

SWISS SOCIETY OF NEONATOLOGY

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Neonatal care in a  
resource-limited country  
in sub-Saharan Africa

January 2013





At the time of Ivory Coast's independence (1960), the country was French West Africa's most prosperous. Unfortunately, two civil wars (2002, 2011) and on-going political unrest have since ravaged the country and led to enormous poverty. The health care system has virtually collapsed and the country's universities (Abidjan, Bouaké) have only recently reopened. As a consequence, infant mortality rates (63.2/1000 births, country ranking 22/223, compared to Switzerland: 202/223) and maternal mortality rates (0.4%, country ranking 26/183; compared to Switzerland: 160/183) are very high (1). The country's under-five mortality rate is 12.7% (2).

In early December 2012, the authors were given the opportunity to visit the Hôpital Méthodiste de Dabou at the Ivory Coast for one week to assess the hospital's pediatric and neonatal care facilities. They accompanied daily ward rounds in both the pediatric ward (Fig. 1) and the neonatology unit (Fig. 2) of this non-government hospital and offered teaching sessions for doctors and nurses twice daily.

This report illustrates the enormous challenges that health care workers face in their daily work in this sub-Saharan country. The plight of the children and their families is stunning.



Fig. 1

*Pediatric ward: Patient with trisomy 21 and congestive heart failure due to congenital heart disease (type unknown); no surgical options are available.*



Fig. 2

*Neonatology ward: there is a complete lack of monitoring equipment.*

## CASE REPORT

This female infant was born at a small clinic in the district of Dabou at an estimated gestational age of 36-38 weeks to a 25-year-old G5/P4 mother by normal vaginal delivery. Pregnant women in this area are often unsure of the date of the last menstrual period and early ultrasound examination is not available. The parents brought the infant to the Hôpital Méthodiste de Dabou because of respiratory distress approximately 12 hours after birth. No details of the delivery were available.

On admission, the infant's weight was 2800 g. Because of hypothermia (axillary temperature of 35 °C), the infant was placed under a radiant warmer. There was evidence of respiratory distress with tachypnea (respiratory rate of 80 breaths per minute), intercostal retractions, expiratory grunting and nasal flaring. Pulse oximetry is not available at this hospital, but the clinical impression of the admitting team was that there was no central cyanosis. The heart rate was 134 beats per minute and capillary refill time was > 3 seconds. Equipment for non-invasive blood pressure measurement is not available. The remainder of the clinical examination was felt to be normal.

A complete blood count (not including an I:T ratio) and a C-reactive protein were ordered but, since the hospital's laboratory is not staffed at night, would only become available the next morning. This laboratory cannot do blood gas analyses, and there is no micro-



Fig. 3

*Patient on the second hospital day: a peripheral line and a NG tube are in place, whereas the oxygen catheter has been removed or has become dislodged.*

biology facility so no blood cultures can be done. In addition, X-rays cannot be obtained in neonates.

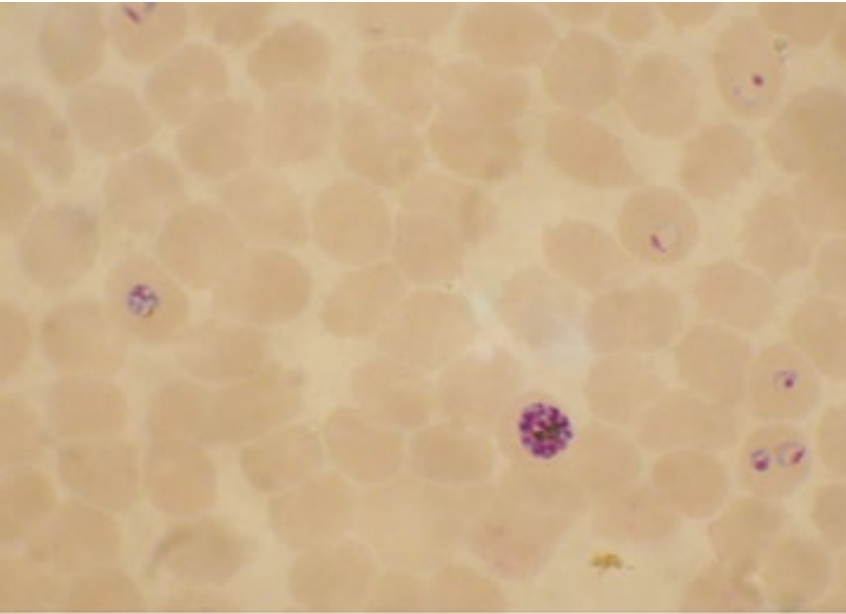
The infant's history and clinical presentation were felt to be compatible with early-onset sepsis, and intramuscular ampicillin and gentamycin were prescribed.

In this institution, parents must go to the hospital pharmacy to buy the drugs. Often, they first have to return to their village to get money. Inevitably, therapies are frequently started with considerable delay. Since the infant was unable to breastfeed, expressed breast milk was given by a nasogastric tube. Later, when the infant appeared to be dusky and the parents agreed to pay for it, a piece of plastic tubing was inserted through the left nostril into the epipharynx and 100% oxygen was administered at a rate of 2 liters per minute.

