This portrait of Charles White (Fig 1) was painted in 1809 when he was 80 years old. Born on 4th October 1728, he was the son of Thomas White, a surgeon and midwife in Manchester. Young Charles served his medical apprenticeship with his father, before going to London to study under William Hunter. There he formed a lifelong friendship with John Hunter, William’s younger brother. After further studies in Edinburgh, he returned to his father’s practice in Manchester and became a member of the famous Manchester Literary and Philosophical Society. In 1752 at the age of 24 he founded the Manchester Infirmary and for 38 years remained its chief surgeon. In 1790, after a quarrel with the hospital management, he, together with all his colleagues including his second son Thomas, resigned and founded ‘a lying-in charity for attendance upon poor married women in their homes’. This charity later evolved into St. Mary’s Hospital, Manchester. Meanwhile, White had demonstrated his originality in a series of surgical publications. In his first paper he proposed removing the ends of the broken bones in cases of ununited fracture. He was also the first to remove the head of the humerus for caries of the shoulder, instead of removing the whole arm. In 1762 at the age of 33 he was elected a fellow of the Royal Society (1-5).

Undoubtedly White’s most important work was his book entitled ‘Treatise on the management of pregnant and lying-in women, and the means of curing but more especially preventing the principal disorders to which they are liable; together with new directions concerning the delivery of the child and placenta in natural births’ published in 1773(6) (Fig 2). This book went through five editions in the next 20 years and was translated into French and German, and reprinted in America. It affected a revolution in the practice of midwifery. Indeed it contains many observations still relevant today. Of particular importance was his contribution to the prevention of puerperal fever some 70-100 years before the works of Semmelweiz, Lister and Pasteur. He appreciated that this condition was contagious and stressed the importance of good hygiene, of drainage of the lochia, and of antisepsis. At a time when 1 in every 25 lying-in women were dying of this disease, he was able to state that in his whole series of normal labours he had never lost a mother from puerperal sepsis.

Above all White had a tremendous admiration for the wonders of natural childbirth, writing: “I might say it is inconceivable that Nature should suffer her most important process to be the least complete, and that she should need the help of art in an operation, almost prior to art itself. In her inferior productions we find that, in fact, she does not require it. The process of renewing the species, in the vegetable creation, is performed entirely by her unerring power: and the fruit when it becomes fully ripened, drops off spontaneously without the hand of art to separate it. In the whole animal race this process is equally distant from disease (there are exceptions). Why then should the human species alone, her noblest production, undergo her unkindness and neglect in so material an object?”

Fig 1 Charles White of Manchester, aged 80, in 1808 (5).

Fig 2 Frontpiece of Charles White’s Treatise on Lying-In Women, published in 1773(6).
For the present I intend to focus on his observations on the importance of not interrupting the feto-placental circulation by prematurely clamping a still-pulsating umbilical cord at birth (Fig 3).

This is what White wrote in 1773:

“The common method of tying and cutting the navel string in the instant the child is born, is likewise one of those errors in practice that has nothing to plead in its favour but custom. Can it possibly be supposed that this important event which takes place in the lungs, the heart, the liver, from the state of a foetus, - kept alive by the umbilical cord, - to that state when life cannot be carried on without respiration, whereby the lungs must be fully expanded with air, and the whole mass of blood instead of one fourth part be circulated through them, - the ductus venosus, the foramen ovale, ductus arteriosus and umbilical arteries and vein must all be closed, and the mode of circulation in the principal vessels entirely altered – it is possible that this wonderful alteration in the human machine should be properly brought about in one instant of time, and at the will of a bystander? Let us leave the affair to nature, and watch her operations, and it will soon appear that she stands not in need of our feeble assistance, but will do the work herself, at a proper time, and in a better manner. In a few minutes the lungs will gradually be expanded, and the great alterations in the heart and blood vessels will take place. As soon as this is perfectly done, the circulation in the navel string will cease of itself, and then, if it be cut, no haemorrhage will ensure from either end.”

Forty-eight years ago I was paediatric registrar to the Birmingham Maternity Hospital (BMH) in Loveday Street. This was the teaching hospital for Birmingham University and took referrals from the whole of the Midlands. Only women with obstetric problems were admitted to its beds. At a time when the national caesarean section rate was 2%, the rate for this hospital was 10 times greater at 20%. Likewise, the perinatal mortality rate in 1960 was high at 71/1000 births, twice the national average. You need to appreciate that there was no provision of neonatal intensive care at that time, and even special care was a new concept. All the babies were looked after in simple nurseries. We acquired our first incubator late in 1960.

Analysis of the causes of neonatal death at the BMH revealed that by far the most important condition was respiratory distress syndrome, almost entirely confined to babies born prematurely (Fig 4). I was particularly impressed by the fact that in 1961 a third of all deaths took place among the 2-3% of infants delivered prematurely before 37 weeks gestation by caesarean section. I was also able to demonstrate that, week by week in gestational age, and after matching factors leading to premature delivery, the incidence of RDS was twice as great after caesarean as compared with vaginal deliveries (Fig 5).
Clearly, there must be some factor associated with the caesarean section that was detrimental to fetal adaptation at birth.

