Thursday, 30 March 2023

(10.00 am)

(In the presence of the jury)

DR ANDREAS MARNERIDES (continued)

Examination-in-chief by MR JOHNSON (continued)

MR JOHNSON: Dr Marnerides, we've been asked that you keep your voice up, if you don't mind. Thank you.

Can we resume by considering the case of [Baby O]'s brother, [Baby P], please. Adopting the same approach that we have taken with the other cases, can I confirm that your original report was dated 25 January 2019?

A. Yes, that's correct.

Q. Thank you. Did you subsequently write shorter reports on 12 July 2020?

A. That's correct.

Q. 20 October 2021?

A. Yes.

Q. 22 October 2021?

A. Yes.

Q. And 11 September 2022?

A. Yes.

Q. I'd like to, as we have before, deal with the material that you received. So looking at your report of 25 January 2019, first of all. With your letter of

instruction and terms of reference, did you also receive the following: a copy of the witness statement made by Dr Evans on 2 June 2018?

A. Not with, but a year later.

Q. Right. Very good.

A. But I did receive that.

Q. Yes. In any event, before you did the report?

A. Yes.

Q. Thank you. A PDF bundle of 603 pages of medical records relating to [Baby P]?

A. Correct.

Q. A radiology report containing the post-mortem skeletal survey radiology report?

A. Correct.

Q. Sixteen digital photographs taken at the post-mortem examination?

A. Correct.

Q. Five digital photos illustrating the radiological images?

A. Correct.

Q. Slides from the post-mortem, pathology slides and paperwork consisting of 68 pages?

A. Correct.

Q. Some further pathology paperwork consisting of a further 70 pages?

A. Correct.
Q. And 220 pages from the coroner's records?
A. Correct.
Q. Then finally, a total of 20 histology slides made up at the post-mortem or after the post-mortem?
A. That's correct.
Q. Thank you.

Just going to additional material that you have received and you dealt with in your statement of 20 October 2021. Did you receive Dr Bohin's medical reports?

A. Let me just find the page.
Q. It's 20/10/21. I think you may have gone too far.
A. Yes, I received the report by Dr Bohin.
Q. The report is dated 22 May 2020; is that right?
A. Correct.
Q. Also, Professor Arthurs' report of 19 May 2020?
A. Correct.
Q. Additional reports of Dr Evans, dated November 2017 and March 2019?
A. Correct.
Q. And also a reconstituted bundle of medical records?
A. Correct.
Q. Are these all -- is this all material that you have taken into account ultimately in reaching your opinions

in this case?

A. I can't say ultimately, I need to check if I have listed anything in the subsequent reports --

Q. Yes.

A. -- additional.

Q. I think in your -- well, let's go through it for the sake of completeness. Your final report of 11 September 2022, is that a comprehensive list of documents that you have considered?

A. Yes.

Q. It goes to, I think, 56 separate items.

A. That's correct.

Q. It includes all the material that we have referred to earlier, albeit you then break down, I think, on an individual basis some of the photographs and similar material; is that right?

A. That's correct, yes.

Q. If there's any doubt about it, in total, by the time you concluded your written views in this case -- I'm looking at your items 35 to 38 -- you had seen four separate reports from Dr Bohin, two dated 22 May 2020 and two documents that bore the date 15 October 2021?

A. Correct.

Q. You had two separate reports from Professor Arthurs, which are items 39 and 34?

A. Correct.
Q. So far as Dr Evans was concerned, I think you had a total of seven separate documents, seven separate reports?
A. Six.
Q. Six, sorry. You're quite right. I beg your pardon.
You also had what the jury have already heard referred to from time to time as the joint expert report, which was the product of a meeting to which you made reference yesterday?
A. Yes.
Q. Thank you.
Because we have dealt with so many cases over the last 24 hours, in order to just put us all back into a mindset where we remember some of the more important detail of [Baby P]'s short life, I just want to run through the chronology, if I may, which you have set out in your first report on 25 January. This is in the "Response to my instructions" section of that report.
Do you record that [Baby P] was born with his brothers on 21 June 2016?
A. Yes.
Q. If Mr Murphy can help with the presentation, that's tile 2. His birth weight was 2,066 grams. You record his Apgar scores, which we can see there reproduced on

screen.

Tile 7, Mr Murphy, please. You record next that [Baby P] was admitted to the neonatal unit at 14.45 that same day. His temperature, his heart rate and respiratory rate are all -- and oxygen saturations are recorded in your report. You also note, which is material at tile 7 and that he was born in good condition and he was making good respiratory effort.

You move on in your paragraph 6 to record the fact that at 11.45 on 22 June, [Baby P] was on CPAP, albeit that specific event isn't noted in the sequence of events, but that by 14.00 hours that same day, CPAP was stopped and he was on Optiflow.

You record that at 02.34 hours on 23 June, albeit he was still on Optiflow, [Baby P] was still in air and not requiring any additional oxygen. That there were no concerns for him at 10 o'clock on the morning of 23 June, his antibiotics were stopped.

You move on at your paragraph 11 to note the basic facts of Dr Gibbs' examination of [Baby P] at 18.00 hours on the 23rd, which is tile 134.

The jury will remember this is the examination noted by Dr Cooke but conducted by Dr Gibbs. The blood tests were ordered and an abdominal X-ray was ordered. You note the blood gas record at 20.27 later that evening;

that's tile 178.

You move on at your paragraph 14 to record the fact of Dr Ukoh's examination at 09.35 on the morning of 24 June; that's tile 289.

[Baby P]'s collapse shortly after the ward round and the calling of someone you describe as "the doctor" at 09.50, who we know was [Dr A].

You record at tile 306 the blood gas record shortly afterwards at 09.51.

At tile 362, your paragraph 16, you record the observations at that stage. It may be I've got the wrong tile number there. I think it's 361, actually. I beg your pardon. It's [Dr B]'s notes relating to that.

You record the fact of a further desaturation, which we have at tile 414, which happened at 12.28 or thereabouts, which is a desaturation that happened at the time [Dr A] and [Dr B] were in the tea room, according to evidence given by [Dr B]; the re-intubation of [Baby P] at that stage and the administration of adrenaline thereafter; the right-sided pneumothorax, which was revealed by a chest X-ray, which was decompressed with the needle at 12.40, which is tile 430; the insertion of the pigtail drain, which is tile 539, 15.00 hours; [Baby P]'s further cardiorespiratory

arrest, which started at 15.14 and ended with his death shortly thereafter, which is tiles 546 to 596.

Did you move on to consider the findings of Dr Kokai, as contained in his report at the post-mortem examination?

A. Yes, I did.

Q. In particular, did you identify injuries to [Baby P]'s liver?

A. Yes, as recorded by Dr Kokai.

Q. Yes. So rather than dealing with Dr Kokai's findings and then going to the pictures, which we have, so these are perhaps less traumatic pictures than yesterday, if you could talk us through the pictures, please, as to what it is we can see. So we have the -- before we deal with this, is what we are about to see broadly similar in the sense that we will be looking primarily at [Baby P]'s liver?

A. We will be looking at [Baby P]'s liver, yes.

Q. These are photographs, as we know, that were taken at the time of the post-mortem examination. What I would like to do, please, Dr Marnerides, is go through them one by one and for you to incorporate the findings made at the time, if you would, and explain to us what it is we can see before we move on to other material evidence in your conclusions. So that's photograph 1, which shows nothing at all, really.

Number 2. Is that -- I don't know if Dr Marnerides can control the screen. We'll give you control of the screen, doctor. This is essentially exactly the same picture that we saw in [Baby O]'s case, is it?

A. It is yes. Will the jury need reminding of the anatomy?

MR JUSTICE GOSS: I hope not. No, the jury's heard an awful lot of medical evidence and they know what to focus on. We know that the liver is depicted there. You went through the anatomy very clearly yesterday, if I may say so, thank you, doctor.

I think Mr Murphy had better take back control.

(Pause)

A. Until we get back to control, can I just make some comments?

MR JOHNSON: Yes.

A. I think these will help the jury. We've got the findings on the baby's liver. We park that information for the time being. We can go through it now --

Q. Well, whichever way you think is the most helpful, Dr Marnerides. I'll defer to you on that.

A. We've got the information from the liver. We'll need to assess the information. I will take you through what I felt was important in that assessment.

Now, looking to the other findings from the pathology, as I explained to you yesterday, when we are

dealing with cases like this, we try to see whether we have any findings from the naked eye examination and from the examination of the histology that would assist us in proposing a cause or a mechanism of death. And when we get our findings all together we need to see whether the snapshot we have is accounting for the clinical assessment we are being provided. Because we are not the experts in that part, those are the clinicians, they go through the medical records, they tell us what their thoughts are and they give us the information on how the baby was behaving up to the point the baby died.

So having gone through the histology and the findings of Dr Kokai, I had no morphological evidence, which is no naked eye visible evidence, no naked eye visible -- no microscopically visible evidence to indicate a natural disease that would account for the baby's death. And the list of natural diseases I went through in my mind included basically all those that we discussed yesterday.

Q. Yes.

A. Now we have the findings from the liver and we need to work out: are these findings due to a natural disease or not?

Q. So in your assessment of the presence or absence of any

natural disease, does that include an assessment of the results of any tests that may have been conducted and that sort of thing?

A. I can only assess the tests that have been conducted post-mortem --

Q. Yes.

A. -- and not all of the tests. Even, for example, if there is a metabolic disease screening test, I will take into account the opinion of the expert on metabolic diseases on the report. I cannot claim expertise in metabolic diseases, I will take their opinion on that report. I cannot pretend to be an expert in explaining the significance of tests that were done during a baby's life, I don't have that expertise.

So this is the liver. We remember, right side of the upper part of the abdomen, below the diaphragm. Dr Kokai reported that there were three small subcapsular haematomas, so bruises on the anterior edge, front edge, of the right lobe of the liver, and these were described as small in Dr Kokai's report.

This is a photograph of the undersurface of the liver. I will guide you through that. This is the front (indicating). This is the back (indicating). This is the gallbladder (indicating).

So I think this is one of the three haematomas,

looking at it from the undersurface, on the right lobe. And there is a further small haematoma here (indicating) that I have identified from my review of the photographs.

There are three small haematomas on the posterior aspect, so at the back of the liver as well, and you can see these are small, they're not big.

Q. You just said "on the posterior aspect". What the text says is --

A. Sorry, apologies, anterior.

Q. It says:

"Three small haematomas on the superior surface of the right lobe and towards it."

A. So it's the upper part. And these are the three areas. So it's the superior. And this is towards the front. So superior towards the front. On this side (indicating).

Q. Top towards the front?

A. Yes, top towards the front.

MR JUSTICE GOSS: Looking at the script, I think it says "towards it". Does it mean towards its posterior aspect?

"Three small haematomas on the superior surface of the right lobe of the liver and towards its posterior aspect"?

A. I think it's a mistake in the text.
MR JUSTICE GOSS: Yes. That's what it should read.
MR JOHNSON: Should it say posterior or anterior?
A. It should say anterior. Sorry. Apologies. A mistake on the text.
MR JUSTICE GOSS: So it should say, "Its anterior"?
A. Yes.
MR JOHNSON: Just so there's a record of this, what's on the screen, for the sake of the transcript, is what is our page J34941, which should read -- the text should read:

"Three small haematomas on the superior surface of the right lobe of the liver and towards its anterior aspect."

Is that right?

A. Yes.
Q. Thank you.
A. So the question I am invited to answer is: why are these haematomas there? You can have haematomas in the liver because there is an underlying natural disease. The nature of that disease could be haemangioma, it could be a cyst, it could be, let's say, disseminated sepsis. I couldn't see any evidence of that.

The other explanation could be the so-called haematomas, subcapsular haematomas that we can see related with prematurity. Those look different,

however. They are typically not located on the superior aspect of the chest, as we see here, they're typically located strictly on the anterior. Whether this could be a rare manifestation of a prematurity-related haematoma, I could not refute that. That could be an explanation. It would not explain, however, the haematoma we saw on the undersurface of the liver.

So although these three could be a rare manifestation of prematurity-related haematomas, theoretically, it wouldn't explain this haematoma here (indicating), which is on the undersurface.

Q. Pausing there for a second, that part of the liver that we see on which there are two circles -- so we're on J34940 and there's a blue circle.

A. I'm talking about the blue circle.

Q. Is that the same area of the liver that was injured in [Baby O]'s case or are we talking --

A. We're talking about the same area, yes. We're talking about the area between the falciform ligament, which we can see here, and the gallbladder we can see here (indicating).

Q. Is this the same area or a different area of the liver that had, in effect, the full-thickness haematoma that we saw when a knife was used to dissect?

A. In the other case, because there were two sections, one

of the sections would have been here (indicating), the sections would have been here.

Q. So we have that coincidence between the two cases?

A. Coincidences are not part of my expertise. I'm talking about this case now.

Q. Yes.

A. It's the same area, yes. It's the undersurface, yes. If you're inviting me to say are they in any way different, I can say these are much smaller.

Q. Yes.

A. There's no comparison in relation to the size of the haematomas we see here and the haematomas we saw in the previous case. So putting this case on its own, it's a different case.

Q. Yes. This is a point, I'm sorry to interrupt you, I made with you yesterday or you confirmed yesterday. You do not look at these cases side by side, do you?

A. No, no, I'm looking at this case.

Q. Exactly.

A. I'm looking at this case. So the information that the liver gives me on this case is that I've got three haematomas that could be a rare manifestation of prematurity. I've got a haematoma on the undersurface, which is very small and I cannot explain on anything from the medical side of things and I need to consider

alternatives.

So the alternatives would be a form of injury to the liver. I don't have features to tell me that there had been severe impact to this liver because I don't have a huge bruise, I don't have haemorrhage into the liver, I don't have the superficial lacerations related with the bruise, so I cannot say there had been huge impact to this liver.

Could it be some sort of impact, for example, due to cardiopulmonary resuscitation? It could be. So I don't feel I can have a confident answer on whether this would be -- on what the explanations for these are. It could be a combined effect of haematomas of prematurity and cardiopulmonary resuscitation, I cannot refute that. Is this an impact, an inflicted injury? I don't have enough to say that. And that's where we are.

Q. So that's this case viewed in complete isolation from [Baby O]'s case. I'm not going to ask you to express an opinion in the light of [Baby O]'s case because that's the jury's function.

A. Yes, not mine.

Q. All right. So that's the liver injury. What about other unusual features that you were able to identify in [Baby P]'s case?

A. Are we talking about the pathology point of view?

Q. Starting with pathology and then moving on to what you took into account of what other experts said.

A. From the pathology point of view, there was evidence, from the examination of the lungs, of features that would be consistent with the pneumothorax complication that had been described. The assessment I'm invited to make in cases where I see features consistent with pneumothorax are: is this a pneumothorax that happened because there is an underlying disease or is it a pneumothorax that happened as a complication of medical intervention?

I couldn't see any morphological, so naked eye, or histological evidence that this could be explained on the basis of an underlying pathology. It happened, if I may use the term with a bit of freedom, contemporaneously to medical intervention, which we know can cause this pneumothorax, and I can feel confident to attribute that to that medical intervention.

Otherwise, there was no morphological evidence, as I said earlier, indicating an acutely occurring natural disease process, so a process that would explain why this baby, being prematurely born, collapsed.

