



Neutral Citation Number: [2023] EWHC 1304 (KB)

Case No: QB-2020-004468

IN THE HIGH COURT OF JUSTICE
KING'S BENCH DIVISION

Royal Courts of Justice
Strand, London, WC2A 2LL

Date: 1 June 2023

Before:
GERAINT WEBB KC
sitting as a Deputy High Court Judge

Between:

HAZHAR SHALLY

Claimant

- and -

**IMPERIAL COLLEGE HEALTHCARE NHS
TRUST**

Defendant

Eliot Woolf KC (instructed by Stewarts Law LLP) for the **Claimant**
Charlotte Jones (instructed by Capsticks Solicitors LLP) for the **Defendant**

Hearing dates: 27 to 30 March 2023

APPROVED JUDGMENT

This judgment was handed down by the Judge remotely by circulation to the parties' representatives by email and release to The National Archives. The date and time for hand-down is deemed to be 10:00 on Thursday 1 June 2023.

Geraint Webb KC sitting as a Deputy High Court Judge:

A. Introduction and background

1. This is a judgment on issues of liability in a clinical negligence action.
2. The Claimant, Mr Shally, underwent surgery on 22 February 2018, at Charing Cross Hospital, London, to excise a large calcified prolapsed thoracic disc at the T10/11 level. He was aged 42. The operation was carried out by a consultant neurosurgeon, Mr Kevin Tsang with the assistance of two specialist trainee surgeons. As a result of injury sustained to his spinal cord during the course of that operation, the Claimant was rendered paraplegic (incomplete paraplegia, T10 AIS C). It is the Claimant's case that the spinal cord injury was a result of negligence on the part of the Defendant NHS Trust in respect of the clinical care provided. The Defendant denies negligence.
3. For present purposes, it is sufficient to describe the relevant disc as a very large (also properly described as "giant") prolapsed disc which was both central and eccentric to the right and which displaced the spinal cord posteriorly and to the left. Mr Shally gave consent for, amongst other matters, a **costotransversectomy** which is a procedure which involves the removal of part of the head of a rib in order to facilitate a posterior-lateral approach to the prolapsed disc.
4. It is common ground that a costotransversectomy was an appropriate surgical approach for this disc. It is also common ground that there is a risk of spinal cord injury (and resulting paraplegia) of 5-10% for all relevant approaches in respect of this type of thoracic disc prolapse.
5. The operation note completed by Mr Tsang immediately after the surgery provides a convenient summary of the procedure for present purposes. The note records that following initial surgery to provide access to the disc (involving removal of the lamina, facet joint and pedicle at the T10/11 level), it was not possible to strip the **dura mater** (the tubular membrane encasing the spinal cord) off the calcified disc due to adherence of the disc to the dura. It records that consideration was given to removal of the rib (part of the costotransversectomy), but that it would still not be possible to remove the disc

without injuring the dura. The note records that it was decided to approach the disc transdurally, that is, by opening up the dura.

6. According to the operation note, after opening the dura the spinal cord was ‘mobilised gently to the left’ to expose two thirds of the disc. Following removal of the majority of the disc ‘a small sharp portion [of the disc] towards the left’ was noted to be ‘digging into the spinal cord’. The spinal cord was ‘gently mobilised to the right’ to expose that smaller rim remnant, which was removed with rongeurs. The note also records that at this stage the neurophysiology monitoring showed a drop in the motor evoked potentials (“MEPs”) for the left leg to 60%. The surgery was paused for around 25 minutes, by which time the MEPs had recovered to about 75-80% of the starting amplitude. The note records that the operation was ended at that stage and no further attempt was made to remove any more of the remnant disc material.
7. The Claimant alleges, in summary, that the Defendant acted in breach of duty: (i) in abandoning the costotransversectomy; (ii) in adopting the surgical approach taken; and (iii) in respect of retraction and/or manipulation/mobilisation of the spinal cord.
8. Following the operation, Mr Shally woke with worse neurological deficit in the right and left legs than pre-operatively. On 23 February 2019 a non-contrast MRI demonstrated a focal area of a new signal change below the level of the operation (T11/12) with signal change present from T9/T10 through to T11/T12. At that stage it was thought that the loss of motor function might be a result of swelling of the spinal cord.
9. There was further post-operative deterioration, including deterioration in bladder and bowel function. An MRI on 6 March 2018 demonstrated ongoing cord compression at the T10/11 level secondary to a combination of residual disc material and collection of fluid. There was also an abnormal signal at the T11/12 level.
10. A ‘re-do’ right sided costotransversectomy was carried out on 7 March 2018 by another neurosurgeon, Mr Haider Kareem, to excise the remaining portion of disc, although the chances of improvement were considered small. There was no significant improvement following the re-do operation.

11. No internal incident review was carried out contemporaneously. Following receipt of a letter of claim dated 9 March 2020 an internal Incident Review and Serious Incident Investigation Report were carried out by the Trust.

B. Issues for the court

12. The main issues for determination are as follows:
 - (1) Mr Shally's pre-operative condition and the nature, position and extent of Mr Shally's pre-operative prolapsed disc;
 - (2) Breach: whether the Defendant's management of the Claimant's clinical care was negligent as alleged (the particulars are set out at [13] below);
 - (3) Causation: if breach of duty is established, whether the Defendant's negligence caused or materially contributed to the Claimant's spinal cord injury and the likely outcome of the operation, but for any such breach of duty.
13. As to breach of duty, the Particulars of Claim allege that the Defendant's management of the Claimant's clinical care on 22 February 2018 was negligent in that, by its servants or agents, it:
 - (i) abandoned carrying out the costotransversectomy when the mere fact that the thoracic disc was attached to the dura was not a satisfactory reason for failing to continue with the planned procedure;
 - (ii) converted the procedure to a wide posterior laminectomy and transdural approach when such an approach was wholly inappropriate for a large central calcified thoracic disc prolapse (albeit extending slightly more to the right than the left) with severe cord compression. Posterior approaches for resection of a large calcified central thoracic disc are known to be associated with a much higher risk of spinal cord injury as they require spinal cord mobilisation;
 - (iii) whilst adopting a posterior and transdural approach, manipulated and/or retracted and/or mobilised an already compressed spinal cord, notwithstanding that any such contact with the spinal cord is contraindicated in circumstances where there is a large calcified disc prolapse with severe spinal cord compression.'
14. As to causation, it is alleged that, on the balance of probabilities, the Claimant sustained a spinal cord injury during the mobilisation of the spinal cord, evidenced by an associated

drop in the MEPs and by a clear worsening of spinal cord function on recovery from general anaesthetic. The Claimant also contends that if the planned costotransversectomy had been competently performed (or the alternative option of a transthoracic discectomy undertaken) then any manipulation or mobilisation of the spinal cord would have been avoided and there would have been no spinal injury. In such circumstances, it is contended that Mr Shally's immediate post-operative neurological state would have been similar to his pre-operative condition and that it is probable that there would have been some improvement in motor and sensory function over the following year.

C. The law

15. There were no significant differences between the parties in respect of legal principles. The relevant principles are derived from the direction given to a jury by McNair J in *Bolam v Friern Hospital Management Committee* [1957] 1 WLR 583 at 587. A clinician:

‘... is not guilty of negligence if he has acted in accordance with a practice accepted as proper by a responsible body of medical men skilled in this particular art... Putting it the other way round, a man is not negligent, if he is acting in accordance with such a practice merely because there is a body of opinion that would take a contrary view...’

16. Accordingly, it is not sufficient for a claimant to demonstrate merely that there is a body of competent professional expert opinion which disagrees with the judgment taken by the relevant clinician, provided that there is a body of competent professional expert opinion which supports that judgment as reasonable in the circumstances. This reflects the fact that, in an area where professionals exercise a high degree of technical and medical expertise, there may be a range of different views which might legitimately be held about the same issue by different professionals. The position was put as follows by Lord Scarman in *Maynard v West Midlands RHA* [1984] 1 WLR 634 at 638E:

‘Differences of opinion and practice exist and will always exist in the medical and other professions. There is seldom only one answer exclusive of all others to problems of professional judgement. A Court may prefer one body of opinion to the other, but that is no basis for a conclusion of negligence.’

17. A practitioner who departs from the accepted methods of treatment will normally have to provide justification for doing so if, as a consequence, the patient suffers injury. In

Clark v MacLennan [1983] 1 All ER 416, it was considered that in such circumstances the burden of proof shifts to a defendant to show that there was no breach of duty or that the damage did not result from the breach.

18. In *Bolitho v City and Hackney HA* [1997] UKHL 46; [1988] AC 232 further consideration was given to the relevant test and, in particular, whether a court was required to accept the views of one body of expert professional advice even if the court was not persuaded as to its logical force. The House of Lords concluded that it would be a rare case where a court can be satisfied that a body of genuinely held clinical opinion cannot be logically supported, but that if that were its conclusion then it would be obliged to reject that professional opinion. It is for the court, not for medical opinion, to determine the standard of care required of a professional in the circumstances of the case. Lord Browne-Wilkinson provided the following guidance at 242:

‘...in my view, the Court is not bound to hold that a defendant doctor escapes liability for negligent treatment or diagnosis just because he leads evidence from a number of medical experts who are genuinely of the opinion that the defendant’s treatment or diagnosis accorded with sound medical practice. In the *Bolam* case itself, McNair J stated... that the defendant had to have acted in accordance with the practice accepted as proper by a “responsible body of medical men”.

Later, he referred to “a standard practice recognised as proper by a competent *reasonable* body of opinion”. Again, in the passage which I have cited from *Maynard’s case*, Lord Scarman refers to a “respectable” body of professional opinion. The use of these adjectives – responsible, reasonable and respectable – all show that the court has to be satisfied that the exponents of the body of opinion relied upon can demonstrate that such opinion has a logical basis. In particular, in cases involving, as they so often do, the weighing of risks against benefits, the judge before accepting a body of opinion as being responsible, reasonable or respectable, will need to be satisfied that, in forming their views, the experts have directed their minds to the question of comparative risk and benefits and have reached a defensible conclusion on the matter.’

19. Lord Browne-Wilkinson then considered various authorities before stating:

‘These decisions demonstrate that in cases of diagnosis and treatment there are cases where, despite a body of professional opinion sanctioning the defendant’s conduct, the defendant can properly be held liable for negligence (I am not here considering questions of disclosure of risk). In my judgment that is because, in some cases, it cannot be demonstrated to the judge’s satisfaction that the body of opinion relied upon is reasonable or responsible. In the vast majority of cases the fact that distinguished experts in the field are of a particular opinion will demonstrate the reasonableness of that opinion. In particular, where there are

questions of assessment of the relative risks and benefits of adopting a particular medical practice, a reasonable view necessarily pre-supposes that the relative risks and benefits have been weighed by the experts in forming their opinions. But if, in a rare case, it can be demonstrated that the professional opinion is not capable of withstanding logical analysis, the judge is entitled to hold that the body of opinion is not reasonable or responsible.

I emphasise that in my view it will seldom be right for a judge to reach the conclusion that views genuinely held by a competent medical expert are unreasonable. The assessment of medical risks and benefits is a matter of clinical judgment which a judge would not normally be able to make without expert evidence. As the quotation from Lord Scarman makes clear, it would be wrong to allow such assessment to deteriorate into seeking to persuade the judge to prefer one of two views both of which are capable of being logically supported. It is only where a judge can be satisfied that the body of expert opinion cannot be logically supported at all that such opinion will not provide the benchmark by reference to which the defendant's conduct falls to be assessed.'

