication we made use of economic criteria. For each patient we estimated the price, in Italian Lire, of all the treatments for infections related to the operation (divided as above described), performed during hospitalization and/or at home. This price derives from the total amount of antibiotic treatment calculated according to the price list of specialists' services or of the mean hospitals cost of the Lombardy Region, Italy.

RESULTS

From March, 1991, to April, 1992 data were gathered prospectively on all patients who required cesarean section, regardless of indication, at the Department of Obstetrics and Gynecology, University of Pavia, II Faculty of Medicine, Varese.

8 out of 115 patients were not considered because of violation of our protocol (5 pts), corionamnionitis before the operation (1 pt), use of antibiotics during the 15 days before the operation (2 pts).

As above described we divided the remaining 107 patients into two groups, with the following findings:

High infection risk group: 50 pts

Median age:	27 years (range 21-41)
Median operation time:	45' (range 20-120)
Median post-operative Hospitalization:	7 days (range 4-16)
SFM:	1 (2%)
Abdominal Wound Infection:	5 [3G ₃ , 2G ₄] (10%)
Endometritis:	1 (2%)
UTI:	12 (24%)
Median foley permanence:	1 day (range 0-2)
RTI:	1 (2%)
Cost/pt	L. 46.140
Cost/pt w/o UTI	L. 41.795

Low infection risk group: 57 pts

Median age:	30 years (range 19-40)
Median operation time:	55' (range 20-105)
Median post-operative Hospitalization:	7 days (range 4-18)
SFM:	0
Abdominal wound infection:	0
Endometritis:	1 (1.75%)
UTI:	11 (19.3%)
Median foley permanence:	1 day (range 0-4)
RTI:	1 (1.75%)
Cost/pt	L. 10.095
Cost/pt w/o UTI	L. 7.980

CONCLUSIONS

Women undergoing cesarean section are predisposed to postoperative infectious morbidity by the nature of the surgical procedure; patients with ruptured fetal membranes in labor, HIV + and with Diabetes were considered as greater risks.

Our findings support this classification both clinically and economically.

Based on this experience we believe that in cesarean sections with high infection risk AP is always to be recommended whereas in the low risk ones AP should not exceed L. 10.095 to be cost-effective.

REFERENCES

- 1) Kreutner K. A. *et al.*: "Perioperative antibiotic prophylaxis in cesarean section". *Obst. and Gyn.*, 1978, 3, 279.
- 2) Dunn L. J.: "Cesarean section and obstetric operations". In: Danforth D. N. (eds.), 'Obstetrics and Gynecology'. Third edition. Harper and Row, Hagerstown, 1977, 691.
- 3) Plank K., Stencl J. and Polak L.: In: "2nd International Meeting of ESIDOG", Gardone Riviera, Italy, 1990, 493.
- 4) Wallace R. L. *et al.*: "The use of prophylactic antibiotics in patients undergoing emergency primary cesarean section". *Am. J. Obst. Gyn.*, 1983, 1, 533.
- 5) Phelan J. P. *et al.*: "Prophylactic antibiotics in cesarean section: a double blind study of cefabolone". *Am. J. Obst. Gyn.*, 1979, 5, 474.
- 6) Ford L. C. *et al.*: "Cost-effective use of antibiotic prophylaxis for cesarean section". *Am. J. Obst. Gyn.*, 1987, 2, 506.
- 7) Duff P. *et al.*: "Single-Dose cefazolin versus cefonicid for antibiotic prophylaxis in cesarean delivery". *Obst. and Gyn.*, 1987, 5, 718.
- 8) Davey P. G. *et al.*: "Cost benefit analysis of cephradine and mezlocillin prophylaxis for abdominal and vaginal hysterectomy". *Br. J. Obst. Gyn.*, 1988, 95, 1170.
- 9) Dionigi R., Dominiononi L.: "Prevenzione e controllo delle infezioni di interesse chirurgico". Linea Famitalia, Milano, 1986.

Address reprint requests to:

M. FRANCHI
Clinica Ostetrica e Ginecologica
Ospedale Multizonale
Viale Borri, 57
21100 Varese (Italia)