Q. So that's from the -- taking into account the views of the other experts?

A. Mm-hm.

Q. Did you draw any conclusions as to what it was that had caused the death of [Baby P]?

A. So the assessment of my part, I had no explanation and I could not see how a natural disease would have resulted to that. My understanding of the clinical assessment was that there was no clinical evidence of a natural disease accounting to this and that prematurity, in the absence of an evident clinical or pathological pathway to explain the death, would not be consistent with a natural cause of death.

So we were looking into unnatural causes and the assessment of the clinicians and thereafter the assessment of the radiologists, but I didn't have the radiology the first time, would indicate that there had been excessive injection/infusion of air into [Baby P]'s stomach and intestines.

Q. So far as the evidence that you saw was concerned, what conclusion did you draw then as to the cause of death?

A. You mean my final conclusion or the conclusion of the first report?

Q. No, having taken all the evidence into account, what is --

A. I think it's important to say that at the last report, where I had the benefit of the discussion with the experts present, both from the prosecution and from the

defence, I had the benefit of considering other proposals in terms of how that explanation, how potential explanations could be --

MR JUSTICE GOSS: Sorry to interrupt. Prosecution and defence. You said experts from the prosecution and defence?

A. Yes.

MR JUSTICE GOSS: So you had the benefit of all the discussions?

A. Yes, I had the benefit of the discussion, listened to the views, listened to what they proposed as things that should be considered, and I came to the conclusion that there was gastric and intestinal distension following excessive injection/infusion of air via the NGT, NG tube, the nasogastric tube.

MR JOHNSON: So air into the stomach through the nasogastric tube?

A. Correct.

Q. And in that context, from that factual position, is the mechanism of death similar to that which you have already described?

A. Yes. It's the distension of the stomach, either splinting of the diaphragm, acute splinting of the diaphragm, or the vagal nerve stimulus.

MR JOHNSON: Thank you.

Would you wait there, please? There will be some more questions for you.

Cross-examination by MR MYERS

MR JUSTICE GOSS: Mr Myers, before you start, what we will do is have a 15-minute mid-morning break, rather than 10 minutes today, because it's a long potential session until 1 o'clock. So if you would, at a moment that is most convenient, as far as you're concerned, from about 11.30 to 11.45, that splits the morning.

MR MYERS: Thank you, my Lord. It's also very warm, so it'll give us the chance to cool down if possible.

MR JUSTICE GOSS: Yes.

MR MYERS: Dr Marnerides, I'd just like to start by reviewing the role of pathology in the exercise that we are engaged in. Your role, at least in part, is to assist us with an opinion on cause of death, where that is possible, from the perspective of pathology; is that correct?

A. That's correct, yes.

Q. In doing that, to use an expression you've used, we have in effect the snapshot in time of the state of the body at the time of death. That's one factor that we have?

A. Correct.

Q. We may also, or you may also have, evidence from some of the processes that might follow after death that might

happen?

A. Correct.

Q. By which I mean, for example, when it arises, things like post-mortem gas or decomposition, for example?

A. That's correct.

Q. When it comes to looking at the body, the two areas in particular that you deal with, and we're getting familiar with these expressions, are morphology and histopathology; is that right?

A. That's correct.

Q. And morphology, we're getting there now, is how it looks to the eye unassisted, how the body and parts of the body appear; is that correct?

A. I'm not sure I follow you.

Q. Morphology is how the structures of the body or how it appears on examination with the naked eye?

A. Yes.

Q. Histopathology is once we start looking, for example, microscopically at cells and things like that; is that correct?

A. Yes.

Q. Now, in terms of your expertise, you've set out your qualifications and your education to us when you began your evidence. In fact, you were registered as a specialist in forensic pathology in Greece where you

originally trained in 2007, weren't you?

A. Yes.

Q. I think you explained that from there, you went to Sweden, where you trained in histopathology and perinatal and paediatric pathology?

A. That's correct.

Q. And you completed that training in 2012, didn't you?

A. That's correct.

Q. So since then, you've practised in general histopathology and perinatal and paediatric pathology?

A. That's correct.

Q. It's in your capacity as a specialist in that area that you give your evidence; is that right?

A. That's correct.

Q. And you understand, don't you, there are strict rules, including rules from the General Medical Council, about the extent to which an expert can give their opinion on matters? They have to stay within their specialism, do they not?

A. Yes.

Q. Now, we're going to look at this as we go through the babies here, the children. I'm not suggesting, by the way, that you have done anything other than say the position, Dr Marnerides. But you give your evidence as a pathologist and a histopathologist?

A. Correct.
Q. You are not, and I'm not being disrespectful when I say this, you're not a paediatrician?
A. I'm not.
Q. Or a neonatologist?
A. No, I'm not.
Q. And that means, if we just translate that into medical practice, you're not dealing with babies in the clinical setting day-to-day on the wards, are you?
A. No, I'm not.
Q. So when we consider all the circumstances of this case, as we and the jury must do, things like day-to-day practice in feeding or breathing support or desaturations that children may have on the ward day to day, that is not something you are dealing with, is it?
A. No.
Q. Indeed, when we go on to consider things like treatment in response to deteriorations or resuscitation or things like that, that's not what you're engaged in, is it?
A. I never resuscitate, no.
Q. So for that reason, as you've explained to us, you have to rely upon what the clinicians say to a large part when you come to consider the clinical circumstances that have taken place before the pathology? Is that correct?

A. It's not entirely correct. I have to rely on the views they expressed and the chronology and, yes, that's correct, but I need to consider what their opinions are in relation to what I can see and the mechanism and cause of death I'm invited to express an opinion on, on whether it is a reasonable probability, unlikely, not likely, and so on.

So yes, the first part I need to rely on. The second part is my role.

Q. I don't think actually we're at odds here. You take their opinion on the clinical circumstances?

A. Yes.

Q. Then you will accept that and apply it to the pathology that you're looking at?

A. I will accept the facts, not the opinion.

Q. Yes.

A. Unless I can be satisfied that on the basis of my findings, yes, that -- if I cannot be satisfied then I will not accept the opinion, I will accept the facts of the chronology, the treatment and so on.

Q. In the process you're engaged in, where the pathology is neutral, where there are no specific findings one way or another --

A. Correct.

Q. -- then when you are presented with the opinion of the

clinicians, unless something directly contradicts that, then you work with that opinion, don't you?

A. Yes, that's true.

Q. Right. In fact, we're going to go through them, but in this case, in many instances, the pathology does not point decisively one way or another, does it?

A. The histopathology.

Q. And the morphology does not?

A. Correct. It does, however, allow to exclude many considerations in relation to the clinical opinions that have been...

Q. For example, if there is no pathology of a natural disease process, then that assists you in discounting that from what you can see as a factor in the case?

A. That's correct.

Q. And that's one of the things you've referred to?

A. Yes.

Q. In terms of your actual work with the notes and the materials with which you've been provided, Dr Marnerides, we've heard there's a substantial body of material you've been given in most of these cases; is that correct?

A. That's correct.

Q. When you were answering questions about [Baby D], I want to ask you about something you said so we can

understand your part in the process again. You were asked this yesterday, whether you'd reviewed the medical records which had been set out and it was one of the tiles that we looked at. Again, I'm not asking this question critically, but it's so we understand where your part is.

You said:

"Answer: I have not reviewed the medical records."

The prosecution said:

"Question: Sorry?"

You said:

"Answer: I've extracted the information from the medical records and I state it in my report because that's the job of the clinicians, to assess the medical records. So I strictly followed my instructions, did a pathology review, so this [and you were talking about some material about [Baby D]] I extracted it from the report by Dr Evans that I received, I didn't go through the medical records."

A. Yes.

Q. Again, no criticism.

A. No, no, no, I can explain.

Q. Please.

A. In everyday life, when pathologists are dealing with post-mortem examinations and are dealing with reviewing

cases that other colleagues have done the post-mortem on, what we do is we are supplied the medical records or copies of the medical records, but the review of those medical records, if it is of significance to the case we are dealing with, is done by a clinical expert and then we use that as our reference. We have the copy in hand, so we can go back if we feel there is an information of pertinence that may change what the interpretation of the findings in front of us may be.

For example, if we are being presented with, let's say, a baby that is found dead in their cot and the clinical review is that we have nothing to explain that, they have reviewed the medical records, the baby was in hospital for, let's say, 3 days. And if I did the post-mortem or somebody else did the post-mortem and there is a severe head injury, I will go back to the medical records and say: how could they have missed that, did they not do a CT scan? And ask the question to see what happened there. So in that sense we will go back.

Q. Unless there's an apparent problem that you identify from the pathology then you accept that review as it's been conducted by, for example, Dr Evans?

A. Yes, it's been conducted by the appropriate expert, yes.

Q. In each of your reports you refer to significant

passages from Dr Evans, setting out his review and indeed his opinions, don't you?

A. Oh yes. And in every report I have said that in the initial notes after the documents that this is what I did, I have. The source of the information was this review and I only went back if I needed clarifications.

Q. So that means, and what follows from that naturally, is that, for example, where you rely upon a description of the clinical history, for example that the baby was stable prior to collapse, that is something that you rely upon, taking it from that review by the clinical expert?

A. Oh yes.

Q. As for radiology, that's the clinical material, you've also been able to draw upon radiology material, haven't you, Dr Marnerides?

A. I was given the X-rays and the reports, yes.

Q. Professor Arthurs, you're aware of, is the consultant paediatric radiologist who's acted as an expert in these proceedings for the prosecution on radiology, and you're aware of that?

A. Correct.

Q. And again, where that is concerned, unless you identify something where the pathology appears to be in direct conflict with what he says, you accept his analysis of

what we see on the radiographs; is that correct?
A. I accept his findings.
Q. His findings, yes.
A. I accept his differential diagnosis and then I have to -- it's my duty to go through that proposed differential diagnosis and see whether my review would allow one to take a view, yes, that's the more likely or the less likely and so on.
Q. But again, we've heard you say, and we'll encounter it as we go through the babies we're looking at, how you have relied on the clinical assessment and the radiology in forming your view?
A. That's correct.
Q. And that's where those two aspects of the case feed in in the way we've just been looking at; that's right, isn't it?
A. Yes.
Q. I just want to ask you next something about air embolism itself. Air embolism, as we know, features in this case in a number of the allegations.
When you prepared the initial reports, you assisted us with a number of papers that contained information relevant to this issue, didn't you?
A. Yes.
Q. I'm not going to start quoting from all of them, but I'd

just like to make a reference to them if necessary. One of the papers was a paper by Bernard Knight, a book on pathology by Bernard Knight.

A. It's a chapter from that.

Q. I just have that in mind in the questions I'm asking.

Just to assist us all, an air embolism is, in effect, when it creates the problems, serious problems, fatal problems, is in effect an air lock in the heart, isn't it?

A. It will go through the heart as well.

Q. Yes.

A. But it's not necessarily only then it can cause the problems.

Q. Is the principal problem created by an interruption in the circulation because of a blockage in the heart?

A. Yes. It's one of the big problems, yes.

Q. When that happens, is that usually on what's called the venous side of the heart?

A. Um...

Q. Blocking circulation on the right side, where it's going to the lungs?

A. It depends on the quantity of the air. It could be on both sides.

Q. Do you agree with the suggestion or the description that air must enter on the venous side, to be sucked towards

the heart, causing pulmonary air embolism?
A. If it's injected through the veins. If it's injected through the arteries then it's the other way round.
Q. Right. If it's injected through the veins then, it would go into the pulmonary side of the heart?
A. Yes, and it can return to the arterial side, because there is arterial flow, and go to the rest of the body.
Q. If we --
A. So it pretty much depends on the site of the circulation where the initial insertion of air was and the amount of the air that inserted the circulation.
Q. If we look at the Sally Kinsey exhibit, which is the one we looked at yesterday, page 6, the exhibit setting out the image of the heart. I'd like to look at that. Thank you.
So we can all follow what's being referred to by the description, the pulmonary circulation or the pulmonary side of the heart is the side that we see where the chambers are blue?
A. Correct.
Q. Is that right, Dr Marnerides?
A. Correct.
Q. It's from that blue side of the heart, the chamber at the bottom, the ventricle at the bottom, that it's pumped up through the pulmonary arteries to the lungs,

isn't it?

A. That's correct.

Q. So if air comes in through the venous system into the heart and is in a sufficient quantity to cause a blockage there, that interferes with the ability of blood to be pumped to the lungs and be oxygenated?

A. That's... That would be true if we were discussing adults.

Q. I'm going to come to the position with children in a moment. But yes. With children, where the -- we can see the blue arrow coming -- the arrow coming from the bottom of the blue, the ventricle, thank you, which is just going up to the pulmonary arteries, in children, particularly babies, there may be the foramen ovale there which allows blood to move across; that's correct?

A. It's open, yes.

Q. That's open. So the pressure means that it may move across into the left side of the heart at that point?

A. It's actually the difference in pressure. My understanding is that it makes it more likely that it will go on that side.

Q. Then of course that can circulate to other parts of the body?

A. Yes.

MR JUSTICE GOSS: Sorry, more likely than what?

A. Than continuing downwards into the -- so if I show you. The blood comes back to the heart into the right atrium, which is here (indicating). Okay? So if it has air and there is no -- and the foramen ovale is closed, as it is in adults, the air will have to necessarily go this way (indicating), downwards, and then pump to the lungs. But in babies, because there is a hole there called the foramen ovale, and it's typically open, it has a flap there (indicating), remember that, my understanding of the difference in pressures, left to right, between these two chambers is that it makes it more likely that instead of going this way (indicating), the air will travel this way (indicating), into the left atrium of the heart, then left ventricle, then to the systematic circulation, so the arteries.

But I'm not an expert in the physiology, so my quotation on the pressures may be wrong. That's my understanding but I may be wrong on that. It's likely because there's a hole there, it'll move that way.

MR MYERS: When the respiration is interfered with because of air embolism, when, for instance, a baby deteriorates, as it is in this case alleged, that will be because blood is not being oxygenated from the pulmonary circulation, won't it?

A. You're asking me a clinical question.

Q. I'm not being rude. Can you not answer that question?
A. You're asking a clinical question.
Q. All right, we're at the limits of where we can get to.
But of course, if air moves across the heart and into the circulation, it is then moving away from the lungs, isn't it, until it comes all the way back round again?
A. That's correct.
Q. The paper that you cited from Knight --
A. The chapter.
Q. Yes, the chapter from Knight describes how air remains in the pulmonary side of the lungs and that can cause a blockage in the pulmonary circulation, doesn't it?
A. That applies to adults.
Q. And in adults it's the blockage in the pulmonary circulation which prevents the blood from being oxygenated and which would cause the collapse and potentially prove to be fatal?
A. If that adult doesn't have an open foramen ovale, which can be the case in adults, and that's how adults get strokes, for example, from deep vein thrombosis.
Q. Can you assist, with a baby, maybe you can't, but with a baby, if the baby isn't receiving oxygen, if the air embolus is acting as a blockage, as an embolus, where that blockage is, where it's affecting the baby?