20. In *C v North Cumbria University Hospitals Trust* [2014] Med. L.R. 189 Green J (as he then was) provided the following guidance, at [25], in respect of conflicting expert opinion evidence in clinical negligence cases:

- i) Where a body of appropriate expert opinion considers that an act or omission alleged to be negligent is reasonable a Court will attach substantial weight to that opinion.
- ii) This is so even if there is another body of appropriate opinion which condemns the same act or omission as negligent.
- iii) The Court in making this assessment must not however delegate the task of deciding the issue to the expert. It is ultimately an issue that the Court, taking account of that expert evidence, must decide for itself.
- iv) In making an assessment of whether to accept an expert's opinion the Court should take account of a variety of factors including (but not limited to): whether the evidence is tendered in good faith; whether the expert is "responsible", "competent" and/or "respectable"; and whether the opinion is reasonable and logical.
- v) Good faith: A *sine qua non* for treating an expert's opinion as valid and relevant is that it is tendered in good faith. However, the mere fact that one or more expert opinions are tendered in good faith is not *per se* sufficient for a conclusion that a defendant's conduct, endorsed by expert opinion tendered in good faith, necessarily accords with sound medical practice.
- vi) Responsible/competent/respectable: In *Bolitho* Lord Brown Wilkinson cited each of these three adjectives as relevant to the exercise of assessment of an expert opinion. The judge appeared to treat these as relevant to whether the

opinion was “logical”. It seems to me that whilst they may be relevant to whether an opinion is “logical” they may not be determinative of that issue. A highly responsible and competent expert of the highest degree of respectability may, nonetheless, proffer a conclusion that a Court does not accept, ultimately, as “logical”. Nonetheless these are material considerations...“Competence” is a matter which flows from qualifications and experience. In the context of allegations of clinical negligence in an NHS setting particular weight may be accorded to an expert with a lengthy experience in the NHS. Such a person expressing an opinion about normal clinical conditions will be doing so with first hand knowledge of the environment that medical professionals work under within the NHS and with a broad range of experience of the issue in dispute. This does not mean to say that an expert with a lesser level of NHS experience necessarily lacks the same degree of competence; but I do accept that lengthy experience within the NHS is a matter of significance. ...“Respectability” is also a matter to be taken into account. Its absence might be a rare occurrence, but many judges and litigators have come across so called experts who can “talk the talk” but who veer towards the eccentric or unacceptable end of the spectrum. ...A “responsible” expert is one who does not adopt an extreme position, who will make the necessary concessions and who adheres to the spirit as well as the words of his professional declaration (see CPR35 and the PD and Protocol).

- vii) Logic/reasonableness: By far and away the most important consideration is the logic of the expert opinion tendered. A Judge should not simply accept an expert opinion; it should be tested both against the other evidence tendered during the course of a trial, and, against its internal consistency... A judge will ask whether the expert has addressed all the relevant considerations which applied at the time of the alleged negligent act or omission ... a matter of some importance is whether the expert opinion reflects the evidence that has emerged in the course of the trial. Far too often in cases of all sorts experts prepare their evidence in advance of trial making a variety of evidential assumptions and then fail or omit to address themselves to the question of whether these assumptions, and the inferences and opinions drawn therefrom, remain current at the time they come to tender their evidence in the trial. An expert’s report will lack logic if, at the point in which it is tendered, it is out of date and not reflective of the evidence in the case as it has unfolded... If on analysis of the report as a whole the opinion conveyed is from a person of real experience, exhibiting competence and respectability, and it is consistent with the surrounding evidence, and of course internally logical, this is an opinion which a judge should attach considerable weight to...’

D. Overview of the factual evidence before the court

(1) Relevant medical records

Mr Shally’s pre-operative condition

- 21. In January 2018 Mr Shally was referred by his GP for neurological review because of pain in his back and numbness in his legs. On the afternoon of 17 February 2018, he

attended the accident and emergency department of Charing Cross Hospital as the leg pain and numbness had become significantly worse.

22. On assessment in Emergency Medicine he was recorded by a junior doctor (FY2) as reporting: 'long standing lower back pain for many years, attends Putney Chiropractic Clinic'; increasingly severe right sided upper leg pain was noted with reduced movement over the previous two weeks and extreme difficulty mobilising, struggling with stairs; 'describes having to lift his right leg'; 'for the past week has had difficulty controlling voiding of bladder, experiencing leakage'.
23. He was seen by a registrar in the early evening and it was recorded 'SEVERE lower back pain – very bad over the last 2 weeks. Weak left leg – can barely walk also whole left leg feels numb – when he is walking to the toilet he suddenly passes urine – painless...' On examination it was noted that Mr Shally was 'in severe pain – crying with pain – very difficult to manoeuvre onto the bed... Rt leg – decreased sensation all over power 3/5 whole lower leg'.
24. A similar assessment was made later that evening by a Neurosurgical Registrar who recorded 'long history of low back pain, 2 year history of bilateral leg numbness...', right lower limb weakness, 'episodes of urge incontinence' and 'denies faecal incontinence, perianal paraesthesia, sexual dysfunction'. It was noted that he was able to mobilise independently and, as evidence of that statement, that he had been exiting the emergency department for cigarettes.
25. Urgent CT and MRI scans were carried out and reported by the Specialist Registrar in Radiology that evening. It was noted that there was 'a large central and right paracentral disc protrusion at T10/T11 with a small volume of caudally migrated disc material. This is causing severe reduction in vertebral canal dimensions with compression of the spinal cord which was displaced to the left. There is apparent increased T2 signal with the substance of the cord in keeping with myelopathy' (**myelopathy** being injury to the spinal cord due to compression). It was also noted that the majority of the extruded disc material was calcified, in keeping with chronic extrusion of the disc, but there was a small focus of increased signal within the disc material suggesting a more acute component.

26. The following day an addendum was added to the MRI by a Consultant Neuroradiologist who agreed with the provisional report. The description was: ‘there is large volume central right paracentral largely calcified extruded disc material seen at T10-11 level which elevates the posterior longitudinal ligament, displaces the spinal cord posteriorly and to the left and compresses it – with consequent myelopathic central spinal cord signal change at this level.’ It was also stated that ‘there is no convincing piercing of the dura’ by the disc.
27. Mr Shally was first seen by Mr Tsang at 15.29 on 18 February 2018. The record states ‘2 week history of R leg weakness and worsening numbness with urinary incontinence. Ongoing drips of urinary incontinence, however able to feel when passing urine. No faecal incontinence. Long discussion re risks and benefits of operation. Would like to have decompression’. Mr Shally signed the consent form for a ‘Right T10/11 costo-transversectomy, laminectomy and discectomy’. The consent form states (with the standard wording of the form in italics):

*‘Statement of health professional
I have explained the procedure to the patient. In particular I have explained:*

The intended benefits
prevent neurological deterioration
maximise chance of neurological improvement

Serious or frequently occurring risks
no improvement, ongoing deterioration, spinal cord/nerve injury (leg weakness/numbness/pain, bowel/bladder/sexual dysfunction) bleeding, infection, CSF leak, instability, need for fusion, risks of GA (DVT, PE, pneumonia, blindness).’

The operation note of 22 February 2018

28. The operation took place on 22 February 2018. The operation note records that it was signed by Mr Tsang at 18.43 that day, which would have been shortly after he completed the surgery. It records that the operation team comprised Mr Tsang and two specialist trainee doctors. Neurophysiology monitoring was used and it is apparent that this comprised both continual monitoring of somatosensory evoked potentials (“SSEPs”) and *ad hoc* monitoring by MEPs (which monitoring requires surgery to be halted). Starting SSEPs were recorded to be normal and MEPs were normal on the left and severely reduced on the right, consistent with clinical assessment of severe right leg weakness.

T10/11 **laminectomies** were performed (removing part of the lamina from the vertebral bone), together with removal of the **ligamentum flavum** (a ligament that connects the laminae of adjacent vertebrae) to expose the central dura. Ultrasound scanning (abbreviated to “**USS**” in the operation note quoted below) was used to confirm the site of cord compression. The T10/11 facet joint (situated between the pedicle and lamina of the vertebra) was removed and the T10 pedicle was drilled until completely flat with the vertebral body.

29. The note records the following:

‘The large calcified disc can be seen via this approach without removal of the rib. However it was not possible to remove the disc without injuring the dura due to its adherence. As a result, the decision was taken to approach this transdurally. Under the microscope, the dura was opened in the midline but with an extra division laterally on the right to allow better visualisation. The spinal cord can be seen already bruised at the site of the worst compression and thinned down. The arachnoid membrane was fenestrated and the dentate ligaments bilaterally were divided along with the right T10 nerve root intradurally to allow safer access to the disc. The spinal cord was protected with a nerve root retractor and mobilised gently to the left to expose 2/3 of the disc. The dura was incised ventrally and stripped off the calcified disc.

MEPs at this point has not changed. A size 2 burr was used to remove majority of the disc whilst the cord was protected with a patty and the nerve root retractor. Parts of the disc were also removed with rongeurs and upcuts. Under USS, there was still a small sharp portion towards the left digging into the spinal cord. The spinal cord was therefore gently mobilised to the right to expose this smaller rim remnant, which was removed with rongeurs. However MEPs at this point suggested a 60% reduction in amplitude on the left, little change on the right. SSEPs were unchanged...’

30. The note records that the operation was then halted for around 25 minutes whilst the spinal cord was bathed in warm saline. It was then recorded that the MEPs had recovered to around 75-80% of the starting amplitude on the left. Given the ‘dampened MEPs’ it was decided to stop the operation and close, rather than trying to remove the remaining part of the remnant. It was recorded that ‘the neurophysiologist was satisfied that the mild dampening at this point is consistent with any procedures performed on the spinal cord.’

31. The operation note concludes with the following:

‘Outcome and Complications
Procedure Completed: Yes

Procedure tolerated: Well
Confirmed Complications: No complications.’

Events following the first operation

32. Following the operation Mr Shally was assessed as having a neurological deficit with severe weakness in lower limbs. An MRI on 23 February suggested a CSF leakage through a dural defect and reported a small residual central protrusion at T10/11 and intramedullary signal changes.
33. A clinical note of 2 March 2018 records that Mr Shally was advised by Mr Tsang that the operation had gone well, that the spinal cord had been very bruised and that the neurological deficit was likely to be due to swelling of the cord and could take months to improve; a full recovery of the left leg was anticipated but probably not full recovery of the right leg.
34. A further MRI was carried out on 6 March 2018 following noted loss of bladder and bowel control. This showed evidence of some ongoing cord compression at the T10/T11 level secondary to a combination of the residual disc material and CSF leakage. There were also signal changes of the spinal cord at T11/12.

The second operation 7 March 2018

35. A second operation was carried out on 7 March 2018 by Mr Kareem, a consultant neurosurgeon, together with a specialist registrar, and with Mr Ulbricht, consultant neurosurgeon, in attendance. A costotransversectomy approach was taken, with removal of part of a rib and vertebral body. The procedure involved mobilisation of the spinal cord. The remnant of disc which was adherent to the dura was dissected extradurally. The operation notes include the following:

‘...heavily calcified disc identified – adherent to dura
Disc incised with inside knife and excision initially performed with small pituitary forceps. Thereafter, disc had to be carefully dissected free from the anterior dura – this was achieved by placing the nerve root retractor between the disc and the dura and carefully tapping the nerve root retractor mobilise the disc away from the dura. Thereafter, disc exercised using drill and pituitary forceps’
36. Following the second operation it was reported that there was some limited sensory improvement, but with no significant improvement to Mr Shally’s neurological status.

Record of internal review

37. No internal incident review was carried out by the defendant contemporaneously. The letter of claim dated 9 March 2020 resulted in the matter being reported as an incident and a review was undertaken. The review included a ‘Report of a 72 Hour Incident Review’, an ‘Incident Summary Report’, a Level 1 Concise Investigation Report dated 29 September 2020, an ‘Internal Investigation Panel Record’ dated 26 October 2020 and a ‘Serious Incident Investigation Report’ which was stated to have been submitted to CCG on 23 February 2021.
38. The Report of the 72 Hour Incident Review was authored by Adam Lamb, Divisional Governance Lead, Christian Ulbricht, Consultant Neurosurgeon and Haider Kareem, Consultant Neurosurgeon. It includes the following points:
- (1) ‘Symptomatic thoracic disc herniation is uncommon and comprises only up to 5% of all disc herniations’.
 - (2) ‘...the question of the optimal surgical approach for thoracic disc removal is a matter for debate, and it remains a challenge to find the most effective, safe, and relatively simple procedure, especially for the treatment of central thoracic disc herniation. Owing to a general lack of knowledge of the natural course of thoracic disc herniation, there are no strict criteria for the operative treatment of thoracic disc herniation. The most important goal when choosing a surgical approach is to minimise manipulation of an already compromised thoracic spinal cord.’
 - (3) There was no clear evidence of the case being discussed in a multi-disciplinary team (“**MDT**”), although Mr Tsang was recorded as saying that it is likely it was discussed.
 - (4) It was noted that ‘most surgeons would have done a thoracotomy although a costo-transvesectomy was clearly an acceptable option’.
 - (5) ‘[Mr Tsang] took all precautions to make surgery as safe as possible, i.e. intra-operative spinal cord monitoring and ultrasound scan’.
 - (6) ‘It is reasonable to change the surgical approach if it appears that the goal of surgery cannot be achieved. However it is best practice that a second consultant is involved wherever possible if the change is significant or if significant intra-operative complications are encountered.’
 - (7) ‘If the intra-operative ultrasound scan showed that the cord was only on the left sided [sic] than [sic] a transdural approach was justified as rootlets can be safely divided and the cord gently mobilised. It would have been reasonable to either resect the rib trying to get a better angle onto the disc or stop the procedure and perform a thoracotomy at a second stage.’