When the infant's condition deteriorated further, glucose 10% was given intravenously by intermittent bolus injection every three hours since there are no syringe or infusion pumps. Bedside measurements of blood glucose concentrations cannot be done (Fig. 3).

When the infant's temperature rose to 38.5 °C on the second hospital day, a thick smear was sent for malaria testing and came back positive (Fig. 4). The infant was then treated with artemether for vertically transmitted malaria. The next day, multifocal seizures were noted and, without any further investigations, phenobarbital was given intramuscularly. Five days later, the infant was discharged from the hospital. No follow-up information is available.



**Fig. 4**

*Aspect of plasmodium falciparum in a blood smear: several red blood cells have ring stages inside them. Close to the center, there is a schizont and on the left a trophozoite.*

## DISCUSSION

This report lends itself to the discussion of two topics: first, a brief comment on congenital malaria, and, second, on issues regarding the difficulties to provide neonatal care in a developing and war-torn country.

### **Congenital malaria**

Congenital malaria due to transplacental or peripartal infection of the fetus is being increasingly observed (3-8). It has been reported following maternal infections with all four species of human plasmodium, although most cases are reported following *P. falciparum* or *P. vivax* malaria (9-11). In nonendemic countries, *P. malariae* may cause a disproportionately higher number of congenital malaria cases due to its longer persistence in the host (10).

In endemic areas, symptomatic malaria in the neonate is rare, despite a high incidence of maternal parasitemia and placental malaria, as maternally derived IgG and the high proportion of fetal hemoglobin inhibit parasite development (10, 11). In endemic areas, a high prevalence of neonatal parasitemia has been reported, with majority of the parasitemic newborns being asymptomatic; however, the mortality was found to be higher in the parasitemic newborns compared with the aparasitemic and in the symptomatic compared with the asymptomatic (5-8). On the other hand, infants born to nonimmune mothers with malaria at the time of labor may develop parasitemia and illness in the first few weeks of life. Congenital malaria usually



Fig. 5

*Neonate following cardiopulmonary resuscitation: after return of spontaneous circulation, bag/mask ventilation is continued.*

manifests between the second and eighth weeks of life (as early as 1 day or delayed by weeks or months) (10) with symptoms such as fever, anorexia, lethargy, anemia, and hepatosplenomegaly. Features suggestive of neonatal sepsis such as irritability, poor feeding, regurgitation, loose stools, jaundice, and occasionally drowsiness, restlessness, and cyanosis, may also be seen. However, complications seen in nonimmune adults have not been reported in congenital malaria (11).

### **Neonatal care in a developing country**

Given the poor infrastructure of the hospital, both assessment and treatment of this near-term infant presenting with respiratory distress and vertically transmitted malaria were seriously hampered. Lack of adequate laboratory and X-ray facilities dictate that diagnoses are mainly based on the patient's history and clinical observations.

The only treatment option for newborn infants with respiratory distress is the provision of supplemental oxygen. Dosing is based on the infant's color. Neonatal infections can be treated with antibiotics, which are mostly given intramuscularly. Peripheral intravenous access can be obtained and parenteral fluid (dextrose 10%, Ringer's lactate) can be administered but the rate of administration is poorly controlled. Since the neonates cannot be monitored, life-threatening situations (i.e., apnea and bradycardia or asystole) are



Fig. 6

*Neonate following cardiopulmonary resuscitation: postresuscitation care consisting of supplemental oxygen and intravenous glucose administration; although resuscitation was initially successful, the infant was found dead in his crib two days later.*



Fig. 7

*Patient with severe anemia (hemoglobin of 45 g/l) following umbilical hemorrhage at home.*



Fig. 8

*Neonatal resuscitation table in the OR where C-sections are performed.*



Fig. 9

*Currently there are no treatment options for many newborn infants with congenital malformations (term infant with giant omphalocele).*



frequently encountered (Fig. 5, 6) but resuscitation attempts are rarely successful.

Often patients arrive at the hospital late and in a poor condition (Fig. 7) which – combined with inadequate training of both physicians and nurses, a lack of even a basic infrastructure (Fig. 8) as well as financial resources – contribute to the very high mortality rates of patients admitted to the pediatric and neonatology ward (20%). For many infants with congenital malformations there are no curative therapies (Fig. 1, 9).

The authors wish to thank the medical staff of the Hôpital Méthodiste de Dabou for their hospitality and to allow us to get an impression of the immense challenges they have to face in their daily work. The authors are also grateful for the invitation by the Ruedi Leuppi Foundation ([www.stiftungleuppi.info](http://www.stiftungleuppi.info)) to visit the Ivory Coast. Finally, the authors wish to thank their colleagues Ruedi Leuppi (urologist) and Hans Werder (obstetrician and gynecologist). The two experienced clinicians have visited the Ivory Coast on many occasions and their advice greatly reduced the authors' anxieties.

## ACKNOWLEDGEMENTS

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