A. That's again a clinical question.
Q. You don't know?
A. I can't answer that.
Q. Okay. In any event, in an adult, it's blocking the pulmonary circulation, which is why the blood doesn't get oxygenated?
A. If the entry is in a vein.
Q. In the venous -- in terms of evidence of air embolus, the best evidence of course would be a chest X-ray indicating air embolism in situ, wouldn't it?
A. You mean post-mortem or before death?
Q. Let's say before death.
A. I would suppose so. I'm not a clinician.
Q. With regard to air in the abdomen, so the other mechanism we've been looking at in this case, so far as the pathology is concerned, Dr Marnerides, pathology cannot tell us how the air came to be there, the pathology alone, can it?
A. It can exclude reasons for air to be there. It can discuss potential reasons for air to be there. For example, decomposition. The anatomy is such that it needs to take into account how the air would have gone there.

To make it more applicable to what we're discussing here, if we are discussing a case with a distended

stomach and distended bowels, in vacuum, no clinical information, and I do a post-mortem, I would have said, "There is air, there is distension of the stomach, there is distension of the bowels". I have no evidence of a medical disease accounting for that. There's no infection, there is no stenosis, there is no volvulus, there is no necrotising enterocolitis. There's a big list. It's not there.

There's no anatomical defect to allow air to be trapped there, so the air must have come in, either through the oesophagus or artefactually in terms of decomposition.

I can assess the degree of decomposition on the post-mortem and say whether, because we know how air is produced in -- how gaseous production is produced post-mortem, it requires a period of time for the bacteria that live in our body, in our gastrointestinal system, to start eating up the tissues, and in that process they create gases and those gases will cause the distension. But if you don't have the evidence that this process is ongoing and significant to cause that distension, you can say, well, it's not likely that it's this, so there must be something that made the air travel from the oesophagus down to the stomach and the bowel. That's the thinking process.

Q. Yes. But precisely what that is --
A. No, no, I can't say.
Q. Pathology can't say that?
A. Unless I have clinical or circumstantial evidence saying, yes, there was somebody pumping air or they were doing something, I can't say.
Q. That's the point, really. You can discount various other mechanisms, but you can't say precisely how it came to be there?
A. Not strictly on the pathology.
Q. And nor could you say, in fact, in life, how long it would have taken to accumulate in the way that we see on any given radiograph?
A. In life, you ask clinicians, not me.
Q. Yes. Again, because you've given us opinions on air introduced exogenously, I'm just going over where you fit into that, Dr Marnerides. That's why I'm asking these questions.

Whether or not in fact in a baby, at a given point, the air that's described to you would have splinted the diaphragm, whether it did or it didn't, that's something that you take from the assessment of the clinicians, isn't it? Not the fact it's capable of doing that, but whether that's what would have happened on the face --
A. I never in my reports or in my opinions in writing said

that the distension splinted the diaphragm or induced the vagal nerve system. What I said is that it can do these two or the combination of both. There's no way for me, from the pathology point of view, to say if it was one of these mechanisms or the combination of these two mechanisms. That's the nature of a snapshot.

Q. That's what I wanted to be clear with, Dr Marnerides. When you talk about how the diaphragm can be splinted or the vagus nerve can be stimulated and interfere with the system, those are potential mechanisms in which distension could have that effect?

A. Those are the known mechanisms.

Q. From the pathology, you don't assert that the diaphragm was splinted in a particular case, do you, from the pathology?

A. I cannot, and that -- it's not doable from the pathology.

Q. And the same goes for whether or not there's been any interference with the vagus nerve?

A. Again, it's not doable from the pathology.

Q. No. Thank you. Those are general questions.

I'm going to turn next to [Baby A]. I repeat, as I've said before, that whilst I'm asking what are technical questions -- sorry, I'll just wait for you to be ready, Dr Marnerides.

(Pause)

These are technical questions, but I will repeat what I said before: there is no insensitivity or lack of sympathy to the position of those involved in this with the questions that I ask. The same applies with all witnesses in this case as well. It sounds a little bit objective, but it's not meant to be insensitive when I ask the questions.

Yesterday, Dr Marnerides, you went into some detail at one point about what may be fat globules or bubbles of air in some of the samples you saw.

A. Yes.

Q. But to be clear about it, the pathology does not prove air embolus in this case, does it?

A. That's correct.

Q. Looking at the report you wrote on 21 January 2019, Dr Marnerides, I'm looking at -- it says page 12 of 13. Do your pages have numbers at the top right-hand corner?

A. Yes.

Q. I'm looking at page 12 of 13. It's 771 in our papers, my Lord. It's different numbering.

MR JUSTICE GOSS: I think the page numbering is different.

A. My pagination is of 15.

MR MYERS: It's your opinion, paragraph B, in your report dated 21 January 2019.

A. Yes.
Q. And in fact, having reviewed the items you told us yesterday about items in the lungs or in the brain, you conclude that by saying:

"It is therefore my opinion that from the post-mortem examination point of view, the death of baby [Baby A] remains unascertained."

That's what you say, isn't it?

A. Yes, strictly from the post-mortem.
Q. Yes. Again, what I'm keen to do is to go where we can get to on the pathology. Sorry.

(Pause)

Where we can get to on the pathology and then to see the part played by other experts and their opinions. From the post-mortem point of view, it is unascertained. And your opinion, Dr Marnerides, is that purely from the histology and the morphology, we're used to those expressions now, there is no evidence that death was due to unnatural causes at all, just looking at the morphology and the histopathology?

A. Can you read what I exactly wrote?
Q. Yes, of course. If we look at your paragraph B:

"Having reviewed the post-mortem examination findings and the related ancillary post-mortem investigations and histology, I could not identify any

convincing positive morphological evidence indicating that the death of baby [Baby A] was due to unnatural causes."

Do you see that?

A. Yes. That's what I said. I'm not sure that what you asked me to comment on was exactly this.

Q. First of all, there is no positive morphological evidence that it was unnatural, is there?

A. Yes.

Q. You agree, don't you?

A. Well, I wrote it.

Q. Yes, you did. And likewise, there was no histopathology that indicated unnatural cause. I'm asking you that as a general question, Dr Marnerides.

A. Did you say natural or unnatural?

Q. Indicating it was an unnatural cause, establishing that.

A. I said, yes, there was no convincing positive morphological evidence.

Q. I was also adding histopathological evidence as well. I'm asking you about that.

A. The term morphological means -- includes both, naked eye and histo.

Q. We have that, that's clear. That's what I wanted to confirm.

So far as pathology takes us, the pathology on its

own, that is -- that doesn't take us to air embolus, does it, on its own?

A. On its own, yes.

Q. Which is why you settled on the expression, "The death is unascertained on the pathology"?

A. On its own, yes.

Q. What you go on to do, and you say it in your paragraph C, you then turn to look at what you call:

"The constellation of the circumstantial and clinical evidence in this instance as outlined."

I'm looking in particular at Dr Evans' statement, and that's your paragraph C. That's right, isn't it? You looked at the other material?

A. Correct.

Q. And therefore, because you come to the point that this could be air embolus, don't you? Ultimately in light of that, you take the view this could be explained by air embolus?

A. Yes, this would be explained by air embolus.

Q. And you get to that point by moving beyond the pathology but in effect factoring in what the clinicians say about the circumstances leading up to and at the time of death; is that right?

A. Yes. May I make a comment on that? So that's what pathology is about, when we're asked to offer an opinion

on the cause of death. I will give you an example that I think will explain to the jury how a pathologist will take into account the investigations and the opinions of clinicians.

We have a dead baby, not one of those that we are discussing here, and there is no known medical history, there is no known assessment by any clinician before the baby is found dead. I do the post-mortem examination, I do my ancillary investigations, and I do genetic testing, I take all the results and microbiology, virology, everything comes back negative, and the cause of death at the end is, from the pathology point of view, unascertained.

And we have the family, because of that, that happens very often, the family refer to that, to a review by a clinical geneticist, looking into details for genetic reasons, and they do further testing, not on the samples from the baby but on the samples from the parents and the siblings. The findings say that it is likely, because they have findings from the family, that the baby that died died due to cardiac arrhythmia, which cannot be seen on morphology, and this is a known syndrome, let's say DiGeorge syndrome that has no morphological findings at post-mortem examination.

When I receive that information, I will issue

a supplementary report as a pathologist, saying: in face of the new evidence, although there is no proof on the baby, the likely cause of this dead baby is DiGeorge syndrome. This is what happens in all cases, basically.

Q. Yes, because where the pathology is neutral, you can then take account of the assessments or additional evidence, for example from the clinicians or the radiology; that's correct, isn't it?

A. Yes.

Q. And of course, at that point, unless the pathology directly contradicts what, for instance, Dr Evans says, you are relying upon the assessment that he provides you with, aren't you?

A. Not Dr Evans only, the other clinicians.

Q. All the clinicians, but Dr Evans features in your reports principally, doesn't he?

A. The initial reports because that was the first clinical assessment they had.

Q. So, for example, as I asked earlier, the suggestion that a baby is doing well up to the time of collapse, if you receive that suggestion, that is something that you'd accept unless you find something on the pathology to challenge that?

A. Yes.

Q. Right. Just whilst we're dealing with [Baby A],

although it's not the -- on the issue of air embolus, we heard the agreed facts yesterday, Dr Marnerides, which included this. It was agreed fact 20. I'm going to read it out, it's from the end of that agreed fact where it says:

"Dr Shukla observed that there is a strong temporal relationship between the long line insertion and patient's apnoeic spell and collapse. Long line positions could not be confirmed at autopsy as it was removed during life."

So working backwards from what we have there, so far as the long line that was inserted at some time just before or around 19.00 hours is concerned, that was not in situ at the time of death? It had been removed, hadn't it?

A. It could have been removed after death.

Q. Well, in fact we know from the clinical records and from the evidence when it was removed. So far as -- all you know is that it wasn't there when [Baby A] went to autopsy?

A. All I know is that Dr Shukla didn't see it.

Q. Dr Shukla commented on the strong temporal relationship between the long line insertion and the patient's apnoeic spell. Is it the case that a long line may induce an arrhythmia if it comes into contact with the

heart or the surface of the heart?

A. You're asking me to comment on a comment that somebody else made and on something that has clinical experts to answer.

Q. Well, you have, certainly at the point of incorporating it within your evidence, in effect commented, have you not, on the quality of the clinical assessments you've received?

A. So if the clinical evidence is that the insertion of a line could induce arrhythmia and it could induce arrhythmia resulting to death, if there is such evidence, the pathology cannot refute it.

Q. Right. So first of all, in terms of the general mechanism of a long line inducing arrhythmia in general, is that something you're able to comment on or is it not? I'm not being critical, I just want to know, Dr Marnerides.

A. I don't want to comment on general things.

Q. All right. And in this case --

A. (Overspeaking) I serve any purpose commenting on general things.

Q. Well, you've been asked to assist us with the fact that, as a general principle, a diaphragm could be splinted by excessive air, haven't you?

A. Yes, because I make a comment on that in my report.

That's why.

Q. There are points where I may have to ask you things outside your reports for your expertise to assist us.

A. If I can, I will.

Q. Right. But when it comes to the question of a long line and arrhythmia, as a general principle, is that anything you can assist us with or not?

A. The general knowledge I have is that it can induce arrhythmia.

Q. But I make it plain for your benefit, you don't speak that as an expert, you are just conceding that in general knowledge?

A. Yes.

Q. There is one other matter I would like to ask about [Baby A] before we move from [Baby A]. Again, it comes from material we looked at in the agreed facts yesterday. We've seen the finding that [Baby A]'s lungs were severely congested and haemorrhagic. That's a finding from Dr Shukla from the post-mortem. Can you assist us, and again please say if you can't, as to whether or not what's called pulmonary hypertension can lead to that happening or not?

A. This finding of congestion and haemorrhage in the lungs is so common that it could be a never-ending list of conditions that it could be associated with. In terms

of pulmonary hypertension, for a pathologist to confirm the presence of pulmonary hypertension there are features on histology we can see, but it has to have been there for some time.

Q. All right.

A. So that's as far as we can go on that.

Q. So in [Baby A]'s case, because he was only 24 hours old at the time he died, it's not long enough for any chronic feature to establish itself?

A. Yes, that's correct.

MR JUSTICE GOSS: Can I be clear? Are you saying in [Baby A]'s case you can exclude that then or not?

A. No, the clinicians would be in better position to exclude whether there was clinical evidence of pulmonary hypertension. From the pathology point of view, I don't have features to say that, yes, he had pulmonary hypertension. But because he's so young, I wouldn't -- even if he had pulmonary hypertension, I wouldn't expect to able to see it because there's not enough time to develop.

MR JUSTICE GOSS: Because he hadn't lived long enough?

A. Yes.

MR JUSTICE GOSS: I just wanted to be clear where you were. Sorry, Mr Myers. I just wanted to be clear in my mind.

MR MYERS: I'm going to turn to [Baby C]. It's 11.20.

MR JUSTICE GOSS: It's up to you.
MR MYERS: It'd be a suitable place to take a break maybe, and we can go through to lunchtime, rather than stopping in about 10 minutes, which might be in the middle of some part of it.
MR JUSTICE GOSS: Let's take the break now then. We will have slightly longer than normal because it's the only break this morning and then there's another long session. About 15 minutes.
(In the absence of the jury)
MR JUSTICE GOSS: Doctor, 15 minutes and be ready to continue, thank you very much.
(11.22 am)
(A short break)
(11.37 am)
(In the presence of the jury)
MR MYERS: Dr Marnerides, I'm turning to [Baby C] next, count 3 on our indictment. We're going to go through your opinions concerning this case. I would like to start with your opinion as set out originally in your report of 23 January 2019.
We know that -- we'll come to your opinion now. But on 23 January 2019, I am going to read your opinion paragraphs A and B, in which you said, page 14 of 15:
"Having reviewed the materials provided to me,

I have not identified any suspicious findings or any morphological or clinical evidence that would justify a view that the death of this baby may have been due to unnatural causes."

That's how you start on your opinion, isn't it?

A. That's correct.

Q. You go on to say:

"Having reviewed the materials provided to me and on the basis of what I have previously discussed herein, it is my opinion the most likely cause of [Baby C]'s sudden collapse and subsequent death would be the histologically identified acute pneumonia with acute lung injury."

That was where you concluded at that point, wasn't it?

A. Yes (inaudible) continued.

Q. "Acute pneumonia with acute lung injury would be in keeping with the clinical assessments and opinions..."

And you give the names of the clinicians, that's Dr Evans, and (inaudible) refer to a clinical (inaudible) Platt:

"... namely that [Baby C]'s death might have been due to a natural cause."

And you form your conclusion that this cause of death was acute pneumonia with acute lung injury and

intrauterine growth restriction and prematurity.

A. That's the contributory factor, yes.

Q. Contributing. That remains your opinion, I'm going to suggest, until we come to your report on 4 September 2022, which is your last report in this matter.

A. Yes.

Q. And -- 3 years later, that is -- in this report your view was, and I'm looking at your opinion:

"This could be explained as death due to..."

I'm looking at the underlying section in part B:

"... unnatural causes, having been subjected to excessive and apparently deliberate administration of air into his stomach and intestines via the NGT, against a background of acute pneumonia and with acute lung injury, intrauterine growth restriction and prematurity."

That's where we get to 3 years after the original report.

A. I would be obliged if you read the whole thing rather than parts of the (inaudible).

Q. We've been to parts before during your evidence originally but I'll go through it with as much detail as you require. You say:

"In my opinion, the constellation of the clinical,

radiological and morphological findings would not support my previously expressed view that [Baby C] died due to natural causes."

