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ORIGINAL ARTICLE

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Indications and outcome for intensive care unit admission during puerperium

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Abstract Background: A significant decrease of maternal mortality related to improvement in diagnosis and prevention of disorders in pregnancy has been observed without a similar reduction of puerperal morbidity. Objective of this study was to identify risk factors and outcome of patients, which required intensive care during puerperium. Methods: During the period 1987–1998 all pregnant patients, which were transferred from Department of Obstetrics and Gynecology to Intensive Care Unit (ICU) of University of Bari, were retrospectively included into the study. Several risk factors (age, preexisting diseases, gestational age, medical complication of pregnancy, mode of delivery, surgical additional procedure, fetal outcome, intrapartum transfusions, and puerperal complications) and the indications for transfer were evaluated. Results: The overall incidence of admission into Intensive Care Unit was 0.17% (41/23.694) of deliveries. Indications for admission into ICU were: worsening of preeclampsia in 75.6% of cases, severe bleeding in 14.7% of cases, maternal cardiac disease stage III AHA in 4.9% of cases, pulmonary embolism and acute pulmonary oedema respectively in 2.4% of cases. Conclusions: Transfer of patients to ICU due to hypovolemic postraumatic shock seems progressively declining thanks to modern criteria of obstetric management; on the contrary we assist to a prevalence of serious intrinsic maternal diseases often preexisting pregnancy or late consequence of preeclampsia, pulmonary embolism and sequelae of abnormal insertion of placenta.

Keywords Puerperium · Intensive care · Preeclampsia · Maternal complications

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Introduction

The progress in diagnosis and prevention of disorders in pregnancy and the identification of fetal parameters which could induce serious dystocia have produced a significant decrease of maternal mortality, without a coincident decrease of puerperal morbidity and in the number of admissions into intensive care [5, 8, 14, 15].

In western countries, where a fall of maternal mortality has been obtained, puerperal morbidity has become the main topic of investigation, especially if severe enough to require admission into intensive care unit.

In the present study we have tried to identify the risk factors which required intensive care during puerperium and the outcome of the patients on the grounds of the criteria of admission.

Patients and methods

During a period of 11 years (1987–1998), 41 patients, selected among 23.694 deliveries (incidence 0.17%), were transferred from Department of Obstetrics and Gynecology to Intensive Care Unit (ICU), University of Bari.

Each patient was evaluated considering age, preexisting diseases, gestational age, medical complication of pregnancy, mode of delivery, surgical additional procedure, fetal outcome, intrapartum transfusions, and puerperal complications.

For each patient clinical and therapeutic aspects during Intensive Care recovery have been examined.

Results

The overall incidence of admission into Intensive Care Unit was 0.17% of deliveries. Mean age of transferred patients was 29±5.l9 years; gestational age was less than 36 weeks in 43.9% of patients. Primparae, secondipare and multiparae were respectively 75.6%, 9.7% and 14.6% (Table 1).

36 (87.8%) were pregnancies with a single fetus, 5 (12.2%) were multiple pregnancies obtained after assisted reproduction (4 sets of twin, 1 of triplet). Seven

Table 1 Patient's characteristics

	Number	%
Transferred patients	41	0.17
Mean age (years±SD)	29±5.9	
Gestational age <36 weeks	18	43.9
Diesase antedating pregnancy	7	17
Disease acquired in pregnancy	31	75.6
Varicosis	2	4.9
Primiparae	31	75.6
Secondiparae	4	9.7
Multiparae	6	14.6
Multiple pregnancy	5	12.2

Table 2 Outcome of delivery

	Number	%
Elective caesarean section	35	85.3
Emergency caesarean section	2	4.9
Vaginal delivery	4	9.7
Uterine package	7	17.1
Hysterectomy	6	14.5

Table 3 Neonatal outcome

	Number	%
Favourable outcome	42	89.4
Endouterine foetal death	4	8.5
Death after birth	1	2.1
Total perinatal mortality	5	10.6

patients (17%) had preexisting diseases (heart, liver, gastrointestinal diseases, diabetes) while 31 (75.6%) pregnancies were complicated by various disorders such as anemia, hypertension, coagulopathy and pulmonary diseases; 2 (4.9%) were affected by varicosis (Table 1). Caesarean section was performed in 37 cases (90.2%) while 4 patients (9.7%) were delivered vaginally. Postpartum hysterectomy was performed in 6 cases (14.5%), for various indications (1 uterine rupture, 1 post-caesarean uterine atony, 1 placenta percreta and 3 cases of intravascular coagulation associated with eclampsia) (Table 2).

