Neutral Citation Number: [2025] EWHC 3402 (KB)

Case No: KB-2023-001061

IN THE HIGH COURT OF JUSTICE
KING'S BENCH DIVISION
CLINICAL NEGLIGENCE

Royal Courts of Justice
Strand, London, WC2A 2LL

Date: 23/12/2025

Before :

His Hon. Judge Dight CBE, sitting as a Judge of the High Court

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Between :

LMN	**Claimant**
(a protected party suing by his mother and litigation friend, PQR)	
- and -	
SWANSEA BAY UNIVERSITY HEALTH BOARD	**Defendant**

- -
- -

Miss Catherine Ewins (instructed by **Hugh James**) for the **Claimant**
Mr Jonathan Holl-Allen KC (instructed by **NWSSP Legal and Risk Services**) for the **Defendant**

Hearing dates: 1st to 4th and 7th to 11th April 2025

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Approved Judgment

This judgment was handed down remotely at 10.30am on 23rd December 2025 by circulation to the parties or their representatives by e-mail and by release to the National Archives.

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HIS HON JUDGE DIGHT CBE

His Hon. Judge Dight CBE:

1. The claimant was born by caesarean section at 20:34 on 14 February 2003 at the Princess of Wales Hospital, Bridgend ("the Hospital"). He was profoundly asphyxiated at birth and suffered ischaemic brain damage with four limb cerebral palsy and permanent neurological disability leading to his motor function being assessed at level II on the Gross Motor Function Classification System. I was told that he has a life expectancy of 78. The claimant lacks capacity to litigate and is represented by his mother in these proceedings, acting as his litigation friend. At the commencement of the trial I made an anonymity order and therefore I will refer to the litigation friend in this judgment as "the Mother". The defendant's predecessor authority was responsible for the administration of the Hospital and was the employer of the obstetric and midwifery staff there and it is agreed that the defendant board is now responsible in law for the acts and omissions of all clinical staff at the Hospital at the date of the claimant's birth. For the sake of simplicity I will refer to the authority as the defendant without distinguishing between the responsible authority in 2003 and its successor in title.

2. The claimant says that his injuries were caused or materially contributed to by the negligence of the defendant. Both breach of duty and causation are in issue. The question of the quantum of potential damages is not before me. The defendant says that there was no breach of duty in this case and that even if there were the claimant would have sustained the same injury.

3. The period of time between incision on commencement of the caesarean section and delivery of the claimant was 17 minutes because of the impaction of the baby's head. The evidence shows, in my judgment, that it was during this period that the injury to the baby was caused. This period of time was out of kilter with the extensive medical literature to which I was taken and was accepted by the obstetric experts as being exceptional.

4. The claimant says, in essence, that there was a negligent delay in delivery. It is submitted that there were several negligently delayed steps in reaching commencement of the caesarean section. It is common ground that the baby's head was severely impacted and that freeing it took some time during the course of delivery and that the delay led to cord compression and hypoxia (deprivation of oxygen) which in turn led to permanent damage. The claimant's case is that the period of hypoxia was in fact about 13 minutes and the period of damaging hypoxia was about 2 to 3 minutes in duration. The experts on causation agreed in their joint report following a meeting on 9 November 2024 that if the baby had been delivered within 10 minutes of opening the uterus he would probably not have sustained any permanent brain injury. In general terms they appear to have agreed that a baby can withstand approximately 10 minutes of hypoxia without damage. The range of damaging hypoxia thereafter in this case is said to be between 2 and 5 minutes but the experts were not agreed as to the precise period. Again, in general terms, it is agreed that it was during the final few minutes of the delivery that the claimant suffered the damaging hypoxia.

5. The claimant argues that had the defendant not negligently delayed in taking various steps leading up to the commencement of the caesarean section the baby's head would have been less impacted and delivery would have been swifter meaning that there would have been no damage caused by asphyxia. In the claimant's skeleton for trial

and in closing and in the course of submissions various time scales were suggested for delivery according to the timing of the steps in the sequence of actions necessary to deliver the baby. At least three different scenarios were suggested which, it was submitted, would have led to the delivery of the baby without damage. The claimant says that with appropriate care delivery should have been achieved by 19:30 to 19:40 as opposed to the actual delivery time of 20:34. The alternative non-negligent delivery times posited by the claimant are 19:55 and 20:29. The claimant's case is that if the period of hypoxia had been reduced to no more than 10 minutes there would have been no damage to the baby.

6. It is common ground that the interval of 17 minutes between uterine incision and delivery in this case was much longer than would ordinarily have been expected. It is said that in usual circumstances delivery takes place within approximately 3 minutes of incision.

7. The defendant accepted that the claimant suffered damage as a result of "a period of acute profound hypoxia immediately before his delivery" (para 32(ix) of the Defence). It says, in the final paragraph of counsel's skeleton argument for trial:

> *"[The claimant's] brain injury was not caused by mismanagement of his labour, but occurred as a consequence of impaction of the fetal head, which could not have been foreseen."*

In other words the defendant submitted that the alleged delay in undertaking the various steps in the sequence of actions leading to delivery made no difference because the hypoxia was caused by the delay due to impaction which would have been the same at whatever time delivery occurred after about 18:30. The defendant accepts that if it had been possible to disimpact the baby's head and deliver him just a few minutes earlier he would have avoided all injury.

8. The claimant's alternative case is that if medical science does not allow me to make a finding as to the precise timing when various steps should have been taken and as to the impact of them but I am satisfied that an earlier delivery would have made delivery easier and quicker then I should find that the negligent delay was a material contribution to the claimant's injury entitling the claimant to succeed on the issue of liability.

9. The issues therefore, in very broad terms, are whether there were negligent delays in getting to delivery of the baby and whether, but for those delays, the baby's head would have been less impacted with the consequence that the delivery would have been swifter and the period of hypoxia shorter (and no more than 10 minutes) with the result that the baby would have suffered no damage.

The evidence

10. The claim relates to events which took place more than 22 years before trial. There were three witnesses of fact, the Mother, Mrs Carole Bartle, then a midwife with primary care for the Mother, and Mr Siddhartha Mukherjee, an obstetrician who, in the final 5 hours or so before the birth, examined the mother, advised her, made decisions about her care and delivered the claimant. He was undertaking a locum

registrar's shift in the labour ward of the Hospital on the day of the claimant's birth. Insofar as these witnesses have independent recollections of what happened in a stressful and distressing situation such a long time ago the recollections of the Mother, Mrs Bartle and Mr Mukherjee are obviously imperfect and affected by the passage of time.

11. However, the parties have been able to put before me a significant quantity of contemporaneous manuscript notes from July 2002 onwards, which include the notes made at the time (whether at the exact time of the events which they purport to record or within a few hours) by Mrs Bartle and Mr Mukherjee and others, including a student nurse who was being supervised by Mrs Bartle and whose notes include details of Mrs Bartle's observations. In the course of their live oral evidence the witnesses have helped me to decipher those notes and they used them to jog their memories or explain what their practices would have been at the time. I also have the records of the anaesthetist and the haematology department. The notes, taken as a whole, provide a relatively complete record of the events relevant to the issues which I have to determine.

12. Finally, I have a printed copy of the continuous trace of the fetal heart rate and contractions monitored by cardiotocography, an electronic continuous recording and monitoring system, referred to as the CTG ("the CTG"), which records in parallel in graphic form the fetal heart rate and the uterine contractions. The CTG gave rise to a considerable dispute between the parties who could not agree as to its interpretation at what they each relied on as significant moments or periods of time in the course of the afternoon and evening of 14 February 2003. The heart rate and contractions are recorded on a continuous roll or strip of paper which is read at the time by the treating staff and used in the course of their analysis of the state and condition of the baby and mother. The CTG in this case was not of perfect quality, and had gaps, but the parties were able to provide me with a colour print of the clearest and most complete version of the trace. Nevertheless, even with a better copy, the parties could not agree on what the trace showed and the oral evidence in respect of it differed markedly in its interpretation. In closing it was submitted on behalf of the claimant that if the defendant was unable to produce a trace which was the product of a monitor which functioned correctly at the time the court should prefer the claimant's analysis of it. However, it seems to me that it would be wrong in principle to approach the analysis of the trace in that way. It was obvious from the evidence of Mrs Bartle, the midwife, and Mr Mukherjee, the obstetrician, that they were able to read the trace at the time. They were able to help me interpret it at trial and explain its significance. It is of evidential value but ultimately I formed the view that the trace was not as significant in resolving the central issues in this case as the time spent on its analysis otherwise suggested, as I will explain in greater detail when I turn to the specific allegations of negligence.

13. The Mother, in her evidence, accepted that there would be matters which she would no longer be able to remember after more than 20 years. In the witness box she said that she remembered the birth as being very traumatic and she still remembered the pain. By the time that the claimant was delivered the Mother said that "[i]t was all a bit of a blur". In cross examination she was taken through the contemporaneous medical records but while she remembered a few of the recorded steps there were many that she did not and she could not help with the time at which they were noted

to have occurred. Her overall memory at this distance seems to have been of the pain and discomfort which she was suffering. In considering her evidence I have taken into account the length of time since the birth of her son and the fact that she was undergoing what must have been a stressful experience during the course of which she underwent a number of procedures which would have had an impact on her ability to recall every step of her treatment by the defendant. I agree with what Ms Ewins said in her written closing submissions "The evidence of the Claimant's mother was obviously honest. She was giving her true and sincere account." I accept, without hesitation, the Mother's limited recollection of the events of 14 February 2003 and her evidence as to the impact on her son.

14. On retirement Mrs Bartle had been a Community Midwife Manager. She had been based at the Hospital. At the time of the claimant's birth she had 15 years of experience working for the Abertawe Bro Morgannwg University Health Board in Bridgend. When she came to give evidence Mrs Bartle confirmed the contents of her witness statement dated 31 January 2024 in which she said that she had no recollection of the events which this claim concerns and that her evidence was based on the records which she made at the time, which she helped me understand during the course of the trial. In giving live oral evidence Mrs Bartle explained the notes which she had made, and those which the student midwife had made under her supervision and which she had checked for accuracy, and where she was not able to answer a question in cross-examination by reference to the notes she explained what her practice would have been. She explained that a comprehensive note, written retrospectively at 22:00 on the day of the birth, would have been written up from contemporaneous notes written on pieces of paper which she retained or on the leg of her "scrubs" until she had time to write up a full note. I accept that the full note, albeit written retrospectively (and noted by her at the time as having been written retrospectively), which I have read, is an accurate record of her observations from 19:15 onwards and it has informed my finding of facts below.

15. Mrs Bartle was a careful, open and patently honest witness who demonstrated very obvious concern for her patients, both Mother and baby, and was distressed by what had occurred in this case. She was not an overly confident witness and, indeed, as her time in the witness box wore on she became visibly distressed by the trial process and I find that to the end of her cross-examination she appeared to accept adverse propositions which she would not have done had she not been distressed and which I find she had no need to accept. I do not accept that they were "appropriate concessions" as described in closing and I place little weight on those apparent admissions which were out of step with the rest of her evidence given when she was not as clearly anxious to leave the witness box. I place greater reliance on her comprehensive written notes and records compiled at the time, including those which she told me she wrote on her scrubs because of a shortage of time and wrote up in the formal records later that day.

16. I find that when Mrs Bartle came on duty in the afternoon of 14 February 2003 and began to look after the Mother she read and familiarised herself with the Mother's medical notes and was aware of her condition insofar as it was recorded in the notes. I accept that she assessed the Mother herself and became aware of the extent to which the Mother was dilated and was also aware of the position of the baby (and the pain

implications of the position for the Mother) and the fact that the birth was in the process of being induced because of the Mother's symptoms and risk.

17. It is clear to me, having regard to her evidence and her notes, that during the time that she was caring for the Mother and unborn child that Mrs Bartle acted in what in her view were their best interests and in accordance with what she understood to be good practice for a midwife in a district general hospital in 2003.

18. Mr Mukherjee is currently a locum consultant in obstetrics at the Singleton Hospital in Swansea. He trained overseas (where since his graduation in 1987 he had undertaken post-graduate training and acted as a Senior Registrar in two hospitals) and had been in practice in the United Kingdom from February 1994. In his witness statement dated 26 February 2024 he described himself in February 2003 as a Senior Middle Grade at the Prince Charles Hospital in Merthyr Tydfil with 10 years of experience working in Obstetrics & Gynaecology in the United Kingdom. He had rotated between 4 different hospitals in the South Wales area between 1994 and 2003. He was therefore an obstetrician of some considerable experience at the time that he was called on to assist at the birth in this case. He went to Canada to work as a consultant in 2004 and took up work again in the United Kingdom in 2021. At the time of the trial he was working providing emergency obstetric training to medical professionals. He had the appropriate training and qualifications and experience to handle the birth in this case, subject to the supervision of the consultant, Mrs Nagrani, whom the records show (see my factual findings below) was regularly consulted and who approved the steps proposed by Mr Mukherjee.

19. Although he says in his witness statement "Unfortunately I do not recall the patient, given the time duration of 20 years" he was able to explain clearly what his usual practice at the time would have been and how I should understand his detailed contemporaneous notes.

20. At the beginning of his cross-examination Mr Mukherjee gave evidence about the time which he had spent working in Canada. Ms Ewins challenged his credibility and sought to introduce a document dated 18 March 2020 entitled "Record of Determinations – Medical Practitioners Tribunal" which recorded proceedings against Mr Mukherjee before the Medical Practitioners' Tribunal arising out of events which had taken place in Canada in 2013 or thereabouts concerning his relationship with a woman that he had worked alongside in Canada. For the reasons which I gave in an oral ex tempore judgment during the course of the trial I ruled that the claimant could not rely on this report, essentially because it was irrelevant to the issues which I had to try, had no probative value in respect of the issues in the instant case and was of limited value as to credit. Insofar as it is suggested that Mr Mukherjee was not an honest witness, having heard him give evidence at considerable length, I reject that suggestion.

21. I found that Mr Mukherjee tried to help as much as he could with piecing together the events of 14 February 2003. Because he was the senior clinician responsible for the care of the Mother and baby on the day and was necessarily the focus of much of the criticism concerning what occurred and although he, also necessarily, sought to explain how that care that he provided and the decisions which he made were reasonable and, unsurprisingly, sought to protect his reputation, I did not find him unduly defensive and I did not find that he formulated his answers so as to cover up

what happened. The fact that Mr Mukherjee was at times somewhat enthusiastic (and protective) in the way in which he answered questions did not lead me to conclude that he was dishonest. I accept that he is, and was at the time, a professional man of considerable experience whose evidence was honest albeit given in forthright terms on occasion. The accuracy of his evidence is to be measured against the detailed contemporaneous notes which he and others made. I find that the notes which he made at the time were an honest, detailed and accurate record of his assessments, his plans, his advice, his actions and the outcome of his actions. His oral evidence was supported, and corroborated, by the contemporaneous records.

22. Mr Mukherjee summed up his position in paragraph 14 of his witness statement as follows:

> *"I consider that I acted in a systematic way, with objective evidence of fetal blood sampling. I transferred the patient to theatre, and undertook trial of forceps in a safe setting, with adequate anaesthetic cover, enabling me to revert to caesarean section without any delay following failed trial of forceps. I also dealt with the issue of deeply impacted fetal head: the fetus was impacted in OP position, with occipito-frontal diameter, which made it extremely difficult to disengage the fetal head, resulting in a significant delay in delivery."*

That summary is consistent with the notes which he made at the time.