You gave the opinion that the constellation of those clinical, radiological and morphological findings would on the contrary, strongly indicate that [Baby C] died due to unnatural causes. And you restate the mechanism of excessive air down the NGT against a background of acute pneumonia with acute lung injury, intrauterine growth restriction and prematurity and so you say the cause of death is:

"Respiratory and cardiac arrest, gastric and intestinal over-distension and [you say] excessive injection/infusion of air into the GI tract via the NGT."

And then you also have:

"Secondary: acute pneumonia with acute lung injury, intrauterine growth restriction and prematurity."

A. May I respond now?

Q. Well, first of all, do you agree that's the change we have in the opinions?

A. On the basis of the new evidence.

Q. Well, I'm going to ask you about that. That comes in the light of, first of all, the opinions of clinicians at the joint meeting; is that correct?

A. Correct.
Q. And in particular, Dewi Evans and Sandie Bohin, who favour that cause, don't they? Do you recall that?
A. And Dr Hall.
Q. Yes. There's a different explanation from him in fact.
A. Yes, and I discuss these explanations in my report.
Q. Let me just go through what I am looking at as additional factors. They relied, didn't they, upon an abdominal X-ray on 12 June -- taken on 12 June 2015; do you agree?
A. They gave evidence or they're giving evidence, I don't know. You can ask them on what they rely.
Q. Okay. We'll come back to that then. I'm going to come back to any additional point you want to raise, Dr Marnerides, but can I just ask you this: the post-mortem evidence does not, in fact, provide evidence that shows that there was air in the abdomen sufficient to cause collapse at 23.15 on 13 June? The post-mortem evidence does not establish that, does it, the snapshot?
A. So the first question I need to answer is -- I don't have a recollection of whether there was abdominal distension of those organs observed at post-mortem. I need to go back to the reports.

(Pause)

Q. It may assist you if you look in your report of

4 September 2022, paragraph 6.

A. So I'm reading paragraph 5 in my last report, what Dr Kokai observed:

"The stomach: all loops of the bowel and mesentery show normal rotation pattern apart from descending colon, which crosses the midline into the right lower abdominal cavity and connects to the sigmoid colon, which is in normal position. The serosal cover is thin, shiny and translucent. The stomach contains a large amount of air and some bile-stained secretions."

Point 6 --

Q. Hang on, could you finish that sentence, please?

A. "The remaining bowel is empty. The colon contains meconium."

6:

"The digital photographs we have identified, PCSN3278, from the post-mortem examination of [Baby C] illustrates a distended stomach and distended bowel loops. The distended bowel loops occupy the left half of the abdominal cavity and is represented in the photographs and the bowel loops only extend crossing the midline towards the right-hand side to a mild degree."

You heard yesterday, I have illustrated, when I discussed the case, what my view was that those

photographs were illustrating. I took the view that the air that was visible at post-mortem was in the stomach and the small bowel and there couldn't have been an explanation for the colon, the large bowel, to be distended. I have went through the two possibilities yesterday. So there was evidence of air from the post-mortem examination.

Q. Now, the question I asked, Dr Marnerides, was: the post-mortem, the pathology, does not provide evidence that demonstrates air in the abdomen was sufficient to cause collapse at 23.15 on 13 June. The pathology does not do that, does it?

A. It needs to be taken into -- so there is air and it needs to be correlated with the clinical course to answer the question on whether that air would account for the collapse. You're asking me -- you're breaking down something in a strict way, which I understand that I might have invited you to do it, saying I'm a pathologist, but it's like asking an expert in physics explaining a mechanism without using maths. It's simply not doable --

Q. But again --

A. -- because I'm not an expert in maths.

Q. What I'm anxious to identify is where the pathology goes and then where other materials comes in to shape the

conclusion you reach.

A. The pathologist here says that there was extensive distension of the stomach and the small bowel. That's what I -- ended up being my opinion in terms of what the pathology can say.

Q. Is that different from what Dr Kokai says where he said, and it's in the agreed the facts:

"The stomach contains large amounts of air and some bile-stained secretions. The remaining bowel is empty"?

He makes no reference to air on the post-mortem in the remaining bowel as it happens.

A. It's different because the photographs show distended bowel loops.

Q. In the small intestine.

A. In my opinion it is the small intestine, yes.

Q. In the small? All right.

A. I consider whether -- and I explained yesterday whether it could be the large intestine.

Q. Yes.

A. And in my opinion, it is the small intestine.

Q. All right. As to the possible consequences of that, that's not something you can tell us from the pathology?

A. Without input from the clinical view, no.

Q. Just as to the original view that you formed about pneumonia being a cause of death, I would just like to

look at some of the points you identified that supported that in that report. This is the report of 23 January 2019.

That opinion which you gave, which we read out in paragraphs A and B, just to remind us, everybody, A and B, your opinion. Histologically, you say:

"Having reviewed the materials..."

And we've been through them, you had the clinical materials, matters like that:

"In my opinion the most likely cause of [Baby C]'s sudden collapse and subsequent death would be the histologically identified acute pneumonia with acute lung injury."

Your opinion as to that is based upon histopathological and clinical factors which are consistent with acute pneumonia; is that correct, is that what that's based on?

A. At that point the clinical assessment, that's what was indicated.

Q. So we can understand this, or so I can anyway, those factors haven't changed in the 3 years that followed, have they, those factors remain, the histopathology and the clinical picture so far as that is concerned?

A. Yes, the -- well, the clinical picture you need to discuss it with the clinical experts --

Q. All right.
A. -- because the clinical picture that was put in front of me to assess later on, when I was invited to generate the other report that we referred to earlier, was different.
Q. One of the factors that you take from the clinicians' view -- sorry, Dr Marnerides.
A. So what remained the same is the finding -- the findings from the histological examination of the lungs. To put it in as simple terms as possible, in 2019, when I did my first assessment of the case, the clinical assessment I was given was that this baby had clinically pneumonia and the clinical view was that that pneumonia from their review was sufficient to explain the baby's death. That was the clinical view I had back then.

The histology that I reviewed confirmed the presence of pneumonia. That did not change, it cannot change, it is there. And my response to that was, yes, I see the pneumonia, given that the clinical assessment is that this is enough to kill this baby, I would agree, yes, this is the cause of death.

Later on, there was further review of the clinical evidence, more reports were produced, a radiologist assessed the images, radiology images. All this information was brought to my attention and we had

a joint experts' meeting. During that meeting, the new clinical evidence that I was not aware of in 2019 was brought to my attention. And the clinical evidence was that the pneumonia being there was not sufficient to kill this baby for that deterioration at that point in time and there were other factors clinically/radiologically present that could explain this death.

Reviewing the photographs, I said, yes, the air you refer to is there, I will accept the clinical review that there is no sufficient clinical evidence for the pneumonia accounting to death. I have no alternative explanation for that air being there. As I explained yesterday, systemic inflammation, sepsis, there was localised inflammation.

Abnormalities of the colon, abnormalities of the small bowel, structural abnormalities. I did not feel that decomposition would be sufficient to produce this amount of air.

And then I came to the conclusion that this would be a baby dying with pneumonia rather than a baby dying from the pneumonia. And --

Q. In terms of -- sorry.

A. And that's how I came to formulating the cause of death I formulated in my last report.

Q. Right. Now, in terms of the opinions of the clinicians, you told us yesterday you received further clinical information that [Baby C] was clinically stable and responding to treatment and there was no collapse imminent. So the clinicians described a position, which meant he was stable before the collapse. That's right, isn't it?

A. That was the information I had.

Q. We have evidence from them, that's a matter the jury can assess, but as to that, that featured into your view as to whether or not [Baby C] really was suffering from pneumonia; that's what you're describing, isn't it?

A. There's no doubt he was suffering from pneumonia. The question is: would that pneumonia be sufficient to kill?

Q. Part of your reason for rejecting that as a primary cause of death is that the clinicians' view was that [Baby C] was stable before the collapses?

A. Yes.

Q. All right. As for air, you make reference in the more recent report to -- and it's in the findings -- to:

"The massive gastric dilation seen on the X-ray of 12 June 2015."

You refer to that.

A. Where exactly?

Q. It's at the response to your instructions, my page 8 of

16, point 2.

(Pause)

You see:

"Massive gastric dilation... on the X-ray of 12 June 2015 most likely due to deliberate exogenous air down the NGT"?

A. Yes. That's my understanding from the statements and the views expressed.

Q. By Dr Evans and Dr Bohin?

A. Yes. That's what I said.

Q. So that forms part of the picture that you rely upon in considering alternative diagnoses, for instance, could this be due to air down the NGT which led to the collapse on 13 June?

A. Yes.

Q. You're taking what they have said about that X-ray and applying it to the circumstances at the time of death; is that correct?

A. They said it and the radiology experts say it.

Q. We'll put the X-ray up briefly. It's at page 1996. Thank you. This is 12 June. Just reminding us all, lest we need to be reminded, that [Baby C]'s actual deterioration and final collapse began at 23.15 on 13 June.

Just scroll down to see the commentary that attaches

to that, please. Enlarge that, please.

It makes reference to:

"Marked gaseous distension of the stomach and the proximal small bowel."

So this is what we're dealing with. Thank you, Mr Murphy, we can go back to the image as I ask these questions.

Drs Evans and Bohin were advancing this as material in support of deliberate administration of air down the NGT, weren't they? You make reference to that.

A. I don't understand why I'm being shown the radiology --

Q. So we know which image we're talking about.

A. I cannot comment on radiology.

Q. Right.

A. It's outside my area of expertise. If you invite me to comment on this radiology within my area of expertise, I can only assess the skeleton.

Q. I'm not asking you to comment on it. I'm just asking you to confirm this is the X-ray Drs Evans and Bohin identify as being most due (sic) to the deliberate exogenous administration of air via the NGT?

A. Dr Evans and Dr Bohin gave evidence. They could confirm if this is the X-ray. I cannot.

Q. In your report, Dr Marnerides --

A. In my report I say what the information I received from

them was. I cannot say that this is the X-ray. They need to confirm it. They were here or they will be here. You can ask them.

Q. All I'm identifying is you say:

"The massive gastric dilation on the X-ray of 12 June was most likely due to deliberate exogenous administration of air down the NGT."

And you make it plain, above that, that is something that both Dr Evans and Dr Bohin consider or regard. That's right, isn't it? Do you see it at 2? All I'm asking is to confirm what it was they said to you, Dr Marnerides.

A. That's what I said, yes. That's what they said to me. I cannot confirm that this is the X-ray though.

Q. We can take the X-ray down. One matter -- you introduced or you referred to the joint expert meeting in August 2022, didn't you? You have made reference to that?

A. Yes.

Q. And you refer to the fact that one matter that came up was CPAP belly, CPAP.

A. Yes.

Q. What you said yesterday, a note of this, was:

"In that meeting the clinicians felt it was unlikely that CPAP could explain that, could explain abdominal

distension like that."

That's what you told us yesterday.

A. That was my understanding, yes.

Q. Just to be quite clear, at that meeting there were a number of experts, weren't there, not just Dr Evans and Dr Bohin?

A. Yes.

Q. There was also an expert, a neonatologist called Dr Hall?

A. Yes.

Q. Just so no one's under any illusion from what you said, his opinion was not that CPAP did not apply, his opinion was that CPAP did apply, wasn't it?

A. When I -- my recollection of the discussion is that CPAP could potentially apply, not did apply. My understanding was that he could not exclude CPAP.

Q. I'm asking you this because of what you said in evidence yesterday. We have the joint report. So far as Drs Bohin and Evans are concerned, they did not accept that that X-ray on 12 June was the result of CPAP belly. They did not.

A. Yes.

Q. And in fact, as a matter of record, so far as Dr Hall was concerned, his view was that that could be explained by CPAP belly. That's what we have.

A. Yes. Could, yes. You asked me whether it did explain.
Q. Yesterday when you told the jury the clinicians felt it was unlikely that CPAP could explain it, you were actually taking as your lead on that what Drs Evans and Bohin said, weren't you?
A. Not really. Not only. Because I apply my critical judgement to what a proposition was. The proposition of Dr Hall was that it could explain, so as a pathologist I had to consider that view. And in considering that view, I would have to run back to my number of post-mortem examinations and see whether distended stomach and bowel like this, which we have on photographs, we can show the photographs, I am more than happy to discuss those photographs of how distended the bowel was and the stomach -- was ever a discussion in my practice that this could be due to CPAP belly. That's when I formulate the opinion of unlikely. And the unlikeliness lies with that I have never in the past 10 years that I have been -- since 2013, that I have been doing this type of post-mortem examination come across even a suggestion that CPAP belly would result to deterioration of a baby, let alone this gastric distension that could be associated with a baby's death.
Based on the worldwide experience that CPAP is used in millions of babies in neonatal care units, I could

not see that if this was a likely mechanism, this would not have been reported in any pathology paper or review or post-mortem examination or congress that I have been to or a case that I have discussed. There must have been at least some pathologist that has experienced that, and none of this is to my knowledge. That's why I regarded the proposed mechanism as unlikely.

Q. So do you accept, and it's said, that on that X-ray of 12 June by Dr Evans and Dr Bohin, so we understand this, on that X-ray when it's said that that is due to the deliberate exogenous administration of air down the NGT, is that something you accept and work with in forming your pathological views?

A. Yes, having considered the alternative proposed explanation.

Q. Right. One other matter with [Baby C], please, Dr Marnerides. It is the question of the structure of the gut. I just want to ask you a little bit about that before we move on.

Dr Kokai identified, and his words are in the formal admission we all have, that:

"The loops in the bowel and the mesentery show normal rotation pattern apart from the descending colon, which crosses the midline into the right lower abdominal cavity and connects to connects the sigmoid colon, which

is in a normal position."

I won't get too hung up on words, but if that's right that's not the conventional way in which the bowel flows, is it?

A. I explained yesterday, in considering the two possibilities of how that could be a probable contributor or not to death, whether that's an accurate description of what he actually saw. My opinion is that he did not accurately record what he actually saw. At least I cannot confirm that this is what he saw on the photographs from the post-mortem I saw.

On the basis of the radiology from Professor Arthurs and the joint review, the way they described the distribution of the air, the way I see the loops, I worked through two possible scenarios to explain it. I don't think this was the case here, I think that what he was seeing in front of him were dilated small bowel loops. But even if we accept that he was correct in what he wrote in his report, that it was an accurate description, what he describes as the loops, the sigmoid colon -- the descending crossing the midline and then the sigmoid colon coming back to meet with the rectum and go down, if this is what he's describing, this is something that could in the circumstances be of pathological significance. And the circumstances would

have been if this, if we accept it's correct, twisted around the excessive mesocolon and caused a volvulus there. There was no evidence of volvulus.

Dr Kokai did not see a volvulus, I could not see a volvulus on the photograph, there is no histology that would support a view of volvulus, there is no radiology, is my understanding from the reviews, that would support a volvulus. So we are presented with two things here.

Q. We dealt with those yesterday.

A. He either recorded it inaccurately in his report or, if he recorded it correctly, it's a moot point. It has no correlation with the increased amount of air that we see in the small bowel and the stomach.

Q. Right. Now, I'm not suggesting, so you can be quite clear, that whatever the disposition of the bowel at that point, that is directly a cause of death. That's not what I'm suggesting. We suggest it's a relevant aspect and may be related to what we see in the radiograph on 12 June. It's something to be considered. I'm just saying that so we can all follow this.