- (8) ‘Regarding the allegation of not continuing the planned procedure – The surgeon has the right to abandon the procedure or change the approach if thinks [sic] the risk of complication outweigh the benefit, acting on the best interest of patient.’
 - (9) ‘Regarding converting to an “inappropriate” procedure – Although the surgical approaches of thoracic disc herniation are a matter of debate, there are a [sic] good scientific evidence reporting a well tolerated/low risk of complications with trans-dural approach for centrally herniated thoracic disc’.
 - (10) ‘Conclusion: This was a high risk surgical case with a well-documented risk of paralysis from surgery. The risk of paralysis was also significant without surgical intervention. The planned surgery was a reasonable approach, even converting this to a trans-dural approach depending on ultrasound image findings but a discussion with another consultant colleague would have been desirable’.
39. The Level 1 Concise Investigation Report is largely consistent with the other internal reports. It notes that the consent and outlining risks and benefits for the first operation were not documented in electronic patient records. The Action Plan recommendation suggests that Mr Tsang should ‘reflect on this case – difficult cases may require discussion with colleagues and the importance of documentation’.
40. The Serious Incident Investigation report, with Mr Ulbricht as the Lead Investigator, repeats much of the same information and the overall conclusions contained within the previous report, but there are some differences. I note the following points:
- (1) ‘...there is no evidence of a pre-operative multi-disciplinary team (MDT) discussion/decision on the case although [Mr Tsang] has stated that they discussed the case with other surgeons’;
 - (2) ‘There was not a specific spine MDT in early 2018, however, most complex cases were discussed in the office between several consultants. These were not officially documented, as they were not part of an MDT meeting. It would be unusual if the possible need for a costotransversectomy or thoracotomy was not discussed in this instance, but there is no evidence to prove either way that this conversation occurred.’
 - (3) ‘Surgical approach – most surgeons would have done a thoracotomy although a costotransversectomy was clearly and acceptable option. As a thoracotomy is a more invasive operation where deflation of the lung and a stay on ITU is required [sic]. It might also required a second (cardiothoracic) surgeon. However, it should be noted that the chosen costotransversectomy was a reasonable option...’.
41. The Serious Incident Panel record dated 22 February 2021 (that is, precisely three years after the surgery) records, amongst other matters, Mr Ulbricht as saying:

‘..the surgeon took an unusual approach, though nothing wrong with it, it was a reasonable approach. But he didn’t ask anyone else for their opinion. Patient significantly worse post-op. ...I don’t think the change of plan in itself is inappropriate. But would be desirable/good practice to discuss with another surgeon. A thoracotomy would have been my preferred approach, but it was neither right nor wrong. It was an acceptable approach. Doing a thoracotomy after opening the dura would have been wrong. No problem with the consent form. An unfortunate case but I don’t think it’s negligent.’

(2) Factual witness evidence

42. Both Mr Shally and Mr Tsang provided witness statements and gave oral evidence. I have not seen witness statements from, nor heard oral evidence from, either of the two trainee surgeons who assisted Mr Tsang with the operation of 22 February 2018.

Mr Shally’s evidence

43. It is evident that Mr Shally has suffered very greatly as a result of both the loss of function which he has sustained and the pain which he now has to endure. His evidence was given with dignity. English is not his first language and he explained that he could not speak English when he moved to the UK in 1997; he states in his witness statement that his English is not fluent and ‘I do need words explaining to me’. I do not underestimate the difficulties of giving evidence in a second language. However, having had the benefit of hearing Mr Shally give evidence, it was apparent that he had a good understanding of all the questions being put to him and was able to give clear responses.
44. With a few exceptions, his evidence was largely consistent with the contemporaneous medical records. At [48] and [49] below I note two points on which I was not able to accept his recollection about statements which he says were made to him, but nothing turns on either of those points.
45. Mr Shally worked as a barber before the operation and had been fit and healthy, enjoying spending time with his children and the rest of his family. He experienced minor lower back pain on and off for many years and in the summer of 2017 he developed pain in his right groin and leg, making walking difficult. He says that it was not until January 2018 that he began to experience more serious problems, with pain in his back and numbness in his legs.

46. By 17 February the pain had ‘become unbearable’ and so he went to A&E. He also explained that whilst waiting (between 18 February and 22 February) for surgery the pain in his legs was getting worse, but he was still able to exit the hospital, using the lift, in order to have a cigarette or to visit his barber shop. He was able to travel home for a shower and shave and return to hospital the day before his surgery.
47. In his second witness statement Mr Shally responded to the fact that his medical records refer to issues concerning bladder control by the time of his admission to hospital; he said ‘I do not specifically remember that being a problem; the main thing I recall is being in severe pain in my back and legs. I did however have a weak bladder for many years prior to the operation in February 2018’, by which he says he means that he had to urinate frequently. In oral evidence Mr Shally was adamant that he had not experienced any “bladder problems” in the form of incontinence prior to his operation.
48. I deal with his evidence in respect of the consent process at [93]-[98] below. Mr Shally’s evidence was that after the operation he felt numb from the stomach down and had no bladder or bowel function. He says that he believes that it was not until 2 March that he saw Mr Tsang. Mr Shally says that Mr Tsang told him that he had ‘hit a nerve during surgery but that I would fully recover’. The allegation that Mr Tsang told Mr Shally that he had ‘hit a nerve’ is not consistent with the clinical record of the review on that date and the expert evidence does not suggest that any nerve was “hit” in this case; I do not consider that Mr Shally’s recollection is accurate on this point.
49. He says that he was subsequently seen by a second group of doctors led, he believes, by Mr Kareem. His evidence was that Mr Kareem was very honest and told him that the first operation had not been successful, that he had ‘lost a lot of blood and so the surgical team panicked and that my spinal cord had been damaged’. The suggestion that Mr Kareem said that the surgical team ‘panicked’ is not supported by the clinical records and strikes me as a highly unlikely statement for Mr Kareem to have made; I do not consider that Mr Shally’s recollection is accurate on this point.
50. Following the second operation Mr Shally says that he could move two toes on his left foot and move his left leg but cannot move his right leg. He was later transferred to the National Spinal Injuries Centre at Stoke Mandeville Hospital where he was able to stand holding a zimmer frame for an hour each day. In his statement of November 2021 he said

that he has gone backwards since leaving the hospital and can now only stand for 5- 10 minutes and struggles to walk using the frame. He describes how the injuries have, in his words, destroyed his life and affected his marriage and sex life.

51. In his witness statement, Mr Shally stated that he was told by a clinician at the National Spinal Injuries Centre that the first operation should never have taken place and that the problem could have been fixed with rehabilitation rather than surgery. This strikes me as a surprising and unlikely statement for any competent clinician to have made in this case; however, it is not a point which I need to determine. It was certainly not a view shared by either of the consultant neurosurgeon experts in this case.

Factual evidence of Mr Tsang

52. Mr Tsang completed his higher surgical training (registrar training) in Plymouth (2008-2012) and Bristol (2012-2014) and qualified as a Consultant Neurosurgeon in November 2014, so three years and three months prior to operating on Mr Shally. He has worked as a consultant at Imperial College Healthcare NHS Trust since 2014, working at Charing Cross Hospital and St Mary's Hospital. He explained that he deals with all kinds of trauma related to the head, face and any part of the spine in his acute practice whilst his elective practice is concerned with complex spine conditions and CSF disorder conditions such as hydrocephalus and chiari malformations.
53. Mr Tsang gave evidence clearly and took pains to be precise with his answers. I have no doubt that he is an attentive clinician and surgeon who seeks to do his very best to assist his patients.
54. He was also careful in his oral evidence to try to distinguish between his experience prior to the 2018 operation and the experience which he has gained since that time. Since the operation he has been appointed Head of Specialty for Major Trauma (November 2021) and Unit Training Lead for Neurosurgery for the Trust.
55. By way of a second witness statement Mr Tsang produced a copy of extracts of his logbook setting out relevant surgeries in which he had been involved prior to February 2018. He explained that thoracic spine pathologies are relatively uncommon compared to lumbar spine and cervical spine pathologies. By February 2018 he had recorded 26 posterior thoracic operations in his logbook, including 7 costotransversectomy approaches. Of the 26 cases 16 had been performed by Mr Tsang, including 8 disc

herniation cases; the others were cases in which he was not the operating surgeon, including three which he had supervised. He had undertaken one anterior (transthoracic) approach at the time of operating on Mr Shally. His evidence was that prior to operating on Mr Shally he had been involved in surgery concerning at least one (possibly two, but no more than three) large/giant thoracic prolapsed discs.

56. He also stated that by February 2018 he had conducted 24 intradural operations, although these were in respect of tumours. He therefore considered that he was experienced in working within the dura and in close proximity to the spinal cord.
57. He emphasised that part of his reason for choosing a costotransversectomy approach in respect of the Claimant's prolapsed disc rather than a thoracotomy was that he had only been involved in one transthoracic approach and that surgeons will naturally take into account their own skill set and experience in deciding what approach is most appropriate for them. I consider Mr Tsang's evidence in respect of pre-operative consultation with colleagues at [81] – [91] below.
58. As to the operation itself Mr Tsang's evidence was that intraoperatively it became apparent that even with a costotransversectomy it would not be possible to get to the central parts of the disc as the calcified disc prolapse was densely adherent to the dura. The adherence of the disc to the dura meant that the dura obstructed his view of the disc. He did not consider that removing the rib head would improve the position.
59. He therefore decided not to remove the rib head and so did not complete the costotransversectomy approach. Instead, he elected to take an intradural approach which, he considered, would allow him access to the majority of the disc. I deal with his evidence in respect of this decision in more detail at [100] to [104] below.
60. His evidence was that he made a vertical incision in the dura then a horizontal incision to create a T-shape to allow him to open up two leaves and create a window giving a good view round the right-hand side of the spinal cord.
61. Having removed the major part of the disc he noted the small sharp fragment to the left digging into the spinal cord. He mobilised the cord to the right and removed part of that fragment. Mr Tsang accepted that there was a temporal correlation between this activity on the left side and the drop in MEPs but that he could not say whether this was a result

of the rotation of the spinal cord, or a result of removing of some part of the remnant of disc or because, by removing part of the remaining remnant, he had created a smaller sharper fragment of disc that was digging into the spinal cord.

62. Mr Tsang's position was that the same difficulties would have been encountered had he completed the costotransversectomy by removing the rib head. He claims that he followed a well-recognised technique and emphasises that spinal cord function deterioration is a recognised complication of the surgery. He says that this is also why the matter was not reported for internal investigation until the letter of claim was received.

E. Expert evidence

(1) Expert evidence from the consultant radiologists

63. I had expert reports from Dr Terry Bloomberg, Consultant Radiologist, and Dr David John Wilson, Consultant Interventional Spine Radiologist, instructed by the Claimant and Defendant respectively. There was considerable degree of agreement between the consultant radiologists, including as to the nature of the prolapsed disc, both of which were also largely consistent with the reports of the Specialist Registrar and Consultant Neuro Radiologist of 18 February 2018. The expert radiologists were therefore not called to give evidence.

(2) Expert evidence from the consultant neurosurgeons

64. I heard from Mr John Leach, Consultant Neurosurgeon, called by the Claimant and from Mr Richard J Mannion, Consultant Neurosurgeon, called by the Defendant. I also had the benefit of their detailed expert reports and joint statement. Both experts are extremely experienced clinicians. Both been in consultant practice in the NHS for approximately 12-13 years. It is evident that they each have very firm and genuinely held professional opinions on the issues arising in this case. I was impressed by both experts. I have no doubt that they were both trying to assist the court. I summarise their evidence in relation to the key issues as part of my analysis in the next section.