23. I also had the benefit, which I will consider in greater detail below, of the expert evidence of a number of specialists in disciplines relevant to the issues in this case. All except Ms Greta Beresford were called to give evidence:

Claimant's witnesses

i) Mrs Helen Stanley – a midwife, who prepared a report dated 21 June 2024 commenting on the allegations of negligence. Her curriculum vitae and evidence disclosed that she is heavily involved in the business of litigation, with her medical work taking very much a secondary role. That caused me to pause in evaluating the objectivity of the expert opinion evidence which she gave, which was, to my mind, uncompromisingly critical of the defendant. In cross-examination Mrs Stanley "stuck to her guns" and was not prepared to yield to suggestions put in cross-examination even when, in my view, it might have been more appropriate at least to soften her stance;

ii) Professor Dimitrios Siassakos – a Professor in Obstetrics at University College London and Honorary Consultant in Obstetrics at University College London Hospital, who prepared two reports, dated August 2024 and January 2025 which covered both whether there had been a reasonable standard of obstetric care and causation of the injury in this case. He has a very impressive curriculum vitae and is engaged in work of national importance intended to drive the standards of obstetrics in this country upwards and improve the care for mothers and babies. Because of his enthusiasm and focus on improving standards of obstetric care it was submitted on behalf of the defendant that I should approach his evidence as to minimum standards of care in a district

hospital in 2003 (at a time when he was a relatively junior doctor) with a degree of caution. In the witness box Professor Siassakos, who was a very energetic witness, found it difficult to provide simple answers to the questions which he was asked often providing considerable background detail and explanations which were not strictly necessary. I have to admit that at times I had difficulty in following his train of thought and the answers which he gave because they were not sufficiently focussed on the issues which I have to decide. I am unable to give his evidence the weight which he attached to it concerning relevant standards in 2003, the allegations of negligence in this case and the question of causation (which appeared to be out of line with the other experts who gave evidence on the issue of causation). I explore his evidence on both of these issues in further detail below;

iii) Dr Tony Ducker – a retired Consultant Neonatal Paediatrician who prepared a report dated 1 June 2024. His evidence was not particularly controversial;

iv) Dr Keith Pohl – a Consultant Paediatric Neurologist who prepared a report dated July 2024 to identify the likely cause of the claimant's neurological disability.

Defendant's witnesses

v) Mr John Spencer - a Consultant Obstetrician and Gynaecologist at the time of the events in this case who prepared a report dated July 2024 covering both the alleged breaches of duty and causation. Although he was cross-examined as to credit on the basis of his dismissal from the NHS, as I set out in greater detail below, I find that he was an honest witness who gave careful and logical answers to the questions which he was asked. I do not accept that the circumstances in which he came to leave the NHS have an adverse impact on my view of his expertise or his ability to provide impartial expert opinion evidence to the court;

vi) Dr Janet Rennie – a retired Consultant in Neonatal Medicine who prepared a report dated July 2024. Dr Rennie was the draftsman of the joint causation report to which the other causation experts contributed amendments before they all signed it. As I set out in greater detail below she is an eminent practitioner and academic who gave compelling evidence. I have relied heavily on her evidence, both written and oral, which was careful, logical and, if I may say so, clearly explained;

vii) Dr Shakti Agrawal – a Consultant Paediatric Neurologist who prepared a report dated July 2024. He was an impressive witness whose logical analysis of the events which he dealt with was compelling; and

viii) Ms Greta Beresford – a practising midwife at the time of the alleged incident who prepared a report dated July 2024 in respect of the allegations of negligence but for logistical reasons was not called to give evidence at trial although she had been present in court throughout most of the evidence of the other witnesses. I have also been provided with a note of the joint meeting of the midwifery experts dated 5 November 2024. Although Ms Beresford was not called to give evidence, and the claimant's counsel was therefore deprived

of the opportunity of cross-examining her, I have read her report and her views as expressed in the note of the joint meeting and given them such weight as in the circumstances (including the inability to test them in live oral evidence) as I think they merit.

ix) There was written evidence of two neuroradiology experts on the issue of causation, Professor Griffiths for the claimant and Dr Likeman for the defendant, who were not called to give live evidence in light of their agreement.

24. I was also taken to the following joint reports or minutes of meetings of the experts:

i) The notes of the meeting of the midwifery experts which took place on 5 November 2024;

ii) The joint report of the expert obstetricians dated 6 November 2024;

iii) The agreed note of the meeting of the expert neonatologists and paediatric neurologists dated 9 November 2024.

25. During the course of the expert evidence the witnesses and I were taken to a significant quantity of what was collectively described as medical literature consisting, in the main, of published papers on various aspects of medical practice and outcomes said to be relevant to the issues which I have to decide. I have, in considering the quality of the expert evidence, and reaching my conclusions, looked again at and taken such medical literature into account but I have refrained from citing it in detail in this judgment save where it is, in my view, of absolutely central importance and is capable of assisting me in determining the issues.

The Facts

26. The Mother was born on 22 March 1983 and the claimant was her first child. She was 19 years old at the date of the birth. She gave evidence and confirmed the contents of her witness statement dated 11 December 2023. The Mother was under the care of the defendant. The estimated date of delivery was 16 February 2003. She said that the pregnancy itself was relatively straightforward, but she developed high blood pressure and at an early examination there was evidence of protein in her urine and she was later diagnosed as having pre-eclampsia. Mr Spencer, the defendant's obstetric expert, accepted in cross-examination that the Mother had pre-eclampsia prior to admission to the Hospital but said that according to the relevant clinical standards in 2003 she did not need treatment for it unless the diastolic blood pressure reading was too high. His evidence, which I accept for the reasons he gave, was that it was not considered to be severe pre-eclampsia at the time.

27. In the joint report of the obstetric experts pre-eclampsia is defined in the following terms:

> *"Pre-eclampsia is a multisystem disorder that develops in previously normotensive women after 20 completed weeks of gestation (with no pre-existing renal disease). It is characterised by:*

– hypertension (defined as blood pressure [at or above] 140/90 mm/Hg, on two separate occasions at least two hours apart

and

– proteinuria (significant proteinuria [greater than] 0.5g in 24 hours in the absence of urinary tract infection

both of which resolve by the sixth postpartum week."

28. The Mother's general practitioner referred her to the Hospital and on 22 January 2003, at 36 weeks of gestation, she was admitted and was noted to have some swelling, protein in her urine and high blood pressure.

29. On 10 February the Mother was examined and the fetal head was found to be 2cm above the ischial spines. Her blood pressure was 151/95.

30. The Mother was admitted again on 11 February 2003 for assessment but she remained in hospital until after the birth of her son. Her blood pressure was recorded as 160/90 at about 08.30 in the morning and subsequently varied over the coming days. Her ankles were swollen.

31. At 08:00 on the morning of 13 February the Mother's blood pressure was raised. The contemporaneous notes for that timing are difficult to decipher and suggest a reading of between 110 and 180 over 100. It seems to me that a reading of 140 or 150 over 100 is more consistent with the other data for that time of the morning. By 15:00 it was 140/95 which is approximately where it remained for the remainder of that day. At 10.20 the Mother was prescribed Prostin to bring on contractions. At 17:45 the notes record that the Mother was having contractions and was distressed and vomiting. Her cervix was 2cm dilated. She was given a small amount of paracetamol and offered a TENS machine to help with the pain. Later that night, at 22:45, her waters broke. She was apparently not in pain having declined analgesia apart from the occasional paracetamol tablet, until the following morning.

32. By 08.30 on the following morning, 14 February, the Mother was in some pain as a result of which she was advised to take a bath and then use the TENS machine. Her cervix was still at 2cm and the fetal head was still 2cm above the ischial spines. At 11:25 she was described as "coping well at present", although shortly afterwards she was said to be becoming more distressed while having contractions and was given pethidine and an anti-emetic. The Mother's evidence was that neither the painkillers nor the TENS machine helped her very much and by 14:20 she was requesting further analgesia. It was noted that her cervix was, by then, 8cm dilated.

33. The records at that point note that it felt like the fetus was in what is formally known as in the occiput posterior position (referred to in the notes and elsewhere as "OP") meaning that the baby's head was down but the back of the head was facing the mother's back rather than her front (ie the baby's back was parallel with the mother's back), which is known to give rise to greater complications than when a baby is in the occiput anterior position. A paper by A.R.Sizer named "Occipitoposterior Position: Associated Factors and Obstetric Outcomes in Nulliparas" dated 1 November 2000 noted that *"[t]here was a higher incidence of instrument and emergency caesarean*

deliveries in occipitoposterior compared with occipitoanterior labors (43.7% versus 24.4%, 41.7% versus 13.7% respectively..)" I also note that Mrs Bartle, who had considerable experience as a midwife, agreed that the fact that the baby was OP increased the likelihood of the need for an assisted delivery but went on to say that she had been present at very many births where the baby's position was OP but did not need an assisted delivery and were born spontaneously.

34. There is a conflict in the notes as to whether the Mother was transferred to the labour ward at 15:10 or 15:30 but it is apparent that at about this point in time she was given nitrous oxide, which was noted to have been beneficial. Her blood pressure was recorded variously as 160/68 and 160/90 rising to 180/90 by 15:45, which the claimant says should have prompted an obstetric review and should have led to consideration of immediate epidural anaesthesia which would have reduced the Mother's blood pressure as well as relieving her pain. Mr Spencer's evidence was that this rise in blood pressure was, in the circumstances of her move to the labour ward, not significant. It does not seem to me that, in the context of the Mother's general blood pressure readings, and the subsequent blood pressure readings, that this particular reading was such as to have prompted some type of intervention. The Mother's blood pressure continued to be monitored, and is noted to have fallen. In any event, any failure to manage this isolated spike in blood pressure has no causative link in my judgment with the injury later suffered by the claimant.

35. The continuous monitoring of the fetal heart rate began at 15:45 recorded separately in the notes as being 130bpm at that moment and 132bpm 30 minutes later with "some early decelerations [followed by] good recovery". Mrs Bartle was taken through the CTG in considerable detail and explained how she believed it should be interpreted and whether in her view what are referred to as the variability and the decelerations were acceptable. She also explained how on more than one occasion it appeared that contact with the transponder was lost and at one point the CTG seemed to have picked up the Mother's heart beat instead of the baby's. When she was taken to what seemed to be a confused trace from around 18:50 she explained: "I would have been prepping this lady with her legs up at lithotomy and playing with the transducer to pick up the trace." It is not surprising, in my view, that from time to time there have been difficulties in interpreting the CTG.

36. To explain the use and understanding of the CTG I was taken to a document published by the Royal College of Obstetricians and Gynaecologists in May 2001 entitled "The Use of Electronic Fetal Monitoring" which explained some of the basic concepts in the introduction to the document in the following terms:

> *"The basic principle of intrapartum monitoring is to detect developing fetal hypoxia [or lack of oxygen] with the aim of preventing subsequent acidaemia [or a high level of acid in the blood] and cell damage. Intrapartum hypoxia can develop in a number of ways…More acute fetal hypoxia could occur as a consequence of uterine hyperstimulation, placental abruption or cord compression.*
>
> *The initial response to chronic or slowly developing hypoxia is to increase cardiac output and redistribute this to the brain and heart. The increase in cardiac output is achieved by an*

> *increase in heart rate. This may be followed by a reduction in heart-rate variability due to brainstem hypoxia. Continued and worsening hypoxia will eventually produce myocardial damage and heart-rate decelerations. Acute hypoxia, in contrast, results in a decrease in the fetal heart-rate (decelerations or bradycardia) initially produced by chemoreceptor-mediated vagal stimulation but eventually by myocardial ischaemia [or restriction of blood flow]. Metabolically, progressive fetal hypoxia results firstly in a respiratory acidaemia and secondly in a metabolic acidaemia with tissue injury."*

37. The Guideline also offers some useful definitions of terms which it uses and which the various medical practitioners and experts also used. The Guideline referred to fetal heart rate by the abbreviation "FHR". It explained that a baseline FHR was the *"mean level of the FHR when this is stable, excluding accelerations and decelerations. It is determined over a time period of 5 or 10 minutes and expressed in bpm…A trend to a progressive rise in the baseline is important as well as the absolute values."* The notes and experts often referred to "variability". The Guideline stated that "baseline variability" was *"minor fluctuations in baseline FHR at three to five cycles per minute. It is measured by estimating the difference in beats per minute between the highest peak and lowest trough of fluctuation in a one-minute segment of the trace"* and that "normal baseline variability" was *"greater than or equal to 5 bpm between contractions".* There were also many references to what were called "decelerations" whether early, late, variable, atypical or prolonged. The Guideline defined those terms as follows:

"Decelerations	*Transient episodes of slowing of FHR below the baseline level of more than 15 bpm and lasting 15 seconds or more*
Early decelerations	*Uniform, repetitive, periodic slowing of FHR with onset early in the contraction and return to baseline at the end of the contraction*
…	
Variable decelerations	*Variable, intermittent periodic slowing of FHR with rapid onset and recovery...*
Prolonged deceleration	*An abrupt decrease in FHR to levels below the baseline that lasts at least 60-90 seconds. These decelerations become pathological if they cross two contractions, i.e. greater than 3 minutes"*

38. The Guideline also explains how the trace readings should be interpreted, explaining that there were three categories of results, "Normal", "Suspicious" and "Pathological" according to the number of what are called "Reassuring", "Non-reassuring" and "Abnormal" features of the readings by reference to the baseline rate, the variability and the presence and type of decelerations. One non-reassuring feature means that the FHR is suspicious, two or more non-reassuring features or one abnormal feature places the FHR reading in the "Pathological" category.

39. The Guideline then summarises in very general terms the steps which should be taken depending on the category into which the readings fall. In cases where the CTG falls into the suspicious category the Guidelines advise conservative measures. In cases where the readings fall into the pathological category the Guidelines advise conservative measures and fetal blood sampling where appropriate and feasible. They go on to say that *"In situations where fetal blood sampling is not possible or appropriate then delivery should be expedited."* Thus it is clear from the Guidelines that the purpose of fetal blood sampling was to check what the next steps should be rather than necessarily moving immediately into delivery of the baby. Section 2.6 of the Guideline explains that if the evidence demonstrates suspected or confirmed acute fetal compromise the baby should be delivered urgently. This section concludes by saying that *"The accepted standard has been that, ideally, this should be accomplished within 30 minutes"*.

40. Helpfully the Guideline distils the steps which I have set above into a flow chart identifying two paths according to whether the CTG is suspicious or pathological. Of significance in the present case is the path which is described as "Pathological CTG". The steps or path which it indicates are as follows:

    i) The first two steps in the chart suggest that if fetal blood sampling is "indicated" then the mother is encouraged to adopt a left lateral position and her blood pressure was to be checked before the sample is to be taken. The third and final box/step in the chart sets out the actions to be taken depending on the pH result of the fetal blood sample. Three different actions are suggested according to three different pH results:

        a) Where the pH result is equal to or greater than 7.25 the flow chart indicates that the fetal blood sampling should be repeated if the fetal heart rate abnormality persists, but the chart does not indicate the interval between sampling;

        b) Where the range is 7.21 to 7.24 the flow chart says that the fetal blood sampling should be repeated within 30 minutes or "consider delivery if rapid fall since last sample";

        c) Where the result is equal to or less than 7.20 the flow chart simply says "[d]elivery indicated".