What I want to ask you is this. You have said elsewhere:

"We look at the constellation of circumstances and all the clinical evidence in forming a view."

That's how you do this, isn't it; yes?

A. Yes.
Q. So far as that bowel is concerned, we have heard that on 12 July radiograph the air is in the small bowel but not the large bowel. The fact the air does not pass through may be one matter to bear in mind in question as to whether or not there's some blockage there, one matter; do you agree?
A. No.
Q. All right.
A. I can explain why I cannot agree, because the small bowel meets the colon, the large bowel, at the ileocaecal junction. Okay? That's a valve. To put it into context, for that bowel to open and allow movement of contents from the small bowel to the large bowel, there needs to be some pressure difference between the two components, the large and the small bowel. If the air there did not produce that pressure, the valve would have not opened, so it does not necessarily tell us that there was an obstruction in terms of a malformation or an anatomical obstruction of any other description, it simply tells us that the air that reached the terminal ileum, the ileocaecal valve, was not of the pressure sufficient to open that valve. That's what it tells us.
Q. Right. So you're saying if air is being forced into the gut by the NGT, that's not at sufficient pressure to do

that either?

A. I wouldn't know that. But to put this into perspective, the length the air would have had to travel is -- we're talking a metre. It's a big length. The bowel is like this (indicating), it's a big length that it needs to travel to. So the distension, the amount of air would have been sufficient to distend it, because we see it distended. Whether it would have been -- the pressure would have been sufficient to open the valve, I cannot answer that.

Q. Can you help us with, if it isn't all the way through the abdomen and there is air in that part, why the air wouldn't rather go down the large intestine rather than splint the diaphragm if there's capacity to move through the gut?

A. Not really, no.

Q. Can you actually answer that?

A. Yes, because if -- when air is injected -- let's not talk about air, let's talk about anything that gets into our stomach. For whatever is in our stomach to advance, we need the pylorus -- the distal part of the stomach, needs to be open for whatever is in the stomach to advance and go to the duodenum and so on. We know if the stomach is overloaded with fluid, with food, with air, then there is a spasm at the pylorus. That's the

natural reflex which will result to distension of the stomach by fluid, by food, and then it will relax and allow gradual advance of whatever is in the stomach. So I would expect a mechanism like this to have taken place rather than anything else.

Q. Did you undertake a clinical review yourself of how [Baby C] was presenting in the period leading up to the collapse?

A. No, the clinical review was done by the clinicians.

Q. All right. So as for records, observations, feeding, things like that --

A. By the clinicians.

Q. -- aspirates, nothing from you? Bile, nothing from you?

A. No, clinicians.

Q. [Baby D], please. I am looking at the report that you produced in May 2019, which is the report we've been through in your evidence, Dr Marnerides.

A. Which report, I'm sorry?

Q. Sorry, the 22nd. 22 January 2019. I'm going to your opinion at the back of the report.

First of all, considering [Baby D]'s case on the basis of autopsy findings and morphological evidence and histopathology, there was nothing that you could identify that established cause of death was by an air embolism; that's correct, isn't it?

A. Yes.
Q. On the subject of -- you mentioned air in the aorta and also small amount of air at the tip of the catheter that was seen.
A. That's the information from the radiology.
Q. That's what you received. And we've had evidence on air in the aorta from the radiologist. Just with the catheter, can you confirm for us, we're talking about the UVC actually, aren't we, the umbilical venous catheter? That can be confirmed if necessary, but it's in the report of Laurence Abernathy, who's the paediatrician who dealt with that, the paediatric radiologist. The air is just at the tip of the UVC, Dr Marnerides.
A. Yes.
Q. As it happens, I can go to the notes if we need to, but let me deal with it this way, that UVC was used during resuscitation for adrenaline and other medications to pass through it. So however that comes to be there after all of that has taken place, it's pretty unlikely in fact -- I'm not saying you're suggesting this -- but it's pretty unlikely that that is something which was put in in the first place to trigger a collapse; do you agree?
A. Let me get to understand what you're suggesting. You're

suggesting that the air was put -- that the report is that the tip was generated --

Q. No, you have made an observation and referred to air being seen at the tip of the UVC catheter.

A. Yes.

Q. And in fact that could just be a post-mortem change or something associated with the resuscitation process, couldn't it?

A. It could, yes.

Q. And in support of that I was simply identifying -- can we put up T256, please. This is the point I'm making, just so we can settle this, Dr Marnerides. If we go behind that, please, actually to the exhibit.

Just scroll down. This is the period of treatment after [Baby D]'s collapse. We can see, if we keep scrolling down, please, notes by Dr Brunton. Can you see at 04.00, Dr Marnerides, we've got the first dose of adrenaline given via the UVC -- this is after the collapse has happened -- and then a second dose and then a third dose at 04.05, sodium chloride at 04.04.

Do you see that?

A. I see it.

Q. So as it happens, even after the time of the collapse, the UVC had medication passing through it.

A. Yes. But that -- to be fair, we need to consider the

other possibilities. So could it be air introduced during the resuscitation, knowing that there has been infusion of fluids and adrenaline through that catheter? Yes, this could be the case. That's why we could see the tip there, the air at the tip. That could be. Could it be that air was there and it simply was pushed back and forth when fluid was passing through? That's another possibility. To say what of the two is the more likely, I don't think I can.

Q. Right. In any event, your view on the pathology is that there's nothing to identify that this is anything in support of air embolus?

A. You mean the tip?

Q. Overall, the pathology and what you find.

A. So there is no -- from the histology there is no findings of air bubbles if that --

Q. Yes. And indeed, from the pathology, as you said yesterday, you don't see findings of air embolism; is that correct?

A. That positively support air embolism, yes.

Q. All right. In [Baby D]'s case, we know from the agreed facts that were read to us coming from the pathologist who conducted the post-mortem, Dr McPartland, that there was -- what was described as agreed fact 22, ladies and gentlemen -- that there was:

"Patchy acute pneumonia, most prominent within one of the right lung samples, with some hyaline membranes present, indicating diffuse alveolar damage."

Do you recall that from yesterday, Dr Marnerides? She also formed the view that it was likely pneumonia was present at birth. Do you accept those findings?

A. Yes.

Q. The hyaline membranes with alveolar damage associated is indicative of the effect of acute pneumonia, isn't it, or aren't they?

A. It's not a black-and-white interpretation of that. Let me just...

(Pause)

So she was 37-plus weeks when she was born, so I was just thinking whether it could be acute lung injury of prematurity, the hyaline membranes. It's highly unlikely given her gestational age at birth. There are two alternatives -- well, three alternative reasons for a baby of this age to show those hyaline membranes. One is surfactant deficiency. This is not the case here from the clinical review. That's my understanding.

The other one is the direct effects of ventilation, mechanical ventilation, so you can get hyaline membranes even in the absence of inflammation when you ventilate a baby. And the third alternative is the inflammation,

so the pneumonia.

In this case, whether it is the pneumonia on its own or it is the combined effect with ventilation, I can't really say. But it's the evidence that there has been acute injury to the brain -- to the lung there, sorry.

Q. Do you accept that pneumonia could be a contributing factor to death in this case?

A. You mean in part 2 of the formulation of the cause of death?

Q. Yes. Did it play a part in this?

A. If there is clinical support that the baby was unwell clinically because of the pneumonia, I think, yes, it could be a potential contributor.

Q. Now, I'm going to follow up on that. I'm not going to leave that there, Dr Marnerides, we'll follow through with that. You explained to us yesterday, when dealing with this in particular, that you relied on the clinicians and the radiology in forming your final conclusions about cause of death in this case.

A. The immediate cause of death, yes.

Q. In particular, and with regard to the question of pneumonia, you considered the course of events as described by the clinicians?

A. Yes.

Q. And that includes the opinion of Dr Evans; is that

correct?

A. Correct.

Q. You've also had the benefit of opinions by Sandie Bohin; is that correct too?

A. Correct.

Q. And the position you take from the clinical review is also someone called Ward Platt who's featured in it as well. The position you take from the clinical view, relying upon that is that [Baby D] was in effect stable at the time or shortly before the collapse; is that correct?

A. That's my understanding, yes.

Q. And indeed, a description or an expression used by Dr Evans and referred to in your report is that there had been:

"A window of near complete recovery prior to the collapse."

That's talking about her condition at birth through to the period of collapse some time later.

So against that background, against that clinical assessment, you then go on to consider the possibility of whether this was an air embolus, which is the suggestion that's been raised? Is that correct?

A. I considered the proposed mechanism, yes.

Q. So your conclusion is based on the co-assessment of the

clinical review and the radiology in particular; is that correct?

A. And the pathology.

Q. And the pathology. Insofar as the pathology doesn't identify any, for instance, natural mechanism that could otherwise explain this --

A. Alternative.

Q. Alternative, yes. Although the question of pneumonia is settled to a large degree to you because of the clinical descriptions of the recovery and stability prior to collapse?

A. Yes, because the experience is that babies at 37 weeks of gestation who are born with congenital pneumonia, unless they develop sepsis, which was not the case here, or other complications, they will recover. That's the -- so if the clinical indication is that the baby was recovering and stable, and this is my understanding from what I was being -- then this would be a baby dying with the pneumonia rather than from the pneumonia.

Q. All right. That's what I wanted to establish. Thank you for dealing with that.

For obvious reasons, there was no requirement to deal with the position of [Baby E] yesterday and therefore there's nothing that I wish to ask about that. Again, that's not said disrespectfully or insensitively,

but nothing arises from the pathology on that issue, so we'll turn next to [Baby I], if we could, please, Dr Marnerides.

We know that in the case of [Baby I], to remind us all, [Baby I] was born on 7 August 2015 at Liverpool Women's Hospital. She actually was transferred to the Countess of Chester on 18 August 2015. There are events that have been considered on 23 August 2015, 5 September 2015, after which she was transferred to Liverpool Women's Hospital, and she returned to the Countess of Chester on 13 September 2015. I'm just saying this to remind us all so we can keep track and you too, Dr Marnerides. All of that leads up to what is called event 1 -- perhaps don't worry too much about the numbers I give the events, Dr Marnerides, that's just to help us keep track -- on 30 September 2015.

The next event of focus is 13 October 2015. We have also looked at events over the 14th into 15 October 2015, and then finally, sadly, the events of the 22nd into 23 October 2015 and [Baby I] died on 23 October 2015.

That covers many months of clinical and nursing notes and observations and charts. Again, so we know where we're starting from -- this is not asked critically in any way, Dr Marnerides, but when it comes

to the overall clinical picture and your opinions, is that based upon a review by you directly of those nursing notes and clinical notes and observations and charts or is it based upon the reviews that were provided to you from the clinicians?

A. It's based on the reviews provided to me.

Q. Yesterday you were asked about and you told us about an hypoxic ischaemic injury to [Baby I]. We'd heard there were the findings of Dr Kokai, which we looked at, and what you said to us was that that injury would have occurred later than birth --

A. Yes.

Q. -- maybe a week or many weeks before the final collapse --

A. That's my view.

Q. -- although not shortly before the death. It's not an acute matter that led directly to the collapse.

A. No, and just to expand on this a little bit, so all changes were a week or weeks old and no associated changes, at least as described by Dr Kokai, because I explained I didn't have the benefit of reviewing the histology because the histology was not available, so I didn't physically look at the slides. So on the basis of his assessment, he indicated in his reports that he could not see evidence of something changing acutely on

the appearances of the brain. I explained acute means something within the 24 hours and I explained what those findings are: haemorrhage, hypoxic neurons, (inaudible) neurons and so on, apoptosis .

Q. Thank you for explaining that. What I wanted to ask, I apologise if it's only me that needs this, but I'd really like to understand this. You were asked about all of that. What's the relevance of that? I'm not being critical. What's the relevance of that to what we're dealing with in the case of [Baby I]? You told us it's all about this hypoxic ischaemic damage, you told us the time frame within which it might have occurred --

A. I can explain.

Q. So we can follow (overspeaking) what's it to do with this?

A. The relevance would be: does the hypoxic ischaemic brain injury that's been there, and is known to have been there, explain the collapse?

Q. The final collapse?

A. Yes. Because then if it does explain the final collapse we need to still try and work out what the source of that hypoxic ischaemic brain injury is. My view, from reviewing the pathology, is that it cannot explain on its own the collapse. That's the pertinence of discussing the finding.

Q. All right. Yesterday when you went through your opinion and how you come to the conclusions you do with [Baby I], you were taken to, first of all, 30 September and then 13 October when you came to look at the events that took place. In fact, in your assessment, the starting point in considering cause is actually the first deterioration on 23 August 2015, isn't it?

A. For the final.

Q. When you're looking across the whole period, that's where you actually begin your considerations, isn't it?

A. Yes. In essence, yes.

Q. I'm looking in your report where you deal with this, Dr Marnerides. Sorry it's very convoluted, ladies and gentlemen, but I'm going to work through it slowly to piece it together. It's in your opinion section. And if you go to opinion, you've got a capital A, and then a paragraph 1, which is a very lengthy paragraph.

If we go down that, I'm not going through the whole of that, I want to go down to where it starts:

"In my opinion, [Baby I]'s clinical condition..."

It's the first paragraph after that long one. Are you there?

A. So the paragraph which has a number 1 next to it?

Q. Yes. If you go down there, quite some way down, you'll come to a section after a line break that says:

"In my opinion, [Baby I]'s clinical condition at the time of her clinical deterioration..."

Have you got that?

A. Yes.

Q. That deterioration on 23 August, as outlined in Dr Evans' statement, in your view, would not justify regarding it as a naturally caused event?

A. Yes.

Q. Right. I want to make sure we've got that. So your assessment, and specifically here, of the events of 23 August, as outlined in Dr Evans' statement, off the back of that you discount natural cause. Right? So that is the starting point as you begin to piece together what you do when looking at this through the eyes of a pathologist?

A. Correct.

Q. The suggestion that was made, if you look a little bit further down -- in fact I'll read it rather than trying to work it through. You say:

"It is my understanding that Dr Evans' [and you refer to a Dr Ward Platt] thorough review of [Baby I]'s medical notes failed to demonstrate a natural disease process to which that first clinical deterioration on 23 August could be attributed."

A. Mm-hm.

Q. "The post-mortem examination did not reveal any morphological evidence of a natural disease to account for excessive air being radiologically identified in the stomach and intestines. Both Dr Evans and Dr Ward Platt appear to agree that [Baby I] receiving a large bolus of air into her stomach via her NGT would account for the deterioration on 23 August 2015."

That's what you had in terms of the clinical review?

A. That's correct.

Q. I'm going to put up, if I may, because I don't think this was in the review of the tiles, we saw a little bit to orientate us, a nursing note that deals with this at page 1803. This is for us to see the material upon which that is based.

We see 23 August 2015, 05.53. No name there on the note in terms of a nurse. It says:

"Care commenced at 19.45. All safety equipment, alarm limits and fluids check. At start of shift [Baby I] weaning off CPAP in facial O2, having cuddles with parents. Placed back on to CPAP at 20.45 due to cluster of desats. Managed to wean off for 2 hours and 35 minutes. Observations are stable and temperature maintained well. Small milky vomit overnight. Abdomen remains full and distended at times and appears veiny but she has passed urine and had bowels opened.

Continues on 2x12 feeds."