F Analysis and findings

Mr Shally's pre-operative condition

65. The hospital medical records contain a number of histories and descriptions of Mr Shally's condition by different clinicians (summarised at [21] to [27] above) which are largely consistent with each other. The clinical records are also largely consistent with Mr Shally's own evidence.
66. Prior to the operation, Mr Shally had experienced long standing back pain for several years, with pain in his right groin and leg developing in the summer of 2017 which made walking difficult. Matters became markedly worse in January 2018 such that he began to experience more severe back pain and numbness in his legs.
67. By the time he attended A&E on 17 February the pain had become "unbearable" on Mr Shally's own account. By this stage he was having to lift his right leg and sensation was globally reduced on the right side; he had severe weakness in the right leg and numbness. He was, however, able to self-mobilise for the purposes of exiting the hospital to smoke. He was continent of bowels.
68. Mr Shally did not accept in oral evidence that he was suffering from any urinary incontinence prior to the operation. In general terms, I accept that it is correct that he was not incontinent of bladder, but it is clear from the medical records, in my view, that there were some issues in relation to urge incontinence and occasional leakage. As Mr Mannion noted this may have been related, in part, to difficulty in accessing a toilet because of his reduced mobility and/or due to the pain he was experiencing.
69. The notes of the clinical examination of 17 February 2018 record pathologically brisk reflexes and clonus (muscle spasm), with extensor plantar reflex. I accept Mr Mannion's evidence that these are indicative of myelopathy and evidence the fact that Mr Shally was suffering from severe cord compression and injury to the spinal cord caused by the disc protrusion.
70. The above summary is consistent with the pre-operative imaging. The spinal cord was distorted and there were signal changes on STIR imaging at the level of the disc protrusion consistent with spinal cord damage.

Nature of the prolapsed disc

71. Having regard to the contemporaneous radiological reports ([25] and [26] above) and the evidence of Dr Bloomberg and Dr Wilson it is apparent that Mr Shally was suffering

from a giant prolapsed thoracic disc at T10/T11 which occupied more than 50% of the cross-sectional area of the spinal canal. It was largely calcified, but part of the disc on the right-hand side was not calcified, indicating a more acute component. It was both central and eccentric to the right and can also be described as right paracentral. No piercing of the dura was identified from the imaging. I accept that, from a risk standpoint, it was appropriate to assume that the largely calcified disc was likely to be adherent to the dura and that there was a risk of further cord damage should manipulation of the spinal cord be used to free it from the disc.

The need for surgical intervention

72. The expert neurosurgeons agreed, and I accept, that conservative management was not an appropriate option for the Claimant given the clear evidence of progressive neurological deterioration secondary to spinal cord compression. Surgical decompression by way of discectomy was the only reasonable treatment option to try to prevent future neurological deterioration. Insofar as Mr Shally believes that he was subsequently informed that his condition could have been managed without surgery (see [51] above), that suggestion was not supported by the expert neurosurgeons in this case.

The risks with any approach to a prolapsed disc of this nature

73. The neurosurgical experts were very largely in agreement as to the risks posed by prolapsed thoracic discs of this nature. I have summarised the key aspects of their evidence in this regard in paragraphs [74] to [77] below and I accept that evidence.
74. Both experts agreed that there is a risk of paraplegia with any surgical approach to a giant central partly calcified thoracic disc prolapse. They put the risk of paraplegia as 5-10%. Mr Leach correctly and fairly emphasised that this was an ‘extremely high’ risk. He explained that such a risk was ten-fold times higher compared to equivalent pathology in other areas of the spine; by way of comparison, the equivalent risks for cervical (rather than thoracic) cord decompression surgery were 0.1% to 0.5%. He also noted that paraplegia from intradural tumour surgery is also rare, the risk being much less than 1%.
75. Mr Leach’s evidence was that the risks of paraplegia were known to be higher in cases where manipulation/retraction of a compressed spinal cord is undertaken and that avoidance of spinal cord manipulation/retraction is the cornerstone of safe thoracic

discectomy surgery. Mr Mannion agreed with this, but emphasised that, in his opinion, some degree of cord mobilisation may be necessary in all approaches.

76. The experts also agreed that an antero-lateral or transthoracic approach may be associated with complications such as chest wall pain, pulmonary complications and low pressure intra-thoracic CSF leak. In general, the approaches affording better access to the anterior dura have a higher approach-related morbidity and are more technically challenging than other approaches, partly due to unfamiliarity.
77. Mr Leach explained that a thoracic disc compressing the spinal cord represents a challenge for any spinal surgeon. The experts also agreed that large central thoracic discs with severe cord compression are not commonly encountered. NHS England and the Get it Right First Time (GIRFT) program have identified these operations as one of the Low Volume High Complexity (LVHC) procedures in spinal surgery that may, in the future, be restricted to certain centres. Both experts have been in consultant practice approximately 12-13 years and have performed approximately 10 such operations, so slightly less than one per year. A large regional unit would probably only encounter approximately 2 per year.

Decision as to a costotransversectomy approach

78. Mr Leach and Mr Mannion were agreed, and it was accepted on behalf of the Claimant (correctly in my view), that a costotransversectomy approach was a reasonable approach for Mr Tsang to have elected to take in respect of this disc.
79. In the joint statement Mr Leach stated that his personal preference would have been to approach this disc by a costotransversectomy. A transthoracic approach would also have been a reasonable approach, but he considered that it is associated with higher approach-related morbidity and, in his experience, is less familiar than a costotransversectomy. Mr Tsang himself was certainly more familiar with a costotransversectomy approach (see [57] above).
80. A costotransversectomy approach would also have been Mr Mannion's preferred approach. He says that this would have involved a laminectomy and removal of facet and pedicle from the right-hand side (as performed by Mr Tsang) and then a decision taken

intraoperatively as to whether removal of the rib head (costotransversectomy) was required.

81. There was no pleaded allegation that Mr Tsang failed to consult with other surgeons prior to carrying out the operation, but it was raised as an issue during the course of the trial. Given the relative rarity of this type of giant calcified thoracic disc, the relatively high risks associated with any surgical approach to a disc of this nature, and the fact that there was no undue time pressure to operate, I am satisfied that the intended surgical approach should have been the subject of discussion in either an MDT, if available, or at least with another consultant neurosurgeon and that a failure to consult in this way would have constituted a breach of duty.
82. Mr Tsang explained that there was no formal MDT process in place at the time. This is also consistent with the information contained in the internal reviews (at [86] below). I accept that this option was therefore not available to Mr Tsang.
83. Mr Tsang's evidence on the issue of pre-operative consultation with another surgeon was not consistent. In his witness statement Mr Tsang says that 'I believe I discussed this case with my senior colleague Mr Christian Ulbricht informally in our office to confirm a thoracotomy would not be required.'
84. In contrast, during cross-examination Mr Tsang accepted that he did not have any specific recollection of discussing the case; nor, therefore, could he say that he spoke to a particular surgeon. He explained that in 2018 there were three full time and one part time spine surgeons in the unit, that they shared an office, and that they would all routinely discuss cases informally.
85. He stated that he 'would be extremely surprised if I took on a case like this without speaking to another spine surgeon, purely because this is not something we see commonly, and I do not think any of the spine surgeons at that time can claim they have done so many of these that they are bread and butter. So I would be very surprised if I did not show this scan to someone else and said "What would you do in this case?"...'. He also said, in re-examination, that 'it would be very, very likely' that he discussed the case with a colleague.

86. I note that the Serious Incident Investigation record, which involved Mr Ulbricht as Lead Investigator, stated that ‘There was not a specific spine MDT in early 2018, however, most complex cases were discussed in the office between several consultants. These were not officially documented, as they were not part of an MDT meeting. It would be unusual if the possible need for a costotransversectomy or thoracotomy was not discussed in this instance, but there is no evidence to prove either way that this conversation occurred.’ The issues which arise in this case illustrate the importance of a formal MDT process with a record of discussions for complex cases.
87. I also note that Mr Ulbricht was recorded as asserting, in the Serious Incident Panel record of 22 February 2021 (see [41] above) that Mr Tsang did not ask anyone else for their opinion. Insofar as that appears to read as some form of finding, it is not clear on what basis any such finding may have been made. It seems clear that Mr Tsang asserted throughout the internal review process that he would have consulted others.
88. During cross-examination Mr Tsang was quick to accept the criticisms made as to the absence of an MDT and/or of any formal recording system of clinical discussions. He also readily accepted that it would have been negligent not to discuss his proposed approach with another neurosurgeon.
89. The impression I formed of Mr Tsang as he gave evidence was that he was a cautious clinician. I note that he used MEP monitoring during surgery and, whilst there may be pros and cons of such monitoring, the fact that he elected to use MEP monitoring suggests to my mind that he took appropriate steps to try to mitigate risks where possible.
90. Ultimately, this is an issue on which there is no documentary evidence and in respect of which Mr Tsang has no direct recollection. I am of the view that Mr Tsang’s oral evidence on this point was candid and honest and I accept his evidence that his normal practice, and that of the other surgeons in the unit, was to discuss complex cases in the shared office. This was, undoubtedly, a complex case. Further, this type of giant thoracic prolapsed disc was a relatively rare condition; it was not, as he put it, a “bread and butter” procedure for him, or indeed, for other surgeons. In addition, it was a case which carried high risks of paraplegia.

91. In all the circumstances, I consider that it is inherently unlikely that in respect of this rare pathology, requiring complex surgery with a high risk of paraplegia, Mr Tsang would not have followed his usual practice of consulting other colleagues prior to embarking upon the operation. Having had the benefit of hearing Mr Tsang give evidence, in my judgment it is more likely than not that Mr Tsang would have discussed his intended approach in this case with at least one of the other neurosurgeons with whom he shared the office.
92. If I am wrong in respect of this finding, and if Mr Tsang failed to discuss his intended approach, then, in my view, that would have been negligent. For the sake of completeness, I deal with this possibility at [186] below in the section on causation.

Consent

93. There was no pleaded allegation in respect of any failure to obtain appropriate consent for the operation from Mr Shally. The experts also agree that, in their opinion, Mr Shally was appropriately consented for a costotransversectomy. Nevertheless, I shall deal with the matter of consent given that Mr Shally suggested during his oral evidence that he did not fully understand what he was being told during the pre-operative consultation on 18 February 2018 and that he was not offered an interpreter.
94. I accept that Mr Shally's command of English would probably not have extended to neurological terms in 2018. However, when giving evidence he struck me as an individual who possessed the self-confidence and awareness to ask questions if he failed to understand a risk being explained to him. Indeed, Mr Shally's evidence was that Mr Tsang made clear that he could ask questions during the pre-operative consultation.
95. The record of the consultation on 18 February 2018 refers to a 'long discussion re risks and benefits of the operation' (see [27] above), but does not summarise what was said. Mr Tsang accepted, during cross-examination, that this record was 'very inadequate'. The consent form itself, however, does provide more detail, as set out at [27] above, and was signed by Mr Shally.
96. Not surprisingly, Mr Tsang has no recollection of the actual conversation, but says he would have explained that the operation is aimed at decompressing the spinal cord to prevent future deterioration and he would have explained the surgical risks, including

nerve or spinal cord injury and the worst-case consequences of this, including paralysis, numbness, loss of bladder, bowel and sexual function.

97. In his witness statement Mr Shally said that he was told that there was a 5% chance of 'nerve damage', but that he did not understand what that meant; he also says he thought that was a very low risk. In cross-examination he accepted that he was told that there was a 5% risk of nerve damage or spinal cord injury. In his witness statement he said that there was no mention of paralysis. In cross-examination he accepted (three times) that Mr Tsang 'could have' told him of the risk of paralysis from the waist down. He denied, however, that he was told that there could be any loss of sexual function. He accepted that, after signing the consent form on 18 February, he was taken through the consent form again by Mr Tsang before the operation on 22 February.
98. In summary, Mr Shally accepted being told of a 5% risk of 'nerve damage'. He did not deny having been told about the risk of damage to the spinal cord and accepted that he 'could have' been told about the risk of paralysis. Whilst he did not accept that he was specifically informed about the risk of a loss of sexual function, that risk is recorded on the consent form which he signed. From the evidence before me, I am satisfied on the balance of probabilities that Mr Shally was informed of the risks set out on the consent form and understood those risks and that he also understood that there was a 5% risk of serious spinal cord injury which could entail paralysis.

Intraoperative change of surgical approach

99. The issue of the intraoperative change of surgical approach is relevant to both of the first two pleaded particulars of negligence, set out at [13] above.
100. ***Mr Tsang's evidence on the change of approach:*** Mr Tsang described the difficulty he faced in his operation note as follows: 'it was not possible to strip the dura off the disc due to significant adherence. Considerations were given to rib removal but even though this would provide a more oblique angle, it would still not be possible to remove the disc without injuring the dura due to its adherence.' He therefore decided not to proceed with the full costotransversectomy and not to remove the rib head. Instead, he elected to proceed with a transdural approach.

