Neonatology—then and now (C H M Walker)

Oxygen tension in the newborn (1957)

Low oxygen tension in the management of newborn infants

SVEN SJOSTEDT AND GOSTA ROTH

Departments of Obstetrics and Gynaecology and of Internal Medicine, University Hospital, Lund, Sweden (Arch Dis Child 1957;32:397–9)

This paper, which was based on a presentation read at the VIIIth International Congress of Paediatrics in Copenhagen, July 24 1956, starts with the somewhat dramatic statement:

'Prolonged administration of oxygen in high concentrations to premature infants is now being abandoned in most countries, thanks to the studies on retrolental fibroplasia which have shown its harmful effects on the eyes.'

Later in the introduction we find:

'The frequent co-existence of retrolental fibroplasia and cerebral palsy as shown in the papers by Ingram and Kerr (1954) and Klause (1955) may perhaps also justify relating cerebral palsy to oxygen therapy.'

The paper then describes 33 infants (21 term and 12 'premature') treated in atmospheres of 15% oxygen, 85% nitrogen, and in whom oxygen saturations fell by about 10 volumes %. Though this was in the early days of such studies in Lund others had exposed infants to low ambient tensions three years previously and reported that 115 mm Hg oxygen did not 'involve undue risks'. Some term infants were cyanosed to start with but then became pink with 'deep breathing, bradycardia (100–110 per min) and slight hypothermia'. The preterm babies were 'often a little cyanotic' but their attacks of cyanosis and dyspnoea were 'not more often than usual' and it was thought that they might possibly be even less frequent. They had temperatures of 33°–36°C for one or two weeks but remained in 'excellent condition'.

Today. Ever since the relationship between oxygen and retrolental fibroplasia was suspected paediatricians have been walking the tightrope between giving enough oxygen to prevent cerebral hypoxia and metabolic acidosis but less than that which is now thought to cause post hyperoxia capillary closure and retinopathy. Currently the 'hypoxaemic hypothesis' is receiving much attention and we have to accept that the pathogenesis of retinopathy is not as straightforward as it once appeared to be, especially as the very immature retina seems to be damaged even though the infants have been nursed in nothing but atmospheric air. It is likely that the various problems of the

preterm baby such as respiratory irregularity and pulmonary pathology cause wide swings in oxygen pressure which stimulate retinal and cerebral vasoactivity and these fluctuations may well be as, if not more, important than the actual levels reached, high or low. Unfortunately, continuous monitoring of transcutaneous oxygen tension does not seem to lessen the incidence of retinopathy in infants under 1000 g birth weight—that is, those at greatest risk—though it may help in those over that weight.¹ It was thought that oxygen tensions below that of atmospheric air might be prophylactic but the authors had to admit that their:

'Material is too limited to tell whether there is a greater survival rate with this treatment or fewer cases of retrolental fibroplasia, hyaline membrane disease or cerebral palsy.'

Though it is unlikely that paediatricians today would embark on further investigations of this nature, this was a brave effort in the early days of oxygen therapy studies in the newborn.

Reference

- ¹ Bancalari E, Flynn J, Goldberg RN, *et al.* Influence of transcutaneous oxygen monitoring on the incidence of retinopathy of prematurity. *Pediatrics* 1987;**79**:663–9.

Sven Sjøstedt graduated first from the University of Malmö (1929) and proceeded to Lund where he received his licentiate medical degree in 1938 and his doctorate in 1946. He became Assistant Professor in the Department of Bacteriology (1946) where he had prepared his doctorate thesis on 'Pathogenicity of certain serological types of *E Coli*'; and in 1948 was appointed Assistant Professor in the Department of Obstetrics and Gynaecology.

He moved to one of Sweden's six regional hospitals in Linköping as Head of the Department of Obstetrics and Gynaecology, later becoming Assistant Medical Head of that hospital. Along with other hospital planning he took a major role in the development of the new University in Linköping and is well known as a regular contributor to medical literature. He was one of the last citizens to be awarded the RNO (Knight of the Order of the Northern Star) before such honours were discontinued.

Professor Gosta Rooth (retired 1984) graduated in 1945,

University of Lund. After experience in the Royal Swedish Navy and a year in pathology he joined the Department of Internal Medicine. In 1949 he initiated a lung function laboratory and soon became involved in perinatal research. He moved to Uppsala in 1973 where his wife was appointed Chairman of the Department of Ethnology and where he was appointed to a personal chair in perinatal research. He is well known for his work on acid base balance and more recently for his contributions along with Albert and Renate Huch on percutaneous gas analysis techniques. He has travelled widely to study and as visiting professor in centres in Europe, the Americas, Asia, and Australia. He has numerous

publications to his credit and his book *Acid Base and Electrolyte Balance* has been translated into 10 languages. His recent books include *Roots of Perinatal Medicine* (1984) and *Perinatal Acid Base Balance* (1987). He initiated the Scandinavian Congress of Perinatal Medicine and was, at the time of writing, still Chairman of the International Federation of Gynecology and Obstetrics Standing Committee on Perinatal Mortality and Morbidity. And yet he found time to take an active part in work of his local town council! He is an honorary member of the Finnish and Italian Societies of Perinatal Medicine and was awarded the Maternity Prize of the European Society of Perinatal Medicine in 1980.