Recent Advances

Obstetrics

Philip Steer

Changing Childbirth, the report of the expert committee chaired by Lady Cumberlege,¹ followed the recommendations of the Winterton committee² in emphasising choice: freedom for women to choose a home confinement, pool birth, or elective caesarean section. Choice means shifting much decision making from professionals to women, which many find challenging; it also has cost implications. The flexibility, skill, and knowledge required to give women choice demands higher standards of professional training, particularly for midwives, whose enhanced role has forced obstetricians and general practitioners to rethink their own.

Antenatal screening

Screening for fetal abnormality is a growth industry. Amniocentesis with karyotyping of fetal cells obtained from amniotic fluid at around 16 weeks' gestation was introduced widely in the mid-1970s and is now universal. The association of Down's syndrome with low concentrations of α fetoprotein and high concentrations of β human chorionic gonadotrophin in maternal serum led in June 1993 to a call for providing screening for all who wanted it.³ Soon, however, concern was expressed about inadequate counselling of pregnant women,^{4,5} who commonly find it difficult to understand the statistical concepts of risk without a great deal of help (many professionals find it difficult, too). Since there is currently no national policy on screening, and no additional funding to pay for the extra counselling or for the scans during the first trimester that are essential to confirm gestational age, it is not surprising that nearly half of all obstetricians in Britain feel that the current service is inadequate.⁶ This concern is corroborated by objective surveys of the women themselves.⁷

The introduction of biochemical screening is sometimes accompanied by disillusion at the relatively low sensitivity of the methods, due not just to technical problems but also to the often surprisingly high proportion of women who decline screening or who choose to continue the pregnancy despite a relatively high risk (although a 1% risk of Down's is also a 99% risk of normality, depending on your point of view). Even the inventors of the "Bart's test" reported only a 48% sensitivity in a demonstration project of 12 603 women.⁸ In a study in Wales, over 90% of women accepted serum screening, but this detected only seven of the resulting 17 Down's babies (one woman elected to continue her pregnancy but two other Down's pregnancies were terminated after amniocentesis based on age alone).⁹ In a recent study from north London, none of seven babies with Down's syndrome was detected in 5699 pregnancies screened.¹⁰ The current

Recent advances in obstetrics

- Antenatal screening for Down's syndrome using serum screening and ultrasound is expanding rapidly but remains controversial
- Doppler waveform velocimetry is of value in monitoring the growth retarded fetus but is not suitable for population screening
- There have been major advances in preventing transmission of HIV from mother to baby, but most mothers still decline testing and therefore many babies are being unknowingly (and preventably) infected
- Nitric oxide donors are replacing use of low dose aspirin in the search to prevent pre-eclampsia
- Magnesium sulphate has now been confirmed as being better at treating eclampsia than diazepam or phenytoin
- New epidural techniques free women in labour from both pain and immobility

commercial price for serum screening is £80 per pregnancy; thus it would cost about £55m to screen 700 000 births. Over the four years from 1989 to 1993, there has been a decrease in the birth of babies with Down's syndrome from 1.1 per 1000 births to 0.9 per 1000 births,¹¹ but whether this is due to serum screening, improved ultrasonography, or a natural fall is unknown.

The picture is now being complicated by the advent of fetal nuchal skin fold thickness measurement, which was first described about eight years ago. There are enthusiastic advocates of this method of screening, including Professor Nicolaides at the Harris Birthright Centre in London,¹² who has reported its use in over 20 000 women with a sensitivity exceeding that of serum screening (K H Nicolaides, personal communication). Moreover, because nuchal skin fold thickness and serum markers are not correlated, their combination promises increased sensitivity and specificity.¹³ Others, however, are less enthusiastic. Some have reported that nuchal skin fold thickness does not predict chromosomal abnormalities other than Down's syndrome,¹⁴ while yet others have found that sensitivity varies widely, according to the skill of the ultrasonographer.¹⁵ In an American study of 1375 women undergoing second trimester amniocentesis for advanced maternal age (albeit at 14-20 weeks' gestation, rather than at the 10 weeks usually recommended), only one of 17 fetuses with a skin fold thickness of 6 mm or greater had Down's syndrome,

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and only one of 13 babies with Down's syndrome had neck skin this thick (an 8% sensitivity). The report concluded that this sign was a poor and unreliable screening test for Down's syndrome.¹⁶ A recent study from University College, London, has found that reproducibility of the method is poor, which is likely to limit its usefulness in routine screening¹⁷; it was not feasible in 18% of pregnancies. The same group has reported a sensitivity of only 40% in a pilot study of screening in the general population.¹⁸

Not only is screening for fetal anomalies expensive and of unproved efficacy (there are no prospective randomised controlled trials), it is also contentious. Detailed ultrasonography continues to discover more and more potential abnormalities, many of which are thought to be important and then turn out to be less so—for example, isolated choroid plexus cysts.^{19, 20} This can lead to ethical dilemmas relating to second and third trimester termination of pregnancy, now that this is legal in Britain for "serious fetal abnormalities." Only 13% of British obstetricians would be prepared to recommend termination of pregnancy for Down's syndrome discovered after 24 weeks' gestation,²¹ and some consider that such terminations are unethical and inconsistent with professional integrity.²² These issues deserve a much wider public debate than they currently receive; many parents assume that antenatal screening is more or less obligatory, and they are sometimes relieved to find that it is not.