41. On the pH scale of acidity and alkalinity (which has a range of 0 to 14) a score of 7 is neutral. Scores below 7 indicate acidity. Scores above 7 indicate alkalinity.

42. The above paragraphs explain why, when Mr Mukherjee was later deciding on his delivery plan, it was so important that a fetal blood sample be taken and the pH of the sample ascertained.

43. By 17:15, when it was recorded that "[The Mother was] coping well with contractions", her blood pressure was 145/91 and the baby's heartrate was 140 bpm. The Mother was then examined by Mrs Bartle and found to be fully dilated with the "presenting part…1.5cm above ischial spines…position right occipito posterior… fetal heart rate 132bpm". Mrs Bartle accepted that the obstetrician should have been informed about the raised blood pressure at that point in time. The Mother was actively pushing.

44. Between 17:45 and 18:15 the fetal heart rate was rising slowly reaching 150bpm with the Mother suffering strong contractions at 17:30 and at 18:20 Mr Mukherjee was updated and he attended to examine the Mother at 18:30.

45. In the obstetricians' joint report they agreed, in answer to question 3, that the CTG was pathological from about 18:00, although in their oral evidence they and the other witnesses did not agree as to when exactly it was pathological.

46. Mr Mukherjee arrived for his locum shift around 16:15. His shift actually started at 17:00. It was a 16-hour shift ending at 09.00 the following morning. His areas of responsibility during the shift were gynaecology, obstetrics and related aspects of Accident & Emergency admissions. This was a one-off shift at the Hospital.

47. While he does not now recall the handover in respect of this particular case Mr Mukherjee told me, and I accept, that he would have looked at the background notes and information, carried out his own assessment and documented what he found. He told me, and again I accept, that he conducted an abdominal and a vaginal examination. His notes start at 18:30 and contain his review of the information which he had been given about the Mother and the baby, some of which is not entirely accurate. For example, he records that the Mother was fully dilated at 18:00 whereas the contemporaneous notes of the midwifery team noted (as to referred to above) that the Mother was fully dilated some 45 minutes earlier at 17:15. He did not hesitate to accept this discrepancy. He specifically noted and was therefore aware of the range of the fetal heart rate and the recurrence of what he described in what were outdated terms as "Type I" decelerations with a quick recovery, by which he meant early decelerations. He was aware of the variations in the fetal heart rate before he came on duty and I accept his evidence that he would have held out the CTG graph and looked at the whole picture. He told me that he identified what he called a "complicated tachycardia which encompasses more than 5 to 10 seconds" and he recorded that a fetal blood sample or "FBS" was required so that he could ascertain the pH value of the blood having concluded that the trace was pathological according to the Guidelines referred to above.

48. In cross-examination Mr Mukherjee told me that it was difficult to comment on the variability of the fetal heart rate retrospectively by looking at the CTG but his view was that from about 18:30 the trace showed that the short term variability had reduced and the long term variability appeared to him to be "fine".

49. The notes record, and I accept, that Mr Mukherjee explained to the Mother at some point around or just after 18:30 that in view of her pre-eclampsia and concerns regarding the fetal heart rate a decision had been made to expedite delivery and to try ventouse or forceps. He said that he knew that the baby was OP which he accepted and understood would make the delivery challenging. Mr Spencer's evidence was that an OP position meant that there was still a 40% chance of delivery by vagina and until a decision had been made about the method of delivery there was no need to make a final decision about the form of analgesia to be used. The notes then set out very clearly Mr Mukherjee's proposed plan, namely, to undertake the necessary blood tests on the Mother to enable spinal anaesthesia to be used (something which the notes show he had discussed with a senior registrar in anaesthetics). He accepted that a paper to which he was taken ("Influence of Persistent Occiput Posterior Position on Delivery Outcome" by Fitzpatrick and others dated December 2001) showed that in 86% of cases of first babies who were occiput posterior an epidural was used but he neither agreed nor disagreed with that part of the paper. However, he said, and I accept, that the decision as to whether an epidural should be used was a matter for the anaesthetist in discussion with the patient, not for the obstetrician to decide. He said that an epidural would help with the Mother's pain but was certainly not a treatment for her underlying condition. The results of the Mother's blood test would determine whether she could be given epidural anaesthesia. Once the results had been obtained then a decision would be taken as to the precise steps to be taken. Mrs Bartle explained that one would have to wait between 15 and 20 minutes for an epidural anaesthetic to take effect. The Mother, her partner and the consultant all agreed with the proposal. Mr Mukherjee explained that before implementing his plan his final conversation would have been with the consultant to seek her agreement to his proposal.

50. When taken to the Guidelines referred to above Mr Mukherjee said that this was a case of suspected fetal compromise and not a case of a confirmed acute compromise, the inference being that his observations justified the taking of a fetal blood sample to check the pH level and not moving directly to delivery of the baby. He reiterated, when taken to a paper entitled "Decision to delivery intervals for assisted vaginal vertex delivery" concerning the "time interval between decision for assisted vaginal delivery and birth of the baby in different clinical circumstances" that the circumstances did not justify a more expedited delivery in this particular case.

51. In his notes made retrospectively in the "Continuation History Sheet" Mr Mukherjee gave a short overview of this stage:

> *"Fetal blood sampling decided on…via a complicated fetal tachycardia and due to the reason that the delay with spinal anaesthesia since no platelet results available. Fetal blood procedure explained to parents. Procedure of FBS done – pH 7.29. Parents explained and reassured regarding pH but advised that delivery will be required. Detailed discussion with Mrs Nagrani"*

52. The fetal blood sampling was to take place while waiting for the platelet results of the sample taken from the Mother. Mrs Bartle explained that from taking the sample of the baby's blood until receipt of the results would usually have taken about 5 minutes

and that the sample would have been processed in a machine in the corridor adjacent to the labour ward.

53. There is a dispute as to when the blood sample was taken from the Mother and where the blame for any delay lies. The printed record from the haematology department, which contains the results of the blood test, states that the sample was "Collected" at 19:20 but it is not clear whether this is when the sample was taken from the Mother or collected to go to the laboratory. Mrs Bartle explained that in her view although "collection" meant that this was when the test tube of blood was taken from the patient the inference which she drew from the contemporaneous notes was that the Mother's sample was taken prior to this. Indeed the notes suggest that the fetal blood sample was taken after the sample from the Mother. Mr Mukherjee explained that he "bleeped" the anaesthetist at 18:45, as the anaesthetist's notes show, and the anaesthetist saw the Mother at 18:50. Mr Mukherjee's notes show that he discussed the situation with the anaesthetist and was advised to get "full bloods" prior to spinal anaesthesia. He added that where a mother has pre-eclampsia one needs a screen for platelets and clotting, but the crucial test is the platelet tests if there was a possibility of spinal anaesthesia. He was asked about the delay in obtaining the results and while accepting the process took too long (he expected the results within 15 minutes with the FBS and the Mother's results expected to arrive at about the same time) he said that obtaining the results was not his responsibility and he was unable to comment on who might have collected the bloods and delayed in providing the results.

54. Mrs Bartle accepted that there was a delay between approximately 18:30 when Mr Mukherjee attended and the fetal blood sampling which she timed at 19:15. She said, quite understandably, that she now had no recollection of why there was a delay but she explained that in general terms there is a lot to do at this stage of labour, there are many separate steps to be taken to prepare for delivery, and everything takes time. She said, and I accept, "I can only assume that it must have been so busy that I needed to make retrospective notes…It is not a two minute job to get everyone ready, to prepare for this procedure…". There is no suggestion that Mrs Bartle was standing idly by, ignoring the Mother, and not doing her job properly. She denied the suggestion that she might have been called away from her patient. Indeed, as she said, had there been time there would have been no need to keep notes on scraps of paper with a view to writing them up later. In re-examination she clarified what she believed to be the case, saying "Dr Mukherjee attended at 18:30 and between 18:30 and 20:34 I would think that Dr Mukherjee is highly unlikely to have left the mother and it is highly likely that the two of us were present throughout."

55. The fetal blood results were received at 19:26 and the Mother's results were received by 19:35 and the Mother was in theatre by 19:40.

56. The "Obstetric Anaesthetic Record" shows that the anaesthetist was "bleeped" at 18:45 approximately, he saw the patient at 18:50, but the full blood count results were not received until 19:30 only after the anaesthetist had called the laboratory himself. He recorded that the Mother was in the operating theatre by 19:40, the preparation for spinal anaesthesia commenced at 19:47 with the anaesthetic itself introduced at 19:53. He recorded the skin incision at 20:15, uterine incision at 20:17 and, consistently with the other records, delivery at 20:34.

57. In the background Mrs Bartle was, among other things, keeping an eye on the CTG. In a note timed at 19:15, but written retrospectively at 22:00, Mrs Bartle explained that there had been difficulty in keeping contact with the fetal heart rate because of the processes which were being undertaken at the time. She explained that this was because, at least in part, the Mother was in the lithotomy position, using stirrups to support her legs, until 19:30.

58. At 19:26 the results of the fetal blood sample were printed and showed that the pH value was then 7.29. That result was normal. It is to be noted that it was greater than the first of the range of results in the Guidelines flowchart mentioned above and, if one followed the steps or pathway in the flow chart, meant that there was no need to expedite delivery but a further fetal blood sample should have been taken in due course if the fetal heart rate abnormality persisted.

59. Shortly afterwards the Mother's platelet results were obtained and a decision was made to transfer her to the operating theatre.

60. Mr Mukherjee emphasised in cross examination that the plan was to expedite delivery but that this "depended on the FBS result…if the FBS result had been poor I would have gone [straight] to caesarean…" rather than attempting a forceps delivery first. But the FBS results were good and, as I have said, the Guidelines did not suggest that the obstetrician should proceed straight to a caesarean section. He added that "if [there had been] acute fetal compromise then [I would have proceeded] immediately with a C section but there was no evidence of acute fetal compromise, which is demonstrated by the FBS results". Later in his cross-examination he said that he disagreed with the suggestion that there had been a deprivation of oxygen from about 18:00 because he had the reassurance of the positive FBS results at 19:26. He was taken to the variability shown on the CTG and said that the "variable decelerations with shouldering are an indication that the baby is compensating, which was confirmed by the FBS. I had a normal FBS and I would go by that."

61. Mr Mukherjee said that the period of time between the anaesthetist obtaining the Mother's blood results, by calling for them himself at 19:30, until the Mother was ready for an attempted assisted delivery by forceps at 20:00 was in his view very fast. He explained the number of steps to be taken after the blood results were received. The Mother was taken to theatre at 19:40, the spinal anaesthesia was commenced when the Mother was sitting up, the anaesthetist had to check that it was effective, she then had to give consent to being put in a lithotomy position, the process explained, a catheter deployed and then she would have been ready for a forceps attempt.

62. Mr Mukherjee prepared detailed notes on 3 pages of a document entitled "Operation Sheet" describing the whole of the procedure from the point that the decision had been made to attempt delivery. They are dated 14 February 2003 but untimed and I infer that they were made at the end of the night and therefore, relatively soon after the events which they record. It seems to me that they are a reliable contemporaneous record of those events. Mr Mukherjee identified by name the medical team who were involved and added that the consultant was called into theatre. The notes, insofar as material, read as follows:

> *"FAILED TRIAL OF FORCEPS FOLLOWED BY EMERGENCY LOWER SEGMENT CAESARIAN SECTION*

INDICATION FOR FORCEPS

(1) FAILURE OF DESCENT OF PRESENTING PART STATION (O) WITH MATERNAL EFFORT

(2) MATERNAL EXHAUSTION

(3) RECURRENT EARLY DECELERATION WITH A FETAL TACHYCARDIA OF 170 bpm FOR 18 MINS

PROCEDURE: Patient transferred to theatre. Consented...Anaesthesia Team present

SPINAL ANAESTHESIA

Patient in lithotomy position

ASEPTIC PROCEDURE FINDINGS – [fetal head] palpable… fully dilated at (0) [ie at the level of the maternal ischial spines] direct OP

Neville Barnes forceps applied with ease. 2 Gentle pull[s] with maternal effort – No progress – Procedure abandoned

FOR EMERGENCY [lower segment caesarean section]. The fetal head was pushed up vaginally after failed forceps

PROCEDURE: Patient in supine position – aseptic dressings/drapings.

Skin incised – Mother's …abdomen cavity opened. Bladder peritoneum incised. Uterus incised. (The bladder appears firmly adhered to the lower uterine segment)...Bladder pushed down – uterus incised.

Fetal head impacted in the pelvis, and direct occipito posterior. No space [present] posteriorly or laterally. Occiput firmly impacted in the sacral hollow. No room present to manoeuvre the fetal head out of the pelvis . Several attempts to disengage fetal head failed. Request for Consultant – Mrs Nagrani to attend theatre. The following manoeuvres requested (a) Midwife C. Bartle requested to push fetal head per vaginum, (b) Head end of patient downward inclination, (c) Request for uterine relaxant (d) Incision extended to J shape on the [left hand] side. Still failed to disengage fetal head – remains impacted. Rotation of head impossible to achieve. Lower segment incised vertically in midline to secure added space. Partial disengagement of head possible but the occiput remains impacted.

Uterus started to contract at this stage.

> *The fetal head remained DIRECT OP at this stage, although partial disengagement was achieved. Rotational attempt to further disimpact fetal head successful."*

This demonstrates that Mr Mukherjee asked the midwife to push the baby's head up via the vagina, the operating table was tilted head-down to reduce the effect of gravity holding the baby's head in the pelvis, the uterus was relaxed using an injection of salbutamol and then the incisions were extended to increase access after rotation of the head was found not to be possible. After the incisions had been extended rotation was possible, the baby's head was freed, the baby was then delivered and handed over to the paediatrician and the notes then set out the steps taken to treat the Mother.

63. Mrs Bartle recorded that the attempted delivery with the aid of forceps took place at 20:00 but after two pulls it was decided to proceed with a lower segment caesarean section. Mrs Bartle's notes said:

> *"Lower segment caesarean section after no descent after two pulls. Lower segment caesarean section performed under spinal. Extremely difficult to deliver baby's head – impacted in the pelvis – pressure applied via the vagina as instructed.*
>
> *Requested that consultant obstetrician be contacted…"*

64. Mrs Bartle's notes recorded in the "Obstetric Care Plan" of the timing of the steps taken while the Mother was in the operating theatre are consistent with those recorded by the anaesthetist and vary only insofar as she says that the skin incision took place one minute earlier. In her oral evidence Mrs Bartle explained that there was a lot going on, involving a number of steps, each of which took time. When asked why it appeared that the attempt at assisted delivery only started some 7 minutes after the commencement of the epidural her explanation was similar to that of Mr Mukherjkee: *"[t]hings would have been happening. The woman is placed in a certain position for the spinal and then [placed] on the bed and positioned to carry out forceps, in lithotomy, and then the bed is taken apart and [she is] draped – a team does this. In reality it takes time."* It is a point which she repeated, as she was pressed on the question of delay, explaining the many interconnected individual steps to be taken by the midwife team leading to delivery, adding *"[i]t takes time."*

65. Mr Mukherjee said that after the attempt with the forceps failed a decision was made to undertake the caesarean section at 20:06 and that the 8 or 9 minutes which it then took to get to the stage of incision of the Mother's skin was within what he considered to be a reasonable range. He also explained the steps which needed to be taken, consistently with what Mrs Bartle had said*: "Once forceps fail we remove the forceps trolley, the bed is put back together, the legs are taken off lithotomy and onto the bed [the catheter is used again], [the patient] is dressed and prepare the skin and inform the theatre team of the C section and the anaesthetist checks the block and the skin is then dressed and painted and then [you move to] incision…9 minutes is a very good time. These 6 steps are done as a team. 9 minutes [here] shows very cohesive team work and we have to explain to the patient at the same time, [being] empathetic and respectful – [it is] not just medical science."* When asked whether it could have been quicker he responded *"I don't agree it is humanly possible to go to skin incision in 2 minutes [after a failed forceps attempt] …".*

66. When asked about the delay in this case, in comparison with periods of time between decision and delivery which were the subject matter of a paper to which he was taken called "Cohort study of the decision to delivery interval and neonatal outcome for emergency operative vaginal delivery (Feb 2007)" Mr Mukherjee said that in an ideal world he could *"get a baby out in 5 minutes, but every situation is different and you can't compare with the situation in the study"*.