101. Mr Tsang's evidence was that if the disc had been truly central then it would have been inappropriate to undertake a transdural approach, but that in this case the disc started centrally but then veered to the right, leaving the spinal cord all on the left-hand side, giving a window for an approach from the right. In his words, anatomically this was a central calcified disc, but from a surgeon's perspective it provided a surgical approach from the right.
102. The effect of his evidence was that he considered that a transdural approach would be preferable because, by opening the dura, he could then see the spinal cord and how much space he had, reducing the risk of impinging on the spinal cord whilst drilling out the calcified disc. He says that an ultrasound scan was performed to look at the site of cord compression to help with the decision. His position was that: 'This transdural approach allowed me to directly visualise the cord and provide safe access to the calcified disc prolapse'; it also provided a few more millimetres of room in which to operate.
103. In cross-examination Mr Tsang was asked whether he was aware of the debate concerning transdural approaches. He confirmed that prior to the operation he had not carried out a specific literature search relating to thoracic discs and was not familiar with the papers referred to by the neurosurgeon experts in their reports. He stated that he knew about the transdural approach because during his training there were 'a couple of cases where we had to go through the dura, which at the time was not anything I had seen before, so I did some reading up on it at the time'. On further questioning Mr Tsang explained that he had been involved in a transdural approach to a calcified thoracic disc whilst a trainee in Plymouth in around 2012, the operating surgeon being a Mr Nicholas Haden. Mr Woolf KC quite reasonably queried why this evidence was only mentioned for the first time during cross-examination given that the Claimant's case was that transdural approaches to thoracic discs were a novel approach. Mr Tsang's response was that he answered the specific questions he was asked by the lawyers when preparing his witness statement.
104. Mr Woolf KC urged me to reject Mr Tsang's evidence on this point as wishful thinking and rightly pointed out that Mr Tsang's second statement had dealt with his log-book and had not identified this transdural approach to a thoracic disc. It is certainly unfortunate that Mr Tsang's evidence that his training had included a transdural approach to a thoracic disc had not been contained in either of his two witness statements. Nevertheless,

I formed the clear view that Mr Tsang was giving truthful evidence when he explained that he had seen a transdural approach to a thoracic disc (albeit not as large as in Mr Shally's case) as part of his training with Mr Haden and I accept the veracity of that evidence. I also note that Mr Tsang's evidence in this regard is consistent with Mr Mannion's evidence that he was also exposed to transdural approaches to thoracic discs in his own training (see [123] below).

105. **Relevant literature:** The experts considered the literature in respect of transpedicular approaches and also transpedicular/transdural approaches to thoracic discs. I summarise aspects of those papers below.
106. In Bilsky *et al* 2000 (Transpedicular approach for thoracic disc herniations, *Neurosurg Focus* 9(4); E3, 2000) the authors describe the successful removal of 20 consecutive discs with no neurological worsening between 1982 and 1992 using a transpedicular approach which did not involve removal of the facet joint. 10 of the discs were calcified. Mr Leach emphasised that the authors noted that an anterior or lateral approach might be better for central calcified discs as such approaches improve exposure of the anterior dura. The paper includes two cases in which a transdural approach was used to remove an intradural fragment. Mr Mannion relied on the paper as evidence of managing a consecutive series of patients with a transpedicular approach and, where necessary, opening the dura to improve access.
107. The paper by Moon *et al* 2010 (The transdural approach for thoracic disc herniations: a technical note. *Eur Spine J.* 2010 Jul; 19(7): 1206-11) describes three cases of *soft* (i.e. not calcified) para-central (not central) thoracic disc prolapses in which a transdural approach was used. The paper abstract refers to 'gentle retraction' being applied to the spinal cord, but Mr Leach suggested (and I agree) that that was probably a syntactical error as, in the body of the paper, it is clearly stated that 'with the sectioning of the dentate ligament and CSF drainage, the transdural approach allows for an adequate exposure without spinal cord retraction'.
108. A paper by Börm *et al* in 2011 (Surgical treatment of thoracic disc herniations via tailored posterior approaches. *Eur Spine J* (2011) 20:1684-1690) described results from 27 consecutive patients, including 6 calcified lesions, operated on between 1993 and 2001, using a variety of approaches tailored to the individual patient including 8

costotransversectomy approaches and 15 transfacet and/or transpedicular approaches. They had a rate of major complications of 7% with all approaches. Mr Mannion relied on this as evidencing the appropriateness of transfacet/transpedicular approaches in appropriate cases. It does not deal with transdural approaches.

109. Coppes *et al* 2012 (Posterior transdural discectomy: a new approach for the removal of a central thoracic disc herniation. *Eur Spine* (2012) 21:623-628) details thirteen posterolateral (rather than central) disc prolapse operations between 2004 and 2010, with a variety of types of thoracic discs. Mr Leach noted that the authors recorded that the procedures were performed ‘without touching an already compromised spinal cord: a “no touch” strategy is the key to this approach’. He relied heavily on the fact that the authors stated that: ‘there are, however, also patients for which in our opinion a trans-thoracic approach would probably be more suitable, i.e. patients with very large (>50% of the diameter of the spinal canal) central calcified disc herniations. In such cases, manipulation of the spinal cord would be unavoidable with a posterior approach, even with a bilateral approach...’ Mr Mannion relied on the paper as supporting a transfacet/transpedicular posterolateral approach with dural opening; he noted that the authors do not say that such an approach is unsuitable for a central disc with a lateral component, only that it was not suitable for a central disc.
110. Mr Leach also drew to my attention the published reviewer’s comment by S Mehdian (Reviewer’s comment *Eur Spine J* 2012 Apr; 21(4):629), spinal surgeon, on the Coppes *et al* paper in which he said: ‘having carefully reviewed the paper... I have serious concerns about the perilous nature of the operative technique advocated in this article.’ In particular, he noted “The paper lacks a large series to support the safe use of this technique by most spinal surgeons who have limited experience with intra-dural work especially in the thoracic region. Also I firmly believe that intra-dural exposure of the thoracic spinal cord is fraught with a high risk of neurological injury with significant implications to the patient on a long term and hence should not be done. There are several other issues with this technique such as the use of drill adjacent to the exposed cord (risking both mechanical and thermal damage)...’
111. Negwer *et al* 2022 (Posterior transdural resection of giant calcified thoracic disc herniation in a case series of 12 patients. *Neurosurgical Review* (2021) 44:2277-2282) was published after the operation on Mr Shally, but refers to cases undertaken between

2012 and 2020 involving posterior transdural resection of giant calcified thoracic discs. Thus, whilst it was published after Mr Shally's operation it is relevant, in my view, as evidence of the fact that surgeons at this unit in Germany were undertaking transdural approaches to giant calcified thoracic discs prior to the date of Mr Shally's operation. The abstract begins: 'Calcified thoracic disc herniations present a rare and challenging entity. Due to the close proximity to the spinal cord and relative narrowing of the spinal canal, the optimal approach remains a matter of debate. While the transthoracic approach is usually preferred, we adapted a new technique described in 2012 [ie. the Coppes *et al* paper]: the transdural posterior approach'.

112. The paper notes that patients with giant calcified thoracic disc herniations are at much higher risk for postoperative neurological deterioration (3% to 25% with permanent neurological worsening after transthoracic surgery) than is the case in respect of other types of thoracic disc herniations. The authors state 'Reviewing the literature on thoracic disc herniations, authors seem to agree that giant central disc herniation should be treated with a good visibility and a minimal amount of manipulation of the spinal cord.' It is noted that the transdural approach allows for more operative space and hence less manipulation of the spinal cord. The conclusion of the authors was that 'the transdural resection of giant calcified thoracic hard discs through a posterior approach provides an excellent decompression with sufficient visualisation of the spinal cord and a satisfying postoperative outcome.'
113. Mr Mannion noted that the paper included transdural resection of giant calcified thoracic discs for myelopathy (i.e., causing compression of the cord). His position was that this supported the procedure adopted by Mr Tsang in opening the dura as an extension of the posterolateral approach and supported his view that one of the advantages of opening the dura was that it provides more operative space and so, potentially, less manipulation of the spinal cord.
114. Mr Leach emphasised that the context here is very important. It is correct that the paper shows the successful removal of some very large central discs through a transdural posterior approach, but this paper related to the Bernhard Meyer unit in Munich, Germany's most eminent spinal surgeon with an international reputation. He described this as surgery by 'the chief of German spinal surgery at the top of his game publishing some quite extraordinary surgery'. In addition, for some of the patients concerned this

was, in his words, “salvage surgery” as they had already been damaged by unsuccessful surgery elsewhere.

115. ***The experts’ evidence on completing a costotransversectomy:*** There was a difference of view between the experts as to the benefits of completing a costotransversectomy approach by removing the rib head. Mr Leach’s evidence was that the costotransversectomy approach enables the surgeon to remove part of the vertebral body anterior to the calcified disc. This creates a cavity into which the calcified prolapsed disc can be manoeuvred, but Mr Leach’s evidence was that it also allows some access to the anterior dura which can assist the surgeon in removing a calcified disc which is adherent to the anterior dura. His evidence was that he considered that Mr Tsang should have completed the costotransversectomy, including the cavity in the vertebral body, and that this would have given him an appropriate line of approach to break up and remove the calcified disc even though it was adhered to the dura.
116. Mr Mannion’s evidence was that it was his practice to assess intraoperatively whether it would be advantageous to complete a costotransversectomy by removal of the rib head depending, in large part, on where he found the edge (the lateral aspect) of the dura and whether he had enough of an angle without removing the rib. If, having removed the pedicle and facet he needed to remove more bone laterally to provide a posterolateral corridor then he would proceed to a full costotransversectomy, but if the lateral edge of the dura was located such that removal of the facet and pedicle provided sufficient access then there would be nothing to be gained from removing the rib head. He said this in his report: ‘in my own practice, it is very rare that one needs to remove the rib head and transverse process during a posterolateral approach and this is well recognised in the spinal surgical literature (see Bilsky *et al*, 2000; Borm *et al*, 2011)’
117. Mr Mannion also explained that if he did perform a costotransversectomy then he could expect to gain access to about the midline (or perhaps slightly further) of the vertebral body in order to create a cavity, but he would not be able to remove vertebral body past about the midline. If required, the vertebral body either side of the disc prolapse can also be removed by a transpedicular approach, without completing a full costotransversectomy. Further, his view was that a costotransversectomy, being a posterolateral approach, does not provide meaningful access to the anterior dura for the purposes of finding a surgical plane in circumstances in which a calcified disc had

adhered to the dura; in his view, the only way to obtain meaningful access to the anterior dura for this purpose is via an anterolateral approach. He therefore disagreed with Mr Leach's position that it would, in practice, be possible to achieve meaningful anterior access to the dura in this case by the creation of a cavity in the vertebral body via a costotransversectomy. In any event, even if some improved access were obtained by a costotransversectomy, he did not consider that this would materially assist with the problem posed by the calcified disc being adherent to the dura.

118. ***Expert's views on a transpedicular/transdural approach:*** As to the decision to adopt a transdural approach, Mr Leach's position in his report was that such an approach was contraindicated because it involved a high rate of paraplegia (as a result of the need for spinal cord manipulation) and that adopting such an approach fell below the standard of care to be expected of a reasonable spinal surgeon.
119. During the course of cross-examination Mr Leach conceded, and expressly acknowledge that he was conceding, that a transdural approach to Mr Shally's disc was not "Bolam unreasonable". In other words, Mr Leach accepted that a transdural approach to Mr Shally's disc was in accordance with the practice accepted as proper by a responsible body of spinal surgeons. The primary focus of Mr Leach's criticisms during oral evidence was on the issue of spinal cord manipulation/mobilisation.
120. In re-examination, however, Mr Leach's position moved again somewhat. On reflection, he considered the literature did not provide support for clinical practice in the UK for transdural approaches to giant calcified discs taking up more than 50% of the canal. However, he recognised that the Negwer *et al* paper evidenced the fact that in Munich some surgery of this nature was going on at the relevant time, albeit that the Negwer paper itself was published after the operation on Mr Shally.
121. Mr Mannion's evidence was: 'Removing the bone from the rib head and even from the vertebral body fundamentally does not change what you need to do to this disc prolapse, which you have now found out is adherent to the dura, away from the cord. You have two options, really.' The first option, in his opinion, was to try to persevere in finding the surgical plane of dissection between the dura and the calcified disc. The second option was to 'open the dura, see where the cord is stuck to the dura, and dissect it that way...'.