Doppler ultrasonography

Doppler ultrasonography to evaluate human fetal blood flow was introduced in the early 1980s, alongside the increasing use of realtime B mode ultrasonography.²³ An association was soon recognised between impaired diastolic flow velocities in the umbilical artery and fetal aorta with fetuses who were small for gestational age, particularly those shown subsequently to be growth retarded.²⁴⁻²⁶ Impaired diastolic flow in such fetuses indicates an increased risk of fetal hypoxia and acidosis,²⁷ neonatal necrotising enterocolitis,²⁸ and other neonatal morbidity.²⁹ The use of Doppler for the surveillance of small for gestational age fetuses was found to result in fewer admissions and caesarean sections than monitoring with cardiotocography.³⁰ Early randomised trials of routine versus selective use in high risk pregnancies had conflicting results,^{31, 32} but a recent trial with 20 cases of fetuses suspected to be small for gestational age in which end diastolic velocities were absent reported only one death in the 10 cases where the results were revealed to the clinicians but six in the group where the results were concealed.³³

Fetal nuchal skin fold thickness can predict Down's syndrome, but the reliability of this method is in doubt

The usefulness of Doppler assessment in pregnancies complicated by intrauterine growth retardation is now widely accepted.³⁴ However, we must resist using the technique in uncomplicated pregnancies, as three large studies have shown no benefit from its use as a population screen.³⁵⁻³⁷ Why absent end diastolic flow is of little significance in otherwise normal pregnancies remains to be explained. The situation may be clarified by the use of colour Doppler, which allows the identification of fetal intracerebral arterial vasculature and can show the redistribution of fetal blood flow in response to hypoxia.³⁸ It also allows greater precision in the definition of fetal cardiac anomalies, which may enhance the detection of Down's syndrome.³⁹

Human immunodeficiency virus

Another contentious issue is population screening for HIV infection in pregnancy. The vertical transmission of HIV from mother to baby represents one of the most tragic aspects of this devastating epidemic. Early data suggested that almost a third of babies born to mothers with HIV were infected, but that this proportion could be halved by not breast feeding.⁴⁰ More recently, the European collaborative study has suggested that caesarean section reduces transmission by a further 40%.⁴¹ The pediatric AIDS clinical trials group in the United States has shown a 60% reduction associated with zidovudine given to the mother antenatally up to the moment of birth.⁴² It seems likely that with these three precautions vertical transmission can be reduced to less than 5%.

Despite the advantage to the baby of the mother knowing she is HIV positive and taking measures to prevent transmission, more than 85% of HIV positive pregnant women (detected by anonymous screening) in Britain fail to have themselves tested at booking and thus remain unaware of their infection.⁴³ For several years the Chelsea and Westminster Hospital in London has offered named HIV testing to all pregnant women on booking. For the past year it has been emphasised that knowing their HIV status may save their baby's life. Despite this, uptake remains below 15%. A similar experience has been reported from other maternity units in inner London (C Hudson, personal communication), and currently the Department of Health is funding a prospective study in six such units to determine the reasons for the poor uptake. Local studies reveal wide variations in uptake according to who does the counselling, and staff attitudes are probably important. However, there is probably also a need for a national campaign to publicise the important benefits to the baby of the mother agreeing to be tested and treated appropriately if she is positive for HIV.

Pre-eclampsia, aspirin, and nitric oxide

Pre-eclampsia has sometimes been called the disease of theories. In the 1950s it was widely believed to be a disorder of carbohydrate metabolism, while in the 1960s the use of antihypertensive agents was explored. In the 1970s, angiotensin II was seen as the villain, while in the 1980s an imbalance of platelet thromboxane A₂ and endothelial prostacyclin was blamed. This led to an explosion of interest in the use of low dose aspirin to "correct the imbalance," fuelled by several small trials which reported that aspirin produced a dramatic reduction in the incidence of pre-eclampsia and intrauterine growth retardation. In the 1990s, however, the value of aspirin has been challenged. Firstly, an Italian randomised study of 1106 pregnancies showed no effect on the incidence of pregnancy induced hypertension or intrauterine growth retardation.⁴⁴ Secondly, although a randomised

Normal Doppler waveforms in umbilical artery. We must resist using the technique in uncomplicated pregnancies

trial including 3135 women in the United States showed a 30% reduction in the incidence of pre-eclampsia, the 95% confidence interval of the relative risk ranged from 0.6 to 1.0, and there was no effect on birthweight.⁴⁵ Worryingly, there were 11 cases of placental abruption in the aspirin group, compared with only two in the controls ($P=0.01$). Finally, the randomised CLASP study from Britain of 9364 women showed only a 12% (non-significant) reduction in the incidence of proteinuric pre-eclampsia, although the risk of preterm delivery was significantly reduced, from 22.2% to 19.7% ($2P=0.003$).⁴⁶ This study did not find an increased risk of placental abruption, but it concluded that although low dose aspirin is generally safe, its use is justified only in women at high risk of early onset severe pre-eclampsia such that delivery very much before term would be necessary (which means that to be of value aspirin must be started early in the second trimester). In the average maternity unit, these conditions are likely to be fulfilled only about half a dozen times a year.