67. Various timescales were put to Mr Mukherjee in cross-examination and he said:

> *"We don't look at the clock. The main duty is to the patient and we move as fast as possible [following all proper procedures]. Safety concerns of mother and baby are our paramount concern. The timing [put to me] is not the real world. The whole team's job is to move as fast as possible and that is how we manage the situation.*
>
> *If there had been an acute problem she possibly would have had a general anaesthetic and a C section, if I had felt that it was prolonged bradycardia [ie a slow heartbeat]…"*

68. As to the impaction of the baby's head Mr Mukherjee was taken to his notes timed at 18:30 where he noted that there was "minimal caput" ie swelling of the baby's head. It was suggested to him that continued contractions would have increased the caput and therefore increased the impaction. But he said that he "did not know how it was before; I can only say what I saw during C section. This was not an obstructed labour – there was no "Bandl's" ring", adding "I could not have known it was impacted before opening up" and later "[i]mpaction could only be diagnosed peri-operatively". He was able to say that the head was impacted at 20:34 but not whether it was impacted at 19:30. He commented "no one knows and it is pure hypothesis". He was asked again about the swelling of the baby's head which was alleged to have been increased by the continuation of contractions and said *"caput is oedema of the scalp in the forehead because of the collection of fluid. The caput is further down and is not connected to the impaction which can be felt vaginally. For caput to happen there has to be an open space…In my notes I have not written that the head is swollen; only that it is impacted."*

69. The claimant was delivered by Mr Mukherjee at 20.34. The claimant was noted to be floppy, his Apgar scores (a measure of the need for resuscitation) were 4 (at 1 minute of age), 4 (at 5 minutes) and 5 (at 10 minutes). He was ventilated and then intubated. His cord gases were recorded as pH 6.86 arterial and pH 7.01 venous. He took his first spontaneous breath at 6 minutes of age.

70. The total period of acute near total asphyxial insult was about 13 minutes and the period of damaging asphyxia was of approximately two to three minutes in duration. The notes of the anaesthetist recorded that it had been a difficult procedure but that the baby had recovered less than one minute after delivery. It is said that the claimant would not have suffered any brain damage or neurological injury had he been delivered by 20:31 or 20:32.

71. At birth the baby weighed 3.49kg. Resuscitation was required and there was a quick recovery of the fetal heart rate.

72. Following delivery the pH values of umbilical cord blood samples were tested. The arterial sample result was a pH of 6.85, with what was described as a base deficit of -12.2mmol/L. The venous result was 7.0 with a base deficit of -7.8mmol/L. In other words there was excess acid in the samples and the "base deficit" measure indicated the extent of correction necessary to return the pH values to normal. Dr Pohl said that these were significant but not severe and he described them as being at the "top end of what is the normal range".

73. At 21:15, at 30 minutes of age, the venous pH was 7.20 with a base deficit of 18. At 23:00 the pH was 7.25 with a base deficit of 7.

74. The full extent of the claimant's injuries, which I need not set out here, are particularised in paragraph 42 of the Particulars of Claim.

75. The Mother remained in the Hospital until 18 February. The claimant was discharged on 27 February.

The Law

76. The principles of law to be applied are not in dispute. As Ms Ewins submitted, the test for negligence and the standard of skill and care required of a medical practitioner in relation to diagnosis and treatment is to be found in Bolam v Friern Hospital Management Committee [1957] 1 WLR 582, as approved and explained by the House of Lords in Bolitho v City & Hackney HA [1998] AC 232. A clinician is required to exercise the skill and care to be expected of a reasonably competent member of their profession as at the date of the alleged negligence recognising that there is a range of proper, non-negligent, views among the body of reasonably competent professionals in the relevant field of expertise. The test is whether the clinician acted as no reasonably competent clinician would have acted in the circumstances of the case. The headnote of the decision in Bolitho, as reported in the Appeal Cases, suggests that the decision of the House of Lords was that in applying the Bolam test

> "…the court had to be satisfied that the exponents of a body of professional opinion relied upon had demonstrated that such opinion had a logical basis and in particular had directed their minds where appropriate to the question of comparative risks and benefits and had reached a defensible conclusion; that if in a rare case, it had been demonstrated that the professional opinion was incapable of withstanding logical analysis, the judge was entitled to hold that it could not provide the benchmark by reference to which the doctor's conduct fell to be assessed, but that in most cases the fact that distinguished experts in the field were of a particular opinion would demonstrate the reasonableness of that opinion.."

77. I also bear in mind that the standard of care is to be measured against practice in 2003, which is of particular relevance given the lengthy passage of time in this case between the alleged acts of negligence and the oral evidence of the expert witnesses some of whom expressly accepted that the standard of care had changed over that period.

78. As to causation the standard test is the "but for" test, in other words that the claimant must prove that but for the negligence the alleged injury would not have occurred. However, as I mention above, the claimant's alternative case is that if the "but for" test cannot be satisfied nevertheless the negligence of the defendant made a "material contribution" to the claimant's injuries as a result of which he is entitled to a finding of liability against the defendant. The argument is based on the decision of the Court of Appeal in Bailey v Ministry of Defence [2008] EWCA Civ 883, in which the court considered the issue of whether the claimant could succeed where there were said to be mixed causes of the injury which was the subject matter of the claim. The Court of Appeal addressed the principles relating to the concept of material contribution. Having reviewed the existing caselaw Waller LJ set out the relevant principle, at [46]:

> "46. *…If the evidence demonstrates that 'but for' the contribution of the tortious cause the injury would probably not have occurred, the claimant will (obviously) have discharged the burden. In a case where medical science cannot establish the probability that 'but for' an act of negligence the injury would not have happened but can establish that the contribution of the negligent cause was more than negligible, the 'but for' test is modified, and the claimant will succeed.*"

79. In Bailey a lack of post-operative care contributed to the claimant's overall weakness in that it exacerbated her inability to cope when aspirating her own vomit as a result of which she suffered a heart attack and led to the argument that she was therefore entitled to a finding of liability even if the "but for" test could not be satisfied in respect of the main act of negligence.

80. Ms Ewins also referred me to Popple v Birmingham Women's NHS Foundation Trust [2012] EWCA Civ 1628 and CNZ v Royal Bath Hospitals NHS Trust and others [2023] EWHC 19 (KB), a decision of Ritchie J.

The allegations of negligence

81. The detailed allegations of negligence and causation are set out in paragraph 41 of the Particulars of Claim. The claimant alleges that:

    i) The midwifery staff failed to call for an urgent obstetric review following the Mother's high blood pressure reading of 180/90 mm/HG at 15:45, the systolic reading being out of range. It is said that this review should have taken place by 15:55 and that she should then have been given a blood test for clotting followed by epidural analgesia (by 16:55) because of her high blood pressure and because of the OP position of the baby;

    ii) The midwifery staff should have recognised that the CTG had been pathological from 18:00 and they failed to call for an urgent obstetric review by 18:10. Had they done so the obstetric registrar should have attended by about 18:20;

    iii) The defendant delayed in delivering the baby in the following specific respects:

a) at 18:30, when the CTG was pathological, Dr Mukherjee failed to recognise this or make an adequate assessment or take any adequate steps at a time when an urgent delivery was required;

b) there was a delay until 19:15 in obtaining a fetal blood sample whereas the Mother should already have been transferred to theatre and with the sample being taken in theatre would have led to a result at 19:00 (or possibly 18:50);

c) there was a delay in transferring the Mother to theatre, which even after a delay in obtaining the fetal blood sample should have led to delivery by 20:00;

d) there was a delay until 19:20 in undertaking a full blood count test;

e) there was a delay in attempting a forceps delivery, which should have taken place by 19:10 or 19:20;

f) there was a delay in making the decision to undertake a caesarean section, which should have been by 19:20 or 19:30.

It is said that at 19:20 or 19:30 the degree of impaction of the fetal head in the pelvis would have been less than at 20:00

g) there was a delay in completing delivery by caesarean section which should have occurred by 19:30 or 19:40;

h) there should have been immediate delivery following the recording of the fetal heart rate of 95bpm at 19:40, which should have led to delivery by 19:55;

i) there was a delay in performance of the caesarean section after the decision had been made at 20:06 to use that method of delivery. The operation should have started by 20:08 with a skin incision by 20:10 and delivery by 20:19, whereas the incision was not until 20:15 with delivery at 20:34.

82. The claimant makes no criticism of the way in which or the time that it took to disimpact the baby's head once the caesarean section had been performed, despite Professor Siassakos apparent suggestion to the contrary referred to below. The claimant's case is that if the caesarean section had been carried out an hour earlier the impaction would have been less and the disimpaction and delivery would have been easier to perform and therefore quicker at that point.

83. The defendant says:

i) There was no negligent delay in calling for urgent obstetric review by asking for Mr Mukherjee who, in any event, attended by 18:30, nor in administering an epidural anaesthetic at that point in time. It is said that there is no evidence of the claimant suffering any harm as a result of these alleged failures (which related to the Mother and not the child) and in terms of causation these allegations lead nowhere;

ii) The trace did not become pathological until after 18:10 and therefore there was no need to summon Mr Mukherjee until 18:20 who had, in any event, already held a discussion with Mrs Bartle and had arrived at around 18:30;

iii) Mr Mukherjee's responses to the information with which he was provided and the plan which he made, including taking a fetal blood sample, were reasonable (ie non-negligent). There was no culpable delay in taking the sample. The result of 7.29 was normal and demonstrated that the baby was not hypoxic at that stage and there was no need to move to deliver the baby with extreme urgency. Thereafter, and in the absence of a need for extreme urgency, there was no unreasonable delay in taking the steps which led to delivery. He acted in accordance with the Guidelines.

84. Although she was the last of the claimant's expert witnesses to be called at trial it seems to me logical to start, in considering the allegations of negligence, with the evidence of Mrs Stanley, the claimant's midwifery expert, because she deals with the allegations which, chronologically, relate to events which started before the involvement of the obstetrician as well as those which took place subsequently. She says that she was asked to consider "the overall midwifery care afforded to the [Mother] during the pregnancy, labour, and delivery".

85. Mrs Stanley qualified as a midwife in 1996 and by 2003 she was a midwife working for an NHS Trust on an antenatal and postnatal mixed ward and delivery suite. In the section of her report headed "Employment History" she described her experience as follows:

> "Medical Negligence Triage Manager, Leigh Day Solicitors, Central Park, Manchester, M40 5HP – October 2023 – present.
>
> My main area of work is full time at Leigh Day Solicitors managing the Medical Negligence Triage Team. We are currently a team of 6, with plans to develop a clinical team which I will also manage. The team is the first contact a prospective new client will have with Leigh Day. I ensure that the team are able to take details of a prospective claim with empathy and understanding in a timely manner. We also review medical records and write reports to support the lawyers in making a decision on whether or not to take a case on. I am intrinsically involved in maternity cases, both supporting the fee earners and the clients through every part of a claim. I am heavily involved in marketing and business development, attending events as a representative of Leigh Day's medical negligence team. My skills and experience overlaps with the below description of my role at Slater and Gordon Lawyers.
>
> Litigation Midwife, Slater and Gordon Lawyers…February 2018 – October 2023…"

86. In paragraph 1.02 she summarises her opinion and conclusions and provides a list of 14 instances of what she alleges to be breaches of duty by the defendant from the first diagnosis of pre-eclampsia until transfer to the operating theatre in which the

caesarean section was performed. In essence her evidence on the day of birth was to the effect that there was a lack of urgency on the part of the midwifery team in involving the obstetrician and thereafter proceeding with his plan for delivery and that there were "serial breaches of duty after transfer to the labour ward". She said that in 2003 midwives had far less autonomy than now and she "…would have summoned the obstetrician at the earliest point" whose choice, she accepted, it would have been whether to attend the patient and whether to provide any form of treatment. On the crucial question of the latest time by which LMN should have been born (posed in paragraph 4.10 of her report) she deferred to the obstetric experts.

87. In her report dated July 2024 Ms Beresford disagreed with the suggestion that the midwives had been negligent at any stage in their care of the Mother and baby.

88. The notes of the joint meeting did not, in my view, advance the position of either party to any significant extent.

89. Professor Siassakos was instructed to provide his opinion on liability and causation. His two reports were prepared on the basis of documents which he had been shown which appear to have included all the documents in the main trial bundle before me. His thesis is relatively straightforward. His conclusions, essentially, were that there was a failure to recognise that the CTG was pathological at an early stage in the afternoon of the day of birth after which there was a series of delays in performing the actions which led to the commencement of the caesarean section. He was of the view that because of the delay and the continued contractions in the course of the delay the baby's head became increasingly impacted in the Mother's pelvis thereby causing the baby to be "delivered considerably later than ought to have occurred (para 6.2.2)." In the final paragraph of his main report he concluded:

> "6.2.4 Even if difficulty in disimpacting his head had been encountered at caesarean section, there would have been earlier call to the Consultant, earlier Consultant attendance, and earlier delivery, altogether avoiding a prolonged hypoxic ischemic insult."

90. From paragraph 5.3.1 onwards Professor Siassakos expresses the opinion that the Mother and baby were provided with care which fell below reasonable standards but for which delivery of the baby would have occurred earlier. He criticised the lack of earlier epidural anaesthesia, earlier obstetric review and earlier blood tests on the Mother.

91. Professor Siassakos accepted that in many respects the standard of care provided in 2025 was higher than it had been in 2003 but he did not accept that he was judging the events of 2003 by the standards of 2025. He told me that he was at the forefront of many national and global initiatives to improve the obstetric care for mothers and babies. He had been a senior house officer in the United Kingdom in 2003 responsible for the delivery of babies in the presence of a registrar, rising to becoming a consultant by 2014 from which point it seems to me that a significant part of his time was spent teaching and training and preparing medico-legal reports. He told me that in 90% to 95% of the cases in which he is instructed he has acted for the claimant.

92. Mr Spencer's evidence was relied on by the defendant in refuting the allegations of negligence. He is a retired consultant obstetrician and gynaecologist holding his first substantive post as a consultant from 1986 at the age of 34 at a number of different large hospitals in London working for the NHS and in the private sector. His last substantive post with the NHS ended in 2005. He retired from obstetric work in 2017 and relinquished his clinical licence in 2023.