And it sets out what the feed is and how she was weaned off CPAP. That's a note made overnight on 23 August 2015.

The radiograph upon which this opinion is based is found at page 13960, so could we put that up, please? This is a radiograph of 22.03 on 23 August. This is the radiograph which is relied upon in terms of the event on 23 August. This isn't something you would have looked at yourself, is it?

A. Yes, it's not.

Q. And then finally, one other matter with regard to this, which is at page 13807. It's a note that follows on from the one we saw. Again I'm dealing with this here to assist us. This isn't material that we have in our sequence of events, although I think we have seen it before already. It's just so we can place it, Dr Marnerides.

A. I'm waiting for the question.

Q. Yes, I understand that. But just as the prosecution went through the tiles with you and you waited for their questions, I'd be grateful if we could do this, all right?

A. Yes, all right.

Q. Thank you. I'm looking at the bottom part of that.

There's an entry by [Nurse C] at 18.27 on 23 August 2015. In fact, that pinpoints that entry, so this follows on from the last one. If we go across the page and look at the actual entry itself. Thank you.

It describes:

"Settled day. Off CPAP for 2.7 hours. Then clustered desats so returned to CPAP."

It sets out information about the oxygen:

"Warm and well perfused."

The feeds, possets:

"Bowels opened earlier. Had fresh blood in it and also mucus. Reviewed by [Dr B]. Bloods sent for testing."

If we carry on down:

"Abdo distended and veiny but soft and unchanged from this morning. Plan is to observe for now with low threshold for intervention if required."

That's the extent of that note by [Nurse C], started at 18.27, and we have the X-ray that evening.

First of all, where you rely upon the clinicians' summary, you take from them what they say about the course of treatment; is that correct?

A. Yes.

Q. And what they have said about the extent of abdominal distension?

A. As clinically observed, yes.
Q. You take it as read with that that CPAP cannot explain that abdominal distension; is that correct?
A. I... I would have a very big difficulty in understanding how CPAP would explain this amount of abdominal distension that could result to death.
Q. By "this amount" are you talking about what we saw on the X-ray for 23 August?
A. Yes.
Q. Right. Thank you. We can take that down, please, Mr Murphy.

The next event in time, although again we didn't deal with it yesterday, is the 5th and 6 September, in which we know [Baby I] underwent/experienced a series of desaturations. Are you aware of that?
A. Yes.
Q. They ultimately led to her condition deteriorating to the extent she went to Liverpool Women's Hospital on 6 September, where she remained until the 13th. No particular sinister mechanism is alleged about that, is there? Well, there isn't in fact, I can confirm that.
A. Yes.
Q. Right. Is it possible, as we go through now, looking at the collapses that happened, for there to be a cumulative deterioration in the condition of a baby

over time so they become more prone to more serious collapses?

A. That's for the clinicians to answer.

Q. Right. 30 September, let's move to that, the first event you were asked about yesterday. Your view, Dr Marnerides, is that both 30 September and 13 October are likely to be explained by air being put down [Baby I]'s NGT; is that correct?

A. On the basis of the clinical assessment in this case.

Q. Right. Perhaps inevitably, when we're talking about events on 30 September and 13 October, there is no pathology that you're performing with regard to them because that's in life?

A. Yes.

Q. When we come to what happened on 23 October and [Baby I]'s death, your conclusion is that that was caused by excessive air into the GI, the gastrointestinal, tract; is that correct?

A. That's correct.

Q. Right. And you base that upon, can you just confirm, the opinion of the clinicians for the overall circumstances?

A. Correct.

Q. And the post-mortem finding of, is it significantly dilated bowel loops?

A. And stomach, I think.
Q. In the stomach.
I'm just looking at the first part of your report. Let me ask it this way: is it the post-mortem radiograph you're using or a radiograph taken in life?
A. "(Overspeaking) marked gaseous distension of loops of bowel throughout the abdomen."
Yes, sorry.
Q. So far as distension of bowel and loops of air within the abdomen are concerned, or loops of air within loops of bowel, we know that [Baby I]'s post-mortem was conducted on 26 October 2015.
A. That is...
Q. We have that in our agreed fact 23. [Baby I] had died 3 days before that, approximately.
A. Yes.
Q. As it happens, with that passage of time, post-mortem gas gathering can be a natural occurrence, can't it, as it happens?
A. It can be, but not to that extent.
Q. Okay.
A. Not in the absence of histologically evident significant autolysis of the tissue. Not with an abdominal wall that, when you look at it from external examination, is not green. Very unlikely that that amount would be

decomposition.

Q. As to when that air got there, if I put it that way, if it isn't decomposition, identifying when that is is not something you can do from the pathology, you can simply say it was there at the time of the autopsy?

A. Yes.

Q. And as for the way that events unfolded on that night, I'll just remind all of us who have dealt with this, there's a desaturation and a collapse round about or shortly after midnight, followed by another one a little less than an hour later or thereabouts, there's two. As to that sequence of events and the facts surrounding them, is that something you have looked at in any detail or not?

A. It's for the clinicians.

Q. The clinicians. Have you had a look at the radiograph in relation to this?

A. I've looked at the reports.

Q. The reports?

A. Not the radiograph.

Q. And as to events that have happened, for instance, before the radiograph that could account for what took place by the practitioners looking after the child, that's not something you've identified or looked at?

A. Sorry?

Q. As for events involving the practitioners, the nurses and the treatment of the child in between the collapses, that's not something you've looked at?
A. No, no, no. That's not my job.
Q. Right. So when it comes to the circumstances around that, you rely upon the clinical assessment by those clinicians who have described what took place in the reports you received?
A. Yes.
MR MYERS: My Lord, that's what I wanted to ask about [Baby I]. I know it's a little early. We've been going for quite some time and it's very detailed. I just wonder whether we should break for lunch a little earlier -- I will conclude what I have to ask well within this afternoon on the basis of the questions I have in any event.
MR JUSTICE GOSS: Yes, that's not a problem, Mr Myers. We will break off there for lunch. It's slightly earlier than normal. We'll resume again at, shall we say 1.55, just over an hour and 5 minutes. Is that sufficient time?

Your evidence will be completed today, Dr Marnerides, so no need for you to be concerned about that.

1.55, please, members of the jury.

(12.50 pm)

(The short adjournment)

(1.55 pm)

MR MYERS: I'm looking at [Baby O] now, Dr Marnerides -- [Baby O] on the records and [Baby O] as we know him as well. I am looking at three aspects to cause of death from your evidence, Dr Marnerides: inflicted trauma injury to liver, profound desaturation as a result of excessive air down the NGT, and air embolism.

I will come to the liver in a moment, I'll start with the other two first. With regard to the profound desaturation because of excessive air down the NGT, that isn't something which is diagnosed itself from the post-mortem evidence, is it?

A. That's correct.

Q. Although we recognise the post-mortem did not identify any natural illness or disease that could account for what you saw?

A. That's correct.

Q. So the post-mortem is important in that regard, I acknowledge that.

A. Correct.

Q. But the profound desaturation with excessive air down the NGT is a conclusion you reach having reviewed the

radiology and the clinical review that you were presented with?

A. The radiology reports.

Q. The radiology report and the clinical review?

A. Correct.

Q. Thank you. And likewise I'm going to suggest with the air embolism as a cause of death, that doesn't come out of the pathology that you have performed, does it?

A. No, it's...

Q. But it's based upon the clinical review from the radiologists and the radiology report?

A. The clinical review from the clinicians --

Q. Sorry.

A. -- and the radiological report and the absence from the pathology of a morphologically evident cause.

Q. Yes. I recognise that and acknowledge that. But from that position, it is what you're provided with by way of the clinicians' review and the radiology report that you factor in in reaching your conclusion?

A. That's correct.

Q. With the injury to [Baby O]’s liver, you told us yesterday, Dr Marnerides, how much force can be involved in children when you see injuries like this. Do you recall you told us a road traffic accident or bicycle accidents were the examples you gave with children?

A. Yes.
Q. You also said you can get injuries like this in certain forms of non-accidental injury with babies, often accompanied by injuries to the abdomen and the brain?
A. Other injuries.
Q. All of that indicates --
A. Just to clarify, when I said to the abdomen, I was referring to the intra-abdominal components, not necessarily the outside -- from what we can see from the outside.
Q. But other internal injuries, what we would call internal injuries?
A. Yes.
Q. Now, all of that conveys how much force can be involved with injuries like this. But can you assist us with how little force is required, if you see what I mean?
A. I think there is no way of measuring the force in a baby because we cannot conduct such experiments on babies. The way we can suggest the level of force is from the experience we have on when we see this type of injuries. So we see this type of injuries in inflicted injuries and we see this type of injuries -- we can see them in accidental injuries in which there is a description of an accident.

For example, I've seen injuries to the liver in

babies that were walking, not babies that have been in a neonatal care unit, that were jumping on trampolines and fell off. I've seen this type of injuries, injury to the liver.

And I have never seen this type of injury in the context of cardiopulmonary resuscitation. So I would say that the force required would be of the magnitude of the forces generated, the minimum force generated, from a baby jumping on a trampoline and falling.

Q. You will encounter cases in your work as a pathologist where there are fatalities, won't you, inevitably?

A. Only fatalities.

Q. So you will not be dealing in the ordinary course of events with injuries that have been survived?

A. Um... Yes.

Q. So you will see cases where the forces involved are naturally severe enough to have led to death in the course of your work?

A. Or if not led to death, were part of the mechanism that resulted in death.

Q. Again what that can't help us with, I'm going to suggest, is what the least force is required to cause the sort of injury we're looking at. There's no way that you can assist us with that in fact, is there?

A. Um... So you're saying to me that the least force could

be injury -- so practically, you're suggesting that an injury in the neonatal care unit of CPR probably could have generated this type of trauma but the baby survived, hence I have not seen it? That's what you're suggesting?

Q. What I'm asking now, what I asked was, can you assist us with the minimum force required?

A. And I have responded to that. I'm trying to understand.

Q. You cannot actually tell us how little it would take to cause an injury like that?

A. Nobody can tell you because the only way the force can be measured in newtons and nobody can measure it in newtons because we cannot do the experiments. The information we can get from the post-mortem examinations is the information I have discussed earlier. So if you want an answer to whether the minimum -- the less force required to generate these injuries is something that could occur in a neonatal care unit, the baby survived hence we don't have pathology evidence, the only way to address that is to ask a clinician, and potentially a radiologist, on whether they have looked into livers of babies, how they look on imaging and whether such injuries are present.

Q. The reason I'm asking you, Dr Marnerides, is yesterday you told us about road traffic accidents and bicycle

accidents?

A. In children, yes.

Q. Which conveys a level of force, doesn't it? I'm seeking to establish with you -- that may be at one end of the equation, but what you cannot tell us is how little force it would take. That's the reason for the question.

A. I will not entirely agree with what you're saying. I explained what I can say and I think what I can say is that babies with these injuries that have not survived apparently would present this type of liver injury in the spectrum of conditions and circumstances I have discussed.

Q. As it happens with a very small neonate it is going to take significantly less force for an injury like this than it would in a grown child, isn't it?

A. Um... Again, the "significantly less" is a relative term. So is it compared against the force we know the results of when they have died from CPR? So I would take the view that it's significantly greater than that force.

Q. Do you agree that a baby like this, it would take less force for something like this to happen than in a child, a grown child?

A. In a grown child, yes. But we are not comparing this

with a grown child, we're comparing it with a neonate, if we are to answer the level of forces.

Q. As it happens, we reach a point where we go beyond what any data or research can actually tell us, don't we?

A. If you're looking for newtons, yes.

Q. Yes, for the force.

A. In newtons, yes, we can't say.

Q. CPR, you agree, don't you, Dr Marnerides, that subcapsular haematomas can be seen on post-mortem examination of babies subjected to CPR?

A. Of specific type distribution, yes.

Q. Just so we have that as, I'm going to suggest, a fact, there can be a haematoma or haematomas arising from CPR, can't there, in principle?

A. It's a very imprecise principle if you want me to agree to that. The precise principle is that sub-serosal hepatic haematomas can be seen in specific locations and distributions and magnitudes due to CPR. Not as a general statement, they can't be seen in CPR, that's not helpful.

Q. One moment, please. If you take a look, please, at the reports for [Baby O], please. It's your report dated 25 January 2019 for [Baby P].

MR JUSTICE GOSS: [Baby P] or [Baby O]?

MR MYERS: I apologise. I do mean [Baby P].

A. Are we not discussing [Baby O]?
Q. We are, but I'm going to something you say about this under [Baby P], so if you just follow what I ask you, please, Dr Marnerides.
A. I hope that this is not seen as me being biased in what I say by cross-referring to two cases.
MR JUSTICE GOSS: No, I see the point. No, don't worry about that. What I think Mr Myers is going to do is to put to you something you wrote in the report in [Baby P]'s case or a report in [Baby P]'s case and ask you about what you --
A. That would not, I think, be beneficial for the jury because it's a different context of discussion.
MR JUSTICE GOSS: Well, let's wait and see what the question is, first of all, what the passage is and what the question is. We well understand the importance you attach to compartmentalising each baby and the evidence in relation to each baby and not transposing evidence from one baby to another baby. We understand that.
MR MYERS: Thank you, my Lord.
Thank you, Dr Marnerides. I'm looking in this report, and if you go, please, to -- there's a section which is "Response to my instructions", about two-thirds of the way through. Can you see some numbers?
A. Yes.

Q. If we go down to number 4, please. In this report you had been asked to consider whether less forceful trauma than on [Baby O]:

"In respect of the subcapsular haematomas, could the explanation be a less forceful trauma than seen on his brother, [Baby O]."

Do you see that?

A. I was looking at the wrong date. Which date -- which report is it?

Q. 12 July 2020, [Baby P].

A. Yes.

Q. Point 4 under your section dealing with responses. What I'm asking -- I want to establish a principle of something as to whether or not subcapsular haematomas may occur where babies have been subjected to CPR, the precise facts we'll look at in a moment with the specific children, Dr Marnerides. I'm looking where you've got your 4B. If you look there.

As a fact, subcapsular haematomas can be seen on post-mortem examination of babies that have been subjected to CPR, can't they?

A. You're taking this out of the context of my response. The response was to the question:

"In respect of the subcapsular haematomas, could the explanation be a less forceful trauma than seen in his

brother [Baby O] or some form of congenital anomaly?"

So it's in the context of comparing and saying -- taking into account the distribution and extent.

So such refers to the haematomas seen in [Baby P]. It's not such referring to all subcapsular haematomas. So to put this clear to the jury --

Q. I have not suggested all subcapsular haematomas are a result of CPR. What I asked you, Dr Marnerides, is whether CPR can cause a subcapsular haematoma?

A. Of certain distribution and of certain location and of certain size in the liver --

Q. Right.

A. -- not a subcapsular haematoma full stop.

Q. Now, I'm going to look with you, if we may, at page 3 of [Baby P]'s PowerPoint and also page 3 of [Baby O]’s, of the two of them, just to see the area of the haematomas. Right?

A. Okay.

Q. [Baby O] is on the left, [Baby P] is on the right. When we come to [Baby P], although I was trying to deal with this by dealing with it now, your view was that CPR is capable of causing the subcapsular haematomas in the case of [Baby P], isn't it, that's your view?