Nitric oxide, an inorganic free radical gas, is currently the molecule of the 1990s. It is highly reactive and shortlived in the body, which explains why its role as a neurotransmitter and smooth muscle relaxant has been characterised only in the last few years.⁴⁷ There are suggestions that impaired production of nitric oxide is associated with pre-eclampsia,⁴⁸ and work from this and other units has suggested an association with intrauterine growth retardation.⁴⁹ Already there are reports of the use of nitric oxide donors (in the form of glyceryl trinitrate patches) to suppress preterm labour.⁵⁰ It is important, however, that such treatments are not used outside clinical trials until their efficacy is confirmed and their side effects defined.

A dispute between the old world and the new world in relation to the treatment of eclampsia has finally been settled by a major international multicentre randomised trial.⁵¹ There is now little doubt that magnesium sulphate, long favoured by the Americans, is better at treating eclampsia than either diazepam or phenytoin, currently preferred in Europe.⁵² We will have to change.

Advances in anaesthesia and analgesia

The management of pain in labour continues to improve. Epidural anaesthesia has been widely used for several decades and produces excellent pain relief. However, it has been associated with an increase in the rates of caesarean and instrumental delivery,⁵³ long term backache,⁵⁴ and fetal acidosis during caesarean section.⁵⁵ These effects have been attributed to muscular paralysis and effects on blood pressure.

Recent developments include reducing the concen-

tration of bupivacaine from 0.5% or 0.25% to 0.1% or less, with the addition of fentanyl 0.0002%. The speed of onset can be enhanced by giving an initial dose into the cerebrospinal fluid with a 24 gauge needle. This produces improved analgesia with far less motor block,⁵⁶ allowing greater mobility in labour. The initial spinal injection drops maternal blood pressure more than a conventional epidural but less than a conventional spinal.⁵⁷ The technique increases maternal satisfaction, but disappointingly it has not so far been shown to improve the outcome in terms of mode of delivery.⁵⁵ The effects on long term backache remains to be seen.

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Lesson of the Week

Don't twist my child's head off: iatrogenic cervical dislocation

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"Wry neck" in children may be due to atlantoaxial rotatory subluxation and should be promptly evaluated by detailed cervical spine radiography

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Excessive rotation of two children's necks while they were undergoing cervical lymph node biopsy probably resulted in their dislocation; delayed diagnosis necessitated complex spinal surgery to correct the deformity. "Wry" neck, a synonym for atlantoaxial rotatory subluxation, is a relatively common condition in young children often associated with tonsillitis. It usually resolves spontaneously,¹ because the joint surfaces remain in contact. A rotation injury is another possible cause, often following an apparently minor trauma such as heading a football. Iatrogenic torticollis is rarely reported. A complete dislocation of the atlantoaxial joint will not resolve spontaneously and may have important long term effects on the child's facial development. We have treated two otherwise normal children whose necks were dislocated under general anaesthesia while they were undergoing cervical lymph node biopsy. The injury was not appreciated at once and definitive treatment was inevitably delayed.

Case reports

CASE 1

A 10 year old girl underwent lymph node biopsy from the posterior triangle of her neck. After surgery she awoke with a torticollis, a painful neck, and occipital dysaesthesiae. These symptoms ultimately subsided on conservative treatment but the torticollis persisted. Radiography at that stage showed atlantoaxial rotatory dislocation. This failed to reduce following manipulation under anaesthesia and a period of traction performed three months later. At that stage, an upper cervical laminectomy was inappropriately performed in the mistaken belief that spinal cord compression played an important part in the patho-

logical cause. There was no change in the deformity or neurological status. She was subsequently referred to this neurosurgical unit 15 months after the original injury, at which stage minor facial asymmetry was apparent. The atlantoaxial dislocation was explored and reduced successfully via an open operative (the "extreme lateral") approach.²

CASE 2

A 6 year old girl underwent lymph node excision biopsy from the right side of her neck for persistent lymphadenopathy of unknown cause. On return from theatre she was reported as having a torticollis (fig 1) and neck pain, which was attributed initially to focal pain at the site of the incision. When this did not improve over the next few months further investigations, including electromyography (which showed that this was not a spasmodic torticollis), and, later, computed tomography with 2D and 3D reconstructions, were performed. These showed an atlantoaxial rotatory dislocation which, not surprisingly, failed to reduce by closed methods eight months after the lymph node excisional biopsy. One year after the original injury she was referred to our neurosurgical unit for further evaluation and treatment. The atlantoaxial complex was again exposed by the "extreme lateral" approach and reduction was achieved, with postoperative immobilisation achieved by the use of a halo jacket for 10 weeks.

Discussion

Around 70% of all paediatric spinal injuries affect the upper cervical spine.³ This is due to a combination of factors including ligamentous laxity, poorly