93. Mr Spencer was cross-examined at some length about the circumstances in which he came to leave his last NHS post in 2005 which led to proceedings in the Employment Tribunal which were ultimately compromised. Insofar as this line of questioning was intended to suggest that Mr Spencer was not competent or that he was disposed in giving his evidence towards protecting clinicians facing professional negligence claims or was otherwise intended to undermine his credibility, I reject it. In my judgment Mr Spencer was an honest witness who had considerable relevant contemporary experience at the time of the incident in this case and who was able to provide properly independent opinion evidence on the standard of care and practice to be expected of an obstetrician in Mr Mukherjee's position in February 2003. He said in evidence "I totally support what Mr Mukherjee did and I was not straining to support him at any point". Having read his report and seen him give evidence in the course of which he was cross-examined in detail and at considerable length I accept that his comment was honest and based on an objective professional analysis for which he provided a logical basis.

94. Mr Spencer's conclusions were expressed in paragraph 17 of his report:

> "(i) In conclusion, the active second stage of labour was not prolonged in this case. Failure to deliver naturally after one hour prompted, appropriately, a review by the registrar. The plan of action represented a good standard of care.
>
> (ii) It was standard practice in 2003 to attempt an operative vaginal delivery at full dilatation in order to expedite delivery provided maternal condition and fetal condition were both considered satisfactory. Fetal blood sampling excluded concern about the CTG changes."

95. Professor Siassakos was of the view that the CTG was pathological by 16:25 because there were two or more non-reassuring features, namely the presence of variable decelerations and reduced variability for more than 40 minutes, which should, he said, have led to an obstetric review by 16:30 or 16:35 and a fetal blood sample by 16:55 (which would have been normal) with a repeat fetal blood sample by 17:55 at which point a decision as to delivery should have been taken. He said that there was a risk of a rapid drop in the baby's blood pH at this (second) stage of labour which meant that a positive fetal blood sample result would not provide the reassurance that it might earlier in labour. However, he accepted that Mr Mukherjee had been right to direct a fetal blood sample after he had examined the Mother at 18:30. He also accepted that at that point in time there was no evidence of acute fetal compromise. He said that if the baby had been continuously bradycardic (ie had a continuous low heartrate) the baby would not have survived and therefore it is right to conclude that at this point in time, prior to delivery, the baby was not continuously bradycardic. His evidence was, however, having regard to the Guidelines, that there was suspected

(rather than actual) fetal compromise giving rise to two options, either to deliver the baby or seek a fetal blood sample, which he agreed was an appropriate alternative in this case.

96. Mr Spencer said, and I accept, that the evidence at this point indicated suspected, rather than actual, fetal compromise which rightly led to a fetal blood sample being taken for analysis. He emphasised that this was not an urgent case at that point in time and that the FBS result would have confirmed whether it was an emergency. While accepting that the FBS result was a snapshot Mr Spencer's view was that the positive result "would allow the obstetrician at least another hour to play with in 2003. His plan was absolutely correct but the consequences of the FBS means that there would not have been a need [to move to immediate delivery], subject to change in the fetal heart rate,…within an hour".

97. Professor Siassakos also agreed that in relation to the flow chart to be found in the Guidelines the correct pathway for Mr Mukherjee to follow was that which I have set out above, namely where the pathway starts with the condition "Fetal blood sampling indicated". He added that in everyday practice obstetricians knew at the time not to carry out more than three fetal blood samplings in the second stage of labour. However, in my judgment that is not really a relevant consideration in this case because Mr Mukherjee only intended to carry out one sampling as part of his plan to expedite delivery. Indeed Professor Siassakos went as far as saying "Mr Mukherjee's management plan was entirely appropriate and is what I would have done…I do not disagree with the decision to take FBS and then [proceed to] delivery." He then added "My criticism is of the speed with which Mr Mukherjee's plan was implemented". His evidence was that if there was only 1 or 2 minutes delay at each stage of the plan it would be within the range of normal practice but it was the accumulation of delay which was a problem in this case.

98. However, he accepted that at the time that the FBS was taken the result was not acidotic and was within the normal pH range. His concern was that "we don't know if it was already falling". His thesis was that "the baby decompressed after a prolonged period of cord compression in the second stage [of labour]...there was a total collapse of the ability to breathe in [the course of] one hour" although he told me that the trace was essentially stable between 19:30 and 20:00.

99. The Professor then expanded on his theory explaining that in the second stage of labour when contractions became more frequent and the mother is pushing the arteries to the baby become constricted and if the umbilical cord is compressed the baby's heartrate climbs in response to a drop in blood pressure as a result of which the baby starts to become hypoxic leading to a depletion in resources of the placenta which eventually run out as happened here.

100. Professor Siassakos' view was that if the baby had been delivered before 20:31 (rather than 20:34) the hypoxic injury to his brain would have been avoided. The margins are very small.

101. Mr Spencer accepted that the pH of the baby's blood falls faster in the second stage of labour but he said that the important factor was the actual rate of fall. He added that Mr Mukherjee took proper account of the faster rate of fall in the second stage of labour by planning to move onto delivery once the FBS results had been obtained

(rather than waiting andw taking a further FBS in due course, which would have accorded with the practice which the Guidelines suggested).

102. Looking at the CTG Mr Spencer said that the variable decelerations which could be seen, coincided with the Mother's contractions and that the probable cause of the decelerations was compression of the umbilical cord as a result of the contraction but this was not abnormal even though it could be described as non-reassuring. The decelerations were not indicative of hypoxia, of which he said that there was no evidence before delivery. Even during the use of the forceps he said that the decelerations which were seen on the trace did not indicate cord compression because of the extent and speed of recovery of the fetal heart rate immediately afterwards. The appearance of the trace, he said, was inconsistent with Professor Siassakos' hypothesis of the baby falling off a cliff: "if he was correct there would be no recovery of the fetal heart rate during the forceps attempt and the baseline would have remained down and it would have become an obstetric emergency." He added that the pH result of 7.29 at 19:15 was inconsistent with Professor Siassakos's view: "a pH of 7.29 at 19:15 tells me that whatever we saw on the CTG was being perfectly well tolerated [by the baby]".

103. Mr Spencer said that it would have been evident from the CTG trace if there had been a deterioration which required more urgent intervention and he accepted that if there had been unrelieved cord compression it would have led to unrelieved bradycardia and the situation would have become urgent but the CTG showed that the baby continued to recover from decelerations which told the obstetrician that the baby was doing well. On the other hand it was his view that if there had been cord compression which had been unrelieved it would have become an emergency with a risk that the baby would die within 15 to 30 minutes.

104. Mr Spencer was of the view that there was no delay in the steps taken by Mr Mukherjee to implement his plan. He accepted that if it took 45 minutes to obtain the Mother's blood results that was too long (it should have been completed in 30 minutes) and that the spinal insertion was delayed as a result. The FBS results nevertheless reassured Mr Mukherjee that he could continue with his plan, adding "there may have been some delay but this was not a problem when the result was obtained which was extremely reassuring…The FBS excludes fetal distress…it took away any time imperative, any sensible imperative".

105. Mr Spencer was taken through the various steps up to delivery and challenged on the reasonableness of the speed with which they were completed but he stuck to his view that "there was no urgency or timescale to which to adhere" commenting that after the two attempts of delivery by forceps "there was no indication of fetal distress…There was no time imperative at any stage in any of these steps…All the stages took as long as they took and were reasonable in 2003 in the context of [the Mother]". He went on to say that "[t]he documented move to theatre leaves out what actually happens. I do not have any criticism of the timings in this case which accorded with the practice of 2003".

106. Mr Spencer's conclusion was there was "an unavoidable delay in delivery of the baby's head after the uterine incision at 20.17 hrs. This was because of impaction of the fetal head deep in the pelvis, discovered when attempts to disimpact were made." He timed the delay at 9 minutes. Having been taken to a research paper Mr Spencer

was asked whether the time from decision to delivery was generous given that the paper showed that the median time lapse was 29 minutes but he stuck to his view that the period of time in this case was reasonable.

My findings on negligence

107. I remind myself that the standard of care is that of the reasonably competent professionals in the position of the medical practitioners in this case in a district general hospital in 2003.

108. I have had regard, as part of the context, to the pre-admission concerns about the Mother which I have set out in detail above but those concerns and the factors which gave rise to them did not indicate that there were risks of the sort which led to the difficulties in this case and in my judgment lead nowhere in terms of causation. I do not therefore take into account whether there was any pre-admission failure to comply with reasonable standards of care.

109. For the same reasons I do not accept that the blood pressure readings of the Mother on admission to the labour ward at between 15:10 and 15:30 or when Mrs Bartle came on duty slightly later would have been understood at the time to indicate a risk of the outcome in this case and it seems to me the focus has to be on what I consider to be the critical period of time from about 18:00 to delivery. Notwithstanding Mrs Bartle's apparent admission in cross-examination that she should have asked for an obstetric review at that point in time I do not accept that it was her view in 2003 that there should have been a review. In my judgment there was accordingly no need at this early stage to call for an urgent obstetric review.

110. I also reject the consequential suggestion that the defendant fell below the appropriate standard in not offering epidural anaesthesia at the time of the spike in the Mother's blood pressure at that point in the afternoon. As Mr Holl-Allen KC submitted, this allegation of negligence is consequential on the allegation that there should have been an earlier obstetric review. Given that I do not accept that it was negligent not to have called for an earlier obstetric review the allegation of a failure to give (strong) advice that epidural anaesthesia should have been administered at this point does not arise. In any event, there is a genuine difference of expert opinion as to whether proper clinical practice suggested that the Mother should have been given epidural anaesthesia to manage her blood pressure such that it cannot be said that the course taken by the defendant's medical team not to administer the anaesthesia at this point in time was negligent. Finally, I think that it is accepted that even if it were negligent not to advise on or administer epidural anaesthesia at this stage it would not have made any difference to what occurred later and is irrelevant to causation, save that the mother's blood tests would have been undertaken earlier and it might have saved a few moments when the anaesthesia needed to be topped up prior to surgery.

111. There is no evidence to support a suggestion that at any of these early stages the medical team would or should have been aware of the impaction of the baby's head.

112. It was agreed by all the experts that at about 18:00 (perhaps 18:10) the CTG trace was pathological which according to the Guidelines should lead to a fetal blood sample being taken and tested. The results of that test would govern the subsequent course of action of the clinicians. Mr Mukherjee had discussed the case with Mrs Bartle. He

was on the ward with the patient by 18:30. He examined the patient and was aware of the proper analysis of the trace and in the light of all that evidence and information he formulated his plan. The trace disclosed no urgency and no reason why Mr Mukherjee should have been summoned before that point. I do not find that there was negligence in the time that it took to involve Mr Mukherjee, undertake an obstetric review and formulate a plan. The allegation of negligence seems to suggest that there was a delay of 10 minutes. Even if that is correct it does not, in my judgment, lead anywhere in the context of what followed.

113. As Mr Holl-Allen KC reminded me in closing, the evidence suggested that Mrs Bartle and Mr Mukherjee were present with the Mother throughout the whole of what was the critical period from 18:30 to delivery at 20:34 or at least they were not dealing with any other patients during that period. In closing it was said by the claimant that there was no such evidence but I do not recall that it was put in cross-examination to either witness that they were not present throughout. They were dealing only with the Mother and no other patients, focussing on and monitoring her well-being and that of the baby. It is in that context that I consider what they are said to have done during that period which failed to comply with the appropriate standard of care at the time.

114. Pulling the various threads together it seems that Mr Mukherjee had formulated the Plan by about 18:45, which is when the anaesthetist was bleeped. The anaesthetist saw the Mother at 18:50 and, it is to be inferred, examined her and gave his own advice. Mr Mukherjee then spoke to the parents and to the consultant. Those steps were all taken in what in my view was a non-negligent timeframe. There were no features which indicated to Mr Mukherjee or the anaesthetist or the consultant that this was an emergency situation; had there been such evidence then the Plan would not have been formulated and, I infer, the medical team would have proceeded directly to perform a caesarean section.

115. Nor was there any evidence of acute fetal compromise at the time that Mr Mukherjee decided to ask for a fetal blood sample to be taken and tested, and he was, in my view, right to do so, not only because it was in accordance with good clinical practice in 2003 but it proved that the baby was not in an acutely compromised position. Indeed the outcome of 7.29 pH was within the normal range, indicating no compromise. It was reassuring. The clinicians were entitled to rely on it. It was not an emergency situation and the CTG trace at the time does not indicate otherwise.

116. The Guidelines set out the applicable clinical standard and practice at the time of this birth. The evidence clearly demonstrates that the Plan which Mr Mukherjee made was in accordance with good practice at the time and in accordance with the Guidelines. Professor Siassakos and Mr Spencer both said that the Plan was appropriate. They both agreed that it was appropriate to take a fetal blood sample to check on the condition of the baby. I do not accept that there was a negligent failure to recognise at 18:30 that urgent delivery was required if that means more urgent than recognised in the Plan. The expert evidence and the Guidelines do not support such an allegation.

117. Nor do I accept that there was a negligent delay in obtaining the fetal blood sample. The sample was taken at about 19:15. There were no indications that a sample needed to be taken more urgently than it was in fact taken and the outcome showed that there was no emergency.

118. Once the fetal blood sample results had been obtained Mr Mukherjee could, according to the Guidelines, have waited and taken another sample later but he chose to proceed with his plan to expedite delivery. That was in accordance with good practice in my judgment.

119. The fact that Mr Mukherjee sought and obtained the approval of the consultant on two occasions, before and after the fetal blood sampling, demonstrated good practice and reassures me that his Plan and the decisions which he made for treatment of the Mother and delivery of the baby were in accordance with the appropriate standards of 2003. It was suggested that Mr Mukherjee need not have contacted the consultant on the first occasion and that doing so demonstrated a lack of experience, although it was not suggested that he was not properly qualified for the role which he was performing. I do not accept that he lacked appropriate experience, as I set out above, nor do I accept that contacting the consultant on more than one occasion demonstrated a lack of experience. On the contrary, it shows first a proper and careful approach and secondly that his approach and Plan met with the approval of a more senior clinician. Professor Siassakos did not criticise the Plan. The contemporaneous notes show that Mr Mukherjee was careful to explain the Plan and his approach to the Mother and her partner and was focused on the care of those in his charge.

120. There was an unexplained delay in obtaining the Mother's blood results and the paper trail makes it difficult to identify precisely when it occurred. However, the timeline at this point does not suggest to me that the defendant's staff negligently delayed in implementing the Plan. As I have found above, the fetal blood results, which indicated that there was no emergency or any greater urgency than that recognised in the Plan, were received at 19:26, the Mother's legs were removed from lithotomy position, her blood results were received by 19:35, Mr Mukherjee had discussions with the consultant and the Mother and her partner and the Mother was in theatre by 19:40. That does not, in my judgment, disclose a negligent delay in implementing the Plan.

121. The experts agreed that the CTG after 19:40 did not show a fetal bradycardia and Mr Mukherjee was entitled to rely on the FBS result as indicating that there was no need for greater urgency. There was no total collapse as appears to have been suggested on behalf of the claimant: such an analysis is inconsistent with the FBS results and the post delivery results. The Guidelines demonstrate that Mr Mukherjee could have taken a further fetal blood sample, but he chose to proceed to delivery, which the evidence as to proper clinical practice in 2003 shows to have been the options which were properly open to him on the basis of the information which he had received.

122. Thereafter I entirely accept the evidence of Mrs Bartle, supporting Mr Mukherjee, as to the detail of the steps which had to be taken in implementation of the Plan and the time that each step took. Mrs Bartle's clear evidence, to which she stuck in cross-examination even when she gave way on other issues, was that there was an irreducible number of steps to be taken, that each of them took time, and that the speed at which they were taken was not inappropriate. There was no unreasonable delay in my judgment.