A. Yes.

Q. Right. When we come to [Baby O], the first thing I'm going to ask you is this: the location of the haematomas

is in a place where it is possible for CPR to cause injury; do you agree or disagree?

A. You're making a very unrealistic exercise in terms of how medics interpret the findings. So what you're inviting me to do right now is to take a position by looking at a leaf to tell you which forest I think I am in. I need to look, take a further distance and look at a photograph of the leaves, the trees, the whole thing, to make an opinion on the forest. So in isolation, those two, until I have looked at the whole liver, I cannot answer the question. The answer to the question is if I take into account all the haematomas in the liver in the absence of other findings.

So this exercise, mental exercise, is not applicable, in my opinion, in interpreting these sort of haematomas.

Q. We're well aware from what you've shown us already, Dr Marnerides, there is a difference in scale of the haematomas that we are dealing with. That's apparent. I'm going to come to the nature of the haematomas shortly. What I am dealing with at this point is whether in principle, CPR can cause an injury to the liver. Secondly, where the location may be. The extent of it is what I'm going to deal with next.

A. Yes, okay. We are chasing our tails now.

Q. Well, that's not the intention of this.
A. Because that breaking down that you're trying to make me follow, it's simply not how it works. It is the combination of location, extent and distribution that makes the opinion on that specific liver injury. Making general comments about the subcapsular haematoma that can be seen in this context and in this context and then from that general assessment, saying that, oh yes, that's the logical consequences and that's the logical consequence after that, so how can you go back to the starting point. That's not how medicine works. We need to put it into context. And discussing those two haematomas in isolation is out of context.
Q. Right. Well, let me ask you about the haematomas. Take that down, please, Mr Murphy.
I'll make it plain, the contention I'm putting to you, Dr Marnerides --
(2.16 pm)
(No video feed from court)
(2.17 pm)
(Pause)
MR MYERS: I'm grateful. It has been pointed out the last question about the same part of the body and whether the CPR is in the same part of the body as on those images has not been transcribed, so I can repeat it and then

you can repeat your disagreement, Dr Marnerides.

A. I will.

Q. What I was putting to you is that we see the injuries are both in the same sort of area where CPR was capable of, in effect, impacting over the liver. And your response?

A. The question was not --

Q. Well, I can't remember the precise words.

A. So the response is the liver is not in the anatomical area where CPR is applied.

Q. But, and we'll come to it when we come to [Baby P], it's possible for CPR to result in an injury to the liver?

A. Of the extent and distribution and magnitude that we have seen in [Baby P], but not in [Baby O].

Q. Right. Where [Baby O] is concerned, I'm going to ask you about haematoma, the expression you have used, just so we can follow this, haematoma refers to a bleed under the skin or under a covering, a surface?

A. Not necessarily. It could be that, but it is also a bleeding into the tissues of an organ, so into the tissues of the brain -- in the parenchyma of the organ, yes.

Q. Something in our everyday experience, if we get a bruise, if I get a bang on the hand and I get a bruise, is that a haematoma?

A. Yes. That's a skin haematoma.
Q. This is how it is to perhaps those of us who aren't medics anyway, if there's a cut on the skin and blood comes out, that's a bleed coming out?
A. Yes.
Q. If the blood can't come out and it collects, that would form a haematoma; is that right?
A. Yes.
Q. And then that could clot? Could that clot?
A. On the skin, no.
Q. Within the tissues?
A. Clotting is what happens within vessels.
Q. Staying on the organ then, if there is a bleed, if a haematoma is forming, that can -- the blood that runs can track, can't it, from the site of impact? Can that happen?
A. If there is a discontinuity (inaudible).
Q. What do you mean by a discontinuity?
A. Like a laceration to that site of impact, yes, you can have tracking of the blood, yes.
Q. So if, for instance, as we saw yesterday with [Baby O], where you followed the haematoma round to the rear of the liver -- I'm using the word rear, the back of the liver in effect --
A. The (overspeaking) --

Q. Yes, yes. Is that blood that will have tracked round from the point of impact, however that impact happened?
A. That's a big amount of blood to have tracked down.
Q. Right, okay. Can it track, as it happens?
A. It wouldn't look like this.
Q. If CPR is performed into an area where there is an injury like that, will that spread the blood within the liver?
A. (Pause). It... So fluids tend to follow the route of least resistance, so if there had been a haematoma to the liver and pressure was applied by CPR to the liver, what I would expect happening is not tracking down into the substance of the liver and coming towards the capsule and the -- through the capsule into the abdominal cavity rather than into the liver. Because it's less resistance there and that's what fluids do.
Q. All right. What I'm exploring with you, I'm suggesting to you, is that CPR performed vigorously is capable, first of all, of causing trauma from which blood like that, which we see, could run; do you agree or disagree?
A. In the background of an already traumatised liver, you mean?
Q. In the situation we're looking at in the case of [Baby O].
A. Yes, in a background of an already existing --

Q. I don't want you to speak at cross-purposes with me if I haven't been clear. The CPR could cause the injury in the first place if too vigorous?
A. I don't think so, no.
Q. And then secondary to that, if there's been an injury caused in that way and CPR continues, that will have the effect of pushing the blood, in effect the ruptured haematoma, around the liver?
A. I cannot agree with that suggestion because your starting point is that if there had been an injury from CPR, and I say that it cannot have been an injury from CPR of this extent. If you want to discuss injury to the liver and then CPR on to the liver, then I can discuss it.
Q. Right. So if there's already a site of injury there and CPR is then done on to that?
A. Then I think it is reasonable for one to think, consider, that it is probable that blood would have escaped through the capsule rather than going into the liver and getting into the abdominal cavity.
Q. So that you understand, and I appreciate your position on this, Dr Marnerides, you don't accept the proposition that forceful CPR could have caused this injury in general terms, you don't. Do you agree, it can't categorically be excluded as a possibility?

A. We are not discussion possibilities here, we're discussing probabilities. I cannot see how it is probable. Possible, it could be. But we need to understand what we are referring to when we discuss possibilities and probabilities.

Q. Perhaps --

A. When I refer to possibilities, I'm thinking of, for example, somebody walking in the middle of the Sahara Desert, found dead, with a pot next to them, and their head open and traumatised. It is possible that that pot fell off the air because a helicopter was carrying pots and one fell off the air. The question is, is it probable? And I don't think we can say it is probable. So in that sense, I would say possible, we can discuss the theory. Probable, I don't see how.

Q. Well, in fact, let me go to where you deal with the question of likelihood. It's in the report that you did on [Baby O], 24 January 2019. Your opinion, section B, point 5. 24 January 2019 for [Baby O], in your opinion under point 5. B, paragraph 5. Can you see:

"One needs to consider whether these haematomas could have been the result of vigorous cardiopulmonary resuscitation"?

Do you see that, Dr Marnerides?

A. Yes, I'm discussing the possibility.

Q. Possibility. You put it this way, so we have how you put it --

A. I'm discussing the possibility and I take a view on the probability.

Q. You say:

"One needs to consider [I'm going to give you the whole paragraph so we have it given what's been said about pots falling from the sky] these haematomas could have been the result of vigorous cardiopulmonary resuscitation and therefore the aftermath of the collapse. To the best of my knowledge and in my experience, injuries to the liver in the context of vigorous resuscitation performed by appropriately trained staff are not common and tend to present upon post-mortem examination either as small subcapsular haematomas on the convexity of the liver (the anterior edge) without significant parenchymal involvement or as so-called blunt lacerations [which you explain means] (linear or multi-linear ruptures with associated bruising, typically on the superior surface of the liver and to the right of the falciform ligament). Although I cannot categorically exclude that these haematomas may have been due to vigorous cardiopulmonary resuscitation, their bilateral distribution on both sides of the falciform ligament and most importantly on both the

superior and the inferior surfaces of the liver would suggest significant force or forces being applied upon the region, something that would not typically be expected in the context of cardiopulmonary resuscitation being administered by the appropriately trained staff of a neonatal intensive care unit and would therefore not, in my view, favour vigorous cardiopulmonary resuscitation as their likely explanation."

And that's how you dealt with it there. That's right, isn't it?

A. I don't see the difference between that and what I have just said.

Q. No, well, I want us to deal with it in the way you talked about it in the clinical context rather than the desert and the example you gave.

A. Yes. Do you want me to elaborate further?

Q. No, I've asked you the questions I want to ask about that and you've indicated where you stand on this.

As part of the autopsy, 20ml of blood was found in the peritoneal space, weren't they?

A. That's what Dr Kokai reported and that's free blood.

Q. Free blood.

A. 25ml free blood and it's a bit confusing on what he describes as a clot and the measurements he gives of the clot, so I... My assessment of what he was trying to

say was that there were 25ml of free blood and the clot that we saw on the photographs was measured -- I don't recall the dimensions, were the 20ml.

Q. Yes. It's either 20 or 25, it seems to vary.

A. It's a bit confusing.

Q. The peritoneal space. If you indicate on you, where are we talking about?

A. That's a very complex anatomy we need to discuss.

Q. Could you just give us a broad idea of where the peritoneal space is?

A. It's in the abdomen. So that's one membrane that separates the abdomen into compartments, if we say so. Some organs are behind that membrane, for example the kidneys, the adrenals, a part of the duodenum, which is the first part of the small bowel are behind the membrane and some organs are in front of that membrane.

Q. It's in the abdominal area?

A. It's in the abdominal area.

Q. Where did that come from, can you help us?

A. The free blood?

Q. Yes, the free blood.

A. The apparent explanation here is that probably it came from the haematomas.

Q. The haematomas?

A. Yes.

Q. If it came from the haematomas, it follows in some way there must have been some gap or hole for it to come out of rather than staying within the covering of the liver?
A. Yes, there were lacerations.
Q. Yes. We looked yesterday and you identified one item that could potentially have been a puncture wound, although there was no haematoma immediately around that.
A. That looked more post-mortem rather than --
Q. Yes, more post-mortem. If there are haematomas in the liver in the way we've seen, do they bleed freely or does there have to be actually a break in the surface of the liver for the blood to come out?
A. There has to be a break in continuity for the blood to go into the abdominal cavity, into the peritoneum. That's what I was trying to say earlier, that if the liver -- if you have already trauma and you've got a haematoma and you apply more forces on to that region, you expect the blood to come into the abdomen from an area where the continuity is lost, for example, the lacerations I have shown yesterday, the small -- rather than the blood extending into the liver because that's the less resistance.
Q. So the distribution of the haematoma or the free blood could be the consequence of forces applied after whatever the initial force was?

A. The blood in the abdomen, you mean?
Q. Yes.
A. Yes, I didn't put any significance into that in terms of the mechanism because I think it was the aftermath of whatever happened.
Q. Something you were asked about yesterday and you've been asked to deal with in your reports was the question of the decompression and the cannula that was inserted to deal with that.
A. Yes.
Q. Let me just ask you about that. You were asked about it yesterday and I just have a few questions about that, Dr Marnerides.

Is it possible, let's be clear about this, in your opinion, for at least some of what we see with regard to the damage to [Baby O]'s liver arising from the insertion of a cannula that in some way came into contact with that?

A. I would consider it extremely unlikely. I would expect a perforation type of injury and it has not been described. I think the perforation that we see, that injury that we see on the photographs, it's more likely a post-mortem injury rather than an injury where there was active circulation because there is no blood associated with that injury.

So the possibilities one needs to consider and see whether it's probable or not -- could it be that the tube used reached the liver, touched the liver, had so much energy on it that produced these big haematomas but yet did not perforate the liver? This is highly unlikely. I don't see how it is a reasonably probable proposition for something like this to happen.

The other thing is we need to think of the distribution. So if we accept they went in once, you would expect to see one area traumatised. The anatomy here doesn't help us. So unless they were going in and out, in and out, and all times they were producing injuries that had the power to -- force enough to produce this huge parenchymal haematoma, I don't see how this is possible.

Q. Can I just ask you about something you said in your report about that so we can be clear. It's the report for [Baby O] of 20 October 2021. Just turn to that, please.

I'm going to the second page in my copy:

"Response to questions 1, 2 and 3."

You were being asked to consider whether, given there's a puncture mark visible on the right-hand side of the abdomen, and we've heard about the decompression that was performed, whether that has any link to the

pathology identified in the liver post-mortem.

A. I've lost you.

Q. The report of 20 October 2021 for [Baby O].

A. Yes.

Q. The response to questions 1, 2 and 3. It's a short report. It's underlined, "Response to questions 1, 2 and 3", if you go down.

A. Yes, I'm with you. Sorry, apologies.

Q. You were being asked to consider this or you were considering this: there was a puncture mark right-hand side of [Baby O]'s abdomen, and there's reference to the knowledge of the decompression of the abdomen that was attempted, and that you were considering whether or not that has any relevance to the liver pathology post-mortem.

You've explained, I'm sure we can all follow, that, for example, one attempt to insert a cannula is unlikely to cause multiple sites of injury.

A. Yes.

Q. Can I just go down to your summary of what you'd set out there for the position you reach. By all means elaborate if you need to. Your conclusion on this was this:

"Although I cannot but accept that part of the pathology found in the liver [and you say] (for example

the haemorrhage within the abdomen due to injuring a subcapsular haematoma and/or even one of the inferior haematomas and/or superficial lacerations) can be explicable on the basis of iatrogenic injury."

Pausing there, iatrogenic means during the course of medical treatment, doesn't it?

A. Yes.

Q. In other words, the decompression:

"[It] can be explicable on the basis of iatrogenic injury on the basis of the above reasoning and the explanations within my report [the earlier report]. I would still regard impact type of trauma to the region of the liver as the most likely explanation for the majority of the liver pathology found in this case."

That's where you had got to in your report on that issue, isn't it?

A. I think that's what I said.

Q. Yes. In other words, it is conceivable it can have contributed in some way?

A. In one.

Q. In one way, if that's --

A. In generating one of the haematomas potentially or causing someone to rupture pre-existing haematoma. But that's as much as you can get. It didn't cause the haematoma on the undersurface of the liver, it couldn't

have caused the big bruising into the liver parenchyma.

Q. I've asked you the questions, I don't want to ask you about the forces used, we've been through that, so that deals with what I want to ask you about [Baby O].

I would like to turn to [Baby P] next.

Starting with where I began or made reference when we were looking at [Baby O], you accept, don't you, Dr Marnerides, that in the case of [Baby P], the haematoma that we've seen could arise in the course of CPR?

A. Oh yes.

Q. The next matter is this. In terms of the pneumothorax that he had, and we've heard about that, do you agree that that is likely to be secondary to the intubation and the mechanical ventilation that he had?

A. Yes.

Q. And is it also your view that the pneumothorax is at least a component cause of death? If it assists --

A. Well, on the first review, when I had the -- the way the clinical information was given to me, that was my consideration. Yes, that's what I felt then on the basis of the clinical assessment of the information.

When I had further clinical information and views, I felt that this would not have contributed because that was the clinical view about that pneumothorax.

Q. Right. So whether or not the pneumothorax was

a component cause of death --

A. Is informed by the opinion of the clinicians of how that would have behaved in the context of the presentation of the baby.

Q. Very well. Where you come to the conclusion that a cause of death is or may be gastric and intestinal distension as a result of air down the NGT -- again, I'm back to asking you this, Dr Marnerides -- what you can establish from the pathology is that there was no natural disease process or natural cause that you identified that accounts for [Baby P]'s collapse?

