Analysis of perinatal mortality

Ideally, we should know the underlying cause of death in all cases of perinatal mortality. The underlying cause is supplemented with the clinical conditions and contributing factors. Subsequently classification systems for perinatal mortality are used and the cases are discussed in a multidisciplinary audit. As a result we are able to take preventive measures and avert death. Unfortunately this is not possible in all cases, even in the developed countries with ample possibilities for investigations and high motivation for improvement of care. In the developing countries where by far most perinatal mortality cases occur only little possibilities for the analysis of perinatal mortality exist. Our efforts should not only be directed to our practice but to these low resource countries as well, much more improvement can be accomplished there.

From our data it can be concluded that in approximately 11% of perinatal mortality cases the cause of death remains unknown. Only 4% of causes remained unknown when (in our opinion) sufficient investigations had been performed. No consensus has been reached so far regarding the investigations that should be performed in cases of perinatal death. A research project with the goal to determine useful investigations for stillbirths started in the Netherlands in 2001. (Zinnig Onderzoek bij Antepartum Sterfte; ZOBAS). A protocol for the investigations in case of stillbirth will be proposed. The investigations for intrapartum- and neonatal deaths can be extracted from that protocol since the underlying causes for perinatal mortality cases from every subgroup are the same. We hope that with the implementation of a standard protocol more insight will be gained in the pathophysiology of perinatal mortality. The karyotype, autopsy and placental examination already proved to be useful. Multidisciplinary meetings with obstetricians, neonatologists, pathologists and geneticists provide the best insight in the pathophysiology of perinatal deaths. The obstetricians and neonatologists can explain the clinical details, the pathologist can explain the cause and mechanism of death as found during the autopsy and placental examination and the geneticist can explain observed congenital anomalies and the consequences.

Autopsy

The perinatal autopsy often confirms clinical diagnoses or reveals additional findings, as described in Chapter 2. Unfortunately the perinatal autopsy rate has declined over the past decades, although it is more or less stable now. We described in Chapter 3 that one of the main reasons for the decline is the reluctance of doctors to ask for permission. Physicians should do better in their counselling to raise the perinatal autopsy
rates again. The first step towards better counselling would be to be familiar with the value of the autopsy, its procedure and the possible parental religious and cultural objections. One has to feel confident to discuss the topic and obtain consent from the parents. Counselling is a time consuming, difficult and emotional conversation that should take place without disturbances. The physician most involved with the patient should explain the value of the autopsy and the procedure. It is not important whether this is the youngest physician, midwife or head of the department. The pathologist (preferably specialised in perinatal pathology) can counsel the parents regarding the procedure as well. Parents are to be given the opportunity to discuss their fears and possible restrictions and can explain their possible wishes (such as photographs). Combined conversation with the doctor and the pathologist is also an option.

**Placental pathology**

Investigations of cases of perinatal mortality are incomplete if the placenta is not submitted for histopathological evaluation. In *Chapter 4* we describe the quality of placental reports and suggestions for improvement. The conclusions of placental investigations have well been reported. Clinicians may expect a clear explanation of the role of placental pathology present from the pathologist and pathologists need sufficient clinical detail from the clinician, as described in *Chapter 5*. Pathology reports should facilitate comprehension of the histological findings. Pathology reports could contain a short summary of the scenario that resulted in death (as provided by the clinician), it should at least provide a cause of death (or the statement: 'unexplained' cause of death) and preferably a recurrence risk as well. The clinician and pathologist are both responsible for the communication regarding the implications of their findings, between themselves and with the patient.

Not only should the placentas of stillbirths be submitted to the pathologist, but also the placentas of neonatal deaths and terminations of pregnancy for medical reasons. In general, placentas of stillbirths and terminations of pregnancies are easily available for evaluation, placentas of neonatal deaths after an apparently uncomplicated pregnancy are often problematic to obtain. These placentas are usually thrown away after birth when perinatal mortality seemed non apparent. In many hospitals placentas are anonymously collected in a freezer, to be cremated later, without the possibility of retaining the individual placentas when necessary. A system with labelled biological demolition plastic bags or a system with more freezers could solve the problem with the possibility of retaining placentas of neonatal mortality cases.
In developed countries placentas are usually available for histopathological analysis, in contrast to the developing countries. One of the reasons for the poor availability is the high contamination risk with blood transmittable infections for the involved examiner. Other reasons are that in rural areas most women deliver at home and not in a hospital with possibilities for placental analysis, that birth attendants are poorly educated with regard to the investigation of the placenta and moreover that the financial resources are directed towards care of women in labour and not to post-mortem investigations. When gloves are available for the examiner the placenta can be investigated macroscopically in developing countries as well, we suggest the use of a very basic placenta investigation protocol. In collaboration with the International Stillbirth Alliance (ISA) we plan to develop a format for placental investigations in the developing countries with the use of pictures on a poster.

In Chapter 6 we focused at a specific placental cause of death: villous immaturity (VI). VI is an important cause of term stillbirth cases. No internationally accepted definition of VI exists. The etiology of VI is unclear. We classified it as an underlying cause of death as this entity is as far back in the chain of events we can go. It is possible however that with future research another entity is found to be associated with VI or is found to cause VI. The fact that we found 41 cases with VI as the only pathological entity resulting in foetal death strengthens our current opinion that VI is a cause of death.

**Classification of perinatal mortality**

We developed the Tulip classification system (Chapter 7) for classification of the underlying cause of death. Ideally all health workers use the same classification systems to allow comparison of figures. The Tulip classification system however is not suitable for all situations. In the developing countries, only little information is obtained, especially regarding the underlying cause of death. The category: "unknown with important information missing” would be over represented and the placental category would probably remain empty, which obscures comparison of figures. We have proposed a multilayered approach that uses a combination of existing systems to be used in sequence of increasing difficulty in Chapter 9. Using such a combination of systems compensates for the shortcomings of the individual systems (Chapter 8) and allows use in developing countries as well. In this approach it is not obligatory to complete all levels, it is possible to just complete the first level and then stop. Later on with more available investigations the second level and maybe the third can be completed as well. The ISA accommodates this approach in the development of a new classification for assistance.
of the World Health Organisation in the adjustments of the O and P codes for the ICD 11 (International Classification of Diseases). We currently work on this new classification system (Maternal Antepartum Intrapartum Neonatal classification, MAIN).

Audit and multilayered approach for classification
The Peristat studies revealed that the Netherlands is amongst the countries with the highest perinatal mortality rates in Europe. Several reasons have been provided for these numbers. The influence of substandard care was not investigated. For that reason, a national feasibility study for audit of perinatal mortality was performed (Landelijke Perinatal Audit Study, LPAS). The conclusions from the LPAS were that need for national audit existed and that it was feasible. In about 20% of cases substandard care factors contributed to the death. All involved healthworkers considered audit as useful and they were willing to participate in a national audit of perinatal mortality. The RIVM (Rijksinstituut voor Volksgezondheid en Milieu) has initiated a national audit study and in Groningen a regional audit is implemented (IMPACT). Both audits use our proposed multilayered approach for classification of mortality cases. A classification for quality of care and substandard factors could be added as an additional layer of the approach to be used in audits. With this approach, the quality-improvement cycle can start to improve perinatal care and prevent adverse outcomes.
Reference list