123. I ask rhetorically, how much time could, in any event, have been saved if there was unreasonable delay in completing some of the steps leading to delivery?

124. The reality is, and I find, that the point at which events slowed was when it was discovered that the baby's head was impacted, and it then took 17 minutes to free the head and deliver the baby. It is not suggested by the claimant's experts that this period of time was unreasonable or that Mr Mukherjee can be said to have negligently delayed between incision and delivery.

125. In my judgment therefore the claimant has failed to establish that the defendant did not act in accordance with the standard of care to be expected in 2003.

Causation

126. The causation experts agreed a number of important issues in their joint written answers to a series of questions which they considered at their joint meeting on 9 November 2024. It seems to me that in considering the test for causation the first answer to take into account is that given in response to question 11:

> "But for the acute profound hypoxia, would the Claimant have suffered any cerebral damage?"

to which they said "We all agree, no."

The experts were not able to agree on the precise duration of what they described as the "acute profound hypoxic ischaemic insult" but were jointly of the view that it was "probably no more than 15 minutes in total" and that, as I have mentioned above, "if it had been possible to deliver [the claimant] within 10 minutes of opening the uterus he would probably not have sustained any permanent brain injury…".

127. As to the cause of the acute profound hypoxia the experts agreed, in answer to question 8(c) as follows:

> "We defer to experts in obstetrics regarding the precise cause. From the paediatric perspective we note that the uterine delivery time was 17 minutes (20:17 to 20:34), which is unusually long. During this period there were difficulties disimpacting [the baby's] head from his mother's pelvis. We all agree that it is probable that it was this difficulty, and this period of time, which was associated with [the baby's] acute profound hypoxic ischaemic injury. We agree that [the baby] does not have damage due to trauma."

The claimant's case on causation

128. Professor Siassakos said in evidence that he would not hesitate to describe the task performed by the obstetrician here as a "difficult disimpaction" and it would have been classed as an obstetric emergency. His proposition was that it is more likely than not that the baby's head became more impacted as the Mother's contractions continued to push the baby against the pelvic floor and labour progressed. In paragraph 5.11.4 of his first report, under the heading of "More severe disimpaction (sic) with 40 minutes extra contractions" Professor Siassakos said:

> "Their claim that there is no evidence that the head disimpaction (sic) becomes worse with longer duration is against common sense, never mind showing lack of knowledge of the mechanics of labour. The force generated by the uterus on labour is significant, resulting even on occasion in baby injury, for example in temporary (but not permanent) brachial plexus injury. The whole rationale behind current NICE recommendations for two hours passive second stage of labour is to allow the baby's head (if it can fit) to descend into the pelvis with contractions alone, before the woman starts pushing. Most of the progress of labour (all of the first stage, as well as the passive second stage) is achieved with the force of these contractions alone, which is significant.
>
> This force would cause additional impaction, by pushing the baby's head against the maternal pelvis, especially (if using the Defendant's own words), the baby had 'no space posteriorly or laterally and no space to manoeuvre the fetal head out of the pelvis'. The same force that caused the baby's head to descend from 1.5cm above the spines to the level of the spines between 17.15 and 18.30, continued to be applied to the baby until 20:34…"

129. Professor Siassakos returned to this issue between lines 941 and 955 of his report:

> "With competent care, the delivery attempt would have started earlier, [LMN's] head would have been less impacted in his mother's pelvis.
>
> There is indeed no published evidence that the duration of the second stage makes a difference to the degree of impaction. The longer the head is pushed against the pelvic floor, whilst already stuck, the more oedematous both the maternal and the fetal soft tissues become as the venous return is impeded. To use a simple understandable parallel, if one's limb is trapped, let's say in a fence, the duration of the entrapment makes a huge difference to the degree of swelling and the difficulty in releasing it even without any movement. If one now adds repeated pressure similar to contractions then the swelling and entrapment becomes worse. 54 minutes would make a huge difference.
>
> Moreover, even if difficulty in disimpacting the fetal head had been encountered at caesarean section, but for care below reasonable standards there would have been earlier call to the Consultant, earlier Consultant attendance, and earlier delivery avoiding prolonged hypoxic ischemic insult."

130. In cross-examination, while Professor Siassakos stood by his reports, he gave an explanation about the swelling which seemed to me to differ in a material respect to what he had said in writing. He was asked about the caput, swelling at the top of the

baby's head, and said that "with obstructed labour the caput becomes worse – it affects forceps but not impaction…" He later added that impaction itself does not cause hypoxia but he said that on balance the impaction would have been less an hour earlier and the obstetrician should have been able to get the baby out in 5 minutes if the caesarean section had been performed an hour earlier. He accepted that while the baby was not hypoxic at 19:15 he could not say whether the head was impacted at 19:15.

131. Professor Siassakos returned to the cause of the hypoxia in his supplemental report dated January 2025 saying:

> "With regards to the likely cause of the hypoxia, the CTG became pathological, as agreed in our joint statement, following the onset of variable…decelerations, which became late and prolonged with reduced variability. The accepted… mechanism for variable fetal heart rate decelerations is umbilical cord compression, compression which causes the typical M shape seen in [LMN's] actual CTG…
>
> Well grown babies like [LMN], initially tolerate cord compression, as evident from the normal FBS result. However, umbilical cord compression has been compared to diving under water. Eventually, the baby 'runs out of breath' if the intermittent compression is prolonged, or if it becomes more severe during the second stage of labour, when the head descends in the pelvis. The decelerations become late and/or prolonged and/or develop atypical features (loss of the 'shoulders' – the initial secondary increase in heart rate before and after the slowing). The baseline rate also increases, which is a sign that the placental reserves are becoming depleted. Eventually, there is a drop 'from the cliff edge', and fetal hypoxia occurs."

132. The Professor expanded on this in his oral evidence and said that before the impaction the CTG was pathological and there was compression of the umbilical cord, as evidenced by the decelerations on the CTG demonstrating that the baby was not coping. His evidence was that this recurrent umbilical cord compression and then occlusion leading to the depletion of reserves was the most likely cause of the hypoxia in this particular case. He accepted that the theory of cord compression had not been identified by him in his principal report but had emerged in the later joint statement. He denied that he had changed his mind as to the mechanism of injury between his two reports. He did not accept that the cause was the lengthy interruption of the maternal-fetal blood oxygen transfer following incision of the uterus given the delay in delivery due to impaction.

133. In my judgment Professor Siassakos' theory of the depletion of reserves is not supported by the other medical evidence which I heard and read nor is it consistent with the FBS results which gave Mr Mukherjee reassurance as to the baby's wellbeing. Moreover it does not seem to me to go anywhere in terms of causation given that the damage to the baby is agreed to have occurred in the last few minutes before delivery.

134. Dr Ducker's position, in his report (and supported by him in oral evidence), was that the baby had suffered from what he described as a "period of sensitising prolonged partial hypoxia during the period of the pathological CTG" which would have been too short to have caused damage but would, in his view, have sensitised the baby such that a shorter period of hypoxia thereafter would have been necessary to cause damage. As he said on page 10 of his report:

> "The period of acute near-total hypoxic ischemia was short. While its length is unknown it probably lasted in the region of 10 minutes. Given the shortened period of acute near total non-damaging hypoxic ischemia due to the partial hypoxia during the period of the pathological CTG it would have been equivalent to 13 minutes of acute near total hypoxic ischemia and on the balance of probabilities sufficient on its own to be cerebrally damaging."

However, he did not review the CTG himself and relied on what the obstetricians had said in their report, making the assumption that where they had said that the CTG was pathological it indicated fetal distress probably caused by hypoxia, but he accepted that results of the FBS test indicated that there was no need for action at the point that the FBS had been taken and he agreed that there was probably no hypoxia at that point. His view was that the prolonged partial hypoxia began after that period but he could not say when.

135. He was also of the view that the damage to the baby was caused or contributed to by an infection (which in his view would not have caused the damage on its own), but that does not form the basis of an allegation of negligence. Allowing for the sensitisation effect Dr Ducker estimated that the damaging period of hypoxia was 10 minutes and that if the baby had been delivered at 20:27 there would have been no damage.

136. Dr Ducker was unable to say whether the impaction of the fetal head had been worse an hour earlier than the impaction at the time of delivery nor whether if there had been less impaction there would have been less injury. He confined himself to the view that if the baby had been delivered more quickly (by, say, 4 minutes) then there would have been less damage. He expressed the positive view that delivery 30 minutes earlier would have made some but relatively little difference, although he could not say whether there would have been less impaction at that point. In cross-examination he specifically expressed no opinion as to the cause of the acute profound hypoxia which caused the damage to the baby.

137. Dr Pohl verified his report in which he had concluded that it was likely that acute profound hypoxia occurred right at the end of labour which he explained in greater detail in paragraphs 7.6 to 7.9 of his report:

> "7.6 The accepted paradigm for the events that occur around an acute 'near total' (APH) period of compromise, such as probably occurred in [LMN],are that once compromise occurs the first 10 minutes can be withstood before irreversible brain damage occurs. After this damage begins and progresses rapidly. It commences first in the high energy demanding

> deeper cranial nuclear structures of the brain. These are the areas reported as showing changes on [LMN's] MRI brain scan.
>
> 7.7 If this type of compromise continues unchecked, after a total period of around 25 minutes i.e. 10 minutes of a non-damaging period, followed by 15 minutes of escalating damage, survival becomes unlikely.
>
> 7.8 The relatively mild disability in [LMN], together with the limited distribution of damage reported on his MRI brain scan, makes it probable that the damage in [LMN] was confined to only approximately 2-3 minutes beyond the initial non-damaging 10 minute period – i.e. something in the region of a total period of compromise of around 12-13 minutes. Although I cannot exclude it, personally I think that this APH compromise would probably have been sufficient alone to result in the injury to [LMN] and that it is less probable that, in a term infant, an additional inflammatory response to the presence of infection had a significant additional accumulative effect. I note that the defence agrees that the claimat suffered brain damage caused by a period of APH immediately before delivery.
>
> 7.9 Catastrophic events that occurred around the impaction of the fetal head during the attempted surgical delivery are likely to have provided enough time for this duration of APH compromise to have occurred. "

138. Dr Pohl was asked in examination in chief, following Dr Ducker's evidence, about the possibility that there had been a sensitising period of hypoxia to which he responded: "I agree that there was a period of partial compromise not damaging which may have sensitised the baby but that is not critical to my opinion because it would have been of minimal effect. I think that we agreed that there was a period of chronic partial compromise which was undamaging…"

139. Dr Pohl emphasised in his evidence that, having regard to all the data and his knowledge of the patterns in cases such as this, what he had seen was consistent with damage right at the end of the process leading to delivery and that if the baby had been delivered three minutes earlier there would have been no damage. He was unable to say how much less damage would have resulted if the baby had been delivered one or two minutes earlier, adding that it is "a non linear process...in terms of functional outcome".

140. Taken together it seems to me that the claimant's evidence is equivocal as to what was said to be a sensitising effect of the events in the earlier stages of labour and delivery and, as I have already said, I do not accept, on the material before me, the theory that the baby's reserves were being depleted. Given the acceptance that the damage occurred in the last minutes of labour the focus has to be on the reasons for the delay in delivery after commencement of the caesarean section.

The defendant's case on causation

141. In paragraph 32(x) of its defence the defendant pleaded:

> "…the Claimant suffered acute profound hypoxia due to the extreme difficulty and consequent unavoidable delay in delivering the fetal head, which was unexpectedly found to be impacted deep in the maternal pelvis during a caesarean section performed when the cervix was fully dilated. Such extreme difficulty is unpredictable and rare, and there is no evidence linking its occurrence to the length of the second stage of labour. In this case the cervix had been fully dilated since 1715, and therefore the fetal head would have been subject to 2 hours of contractions in the second stage even if caesarean section had been undertaken at and from 1920. It cannot therefore be established that the degree of impaction of the fetal head would have been less, and its delivery at caesarean section correspondingly easier, had caesarean section [taken place] at or after 1920, rather than …the point in time at which the Claimant was delivered."

142. Mr Holl-Allen KC submitted: "[t]his was a therefore an adverse outcome dependent upon an event (the impaction of the fetal head) rather than one dependent upon time (the overall length of labour)." Mr Spencer said, in cross-examination: "This is the most difficult case I have seen in my career. The compromise [of the baby] did not start in this case before the C section." He said that he had never come across such a lengthy period between incision and delivery of a baby.

143. Mr Spencer gave his opinion as to the likely mechanics of the impaction in paragraph 4(d) of his report:

> "(iii) There was no evidence to suggest to those caring for [the Mother] that there was "impaction" of the fetal head at 20.00hrs. Impaction is described when there is unexpectedly difficulty to deliver, as found at caesarean section in this case, and is uncommon. However, when found, it is usual that there has been "failure to progress" of the fetal head within the pelvis. Impaction of the fetal head in this case probably had occurred by the time there was no further descent of the fetal head within the pelvis, at around 18.30 hrs. Impaction is a medical term which describes something wedged or fixed in place within a body or passage or cavity (eg fecal impaction causing severe constipation, or a wisdom tooth pushing against its adjacent molar).

(iv) Impaction of the fetal head can occur both before and after full dilatation. In this case, full dilatation was recognised at 17.15hrs and the head was noted not be engaged in the pelvic inlet -3/5 palpable per abdominal examination – and 1.5 cm above the spines on VE. The midwife, at this time, appropriately suspected an occiput-posterior position of the fetal head. An occiput-posterior fetal position is recognised to have a higher risk of "failure to progress" in labour, both late in the first stage and in the second stage. However, progress in the first stage was normal. There was no further descent of the head after 18.15hrs [corrected in oral evidence to 18:30].

…

(vi) After one hour of the second stage, there was descent documented to station zero (leading edge of the head at the level of the ischial spines). This would have been reassuring. It was still a possibility that the baby would deliver naturally, or with assistance, despite being OP…

(vii) The decision by Mr Mukherjee was to expedite delivery rather than to wait to see whether delivery would occur without assistance. One hour of active pushing in the second stage without achieving delivery is conventionally agreed to be sufficient to justify intervention. However, Mr Mukherjee's management decision after his assessment at 18.30 hrs was one which took into account maternal condition and recognised he possibility of fetal distress. Reassurance to proceed with a trial of non-rotation forceps was obtained when the FBS showed that fetal condition was satisfactory.

(viii) The fetal head was not expected to be impacted deep in the pelvis at 20:15hrs. This station did not indicate this. The application of non-rotation forceps at 20.00 hrs was noted to be easy, consistent with a direct OP position. In fact, the fetal head had not descended since the second assessment at 18.15/18.30 hrs two hours earlier. A recent study…found that more than 50% of occasions where the fetal head was found to be impacted at caesarean delivery occurred before the second stage of labour. The second stage, per se, therefore, does not appear to be the issue and so it seems improbable that delivery of the fetal head at caesarean section would have been significantly easier had deliver occurred around 19.30 hrs. This

> would only have been 45 minutes earlier, and still more than two hours into the second stage. Extreme difficulty such as occurred in the case is rare and unpredictable."

He confirmed this in his oral evidence and he stood by his analysis:

> "Examination showed that there was no further progress and the baby's head remained in that position [that it had been in at 18:15/18:30] and had no further place that it could go.
>
> After full dilatation, at 18:30 Mr Mukherjee examined it and it would have been in the same position."