Neonatal outcome was favourable for 42 newborns out of 47 fetuses, including 5 multiple pregnancies; 4 endouterine fetal deaths and 1 death after birth gave a perinatal mortality of 10.6%b (Table 3). The 4 cases of intrauterine death occurred in single pregnancies, at very early gestational ages (27, 29, 31, 34 weeks respectively), complicated by severe preeclamptic maternal symptoms, while the only case of neonatal death occurred in a triplet pregnancy, with survival of the other 2 newborns.

16 women (39%) were transfused, seven immediately after delivery (1 after spontaneous delivery and 6 after caesarean section for placental or coagulation disorders), while 9 patients only after the transfer to Intensive Care (21.9%).

Table 4 Indications for admission into Intensive Care Unit

	Number	%
Worsening of preeclampsia	31	75.6
Severe bleeding	6	14.7
Maternal cardiac disease	2	4.9
Pulmonary embolism	1	2.4
Acute pulmonary oedema	1	2.4k

Indications for admission into Intensive Care Unit were: worsening preeclampsia in 31 cases (75.6%), severe bleeding in 6 (14.7%), maternal cardiac disease stage III AHA in 2 (4.9%), pulmonary embolism and acute pulmonary oedema respectively in 1 case (2.4%) (Table 4).

Indications for transfer to Intensive Care Unit in patients affected by severe preeclampsia or eclampsia were neurological complications in 16 cases (51.6%), pulmonary oedema in 4 (12.9%), severe intrasvascular coagulopathy in 11 cases (35.4%). Twenty-nine patients affected by hypertension were delivered by caesarean section and two vaginally. The mean stay in Intensive Care Unit was 6 days after caesarean section and 2.5 days after vaginal deliveries. This difference is probably justified by preliminary selection of more serious cases treated by caesarean section.

Among 6 patients (14.6%) transferred into Intensive Care because of severe posthaemorrhagic anemia, 5 had been submitted to caesarean section (two uterine atony not responsive to oxytocic agents, three cases of placenta praevia) and one spontaneous delivery with uterine rupture. The remaining four patients were delivered by cesarean section, two were affected by maternal cardiac disease stage III AHA, one had acute pulmonary oedema, associated with severe autoimmune thrombocytopenia and the last one had pulmonary embolism.

Maternal cardiocirculatory conditions at the moment of transfer were characterised by hypertension in 31 patients (75%), hypotension in 2 (5%) and normal blood pressure in 8 (20%). Cardiac function was abnormal only in the 2 cardiopathic patients (4.9%). Among eclamptic puerperae, hepatic function was damaged in 3 patients (7.3%), renal function in 11 patients (26.8%), and both hepatic and renal in 3 patients (7.3%). 12 patients (29.2%) arrived at Intensive Care Unit without being intubated. Hemogasanalysis was performed in 38 patients when transferred and revealed metabolic acidosis in 5 cases (13.1%), respiratory acidosis in 3 (7.9%) and mixed acidosis in 5 (13.1%). Two patients (5.3%) were affected by metabolic, 1 (2.6%) by mixed alkalosis and 10 (26.3%) by respiratory alcalosis; the remaining 12 patients were normal. Chest X-ray showed pulmonary oedema in 9 cases (29%), although only 5 patients had clinical symptoms at the moment of transfer. Two patients (6.4%) showed bronchop-pneumonic focuses, while 20 (64.5%) were normal. Cranial CT, performed in 16 patients affected by eclamptic convulsion, showed cerebral oedema in 5 cases (31.2%), ischemic lesions in 5 (31.2%) cases, thrombosis of sagittal sinus or superior

marginal in two cases, while the remaining four cases (25%) were normal. Twenty-three of 41 patients were submitted to mechanical ventilation, because of hypoxyemia revealed by hemogasanalysis or following respiratory depression secundary to drug inhibition of central nervous system; the remaining patients were treated only by oxygenotherapy by mask. Hypertension was generally treated by repeated boles of urapidil in 22 patients, while in resistant cases, clonidine (5 cases) or continuous infusion of nitroglycerine (3 cases) (with boles of labetalol) were associated. Hypotension, occurring in 2 cases, was treated by infusion of colloids (albumine), crystalloids and monitoring of plasmatic proteins. Renal failure, which occurred in 11 patients, was treated by furosemide and in no case dialysis was necessary. Convulsions were treated by benzodiapines, while prevention of recurrences was obtained through Fenobarbital administration.

Overall mean duration of stay in Intensive Care Unit was 5.1±3.4 d. The incidence of maternal mortality in this selected group was 4.9% because of 2 cases. Case 1 was due to a massive abrubtio placentae, complicated by acute pulmonary oedema, precipitating a cardiac failure unresponsive to any resuscitation measure. Case 2 was acute cardiac failure in a patient with a severe pregnancy condition (Stage III AHA cardiac disease). The patient had been referred in labour, because of the maternal condition and because of fetal growt restriction. An emergency low segment Caesarean Section was performed due to non reassuring fetal condition and the mother never recovered from general anaesthesia.

