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EDITORIAL

Long-term outcome in meningococcal septic shock

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Meningococcal septic shock (MSS) often runs a fulminant course, reflected by a rapid and dramatic progression from full health to critical illness within hours. Fifty percent of the fatalities occur within 12 hours and two-thirds within 24 hours after ICU admission [1]. This rapid and deteriorating course is explained by the nearly unimpeded outgrowth of meningococci in the bloodstream, releasing blebs rich in endotoxin (lipopolysaccharide (LPS). The plasma concentrations of meningococci are several logs higher than observed in any other type of Gram-negative sepsis [2]. This results in an intense inflammatory response characterized by vasoplegia, capillary leakage and myocardial depression leading to shock and disseminated intravascular coagulation (DIC) associated with petechiae and purpura. Intravascular thrombosis and perivascular haemorrhage in combination with microcirculatory dysfunction can cause multiple organ dysfunction and tissue necrosis.

Early recognition and aggressive treatment is crucial for survival [3,4]. The incidence of meningococcal sepsis is highest among young children (age 0 –4 years) and adolescents. Unlike adults, sepsis in childhood most frequently occurs in previously healthy children. Mortality of MSS in the Netherlands has substantially decreased over recent years - from 4.5/100,000 inhabitants in 2001 to 0.9/100,000 in 2008 - after the introduction of meningococcal group C vaccine which has led to a significant drop in incidence [5]. In addition, increased awareness and development of guidelines in critical care may have contributed [3,6].

Survivors of MMS are at high risk for serious sequelae such as skin scarring, amputation, neurological impairment and renal dysfunction [1]. It is evident that the biological and emotional stress caused to these children and their parents is substantial. Until relatively recently, critical care practitioners focused on the survival and short-term morbidity of their patients and not on long-term outcomes. Today, it is recognized that physical sequelae, neurological dysfunction and neurocognitive impairment following critical illness do occur frequently and may be long-lasting. There are an increasing number of adult studies evaluating morbidity and well-being in ICU survivors [7-10]. Recently Poulsen and colleagues reported significantly reduced physical function one year after hospital discharge in survivors of septic shock [11]. Markedly impaired physical function was also observed in patients with no preadmission morbidity. At 12-month follow-up, two-thirds had not regained their preadmission physical status. Follow-up data on paediatric intensive care units (PICUs) are scarce and mostly confined to physical sequelae in organ-specific patient groups such as neurotrauma or congenital cardiac surgery [12,13].

In this issue of the journal, Buysse et al. evaluate long-term physical and psychological outcomes in a large cohort of patients who survived MMS in childhood [14]. A high percentage of MMS patients show serious physical sequelae. A remarkable finding of their study was the lack of association between adverse physical and psychological outcome. Favourable outcome of long term (> 4 years) psychological functioning was observed. Cognitive functioning and behavioural and emotional problems were comparable with reference groups. These data suggest that children who survive MMS are able to cope effectively with the life-threatening event and its biological and emotional impact as well as with its physical sequelae. However, subtle impairments in neurocognitive function may be missed making the long-term follow up of these patients even more important. The strength of their study is that they included a well-defined group of patients with MMS, aged 1 month to 18 years, from a database in which data had been entered prospectively. They should be applauded for their efforts to give a complete overview of long-term outcome of this relatively homogenous study population, both physical and psychological, using standardized and mostly validated assessment procedures. Such research will likely yield valuable insights into the identification, natural history, prognosis, and potential mechanisms of physical and psychological impairments in PICU patients who survive MMS, and may guide the development, implementation, and fine tuning of intervention programmes. In addition they assessed predictors of outcome variables and developed recommendations for follow up in MSS survivors.

Limitations of the study are that it is an observational study with no controls but comparison with normative data, and single

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centre, which may limit extrapolation of data to other centres. However, in line with this study in 111 survivors of meningococcal disease after (P)ICU admission (participating in a study on innate cytokine production capacity in relation to clinical manifestation and disease severity) we found that 49 % of patients or parents reported sequelae ranging from neurological complaints such as headache or minor scars, to amputations of multiple limbs. Interestingly, in 77% of cases patients presenting with shock reported some sequelae, and 40% reported severe sequelae (defined as severe scars, amputations, paralysis or prolonged hypocortisolism). In patients presenting with other clinical manifestations (meningitis or bacteraemia) these numbers were much lower: 33% minor sequelae in the bacteraemia patient group and 21% minor sequelae in the meningitis patient group. No severe sequelae were reported in these groups. This identifies the presence of shock as an important risk factor for sequelae in meningococcal disease. Sequelae were not related to disease severity or DIC scores [15].

Buysse and colleagues make recommendations for standardized multidisciplinary follow-up teams including a paediatric intensivist, physiotherapist and psychologist for MMS survivors. Special attention for orthopaedic, cosmetic, neurological and psychological sequelae will be likely to improve care for patients after meningococcal disease, although the impact and effect of these interventions have not been studied. In our opinion, each PICU/paediatric department providing care to patients with meningococcal disease should consider implementing these recommendations.

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