144. Mr Spencer did not accept the proposition that the longer the labour, the worse the impaction:

> "There is no room to move further down and no further progress can be made.
>
> Contractions force the fetus down until there is no further progress. The baby's head, if OP, is up against the sacrum. There is no place to move down. It is not wedge shaped…."

He was challenged on the use in his report of the expression "a deep pelvis" and he said:

> Deep pelvis - the pelvis took the head and didn't let it go. I've used deep to try to explain the head in the hollow of the pelvis which I would describe as deep, not factually deep, but the head was deep in the back of the pelvis…"

He added that in his view there was no evidence of a connection between the fact that the baby was in the occiput posterior position and the degree of impaction.

145. He was asked about the relevance of the caput and the swelling and said that swelling was a result of all labours but he could make no link between the swelling and the impaction in this case: "the impaction is because of bone. The baby's head is tilting backwards and force is being misdirected and the head is stuck. I disagree that greater swelling leads to greater impaction."

146. As to the precise cause of the hypoxia Mr Spencer said:

> "When the uterus, which was contracting and relaxing in labour, is incised the immediate response…is to attempt to contract and the muscles then have isometric contractions ie they are contracting but not shortening and therefore not emptying and beginning to occlude and obstruct the mother's bloodflow to the placenta, which would haemorrhage unless the contraction stopped the haemorrhage…
>
> Once the membrane is ruptured [it can lead to cord compression]."

He explained that during labour, prior to the mother's water's breaking, the volume of water protects the cord which floats around but that after rupture there is an increased risk of compression because the cord is no longer protected by water and there is a greater risk of the cord being compressed against part of the fetus' body. That risk, he said, is increased after incision of the uterus which then tries to close off the mother's blood supply.

147. When asked to consider Professor Siassakos' theory about depletion of reserves as time passed Mr Spencer accepted that short periods of cord compression are caused by contractions and lead to variable decelerations which were evident on the CTG trace in this case but they were not, in his view, causing difficulties for the baby, as the FBS result showed. He rejected the suggestion that there would be a continuous depletion of reserves at a time when the CTG showed that the fetal heart rate had settled to 160/165. He said that there was no evidence that ongoing variable decelerations would have had an impact on fetal reserves and no evidence as to what the causal link might have been. He was of the clear view that at the start of delivery there was no evidence that the baby was already compromised. That evidence has the force of logic and I prefer it to the analysis offered by Professor Siassakos.

148. Dr Agrawal also gave evidence on the issue of causation, confirming the opinions he had expressed in his report dated July 2024 and those which he had contributed to the joint statement of November 2024. In his opinion the pregnancy was uneventful and there was no evidence to suggest that the baby had not been developing normally. There was no congenital cause of the baby's neurological problems. His focus was drawn to the impaction of the fetal head during delivery:

> "4.29 ...which resulted in delivery occurring 9 minutes later than the standard time (of 10 minutes) allowed to complete an uncomplicated C section. There is no evidence of exactly when the acute sentinel of foetal bradycardia took place but it is clear that there must have been this event at the time of the C-section when various manoeuvres were carried out to disimpact the foetal head and deliver the baby. It is probably that this bradycardia started at around 2020 hours or thereabouts, and I agree with Dr Rennie this was consequent upon the opening of the uterus deforming the placenta and changes in haemodynamics. [LMN] was born with bradycardia and his heart rate was 100 at 1 minute after delivery. Based on MRI scan…the duration of this insult would not have been more than 15 minutes...Therefore, in my opinion, the acute sentinel event of profound foetal bradycardia occurred at 2020 hours and continued until 2035 hours or thereabouts giving a total duration of acute profound hypoxia of 15 minutes (14 minutes in utero and one minute post-delivery)."

He deferred to the obstetricians as to the cause of the impaction.

149. Dr Agrawal did not accept that delay in reaching the commencement of delivery was causative of the injury:

> "4.36 The earlier delivery, at any rate at or after 1930 (which is the Claimant's case) would not have made any difference because, as per Mr Spencer's obstetric opinion, it cannot be said that the degree of impaction of the foetal head would have been any less than it was when caesarean section was in fact commenced at 2015. As such, it appears that this was an event-dependent outcome in the sense that it was going to occur once the foetal head had become impacted and did depend on how long after impaction delivery by caesarean section took place. My understanding of Mr Spencer's opinion is that the foetal head [became] impacted by 1830 hours after which it did not advance any further."

He explained this paragraph in cross-examination:

> "I mean it appeared [that] if the impaction did not worsen from 18:30 onwards then whatever time delivery took place the surgeon would have come across the same problem anyway. That is what I meant by an event dependent outcome.
>
> The problem started when he came across the impacted head…
>
> It would have been impacted at 18:30 and what followed, followed.
>
> The degree of impaction did not change, therefore whenever the operation took place it would always be that much effort was required…on the assumptions made in Dr Spencer's opinion."

He could not say what the position would have been if it had been easier to extract the head earlier and confined himself to the view that if delivery had been achieved within 10 minutes of incision then there would probably have been no injury but not if it had taken 14 minutes or 12 minutes. He said that the experts worked backwards from delivery, not forwards from incision, in calculating the duration of the damaging event but could not say what the starting point of the acute profound hypoxia was:

> "If [one] reduces the time it takes to take out the head there would have been less injury and if less than 10 minutes he would have been unharmed. If 12 minutes he would be less damaged but I cannot apportion it."

150. He emphasised that even if there had earlier been an abnormal fetal heart rate there were no other indications of brain damage due to chronic partial hypoxia (because of the results of the FBS and the post birth base deficit) and that in his view not all cord compression was damaging or led to brain damage. He said that if it had been a damaging and compromising factor it would have been seen in the fetal condition but there was no such evidence:

> "From 18:50 to 20:34, that is one and a half hours, if there had been significant cord compression I [would] expect the base

> deficit [at birth] to be much worse and the condition of the baby to be much worse and the baby to have suffered much worse injury.
>
> It depends on whether the hypoxia is significant or not – in this case it was not significant enough.
>
> [Even if it is agreed that] there was intermittent cord compression which caused variables…I can't see that this affected the outcome…"

151. In his evidence in chief Dr Agrawal had said that in evaluating the degree and duration of acute profound hypoxia one should take account of three elements, namely (i) the degree of disability of the baby, measured according to what is known as the Gross Motor Function Classification System (5 categories on the scale of which this claimant was at number 2), (ii) the results of the post birth MRI scan (which he said was a very good reflector of the duration of the insult) and (iii) the baby's condition at birth. He said that having regard to those three factors in this case led him to the conclusion that the duration of the acute profound hypoxia was 15 minutes but that 16 minutes was "too long".

152. As to the mechanism of the injury, which he felt that he was well qualified from his experience to give an opinion on, given that in dealing with children with cerebral palsy and gut and bladder problems he needed to understand the physiology of the muscles involved in birth ("I am the one who has to pick up the pieces afterwards and therefore it is crucial for me to understand the [causes]"), he explained his theory as follows:

> "After incision of the uterus at 20:17 in this case – after thinking a lot about this - this is a difficult case to come up with a definitive answer but I can come up with a scientific construct…
>
> It was one incision, then extended and then a third incision to extend, with an impacted head the smooth muscle would contract strongly and there would be contraction around the fetal head…and would change the fetal blood flow and obstruct it.
>
> There would have been an acute drop in maternal pressure when the incision was extended…when the position became really bad…
>
> When the cord is occluded you get big differences in venous and arterial pH, which was not the case here…
>
> If there had been previous hypoxia [relied on by Professor Siassakos] you would not have had the baby resuscitated in one minute and would not have had a deficit of 7.9…
>
> …7.9 does not indicate acute profound hypoxia previously…"

153. When she came to give evidence Dr Rennie confirmed her report and the experts' joint statement, explaining that she was the original draftsman of that document but that it had been contributed to and amended by all four of the experts who provided an opinion on causation in this case. She explained her qualifications and experience and the recognition of her expertise and teaching in being admitted *ad eundem* as a Fellow of the Royal College of Gynaecologists in 2008, even though that was not her area of specialism: a rare honour conferred on a neonatologist. She had been a consultant in Cambridge from 1995 and although she retired from clinical work in 2018 she has carried on with research and teaching. She specialises in brain injuries in babies and has published extensively on this subject. I reject the suggestion that she was not an expert in obstetrics: it seemed to me that given her qualifications, and significant experience, as recognised by her Fellowship of the RCG she was well placed to comment on obstetric issues which are closely associated with her areas of core expertise. She was cross-examined with skill and care but maintained her position and answered persuasively criticisms which were put to her in respect of the opinions expressed in her report. She was an impressive witness. I found her evidence logical and compelling and I accept it in preference to other contrary views which have been expressed by the experts on causation.

154. As Dr Rennie said in cross-examination, it was her view that the "acute profound hypoxic insult…was undoubtedly connected to the period of time there was difficulty in extracting him…In this case it is my opinion that three minutes into surgery there was an interference with [LMN's] oxygenation and the most probable cause was the effect on the placenta which occurred because of the uterine muscle reducing [the] blood supply to the lakes." She accepted that

> "In practice it is the goal of the obstetrician to deliver the baby in an efficient and safe manner as soon as possible after commencing the surgery [and] it is very unusual to take seventeen minutes with three incisions and manipulation."

later adding

> "This was a complicated C-section involving multiple incisions. I have never said that the impaction caused the hypoxia but the complications of impaction caused the operation to take longer than usual and during that time [LMN] sustained injury."

As to what caused the impaction she deferred to the expert obstetricians but her understanding of Dr Spencer's evidence was that the baby's head had been held by the bony pelvis and once impacted it could go no further. She accepted that the medical literature demonstrated that in general impaction of the fetal head is quite rapidly overcome in the course of delivery, but not so in this case.

155. The distillation of Dr Rennie's view as to how the acute profound hypoxia occurred is to be found on page 5 of her report:

> "In my opinion [LMN's] asphyxia insult probably began a few minutes after the uterine incision, at 2020 or thereabouts, due to deformation of the placenta and the change in haemodynamics consequent on opening the uterus. The insult continued until about 2035, 15 minutes. Expert obstetric opinion is that the manoeuvres used were reasonable and that the degree of impaction of [LMN's] head would have been the same at 2000 as it was at 2017. From the paediatric point of view, if it had been possible to deliver [LMN] so that the uterine incision to delivery time was shortened to 10-12 minutes rather than 17 he probably would not have sustained any hypoxic ischaemic injury."

She expanded on this on page 23 of her report:

> "From the neurological and the clinical point of view the total duration of the insult was probably no longer than 15 minutes; that fits with the concept that the asphyxia began at about 2020, 3 minutes after the uterus was opened. After the uterus had been opened for 3 minutes the deformation of the placenta and the change in the intrauterine pressure probably compromised [LMN's] fetal circulation.
>
> Other factors which may have been implicated in [LMN's] vulnerability were the fact that the mother was pyrexial and there was a prior fetal tachycardia. A degree of prior compromise was reflected in the venous pH of 7.01 at 2046, although the fetal blood scalp sample had been normal at 1930, just over an hour earlier. In any event, it is the case that if the delivery of [LMN's] head had been easier, in other words if it had been possible to shorten the interval between the uterine incision and his delivery to 10-12 minutes (rather than 17), he probably would not have sustained any damage at all. [He] did not sustain trauma with the methods that were used."

156. In her oral evidence Dr Rennie explained that in working out the duration of the insult one had to consider the extent of the disability, the MRI results, the condition of the baby at birth, the umbilical cord gas results and the recovery of the heart rate. In other words she adopted the same approach as Dr Agrawal. She described her thinking as to the mechanism of the asphyxia as follows:

> "…profound hypoxia is associated with a significant drop in brain perfusion driven by a fall in fetal blood pressure which is driven by the fetal heart rate. The fetus will have reduced his heart rate to 80 beats per minute or less [but] it was restored to 100 by one minute [after birth] and must have been due to a reduction in fetal oxygen delivery associated with surgical procedures i.e. incising the uterus and manipulating the baby which leads to an effect on the uterine muscle which is stimulated to contract which has an effect on the blood flows. The placenta is like a bunch of grapes sitting in a vat; the fetal

> supply is the bunch of grapes – it needs oxygen in and CO2 out and if the fluid in the vat is not cleared by the maternal side of the equation then the process is inhibited. The maternal blood is a lake which needs to be renewed and drained and refreshed and if it is inhibited because the maternal placental side is not being efficiently renewed and cleared the fetus cannot pick oxygen and get rid of CO2. As Professor Siassakos says the placenta is the fetal lunch..."

She continued:

> "…a profound hypoxia preferentially damages the highly metabolic part of the brain, the grey matter which is the substrate for [LMN's] disability and therefore [in] a sudden profound shut off of the blood supply to the brain these structures are uniquely vulnerable, which is a different pattern to profound partial hypoxia. Structures at this time are vulnerable because they depend on a good blood supply and the only driver is the heart rate…"

157. Dr Rennie disagreed with Professor Siassakos' opinion as to the mechanism of injury caused by a period of intermittent cord compression:

> "At 19:15 the pH was 7.29, which was a significant factor. At that point in time the fetus had not become acidotic, which is the hallmark of [an] anaerobic metabolism – if you switch to making energy containing compounds in a less efficient manner than in an aerobic mechanism it leads to a lactic acid build up and a fall in pH. If there had been a hypoxic ischaemia there would have been a significant reduction in pH in the fetus which, therefore, [in this case] remained healthy. It is therefore not probable, even if immediately after collection of the fetal blood sample, that hypoxic ischaemia had begun in a previously healthy fetus and there would not have been complete circulatory collapse at 20:20…
>
> It is a fact that the claimant was rapidly resuscitated at 20:34. At 20:35 [it was] 100 beats per minute. His heart rate virtually restored itself. He was intubated because he continued not to breathe. Babies' hearts are very strong and can beat without breathing – that is an important feature.
>
> The baby did not have a depletion of reserves.
>
> His heart rate came back almost without intervention. He had good reserves of glycogen, a store of starch – new born babies are born rich with this and are built to withstand labour.
>
> His glycogen was not depleted – it cannot be measured but is to be inferred from clinical facts that his heart rate returned

> rapidly – his heart was strong. Nor did he require cardiac support.
>
> His recovery is inconsistent with the concept that there was a depletion of reserves as a result of prolonged acute profound hypoxia after the 19:15 fetal blood sample which was normal."

She was challenged on this opinion in cross-examination and gave carefully considered and compelling reasons why, in her opinion, she was correct. I do not set them out in detail here because it would be repetition of what I have cited from her evidence above, and which I accept. She said, rather graphically, "it is not inevitable that a baby cannot come up for air – this baby continued to do so" as the factual evidence, including the CTG and the FBS results demonstrated. She also relied on the analysis of the cord gases post delivery, saying that "if there had been significant fetal hypoxia sufficient to cause a collapse you would have expected a metabolic acidosis venous gas ie following heart failure" but there was no evidence of it.

My conclusions on causation

158. The evidence suggests, in my judgment, that the baby was in good condition until the commencement of the caesarean section. The baby's injury was sustained during the 17 minutes between incision and delivery.