The second option was the one chosen by Mr Tsang and, in Mr Manion's view, was a very well established practice.

122. In Mr Mannion's opinion, opening the dura has advantages. It assists the surgeon in finding the surgical plane, it enables one to visualise the spinal cord (and hence minimise the risks of causing inadvertent injury to it), it facilitates a more medial approach, gaining a few millimetres of additional access in relation to the spinal cord, and it enables the surgeon to clarify whether the disc had gone through the dura (and potentially even into the spinal cord). Those advantages mirror the reasons relied upon by Mr Tsang for adopting the transdural approach (see [102] above).
123. According to Mr Mannion, opening the dura to provide better access to the prolapse, as was done for the Claimant, is a well recognised procedure. His evidence, set out in the joint statement and repeated in oral evidence, was that he was exposed to this same transdural technique by Rodney Laing, a senior spinal neurosurgeon, during his own training in Cambridge (2003-2010) in respect of a 'case like this', namely a costotransversectomy approach where the disc has been adherent to the dura.
124. Mr Mannion described how he has himself adopted the same procedure during posterolateral thoracic discectomy surgery when it becomes clear during surgery that the disc is intradural (which cannot be determined from an MRI). It is correct to note that at times in his expert report Mr Mannion incorrectly suggests that Mr Shally's disc was, or might have been, intradural. However, his oral evidence was that whilst Mr Shally's disc was not an intradural disc, the adherence of the dura to the disc means that the pathology falls to be dealt with in a similar way to an intradural disc.
125. In summary, Mr Mannion's evidence was that the surgical approach which Mr Tsang adopted (transfacet/transpedicular/transdural) as a result of his intraoperative assessment of the adherence of the disc to the dura was well recognised, was an approach which he (Mr Mannion) had been exposed to in his own training, and was an appropriate approach to adopt in the circumstances.
126. Mr Mannion's position was that whilst the authors of Coppes *et al* and Negwer *et al* described the transdural approach as "new" as at 2012, the transdural approach was one which he had seen in his own training in the UK before 2012. As noted above, I also

accept Mr Tsang's evidence that he had seen a transdural approach in his own training long before the publication of this paper.

127. Mr Leach expressed the view in cross-examination that the fact that the right-sided intradural approach taken by Mr Tsang had resulted in a small sharp fragment of disc remaining *in situ* on the left was evidence that the transdural approach was not appropriate in this case.
128. Mr Mannion's response to this point was that a surgeon would not be able to say, before attempting to remove the prolapsed material, whether it would be possible to extract the entirety of the material from that approach. But even if it were not possible to remove the entirety, one has to balance the advantages of being able to remove the major part of the prolapsed disc against the risk of an alternative approach, which would probably require an anterolateral approach on another day. A thoracotomy with lung deflation would itself create risks, particularly for a chronic smoker. Mr Mannion explained that in many cases, removing in excess of two thirds of the disc protrusion is likely to provide sufficient decompression for a patient with myelopathy. Thus, in his opinion, even if it could have been ascertained at the outset that some small portion of disc might not be accessible via a right sided transpedicular/transdural approach, this would not be a sound basis for criticising the decision to proceed with such an approach.
129. **Analysis:** I accept Mr Tsang's evidence, which is consistent with his note of the operation completed on the day of the operation, that intraoperatively he found the dura to be firmly adhered to the calcified disc and that his professional judgment was that it would not be possible for him, via an extradural approach, to strip the dura off the disc due to that adherence.
130. I do not consider that it is appropriate to put weight on the fact that Mr Kareem was able to find a plane of dissection extradurally when he carried out the 're-do' operation. At that stage he was dealing with a very different position with a largely decompressed spinal cord and only a small remnant of adherent disc in circumstances in which the major part of disc had already been removed.
131. I accept the evidence of Mr Leach that a costotransversectomy may facilitate the creation of a cavity in the vertebral body and that this procedure may provide some access to the

anterior aspect of the dura. However, this has to be tempered, in my view, by the evidence of Mr Mannion that, in practice, he finds that completing a full costotransversectomy may provide little additional benefit in terms of access to the anterior dura. I am persuaded by Mr Mannion's evidence that it is appropriate and right for a surgeon to make an intraoperative decision as to whether completing the costotransversectomy is likely to provide real additional benefit over a transfacet/transpedicular approach.

132. In my judgment, the literature cited above, in particular Bilsky *et al* 2000, Coppes *et al* 2012 and Negwer *et al* 2021, taken together, provides support for the proposition that both the transfacet/transpedicular approach by itself (i.e. without proceeding to a full costotransversectomy) and in combination with a transdural approach are recognised approaches to calcified thoracic discs and are considered by a respectable body of neurosurgeons to be reasonable approaches to adopt in appropriate cases. The fact that some of these papers related to surgery in continental Europe does not, to my mind, alter that reality, not least as they were reported in journals with an international reach. Further, although the publication of the Negwer *et al* paper post-dates Mr Shally's operation it is still relevant, in my view, as evidence of the fact that such surgery was being conducted prior to 2018 (the cases reported ranging from 2012 to 2020).
133. In addition, I attach very considerable weight to the evidence that during the course of their training in Cambridge and Plymouth, respectively, both Mr Mannion and Mr Tsang had been involved in transdural approaches to calcified thoracic discs. I also accept Mr Mannion's evidence that he uses a transpedicular/transdural approach himself in certain thoracic disc cases and considers it to be part of the arsenal available to spinal surgeons in appropriate circumstances.
134. A transfacet/transpedicular/transdural approach to calcified thoracic discs may well not have been an approach which Mr Leach had encountered in his own practice or with which he is comfortable; but, as Mr Manion points out, and I accept, spinal surgery training is, in part, a form of apprenticeship and practices do vary between centres.
135. The combination of the evidence in respect of both training in practice and support in the literature should, in my judgment, be afforded real weight in relation to the *Bolam* test.

136. I also accept Mr Mannion's evidence, summarised at [122] above, and which is broadly consistent with the evidence of Mr Tsang (at [102] above) and with the literature cited above, as to the potential advantages provided by transpedicular and transdural approaches. Indeed, Negwer *et al* suggests that one of the advantages of the transdural approach is that it provides more operative space (a point made by Mr Tsang and Mr Mannion) and therefore may require less manipulation of the spinal cord than other approaches (see [122] above). A transpedicular/transdural approach may well pose some additional risks as well as some benefits, but in complex and challenging thoracic spinal surgery of this nature that is to be expected. Further, I have not seen any data from which I can properly conclude that such an approach to the relevant type of prolapsed discs is associated with a higher risk of paralysis than a costotransversectomy approach.
137. I take the point that the authors in Coppes *et al* observed that a transthoracic approach would probably be more suitable for very large central calcified discs. However, in the present case, both experts considered that a costotransversectomy approach (i.e. postereolateral) was appropriate and would personally have opted for this approach over a transthoracic approach. This was informed by the fact that Mr Shally's prolapsed disc, whilst being central, was also eccentric to the right and displaced the spinal cord posteriorly and to the left. For similar reasons, I am also satisfied that the nature and position of Mr Shally's giant prolapsed disc meant that it was reasonable and logical to conclude that a transpedicular/transdural approach from the right was appropriate in this particular case once it was identified that the calcified disc was firmly adhered to the dura.
138. I accept Mr Tsang's characterisation of the disc (at [101] above) as providing a surgical approach from the right and his evidence that the transdural approach allowed him to visualise the cord (and so avoid it) whilst also providing him with a few more millimetres of space in which to operate (at [102] above). In my view, such an approach was in accordance with the practice of an appropriate body of neurosurgeons.
139. I also recognise that Mr Leach and other neurosurgeons might well have reservations, or even serious concerns, about transdural approaches to giant calcified thoracic discs and I note, for example, that Mr S Mehdian considered it appropriate to express his concerns about the Coppes *et al* paper in clear terms (see [110] above). That, however, is not the test in law (see the summary of *Bolam* at [15] above).

140. I am satisfied on the evidence before me that a transpedicular/transdural approach to a disc of the relevant type is supported by a body of appropriate expert opinion which is logical and reasonable in circumstances in which such an approach may provide some potential benefits over alternative approaches in appropriate cases. In my judgment, therefore, the professional opinion of those who support transpedicular/transdural approach to such discs does withstand scrutiny (see the summary of *Bolitho* at [19] above).
141. Further, the transpedicular/transdural approach adopted by Mr Tsang remained a reasonable, logical and appropriate approach, in my judgment, notwithstanding that there might be a risk that a portion of disc towards the left might not be accessible via a right-sided transpedicular/transdural approach. I am persuaded by the evidence of Mr Mannion, summarised at [128] above, on this point: the removal of the major part of the calcified disc accessible from the right-sided approach might well provide the necessary decompression of the spinal cord even if the entirety of the disc could not be removed.
142. In all the circumstances, I conclude that Mr Tsang acted in accordance with a responsible, reasonable and respectable body of appropriate expert opinion in electing to proceed by way of a transpedicular/transdural approach to this giant calcified disc once he had found it to be firmly adhered to the dura.
143. Having regard to the totality of the evidence, I am satisfied that Mr Tsang did not act in breach of his duty of care by taking the decision, intraoperatively, to adopt a transpedicular/transdural approach to Mr Shally's disc instead of completing the costotransversectomy approach.
144. Finally, on the issue of the change of approach, it was suggested on behalf of the Claimant during the trial, but not pleaded, that Mr Tsang should have called for a second opinion intraoperatively from another surgeon before deciding to adopt the transpedicular/transdural approach.
145. Mr Tsang's position on intraoperative consultation was that he would have sought a second opinion had he encountered a complication or could not decide what was the best thing to do next. However, on this occasion he says that 'I was very clear that the right thing to do was open the dura to get better access to the osteophyte.... So I did not feel

at that point that I needed a second opinion because I had a plan in my mind already.’ He said: ‘we have made a plan, a very appropriate plan, on how to do this operation. We have gone in there. There was no complication. I have not cut a nerve I should not have cut. I have not punctured a lung.... All it was is that the view was not quite as good as I was expecting, but I had a way to deal with this, which was to open the dura to improve the view. In my mind, that was just part of the operation.’

146. Occasions will undoubtedly arise when it is appropriate and necessary to seek a second opinion intraoperatively and negligent not to do so. In my judgment, however, Mr Tsang did not fall below the requisite standard of care in failing to seek a second opinion on this occasion. I accept his evidence, summarised at [145] above, in relation to his reasons for not seeking a second opinion. He explained clearly that on finding that the disc was firmly adhered to the dura he decided to proceed with an approach he had seen during his training. He did not consider that he needed to seek a second opinion in such circumstances. It is correct that he had only once seen such an approach, but it is relevant, in my view, to take into account his wider experience of intradural/transdural surgery (summarised at [56] above, which evidence I accept) and that this therefore made him relatively comfortable in proceeding transdurally. His decision not to seek a second opinion was, in my view, consistent with the fact that his training had covered a transdural approach to thoracic discs, was logical and reasonable in the circumstances and was not negligent.

The manipulation of the spinal cord

147. The third allegation of negligence is that whilst adopting a transdural approach, the spinal cord was manipulated and/or retracted and/or mobilised notwithstanding that any such contact with the spinal cord is contraindicated in circumstances where there is a large calcified disc prolapse with severe spinal cord compression.
148. The issue of manipulation/retraction/mobilisation of the spinal cord was a major focus of the Claimant’s allegations. There were two stages of mobilisation of the spinal cord undertaken by Mr Tsang. The first was when the spinal cord was mobilised to the left to expose the majority of the prolapsed disc. The second stage was after the removal of the majority of the disc when the spinal cord was mobilised to the right to expose the small sharp remnant on the left.