A. Or for this finding.

Q. Yes. But in terms of moving to the step of saying, well, this is consistent or could be or is excessive air introduced via the NGT and causing the problems that that can do, that's based upon the review by the clinicians; that's correct, isn't it?

A. Taking into account what I could exclude from the pathology point of view, the proposed mechanism by which this air could be explained by the clinicians, whether this would be reasonable or not in the context of the pathology I observed. Yes, with all these being considered, that's how I reached this conclusion.

Q. And also the reports of the radiologist or radiologists so far as --

A. Yes, that is included in the clinical evidence when I referred to that.

Q. But again, and again I emphasise, this is no criticism of the position that you're in, when we come to considering, for instance, what the clinical course was from the night before, overnight into the following day, that isn't something you have specifically reviewed yourself?

A. No, I wouldn't be the expert to review it.

MR MYERS: Thank you, Dr Marnerides.

Re-examination by MR JOHNSON

MR JOHNSON: Can we start with [Babies O and P], please, Dr Marnerides. I haven't got particularly many questions for you.

A. Is it [Baby O] and [Baby P]?

Q. [Baby O] and [Baby P], yes. In answer to a question asked by Mr Myers, you told the court that CPR or bruising or haematomas to the liver as a result of CPR were of a specific type and distribution. You were not asked the follow-up question: well, what is it about the size and distribution of these that puts them outside CPR-caused haematomas? So if we can start with the pictures, please, for [Baby O].

If Mr Murphy can give you control of the slides, perhaps you can pick the appropriate slides and explain

to us why this is --

A. I think I will make an introduction on how --

Q. Please.

A. -- such injuries can be generated. We see here where the liver is (indicating). When CPR is applied, the pressure is applied -- sorry. Can I have a piece of paper, please, that I can use for the mouse?

Q. There's a piece of card there.

A. Thank you. It doesn't...

MR JUSTICE GOSS: It's off the top at the moment. There you are.

(Pause)

A. Sorry, I can't control it. Do we have a pointer I can point on the screens?

MR JUSTICE GOSS: No. There are too many screens.

MR JOHNSON: We're easily going to finish Dr Marnerides this afternoon. If we could have a five-minute break, maybe if the system is closed down and started up again.

MR JUSTICE GOSS: Yes. Normally, that mouse seems to work quite well.

A. It does work now, yes.

MR JUSTICE GOSS: All right.

A. So when CPR is applied, remember this is the diaphragm (indicating), the ribcage where within we've got the heart and the lungs. The centre of pressure is

against -- it's at this level, at the level of the heart because that's what you want to get -- start functioning again. So that's the very major principle. I'm not an expert in CPR. Clinicians can tell you the exact mechanism and how they use their fingers or their pulses.

In terms of pathology, the injuries that we can see from CPR can be fractures to the ribs on the anterior surface. Those are injuries that we can see from CPR. And when it's very, very vigorous, with the fractures we can see haematomas of the liver because of the pressure that is being generated. But haematomas in the context that I have explained earlier in distribution that allows -- that we typically see. So superficial, small, typically on the front edge of the liver and potentially at the back.

Sometimes we may see haematomas on the spleen. Very small again. And when it's very, very vigorous and not done by medics, not done by nurses, done by random people in and outside of hospital setting, which is not something I have seen in babies, I have seen it in older children, you can have more lateral fractures rather than anterior fractures of the ribs. You can have fractures here (indicating). So that's the context we are discussing.

MR JOHNSON: Can I ask you one thing coming out of that before you progress. The proposition here is that there is -- what you have described as a significant degree of force that has been brought to bear on the liver by mistake. If the sorts of level of force that we are talking about were applied to the sternum, would they in all likelihood fracture the ribs?

A. I wouldn't be able to say that you will only see CPR-related haematomas if you had fractures of the sternum or the ribs. They are very elastic at this age, so you can press against them without fracturing.

Q. Okay.

A. So I don't think that the absence of rib or sternum fractures here helps us in that regard.

So what one would not expect to see is a haematoma of this size. So this is a very big area of the liver that is involved in the haematoma, and the cross-section that we have in the following photograph, in the last photograph. These cross-sections on the haematoma tell us that this bruise to the liver, of which one is on the left lobe and the other is on the right lobe, actually involves the full thickness of the liver in that area because that's the top, that's the bottom, that's the front (indicating). This whole area is in essence the area between the falciform ligament and the gallbladder.

It's all bruised there.

This is a huge area of bruising for a liver of this size. This is not something we see in CPR. To give you an illustrative example of what we could see in CPR, the photographs from [Baby P] are illustrative of that.

Q. So that is why you say that this is not of the type and distribution that one will see or could see in a case of CPR?

A. You don't see in CPR so big haemorrhages that involve haematomas, that involve the superior and the inferior, the full thickness of the parenchyma, both lobes. You don't see that.

Q. Can we move on to the issue of tracking? I don't know which is the best photograph to show this. It may be the final -- the tenth slide is the best to show.

A. So let's say that -- I think this is a good example. Let's say that we have an already bruised liver --

Q. Yes.

A. -- and we put pressure on it. Because of how fluids move, they choose the least resistance, the fluid would have come this way (indicating), from the lacerations out, rather than going deeper into the liver parenchyma.

Q. So the parenchyma, just to remind us, is the --

A. The substance. This blood, if there was more pressure applied to that region, would not have gone deeper into

the liver, it would have tracked out this way (indicating) because that's what fluids do.

Q. Because the laceration is a break in the continuity of the capsule, which in effect is what's holding --

A. Yes, the blood there. And it will have gone that way.

Q. Okay. So if we look at the final photograph then.

A. So it would not have gone inside the liver, it would have gone through the lacerations, one is there, for example, this way, out of the liver.

Q. Where is one of the lacerations, sorry?

A. I can't demonstrate one here because it's too far away, but there are lacerations in the other photographs, so that's a good candidate for the blood to come out.

Q. Yes. Thank you. So do you therefore, as a practical possibility, exclude CPR as having caused these injuries to [Baby O]?

A. Yes, I don't see how it is reasonable.

Q. As you've already told us, in evaluating the cause of the liver haematomas to [Baby P], you do not take into account what happened to [Baby O]?

A. Yes.

Q. On many occasions today you have told us that you take into consideration the views of clinicians when you formulate the cause of death of an individual child.

A. Yes.

Q. In the joint meeting of experts, to which you have been referred in the questioning today, were clinicians there who had been instructed on behalf of Lucy Letby?
A. Oh yes, there were.
Q. Did you take into account what they had said before giving evidence yesterday and today?
A. Oh yes, and I have... We discussed them there, I expressed what my views were, and in the cases where I felt I should have put that in writing, I stated it in a subsequent report, which is in the bundle. Yes, I have taken into account the suggestions.
Q. Today, in the cases of [Baby O] and [Baby P], an alternative mechanism for the injuries to the liver has been put to you and you've dealt with it, you've answered the questions. If an alternative interpretation of another child's individual clinical course had been put to you today in cross-examination, would you either, first, have explained why your determination of the cause of death had not changed or have taken it into account and modified your view?
A. Of course. That's what pathologists do.
MR JOHNSON: Yes, thank you.

Questions from THE JUDGE

MR JUSTICE GOSS: Just one question in relation to clarification of your conclusions in relation to cause

of death as a pathologist whereby if you were conducting a post-mortem examination, you were asked then to give the cause of death. Can just explain to us how causes of death are --

A. So when we do a post-mortem examination of a paediatric case -- let's say, the coroner asks me to give a post-mortem examination. In 99% of the cases, even more, the response will be "Pending further investigation" after I've finished my post-mortem. I will then go back to my office, wait for the post-mortem testing results to come back --

MR JUSTICE GOSS: That's the samples that are taken, toxicological, et cetera?

A. Exactly. Review the histology. Once I have listed my findings of pertinence to the cause of death, of pertinence to death, I would have assessed them pathologically and then go back to the clinical information received and say, "Yes, this would be compatible with this, this would not explain this, this would explain this, this would be consistent with this", and on that basis formulate my opinion. And our opinion, as for the cause of death in every Coroner's Court, is we are invited, we are asked. That's what we are expected to do: to reconsider our position in light of new clinical information if this becomes

available. And we are always asked: this is a proposition from the medics in relation to this finding, can you re-review the proposed cause of death? And that's what I will do.

So the answer to the question is: of course, yes, that's how we formulate the cause of death.

MR JUSTICE GOSS: But then if you give a cause or causes of death, we've heard sometimes about different causes of death or unascertained or whatever, what as a pathologist, not specific to any particular case, would you say there?

A. I'm not sure I can understand the question.

MR JUSTICE GOSS: Maybe --

A. I don't follow the question.

MR JUSTICE GOSS: Well, I won't pursue it then. In case it was something that cropped up later on, but I don't think I'll pursue it.

A. Sorry, I didn't understand the question.

MR JUSTICE GOSS: It's all right. We know that sometimes you get 1, 1A, B, C, 2, things like that --

Further re-examination by MR JOHNSON

MR JOHNSON: I think I can deal with that point, my Lord. Often, when a pathologist expresses a cause of death, you, the pathologist, give numbered reasons, don't you?

A. Yes, I see.

Q. There's 1 -- sometimes there's just 1 that's it. Sometimes there's 1A and B, sometimes there's 1A, B, C and 2. That's a well-established system, isn't it, for pathology?

A. That's the system we are asked by the legal profession and that's how the deaths are registered.

Q. It's the lawyers' fault?

A. We agree to it.

Q. Okay.

A. So in 1, we put diseases and mechanisms, one leading to the other. For example, acute myocardial infarction in 1A, that's the direct cause of death. In 1B, due to thrombosis of the right coronary artery. 1C, due to coronary artery disease. So that's the direct cause of death.

In 2 we put conditions or diseases or findings that we, on a balance of probabilities, feel make this sequence of events more likely. So in a scenario like this, if that individual was known to have hypertension, which is known to increase the risk of developing coronary artery disease and dying from myocardial infarction, hypertension goes in 2 as contributory factor. That's the logic of that.

Q. Can we just use an example from this case? [Baby C]. It's your statement, dated

4 September 2022.

A. In which folder?

Q. I don't know which folder it's in, I'm sorry, I can't help you that much. [Baby C] was the second child.

A. The second we discussed, okay. Yes.

Q. So this is one of the reports you've just referred to, which came about when you discussed it with the other experts in the joint expert meeting because it's dated September 2022.

A. Mm-hm.

Q. At the very end, page 16, you give a conclusion and cause of death. 1A, 1B, 1C and then 2. The final report of [Baby C].

A. Yes.

Q. Just talk us through that so that we understand it in the context of the case.

A. In the context of the case, the baby died because the baby had respiratory and cardiac arrest. That's the end mechanism, that's not a cause. We need a cause for that. The cause for that was gastric and intestinal over-distension. The possible mechanisms were the mechanisms of either vagal stimulation or diaphragmatic splinting. In 1C, the reason to get the gastric and intestinal over-distension was the extensive injection

or infusion of air into the tube. So that's the sequence of events.

In 2, there were factors, there were conditions, there were diseases. I referred to them as dying with them but not from them, which I felt makes this respiratory arrest on a balance of probabilities more likely. That's when I put in 2:

"Acute pneumonia with acute lung injury, intrauterine growth restriction and prematurity."

So all these factors were there in this baby. They would have reduced the baby's physiological reserve to tolerate something like this. And in that sense I put them in 2.

Q. So all factors of relevance to a particular individual's cause of death?

A. Yes.

MR JOHNSON: I hope that's clear.

MR JUSTICE GOSS: It is, yes. I was wanting clarification of that because we'd heard some questioning about these different causes, just to explain how it works, and you have explained it. It was my very clumsy question.

A. Apologies, I didn't understand it.

MR JUSTICE GOSS: No, it's me who owes the apology. Right. So that completes your evidence, Dr Marnerides. Thank you very much for coming and giving it to us.

You'll not be required again. So thank you very much for coming and you are free to go.

(The witness withdrew)

Housekeeping

MR JUSTICE GOSS: Mr Johnson?

MR JOHNSON: We're moving on to [Baby Q] tomorrow, please.

MR JUSTICE GOSS: Yes, because of the parents.

Well, we started earlier, we're finishing earlier. I don't know whether that's good or bad from your point of view, but it's a consequence in part of starting earlier that we are finishing earlier. But that's it for today. Sorry about the temperature in here. Actually, there has been a member of court staff who's been taking, when we've had breaks, the temperature, and asking me, "Should I turn it down or should I not turn it down?"

JUROR: It's okay.

MR JUSTICE GOSS: I made the decision that it should not be touched because I thought it was as good as we were going to get. So that's my fault again.

So that's it for today. You've received a lot of evidence today, it's been hard work. So tomorrow and, as you've heard, we're moving on to the last of the babies. 10.30, back to 10.30.

Can I just say this: I did some days ago say I'd give you a sheet of paper to say when we're not sitting. But what I am going to do, because we have got the Easter break coming up, I am just going to tell you orally what the situation is.

Normal day tomorrow. Monday, normal starting time, early finishing time; no later than 2.30 on Monday. All right? So if you wanted to make arrangements to be elsewhere Monday afternoon from 2.30, you can make those arrangements in the confident knowledge that you will not be required here beyond 2.30 on Monday.

As matters presently stand, and I'll look to counsel here, after that, Tuesday, Wednesday, Thursday, normal.

MR JOHNSON: I believe so.

MR MYERS: I believe so as well, my Lord.

MR JUSTICE GOSS: Yes, subject to unforeseen events occurring. So that's it. That's Maundy Thursday. Good Friday is obviously the start of the holiday. It's a public holiday and, as you know, we are taking the whole of Easter week off, the week following Easter. So that's another break.

When we resume on Monday, 17 April, you will not be required to be here until 12.15 in the morning.

MR JOHNSON: Afternoon.

MR JUSTICE GOSS: In the afternoon, yes, sorry. Quite

right. 12.15 in the afternoon. Then, the following day, you are not required because I think, as you know, we cannot sit on that day. So there will be part of Monday from 12.15 to the rest of the day, not required Tuesday, and then Wednesday, normal from then on.

I don't think you need that in writing, do you? All right. I will obviously remind you before the relevant days. So tomorrow, 10.30, as normal. And an early finish on Monday. Those are the immediate ones. Thank you very much.

(In the absence of the jury)

MR MYERS: We would be grateful if we could go downstairs, thank you, my Lord.

MR JUSTICE GOSS: Yes, the usual arrangement, please. Thank you very much.

I should actually have said, as far as tomorrow is concerned, Mr Johnson, I don't want any witness to be inconvenienced, so if we finish a bit earlier, we finish earlier.

MR JOHNSON: Thank you.

MR JUSTICE GOSS: If you could just discuss it, I don't really want to lose another complete half day.

MR JOHNSON: We were working on that basis, my Lord. What we've budgeted for is dealing with the full sequence, which has quite a lot of texts in, reading, there's

a few witnesses to read, and we're going to --

MR JUSTICE GOSS: There's a witness to call?

MR JOHNSON: We're going to have a live witness here for the afternoon session.

MR JUSTICE GOSS: If you have that witness here for 2 o'clock.

MR JOHNSON: Yes.

MR JUSTICE GOSS: Thank you very much.

(3.07 pm)

(The court adjourned until 10.30 am on Friday, 31 March 2023)

I N D E X