159. Professor Siassakos' addendum report suggested that the damaging acute profound hypoxia was caused by decompensation of the fetus at the end of labour because of the prolonged effects of umbilical cord compression leading to depletion of his reserves. To an extent it seems to me that he was supported in this theory by Dr Ducker. Dr Rennie and Dr Agrawal disagreed. Their opinion was that on uterine incision the underlying muscles contracted and interfered with the blood supply to the baby, which would not have been a problem had it not taken such a lengthy period of time to deliver the baby thereafter because of the impaction of his head.

160. I prefer the analysis of the defendant's experts on this aspect of causation. The underlying evidence does not suggest that the continued labour was causing the baby's supplies to deplete. The results of the test of the fetal blood sample at 17.15 of pH 7.29 shows otherwise. The recovery of the fetal heart rate, as shown on the CTG, until the very end of the trace, demonstrates that the baby was strong enough to deal with the challenges it was facing. There is no evidence of failure of the baby as suggested on behalf of the claimant. The evidence does not show, in my view, a swimmer repeatedly coming up for air after nearly drowning as Professor Siassakos would have it. The evidence of the condition of the baby and the venous blood samples taken after birth, taken together with the other factors considered in detail by Dr Rennie (cited above), are also inconsistent with a depletion of the baby's supplies leading to a complete cardiac collapse. Dr Rennie emphasised the fact that babies are designed to withstand labour and have considerable reserves.

161. Mr Holl-Allen KC commented in his closing submissions:

> "…it would be an extraordinary coincidence if the decompensation for which Prof Siassakos contends occurred just at or after the time of uterine incision and attempts at

> disimpaction of the fetal head, but quite independently of those events."

I respectfully agree.

162. The focus therefore has to be on the reasons for the length of time that it took to deliver the baby after incision.

163. The experts agree that the length of time that it took to disimpact the baby's head in this case was exceptional. At 17 minutes it was also well outside the ranges considered in the paper entitled "Impacted fetal head during second stage Caesarean birth: A prospective observational study" by Nia Wyn Jones and others published on 4 March 2022. The objective of that paper was stated to be "To determine the incidence of, and complication rates from impacted fetal head at full dilatation Caesarean birth in the UK, and record what techniques were used." The authors introduced their paper as follows:

> "Caesarean section rates are 31% in the US and 33% in the UK. At least 5% are performed at full cervical dilatation (in the second stage of labour) and this proportion is rising. Both maternal and neonatal complications are greater during the second stage. One reason is that when the cervix is fully dilated, the baby's head may be deeply engaged in the pelvis, a so-called "impacted fetal head". Delivery in this situation may be technically challenging if the obstetrician cannot pass their hand between the bony maternal pelvis and the fetal head. A vacuum effect may also make head elevation difficult. The uterus is also typically thinned and stretched making extension of the uterine incision more likely. Complications for the baby include bony fractures, hypoxic brain injury and death. Risks of complications are further increased if there has been a prior unsuccessful attempt at instrumental birth."

The authors had evidence of 557 relevant cases with a range in time from incision to delivery of 2 to 5 minutes, with a median of 3 minutes. Of the 557 only 3 babies, 0.5%, suffered from hypoxic ischaemic encephalopathy (damage to the brain). I was also taken to the paper headed "Time between skin incision and delivery during cesarean", which did not focus on cases where the baby's head was impacted, which showed that in a study of a larger cohort of women giving birth by caesarean section in a specific hospital in Cape Town, South Africa in 2010 the time for delivery of first babies was 1 to 15 minutes with a median of 1 minute. For repeat births it was 1 to 28 minutes. The current birth was therefore, on the basis of the research recorded in those papers, a very rare incident but those papers do not help me on the question of why it occurred.

164. It is not suggested that Mr Mukherjee acted negligently in delivering the baby, ie from incision to birth. The complicating factor was impaction. It is not suggested that Mr Mukherjee or the rest of the team knew or ought to have known prior to commencing the caesarean section that the baby's head was impacted.

165. It was accepted by the experts that but for such a degree of impaction the delivery would not have taken so long and the claimant would not have been injured. The margin of difference, between non-injury and injury, would appear to be a matter of minutes only. Therefore, if delivery had occurred within the timescale of the deliveries in the Wyn Jones' paper there would, on the balance of probabilities, have been no injury. If birth had occurred 4 or 5 minutes earlier there would, on the balance of probabilities, have been no injury.

166. The claimant submits that the delivery should have commenced significantly earlier and at that point the baby's head would have been less impacted. It was submitted on behalf of the claimant in closing that one does not find this degree of impaction unless there has been negligence. However, in my judgment one does not follow the other and I prefer to analyse the evidence and see where that leads.

167. Ms Ewins submitted in her closing submissions:

> "With caesarean section at a significantly earlier stage, the degree of impaction of the fetal head in the pelvis would have been less severe than in fact occurred. The delivery would have been effected more swiftly at those earlier times and the period of hypoxia would have been reduced, and no injury would have been sustained."

There was nothing in the medical literature before me which seemed to me to be of direct assistance on this issue although Ms Ewins sought to rely on the Wyn Jones paper cited above. In response to the defendant's submission that this particular delivery with a serious degree of impaction and a delivery time of 17 minutes was not within the scope of the paper Ms Ewins argued that the defendant's submission "misses the point. You do not normally get this degree of impaction, because there is not negligent delay in delivering the baby." I am afraid that I do not accept that submission as an answer to the defendant's argument. The Wyn Jones paper is merely an analysis of the data which was available, in the form of the 557 deliveries. It showed that, as I have said, 0.5% of those case studies resulted in hypoxic ischaemia but none of those cases involved a delivery which took 17 minutes because of severe impaction of the baby's head as occurred in the present case. Nor is the paper material from which I could conclude, or properly infer, that if the delivery had commenced at an earlier point in time the degree of impaction would not only have been less but sufficiently less to enable the delivery to have taken place so much more quickly that there would have been no damaging period of hypoxic ischaemia. I am therefore left with the expert evidence in the case.

168. I have set out in detail the specific evidence from the obstetric experts on this issue. It is the claimant's case, supported by the evidence of Professor Siassakos, that the baby's head became more impacted as time passed with the consequence that delivery would have been easier and quicker had the steps leading up to the commencement of the caesarean section been taken earlier. He used the example of continually hammering on a wedge and driving an object further into a space in which it became increasingly stuck. Mr Spencer's evidence was that the head would not have been less impacted an earlier time; that once it had reached as far as it could within the pelvis, a bony structure, it could go no further. Neither of them relied on external

medical expert opinion. Both asserted, in their own way, that their conclusions were a matter of common sense.

169. Insofar as the claimant relied on an increase in caput I do not accept that this was causative of delay. The experts' evidence does not support it. Professor Siassakos did not accept it. The defendant's submission that increased caput would not increase the degree of impaction of bone against bone is, in my view, to be preferred.

170. In assessing the conflicting views of the two obstetricians I have reviewed the evidence of the position of the baby's head at various stages. At 18:30 the evidence shows that the baby's head was at the ischial spines. That is the position where it appears to have remained until the first attempt at instrumental delivery took place. There is no evidence as to any further movement. There is no evidence as to the impaction prior to commencement of the caesarean section. There is no detailed factual analysis as to the cause of the impaction. There are merely the two competing theories. I accept that there would have been a point at which the head was not impacted. However, it is a matter of speculation as to when the impaction occurred and whether there was a gradual increase or caused by a single event at or after 18:30.

171. In comparing the theories of Professor Siassakos and Mr Spencer I prefer the views of the latter. It is, in my view, the more logical. Once the baby's head had descended as far as it could go there was no further movement possible. The constraining structure is bone. The baby's head could move no further. I do not accept the argument that continued contractions were similar in effect to a hammer hitting a wedge. The claimant, on the basis of that theory, also has the difficulty of working out a timeline. In other words when was the baby's head impacted to the degree seen immediately prior to delivery. How much less would it have been impacted at any stage after 18:30 and by how much would that have shortened the time taken to disimpact the head and deliver the baby?

172. The defendant submits that the claimant cannot show that in the 50 minutes before the commencement of delivery the degree of impaction would have been any less: the outcome would have been the same. I accept that submission.

173. The degree of impaction of the baby's head, which led to the delay between incision and delivery and led to the claimant's injury, could not have been expected or prevented.

Material contribution

174. The claimant says that if the court were to find that it is not possible to say, as a matter of medical science, that, but for the negligent delay, the impaction would have been less and delivery would have been effected a specific number of minutes earlier so that there would have been no injury, but it is possible to say that the contribution of the negligent delay to the degree of impaction was more than negligible in the sense that without the delay the impaction would have been less severe and delivery would have occurred earlier, then causation is established on the basis that the negligence contributed to the critical delay and the injury suffered by the claimant.

175. Alternatively the claimant says that if the court were to find that it is not possible to say, as a matter of medical science, by how much the impaction and therefore the injury would have been reduced if there had been no negligent delay, but can say that the delays contributed materially to the severity of the impaction and therefore the injury then causation is established.

176. Mr Holl-Allen KC submits that this is not a case where the court needs to grapple with the concept of material contribution. The key question, he says, if the claimant succeeds on liability, is how much earlier should commencement of the caesarean section have been and what would the degree of impaction have been at that point. If the impaction would have been the same then the claimant would fail on causation even if liability were established. If impaction had been less at an earlier stage the question would be how much less and would the injury have been avoided: in other words would delivery have taken less than 10 minutes (the period for which a baby could cope with acute hypoxic ischaemia without injury)? There is no room, he argues, for the principles of material contribution because the claimant cannot demonstrate that the alleged breach of duty would have materially contributed to the injury, albeit that medical science cannot establish that the injury would not have been suffered but for the breach of duty.

177. Ms Ewins argued in her written closing submissions that

> "It is an impossible conclusion in this case that the multiple negligent acts and omissions of the Defendant had no material causative impact. In other words, it is impossible to conclude that the injury would still have been sustained but for the acts and omissions and in question."

However, it seems to me that the submission places the starting point of the enquiry in the wrong place. In my judgment the court has to start by trying to ascertain, as I hope I have done above, the cause or causes of the injury in question. Coincidence is not enough to establish liability or material contribution.

178. Ms Ewins submitted that the allegedly negligent delay at the earlier stages contributed to the time that it took to deliver the baby and if there had been a shorter delivery period then the baby's injury would have been less and if the court cannot say how much less then it should hold that the delay was a material contribution and a finding of liability for all the injury should be made. She developed this argument by adding that if it cannot be shown by the claimant that the entirety of the injury would have been avoided if the defendant had not acted negligently, because of the absence or inadequacies of medical science, but there would have been some injury then the claimant is entitled to succeed. On the facts of this case she submitted that if I cannot find that an earlier delivery would have resulted in less impaction and the avoidance of the damaging hypoxia and if I cannot ascertain how the degree to which the impaction would have been less at an earlier stage and consequently how much less severe the damaging hypoxia would have been but I am satisfied that nevertheless the delay contributed to the damaging hypoxia then I should find for the claimant.

179. Mr Holl-Allen KC asks me to look at the two elements of the principle separately: contribution and material. He submits that in this case for the principle of material contribution to apply the court must first be satisfied on the balance of probabilities

that the alleged breach of duty contributed to the damage which was caused, not merely that it contributed to the risk of the damage which was caused. Secondly, he submits that the contribution which has been established must be shown on the evidence to be more than minimal or trivial. He develops this by saying that if I were to accept Professor Siassakos' evidence that the delivery should have taken place earlier by, say, four minutes with a consequent shorter exposure to acute profound hypoxia of four minutes then the claimant would succeed on the traditional "but for" test and there is no need to pray in aid the principles of material contribution. He says that the principles have to be applied to the specific context and if the court finds that at an earlier stage the degree of impaction would have been less and therefore the time between incision and delivery would have been less to a material extent and the saving of time would have been four minutes then the claimant succeeds on the "but for" test but if the saving would have been less than four minutes but the breach of duty nevertheless made a material contribution to the delay in delivery then the claimant would succeed.

180. The test for causation which I have to apply is that explained by the Court of Appeal in Bailey v Ministry of Defence [2008] EWCA Civ 883, a case at the heart of which was the issue of whether the claimant could succeed where there were said to be mixed causes of the major injury, the subject matter of the claim. In the course of the judgments which it delivered the court addressed the principles relating to material contribution. The Court of Appeal reviewed the existing caselaw leading to the following pithy statement of principle by Waller LJ, at [46]:

> "46. …*If the evidence demonstrates that 'but for' the contribution of the tortious cause the injury would probably not have occurred, the claimant will (obviously) have discharged the burden. In a case where medical science cannot establish the probability that 'but for' an act of negligence the injury would not have happened but can establish that the contribution of the negligent cause was more than negligible, the 'but for' test is modified, and the claimant will succeed.*"

181. In Bailey's case a lack of post-operative care contributed to the claimant's overall weakness in that it contributed to her inability to cope with aspirating her own vomit as a result of which she suffered a heart attack.

182. In Bailey the trial judge did not find that "but for" the negligence in treating the claimant the injury for which she brought the claim would not have occurred. He found, however, that the negligence made a material contribution to the injury suffered, in other words "a contribution which was more than negligible" as Waller LJ described it [para 36], which the Court of Appeal held to be sufficient to succeed on the question of causation. The passage shows, in my view, that before liability can be established the factor which is said to have made a material contribution must be shown to have added to the cause of the injury for which the claim is made.

183. I was also taken to the relatively recent decision of Ritchie J in CNZ v Royal Bath Hospitals NHS Foundation Trust and others [2023] EWHC 19 (KB) in which he considered the principles of material contribution in what were, it is accepted, obiter comments. The case itself concerned a child born with acute profound hypoxic ischaemia after her mother had initially been refused an elective caesarean section

which was ultimately performed negligently late. The judge found for the claimant. The central question related to the autonomy of the patient and the request for a caesarean section which the clinicians initially refused. The judge found that the claimant had established that the defendant had negligently delayed the birth by 6.5 minutes as a result of which the baby suffered 6 minutes of injurious acute profound hypoxia. Had there not been such a delay the judge held that the whole of the claimant's injury would have been avoided [para 323]. The claimant therefore satisfied the "but for" test. The court went on to consider material contribution. After reviewing the relevant authorities the judge held [350]:

> "I take from these cases the principle that where the but for test cannot be satisfied due to scientific gap impossibility then the law will apply the material contribution to the injury test. If the Claimant can prove the breach made a material contribution to the Claimant's injury which was more than de minimis then damages are to be awarded against the Defendant. In certain (limited) circumstances material contribution to the risk of causing injury will be used but in the current case before me material contribution to risk is not relevant."

He held that there was only one causative factor to the injury in the case before him, namely acute profound hypoxia [355]. The same is true in the case before me.

184. In this case I have rejected the claimant's submission that the defendant acted in breach of its duty in delaying in caring for the Mother or planning for and delivering the baby. No other cause of injury is asserted. The fact that medical science cannot say at what earlier stage the baby's head may have been so much less impacted that it could have been delivered in a timeframe which would have avoided injury is therefore irrelevant. The claimant cannot demonstrate any other negligent cause of the delay in delivery and there is therefore, in my judgement, no room for the material contribution test. For the claimant, to succeed on this test, has to satisfy the court that there is more than one negligent materially causative factor of the injury in this case but unfortunately he cannot do so.

Conclusion

185. For the reasons which I have set out above I have therefore come to the conclusion that the claimant has failed to establish that the defendant acted in breach of its duty or that the alleged breaches caused or were a material contribution to the injury which he suffered.

186. I would therefore dismiss the claim.