149. **Retraction:** The case was opened by Mr Woolf KC on the basis that during the operation the spinal cord was retracted ‘using a surgical instrument to move the spinal cord’. It was made clear that “retraction” was used to mean something more than other forms of manipulation or mobilisation and, in particular, meant the use of an instrument to move the spinal cord out of the way.
150. The understanding on the Claimant’s side that a surgical instrument was used to retract the spinal cord appears to have been based on the operation note. The relevant part of the note for this initial mobilisation reads as follows: ‘The spinal cord can be seen already bruised at the site of the worst compression and thinned down. The arachnoid membrane was fenestrated and the dentate ligaments bilaterally were divided along with the right T10 nerve root intradurally to allow safer access to the disc. The spinal cord was protected using a nerve root retractor and mobilised gently to the left to expose 2/3 of the disc’.
151. In cross-examination Mr Tsang was adamant that he had not retracted the spinal cord. When this was put to him he replied: ‘No. You never retract on the spinal cord. That would be a terrible thing to do.’ As to the nerve root retractor he said that it was ‘just placed there to form a physical barrier so my drill does not touch the spinal cord -- it was not used as a retractor, it was used as a shield, if you like’. He further explained that in the operation note he said ‘the spinal cord was mobilised gently to the left. It does not say “and retracted to the left”. There is quite a big difference...’
152. **Mobilisation without retraction:** As to the principle of mobilisation/manipulation, I accept Mr Leach’s evidence that a ‘no touch’ approach is strongly advisable, as is also clear from the Coppes *et al* paper. A ‘no touch’ approach precludes retraction. But I note that in the ‘methods’ section of the Coppes *et al* paper the authors describe that they used a technique of mobilisation of the spinal cord by rotation via divided dentate ligaments so as to reveal a surgical approach. Thus, the ‘no touch’ approach described by the authors clearly did not preclude this form of mobilisation. This is consistent with Mr Mannion’s evidence. He said the following, which I accept as a fair summary of the position in practice:

I disagree that any surgical contact and manipulation of the spinal cord is contraindicated, as long as it is done carefully and cautiously; this is a requisite part of several different spinal surgeries, including thoracic disc surgery. IOM

[intraoperative spinal cord monitoring] helps to guide the surgeon as to any concerns around spinal cord function during surgery and, in most cases, surgery proceeds satisfactorily. It is therefore not the case that the spinal cord cannot be manipulated, provided careful technique is employed, to facilitate remove of pathology which threatens spinal cord function...’

153. Mr Tsang’s evidence was that there are various different surgical procedures which require mobilisation of the spinal cord, including when operating on tumours and when operating on an anterior cord herniation. He said this:

‘So there are quite a few other situations where you do have to manipulate a spinal cord and there is a standard way of manipulating the spinal cord, which is dividing the dentate ligament. These are ligaments on either side of the spinal cord in between your pairs of nerve roots and they basically suspend your spinal cord at every single level all the way down. When you divide your dentate ligament, you can either directly hold on to the dentate ligament and that allows you gentle rotatory movement of the spinal cord or you can put a stitch through one of the ligaments, as described in one of the papers. The other thing people do in the thoracic spine, you can actually divide the nerve root, so here potentially you could divide the T10 nerve root because ...you are quite safe to cut the nerve root and similarly hold on to the end of the nerve root and do gentle rotatory movement. That is how you mobilise and manipulate the spinal cord. So, this is what has actually happened, which is by doing very gentle rotatory movement essentially you are lifting the spinal cord, so you are not pulling it sideways, you are basically doing this kind of motion [demonstrating with his hands], so you are uncovering a little bit of the osteophyte under the spinal cord...’

154. Mr Woolf KC noted that the operation note does not record using the dentate ligaments as a means of mobilising the cord. Mr Tsang responded as follows:

‘That is a very standard thing to do and I do not always write everything down, just [like] I often write “a standard approach to the spine”, I do not talk about using a monopolar to cut the muscles and take it off the insertion point on the spinous process and lifting the periosteum off the muscle because that is the accepted way of doing something. So I do not go into a lot of details with very standardised things that have to be done.’

155. Mr Woolf also noted that whilst Mr Tsang described how he mobilised the spinal cord on the second occasion in his witness statement (‘we gently mobilised the spinal cord using very subtle rotatory movements via the dentate ligament...’), he did not describe how the initial mobilisation to the left was carried out. Mr Tsang’s response was as follows:

‘All mobilisation is done exactly the same way and I have never done it any other way. It is the only way I have been taught to do it. It is the only way I have seen people do it. It is the only way I have ever done it, which is to hold on to the dentate ligament and do gentle rotatory movement.’

156. The point was covered again when Mr Woolf KC put the Claimant’s case squarely to Mr Tsang as follows: ‘What we would say, the strong implication from how it was written in your operation note is that you in fact mobilised with the nerve root retractor?’ Mr Tsang’s response was: ‘Absolutely not, I would never retract on the spinal cord. That would actually be very, very negligent.’
157. ***Analysis in respect of the method of mobilisation:*** Having heard Mr Tsang’s emphatic evidence on this point, there is no doubt in my mind that Mr Tsang did not carry out a retraction of the spinal cord using any instrument. The operation note is consistent with his clear description of using the nerve root retractor solely for the purpose of providing a physical barrier to help protect the spinal cord.
158. Mr Tsang also compared the mobilisation of the spinal cord right and left with the standard procedure undertaken in the case of an anterior cord herniation where the spinal cord, he says, has to be rotated left and right. The effect of his evidence on this point was that mobilisation of the spinal cord *per se* could be carried out safely and did not cause him particular concern.
159. It was clear from Mr Mannion’s evidence that mobilisation of the spinal cord via gentle rotation using the dentate ligaments is an accepted standard practice. Mobilisation using the dentate ligaments (albeit with the aid of a stitch) was also part of the procedure described in the Coppes *et al* paper. I accept that this is a standard and accepted means by which neurosurgeons mobilise the spinal cord when necessary.
160. The operation note records the fact that the dentate ligaments were divided and that this occurred prior to mobilisation. The operation note then records that the spinal cord was ‘mobilised gently’. Whilst the operation note does not describe the means by which the spinal cord was mobilised, having had the benefit of hearing and seeing Mr Tsang give evidence and demonstrate the manner in which he described his standard procedure for mobilisation of the spinal cord, I am satisfied, on the balance of probabilities, that the spinal cord was mobilised during Mr Shally’s operation by gentle rotatory movements

via the dentate ligaments. I accept his evidence that this was his standard procedure, the only way he had been taught to mobilise the spinal cord and the only way he did it.

161. For the same reasons I find that the same standard procedure of using the dentate ligaments to effect gentle mobilisation was employed both when mobilising the cord to the left at the initial stage of the procedure and, subsequently, when mobilising the cord to the right to access the small sharp remnant on the left.
162. Mr Tsang frequently used the word ‘we’ when describing what was done during the operation and it is right to note that he was assisted by two trainee surgeons in this case. The various steps recorded in the operation note would have been undertaken by a combination of the three surgeons and so the mobilisation of the spinal cord described by Mr Tsang may well have been conducted by one of the two trainee neurosurgeons under his supervision. Mr Mannion explained that these types of operations cannot be conducted with two hands, they require multiple hands. He also emphasised that neurosurgical trainees are, themselves, experienced neurosurgeons who, halfway through their training, will have performed around one thousand operative cases and are being trained to complete these surgeries independently so that, on completion, they can undertake these operations as consultants themselves.
163. ***Whether mobilisation was appropriate and whether it was carried out with appropriate skill and care:*** The second issue which arises is whether, even if the mobilisation was carried out via the dentate ligaments, rather than via retraction with an instrument, Mr Tsang was nevertheless negligent to decide to mobilise the spinal cord at all and/or whether the spinal cord was mobilised excessively or otherwise negligently.
164. As noted at [152] above, the Coppes *et al* paper, advocates a ‘no touch’ approach but describes gentle mobilisation of the spinal cord via the dentate ligaments. My understanding of the procedure described in that paper is that some mobilisation of the spinal cord via the dentate ligament is an integral part of the transdural approach in order to provide the surgical corridor by which to approach the disc.
165. The procedure described in Coppes *et al* is, in my judgment, materially similar to that used by Mr Tsang, albeit that the authors of the paper record the use of a stitch to secure the dentate ligament. Mr Tsang’s evidence on the use of a stitch was that ‘when you cut

the dentate ligament, sometimes they can shrink and retract away and it makes it very difficult to grab on to with your forceps so some people prefer to put a stitch on it so it holds it nicely and then you can hold on to the stitch...'. Mr Tsang clearly described both methods, that is, by holding with forceps or by using a stitch.

166. My understanding was that Mr Tsang's standard procedure was to use forceps rather than a stitch, but the evidence did not descend into the detail as to whether Mr Tsang had ever used a stitch if he found the ligament difficult to hold, nor whether he may or may not have used a stitch on this occasion. Mr Mannion's evidence was that there are some advantages in mobilising using forceps to hold the dentate ligament as one can control the amount of traction and rotation, whereas a stitch provides a fixed amount of traction. Nothing, in my view, turns on the use of a stitch to hold the dentate ligament; from the evidence I have heard it appears that both methods are acceptable and, as is usual, there are pros and cons with both methods.
167. It was, understandably, contended on behalf of the Claimant that the fact that the MEPs dropped on the left after mobilisation of the spinal cord to the right was evidence of excessive or inappropriate mobilisation of the spinal cord by Mr Tsang.
168. The operation note, however, is clear that the MEPs dropped on the left after the spinal cord had been mobilised to the left *and* after part of the small sharp remnant of disc which was recorded to be 'digging into the spinal cord' had been removed using rongeurs. The operation has to be halted in order to enable the MEPs to be recorded; it is a "snapshot" at a particular point in time.
169. I accept that the fact the operation note is likely to be an accurate account of the chronology in this regard (i.e., that the MEPs dropped after the two procedures of mobilisation and the attempt to remove the fragment) given that it was written so shortly after the completion of the operation and signed by both Mr Tsang and one of the specialist trainees on the same day. Whilst such a drop in MEPs *could* have been caused by inappropriate manipulation, the mere fact of the drop in MEPs does not constitute evidence that there *was* inappropriate manipulation of the spinal cord. I consider possible causes further at [182] - [188] below in relation to causation.

170. Mr Mannion's evidence was that if the mobilisation of the spinal cord was carried out gently via the dentate ligament in the standard way, as I have found to be the case, then it is unlikely that such mobilisation would have caused permanent cord injury. He also considered that this view was supported by the fact that mobilisation of the spinal cord had been carried out for a much longer duration during the removal of the majority of the calcified disc from the right without any fall in MEPs, suggesting that the method used to effect mobilisation was not problematic. In my view these points have substance and force.
171. On the evidence before me, I do not consider that the Claimant has demonstrated that Mr Tsang was negligent in respect of his decision to mobilise the spinal cord via gentle rotation of the dentate ligaments. Such mobilisation was, in my judgment, an inherent part of the transdural approach, as described by the authors in Coppes *et al.* Nor, in my judgment has the Claimant demonstrated that the spinal cord was mobilised in an excessive or otherwise negligent manner. Subject to consideration of the further criticism discussed at [172] to [180] below in respect of the attempt to access the fragment on the left side, I am satisfied, on the evidence before me, that the spinal cord was mobilised in a manner recognised as a standard procedure, namely via the dentate ligaments, and in accordance with the requisite standard of skill and care.
172. *The attempt to access the left-sided fragment:* During the course of his cross-examination Mr Leach raised a new, unpleaded, criticism (or, possibly, criticisms) relating to the decision to access the remnant on the left side. He suggested that Mr Tsang's attempt to access the left side of the spinal cord to remove the sharp fragment of material was itself inappropriate because excessive manipulation of the spinal cord would have been unavoidable. He then also expressed the view that Mr Tsang must have excessively manipulated the cord to the right because otherwise there would not have been enough space to access the remnant of disc on the left with rongeurs. His opinion was that there would not have been enough space to get a rongeur 'into that crowded space with a couple of degrees of denticulate ligament rotation. I am sorry I do not believe that as a surgeon. There is not enough space to do that. I am not saying he used a nerve root retractor because there is no evidence he did, but however he mobilised that left side of the cord, that was an unsafe procedure.'