One of my functions as paediatric registrar was to provide resuscitation at birth when needed, especially after caesarean section. By the summer of 1961 I had convinced myself that early cord occlusion in a premature infant whose lungs were still full of fluid, was a major factor in the genesis of respiratory distress syndrome. The observations I made and the physiological evidence in the literature supported my beliefs and, in brief, I argued that maintaining an intact umbilical circulation while respiration was established would avoid a premature rise in systemic blood pressure at a time when resistance to pulmonary blood flow was still high; that the umbilical vein offered a safety valve for any raised central venous pressure in the infant; and that maintaining the feto-placental circulation intact provided the best opportunity for achieving a normal blood volume in the infant. As a result I developed a strategy for resuscitating the infant at caesarean delivery before the cord was clamped. I did this by donning a sterile gown and mask at preterm caesarean delivery and resuscitating the infant as he lay on his mother’s legs before the cord had been clamped or the placenta delivered. As you may imagine this was far from ideal from the obstetricians’ or indeed from my own point of view.

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Fig 6 Delivery of a premature infant with placenta and unclamped umbilical cord.
During the following decade I was mainly occupied with other projects but I was able to find time to attend 24 preterm caesarean sections and manage the babies in the way just described. At an anecdotal level the success of this technique was dramatic (11,12). The babies adapted well and rarely showed any signs of respiratory distress. In January 1972 the professor of obstetrics in Bristol, Geoffrey Dixon, stated that he was totally persuaded of the value of my method and from then on all preterm caesarean infants in his department were delivered in this way. During 1972 and 1973 there were no deaths among normal infants delivered by preterm caesarean section.

The outcome - survival or death – of preterm infants delivered by caesarean section in the maternity hospitals in which I worked between 1961 and 1971 according to whether I was present and used my technique (N=24), or was not present (N=84), in which case the umbilical cord had been clamped and cut at once is shown in Fig 8. I appreciate that this in no way satisfies the rigorous demands of a randomized controlled trial but I think you will agree that the difference in mortality between the two groups is dramatically large (a 3-fold difference) and unlikely to be due to chance. The difference was even greater at the lower gestational ages (a 6-fold difference).

The outcome of fifteen less than 35 weeks preterm caesarean section infants delivered in the University department at Southmead Hospital during 1970-71 is included in the data of Fig 9. The mortality among those delivered conventionally was 5 out of 9 or 65%, while that among those delivered with the placenta and umbilical cord intact was nil. Incidentally, in 1993 Kimmond and her associates (13) in Glasgow also demonstrated the increased incidence of respiratory distress among vaginally delivered premature infants following early clamping of the umbilical cord.

The infant seen in Fig 7 at 1 hour of age following section at 27 weeks gestation delivered with the umbilical circulation intact one hour after Caesarean section in 1974 (see text).

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Returning to Charles White’s book (6), he ended his observations on premature cord ligation by stating: “By this rash, inconsiderate method of tying the navel string before the circulation in it is stopped, I doubt not but many children have been lost, many of their principal organs have been injured, and foundations laid for various disorders.” I have no doubt that he was correct. Premature cord ligation may not only be a cause of respiratory distress syndrome and transient tachypnoea of the newborn but it may also cause haemodynamic circulatory problems (see Fig 10 below).

This is an extract from a paper I wrote in 1984 (14): “I am particularly concerned at the possibility that immediate cord clamping by causing a dramatic and abrupt rise in systemic blood pressure in an asphyxiated preterm infant whose lungs are still fluid filled, may lead to a surge in cerebral blood flow and intraventricular haemorrhage.” (Fig 11, right.)

Four years later, Hofmeyer and his colleagues (1988) (15) confirmed this possibility. They wrote: “The timing of umbilical cord clamping in 18 women with preterm labour was randomly assigned. Ultrasonographic evidence of periventricular/intraventricular haemorrhage, assessed blindly, was found in 77% of the group clamped early compared with 35% of those in whom clamping was delayed for one minute.”

I came across Charles White’s obstetric text in 1965, some four years after I had reached similar conclusions on the importance of maintaining the feto-placental circulation during fetal adaptation to extrauterine life and you may imagine the pleasure I had on reading his account.

Fig 10 Diagram of some of the factors at delivery favouring intraventricular haemorrhage (14).

When White was 83, soon after this bust (Fig 12) was made, he retired to the enjoyment of rural and domestic felicity in his little villa in Sale. It had belonged to his father.
Here he could continue his interest in natural history. Among his published papers were ones on the natural history of the cow, on the regeneration of animal substances, on different kinds of forest trees and on the anthropological length of the upper limb in different races and apes. Sadly he became blind in 1812 and after five months in bed, died on 20th February 1813 at the age of 84. One of his biographers described him as having had “a long life of unremitting exertion and great and extensive usefulness”. The memorial tablet to him in his parish church at Ashton-upon-Mersey described him as “eminent in his profession for the space of sixty years by a dexterity and extent of knowledge scarce exceeded by any of his contemporaries”. So passed one of the greatest obstetricians this country has ever produced. He was the sort of person Euripides had in mind when he wrote:

Happy the man whose lot it is to know The secrets of the earth. He hastens not To work his fellows’ s hurt by unjust deeds, But with rapt admiration contemplates Immortal Natures’ ageless harmony, And how and when her order came to be.

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