Discussion

Puerperal transfer to Intensive Care Unit after delivery is one of modern innovations which could be surely defined as a “life saving procedure”. Very few data exist about the incidence, the causes and the outcome of pueperae who need transfer into intensive care Unit.

A clinically based definition of severe acute maternal morbidity is essential to provide effective maternal care [12]. Maternal death is a rare event in the western world, but still it is a relevant problem for any tertiary referral centre. Only a multinational study can be definitely useful to obtain a sufficient sample of cases, but it would be biased by different characteristics in health organisation, and also difficulty in a common definition of a “severe” event. We have therefore chosen to select our criterion of ”transfer to intensive care” as the one to define a maternal cirtical condition. For that reason, the retrospective analysis of this event can disclose the spectrum of pregnancies related organ dysfuncion in order to find which is in our reality the most frequently critical condition.

In our experience, the rate of transfer is 0.17%, which correspond to 0.26% of Canadian reports [11] and 0.12% of other European studies [17]. Usually women are young (mean age 30 years) and primiparae, indicating that a serious complication of the present pregnancy is usually the cause of admission. Just until few years ago, post-haemorrhagic shock following to difficult operative delivery, mainly in a multipara patient was the most prevalent cause of puerperal transfer to ICU [1, 6, 17]. In our experience we have a very low incidence of transfer for posthemorragic shock (14.7%) while the incidence of serious eclampsia (75.6%) and the consequences of cardiopathy (4.9%) are noteworthy. Hypovolemic posthemorrhagic shock is present in 14.7% of transfers and is mainly correlated to abnormalities of placental insertion or to coagulation disorders caused by preeclampsia.

A large quote (75.6%) of transfer are due to complications of preeclampsia, in young and primiparae women. Patients affected by eclampsia showed higher incidence of endothelial damage of central nervous system, pictured at RMN as thrombosis of longitudinal sagittal sinus. Although is not possible to ascertain if this is a late complication or a cause of convulsive eclampsia, it is conceivable that early treatment of preeclampsia could avoid or reduce such a dangerous complication.

In this context, multifetal pregnancy induced by assisted proceation procedure have an important role, confirming preliminary data about an higher risk of prematurity and preeclampsia [16]. The last quote of transfer are correlated to severe sequelae of preexisting cardiopathy (4.9%) or to pulmonary embolism or oedema (4.8%).

The present results are in accord with previous report. Bouvier-Colle et al. [3] report as a main indication to transfer in ICU clinical worsening of hypertension (26.2%), following by severe haemorrhage (20%) or embolism (12.4%). Grimes [7] in 1994 reported that the main causes of maternal death are hypertension, haemorrhage and pulmonary embolism. Despite the different incidence of various pathologies, many authors agree in the rising incidence of thromboembolic disease and abnormalities of placental insertion. Therefore pulmonary embolism as well hypertension need to be monitored as important factors of maternal morbidity and mortality [10].

In our experience, maternal mortality was 8.4/100.000 newborn, similar to other western countries. For example, Swedish and Canadian studies describe maternal mortality rate of 7.4 and 2.6/100.000 newborn, respectively [9, 11]. These data are profoundly different from the French ones (reporting a rate of 18/100.000); this difference is probably justified by higher incidence of haemorrhagic post-traumatic complications in the French experience [3].

For this reason, a comparative analysis among these studies about incidence of caesarean sections and operative aginal deliveries could be interesting. In our experience, all the maternal deaths in the last 11 years occurred in patients submitted to caesarean section and transferred to Intensive Care Unit. It is arguable that patients with more severe disease are preliminary selected for cesarean section.

Unlike other studies [5, 13], we do not have anaethesia related to infectious complication requiring transfer in ICU, although incidence of endometritis in our experience is quite similar to the one in North America, i.e. 5% [18].

Scarce information are available about management and long term follow-up of puerperal patients transferred to Intensive Care Unit. In our experience maternal mortality is concentrated on the group of patient who need to be transferred in ICU. The remaining patient did not shows any sequelae.

In conclusion transfer of patient in ICU is certainly a life saving procedure for the puerperae affected by different and serious complications. Thanks to modern criteria of obstetric management hypovolemic postraumatic shock is progressively declining, while we assist to a prevalence of serious intrinsic maternal diseases often preexisting to pregnancy.

In next future a special attention should be appointed to late consequence of preeclamspia, to pulmonary embolism and to sequelae of abnormal inserion of placenta.

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