173. It is not uncommon for new points to crop up in cases of this nature during oral evidence from experts and I make no criticism of Mr Leach for raising a point which had occurred to him. However, in my view the allegation that the attempt to access the left side of the disc was inappropriate in itself (even if a transpedicular/transdural approach was not inappropriate in principle) was different in nature to the three pleaded particulars of negligence and was one which could have been advanced at any stage given that the operation note was clear that a bilateral approach had been taken.
174. Ms Jones, on behalf of Mr Tsang, objected to the fact that unpleaded matters were being raised at this late stage. Mr Mannion similarly pointed out that these were not issues which had been raised previously and were not addressed in the joint statement. It is right to record that, in my view, the fact that the new allegation(s) were raised so late did cause the Defendant some prejudice as outlined in [175] below. However, both Mr Mannion and Ms Jones dealt with the point(s) raised on their merits, albeit within the constraints which necessarily apply given the lateness with which the point was raised.
175. When asked about this allegation Mr Mannion, having explained that the allegation was not discussed in the joint expert meeting because it had not been pleaded, volunteered that having heard this criticism for the first time in oral evidence he had undertaken a literature search overnight and that there were a number of papers dealing with bilateral approaches. His position was that with notice of the issue and an opportunity to discuss it in the joint meeting, then scientific literature on the issue could have been considered properly. I accept that prejudice was caused to the Defendant in this way by the fact that the allegation was raised at such a late stage. In short, however, Mr Mannion's evidence was that once the fact of the sharp remnant was noted a decision had to be made as to what to do about it. His view was that operating on both sides of the spinal cord is 'well-recognised and widely practised' and that there was no problem in principle with taking a bilateral approach to a giant calcified disc. The issue of importance was whether the cord was mobilised appropriately to enable access to both sides of the cord to be achieved.
176. In addition, Mr Mannion's evidence was that once Mr Tsang had removed the major part of the calcified disc to the right and centre then the spinal cord would have been far less compressed and would naturally have tended to rotate back to its anatomical (central) position. Thus, whilst an approach on that left side which would not have been possible

at the outset of the operation, such a bilateral approach would, intraoperatively, have become an acceptable option in his opinion. Accordingly, he did not agree that there would not have been enough space on the left side of the cord to insert rongeurs without excessive mobilisation of the spinal cord. Further, he also made the point that by this stage Mr Tsang has some reassurance that the spinal cord could tolerate gentle mobilisation as it had already tolerated prolonged mobilisation without any noted drop in the MEPs.

177. I see the force of Mr Mannion's evidence on this issue and I am persuaded by his evidence that access to the left side would have been possible without excessive mobilisation of the spinal cord at this second stage of the surgery. Further, in my judgment the Claimant has not demonstrated that it is inherently problematic to operate on both sides of the spinal cord provided that the cord is mobilised with appropriate skill and care.
178. In the circumstances, I conclude that Mr Tsang was not negligent for attempting to mobilise the cord to the right given that (i) the small sharp remnant of disc digging into the spinal cord gave rise, intraoperatively, to new risks and a decision had to be taken as to how to deal with that (ii) by that stage, the cord had been very largely decompressed by removal of the major part of the calcified disc which opened up the possibility of gentle mobilisation to the right; (iii) the extended period of previous mobilisation of the cord to the left had apparently been tolerated insofar as it was possible for Mr Tsang to determine from the MEPs.
179. Finally, on this issue, it was submitted by Mr Woolf KC in closing submissions that in re-examination Mr Mannion had made an assumption that Mr Tsang had added an incision in the dura to the left before attempting to extract the sharp fragment in order to open up a window to the left to provide a better angle of approach, but that no such additional incision was recorded in the operating note or in Mr Tsang's evidence. The operation note did record that an incision was made to the right before approaching from the right but did not record any additional incision being made to the left before the attempt to extract the residual fragment. It was suggested by Mr Woolf KC in closing submissions that if Mr Tsang had not made such an additional incision then the angle of approach would have been too proximal to allow proper access to the left-side fragment.

180. Mr Woolf KC is correct that Mr Mannion made an assumption in this regard which had not been dealt with in evidence. I also note that Mr Mannion made this assumption in a slightly different context and not when dealing directly with Mr Leach's new point about access to the left-hand side. However, it seems to me that had the issue in respect of the left-side approach been pleaded as a particular of alleged negligence then the Defendant would have had an opportunity to cover the full details of this aspect of the operation in Mr Tsang's witness statement and, no doubt, it would have been covered in his oral evidence. As it was, the Defendant did not have that opportunity to clarify the position in relation to whether an additional incision was made to the left and, if not, why this was considered not to be necessary. In the circumstances, it would not be appropriate, in my view, to make any finding adverse to the Defendant on the issue of whether an additional incision was or was not made to facilitate access to the left.
181. *Conclusion on mobilisation of the spinal cord:* In conclusion on the issue of mobilisation, I am satisfied on the evidence before me that the spinal cord was mobilised using the dentate ligaments both when initially mobilising to the left and then when subsequently mobilising to the right and that it was mobilised gently and in accordance with standard practice at both stages. I find that neither the decision to mobilise the spinal cord (whether to the left or to the right), nor the manner in which the spinal cord was mobilised, fell below the applicable standard of care.

G. Causation

182. In light of my findings above, it is not strictly necessary to deal with issues of causation. I shall therefore summarise my analysis of causation briefly.

Intraoperative injury

183. I am satisfied, on the balance of probabilities, that the Claimant has suffered injury, including incomplete paraplegia, as a result of injury to his spinal cord sustained during the operation.

Possible causes of the intraoperative spinal cord injury

184. Mr Tsang's evidence was that he did not know what had caused the drop in MEPs or the spinal cord injury and that there were various possibilities. He noted that the drop in MEPs could have been caused by removing some part of the sharp remnant of disc on

the left or because, by removing part of the remaining remnant, he had created a smaller sharper fragment of disc that then dug into the spinal cord.

185. Mr Leach was of the view that inappropriate manipulation of the spinal cord caused the injury to the spinal cord.
186. Mr Mannion elaborated in oral evidence on a point he had made in the joint statement in respect of the likely cause of the intraoperative spinal damage. He explained that the spinal cord is supplied by very small and delicate blood vessels and that damage to these fine vessels can cause catastrophic injury. Assuming that the spinal cord was mobilised gently as described by Mr Tsang then Mr Mannion considered that this was unlikely to be the cause of the injury to the spinal cord. On this basis, his opinion was that the damage to the spinal cord could have been caused by either the sharp fragment of material digging into the spinal cord and/or by the removal of that sharp fragment.
187. I note that Dr Bloomberg placed some emphasis in his report on the new abnormal signal being opposite the 'bony spur', which I take to be the remnant left after Mr Tsang had removed the small sharp fragment which was digging into the spinal cord. Whilst he expressed the view that that was consistent with injury caused during manipulation of the cord, it seems to me that it is also consistent with the view expressed by both Mr Tsang and Mr Mannion that the injury may well have been caused by the sharp fragment digging into the cord or by removal of that fragment.
188. From the evidence before me it is clear that a giant calcified thoracic disc of this nature which is adherent to the dura will need to be broken up and removed in stages. This process may give rise to risks, including the risk of creating sharp edges to the remaining disc material which are capable of causing injury to a compressed and/or vulnerable spinal cord. The surgeon will naturally seek to make reasonable attempts to remove such sharp fragments and such attempts may, themselves, give rise to risks of injury. It seems to me that the risk that injury might result from factors such as the non-negligent creation of such sharp fragments of disc and/or reasonable attempts to remove such fragments are part of the risks which are inherent in a procedure which the experts agree carries an overall risk of paraplegia of 5-10%.

189. It is also possible that non-negligent gentle mobilisation of the spinal cord via the dentate ligament in accordance with standard procedure may also have played a role in the spinal cord damage, albeit that I accept Mr Mannion's evidence that this seems less likely. If I am wrong to conclude that the mobilisation was carried out appropriately then, of course, negligent mobilisation of the cord would not be excluded as another possible cause of the injury.
190. Assuming that I am correct to conclude that the mobilisation of the spinal cord was not negligently executed, my view is that the injury to the spinal cord was most likely caused either by the (non-negligent) sharp fragment of disc digging into the cord and/or by the (non-negligent) attempt to remove it. I do not consider that the available evidence permits a proper conclusion to be drawn as to which of these possibilities is the more likely.

Alleged failure to consult with colleagues

191. If I am wrong in respect of the finding at [91], and if Mr Tsang failed to discuss his intended approach pre-operatively then, in my view, this would have been negligent. However, I do not consider that any negligence in this regard could be said to have been causative. The evidence of Mr Leach and Mr Mannion was that a costotransversectomy approach was an appropriate approach to take. The fact that Mr Ulbricht or another surgeon might have taken a different approach does not change this reality. Mr Tsang had greater experience of undertaking costotransversectomy approaches than of undertaking thoracotomies and it is more likely than not, in my judgment, that that Mr Tsang would have proceeded with his proposed costotransversectomy approach even if, in discussion, Mr Ulbricht or another surgeon had suggested a transthoracic approach.
192. Similarly, I do not consider that any different outcome would have been likely had Mr Tsang sought a second opinion intraoperatively. This is not a case, in my view, in which it could properly be inferred that the recommendation should or would have been to adopt a different surgical approach. It is, of course, possible that Mr Ulbricht or another surgeon might have suggested proceeding by a different approach, but in circumstances in which Mr Tsang had experienced an intradural approach during his training, he may well have proceeded with that approach in any event and it would have been reasonable for him to have done so in my view for the reasons set out above at [140] to [141].

Post-operative condition in the absence of intra-operative injury

193. There was relatively little difference between the expert neurosurgeons in terms of the Claimant's likely condition had he not sustained spinal injury during the operation. Mr Leach's view was that postoperatively Mr Shally would probably have had the same neurological function as pre-operatively but that there may have been some modest improvement in motor and sensory function over the following 12-18 months. The most likely improvements would have been right lower limb weakness and bladder function as the onset of those symptoms had been more recent. Clinical features which had been present for longer would have been less likely to improve, including lower limb numbness. He would have needed a walking stick on uneven ground or for longer distances but would have managed stairs and would not have needed single-level accommodation.
194. Mr Mannion considered that some improvement was possible, but that the eventual neurological outcome was likely to have been similar to Mr Shally's pre-operative status; he would probably have remained ambulant, largely continent but with leg weakness and numbness. Mr Shally had severe weakness in the right leg before surgery and weakness in the right leg would have been expected to continue; he would probably have walked with a stick, but would have struggled to manage stairs and would have been better suited to living in single level accommodation. His reasons were that pre-operatively Mr Shally had suffered very severe compression of the spinal cord resulting in damage to the spinal cord, evidenced by a high signal in the region of the compression consistent with myelopathy. On examination pre-operatively he had clonus, brisk reflexes, extensive plantars which are clinical signs that one would expect to see in patients with established myelopathy and the effects would have been likely to continue after successful surgery.
195. On the evidence before me, I am satisfied that in the absence of the additional spinal injury caused intraoperatively, Mr Shally's condition would have been largely similar to his pre-operative condition with only very modest improvement. He would have had no bowel impairment and any residual bladder dysfunction would have been mild. He would have avoided severe neuropathic pain. He would have continued to have significant right leg weakness and lower limb numbness, would have needed a stick to walk for any period and/or on uneven terrain and would have struggled with stairs, but would probably not have needed single-level accommodation albeit that this would probably have been more suitable for him.

196. Finally, the new and unusual postoperative signal change at T11-T12 was not something that either expert could readily explain. Mr Woolf KC confirmed that no claim in respect of that signal change was pursued.

H. Conclusion

197. For the reasons set out above, in my judgment given the degree of adherence of the disc to the dura which Mr Tsang identified and the difficulties he encountered in finding a surgical plane of dissection extradurally, Mr Tsang acted in accordance with a practice acceptable to a responsible, competent and respectable body of skilled spinal surgeons when taking the intraoperative decision not to complete a full costotransversectomy and to proceed by way of a transpedicular and transdural approach in respect of Mr Shally's giant calcified disc. Accordingly, I find that Mr Tsang did not act negligently in respect of either of the first two pleaded particulars of negligence.

198. I am satisfied, on the evidence before me, that during Mr Shally's operation the spinal cord was not retracted with any instrument. In my view, the spinal cord was mobilised gently and with appropriate skill and care during the course of the operation, via the dentate ligaments, both when initially mobilised to the right and, subsequently, when mobilised to the left. Such mobilisation was in accordance with the standard practice of a responsible, competent and respectable body of spinal surgeons and was not negligent.

199. For the reasons set out above, in my judgment the Defendant, via its servants and agents, did not breach the duty of care which it owed to Mr Shally in respect of any of the three pleaded particulars of breach. Nor, in my judgment, did any of the other, unpleaded, criticisms advanced during the course of trial amount to negligence on the part of the Defendant, its servants or agents. Accordingly, the Claimant's claim in negligence against the Defendant fails.

200. I am well aware that Mr Shally will be extremely disappointed with the outcome of this litigation. I do, however, wish to acknowledge the forbearance, fortitude and dignity which he showed during the course of this trial and, more generally, to express my considerable admiration for the way in which Mr Shally has dealt with the enormous challenges posed by the life-changing consequences of this operation.

201. I am very grateful to both Mr Leach and Mr Mannion for the care and attention to detail which they both took in relation to their evidence. I am also very grateful to counsel for their helpful oral and written submissions.