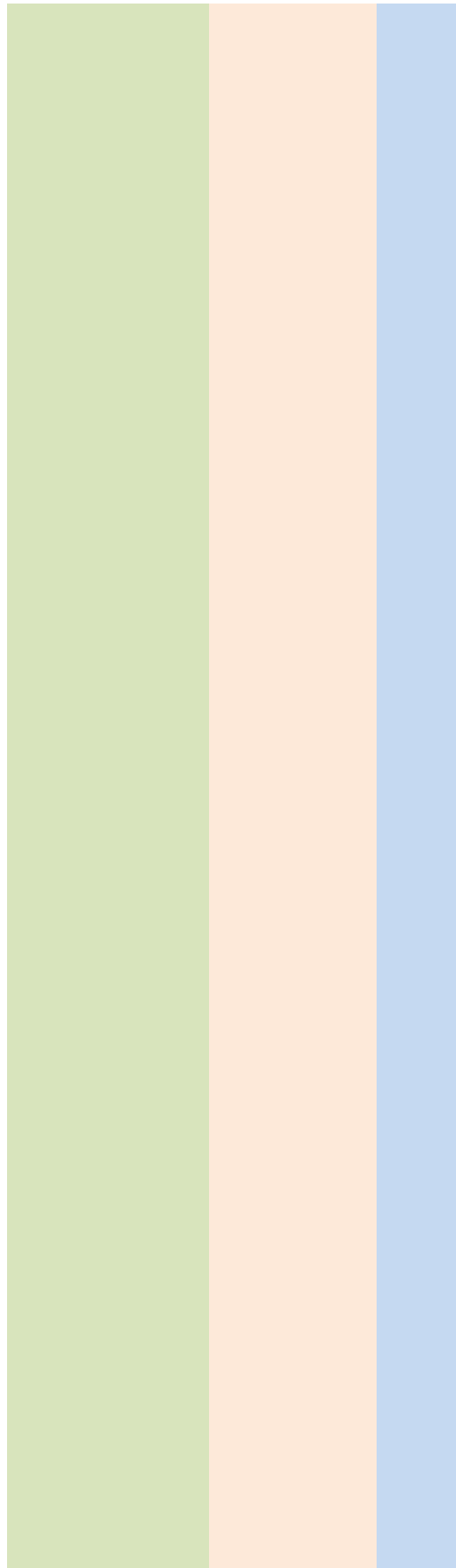












Totals

Posterior Anterior

Retraction and exposure

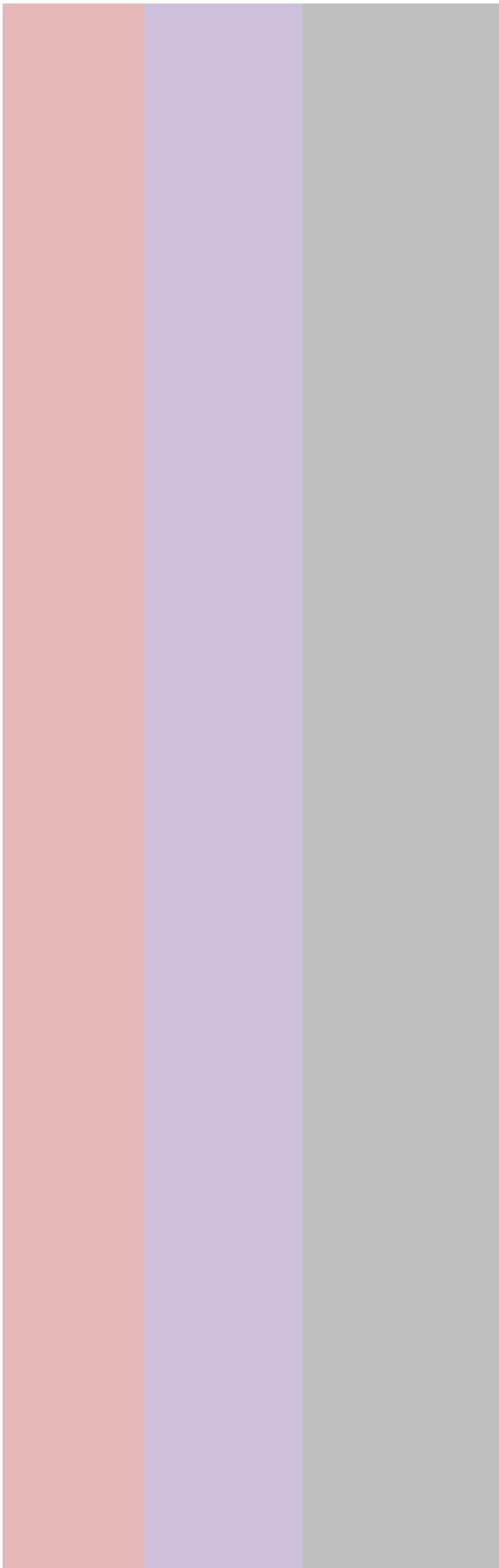
Task performance

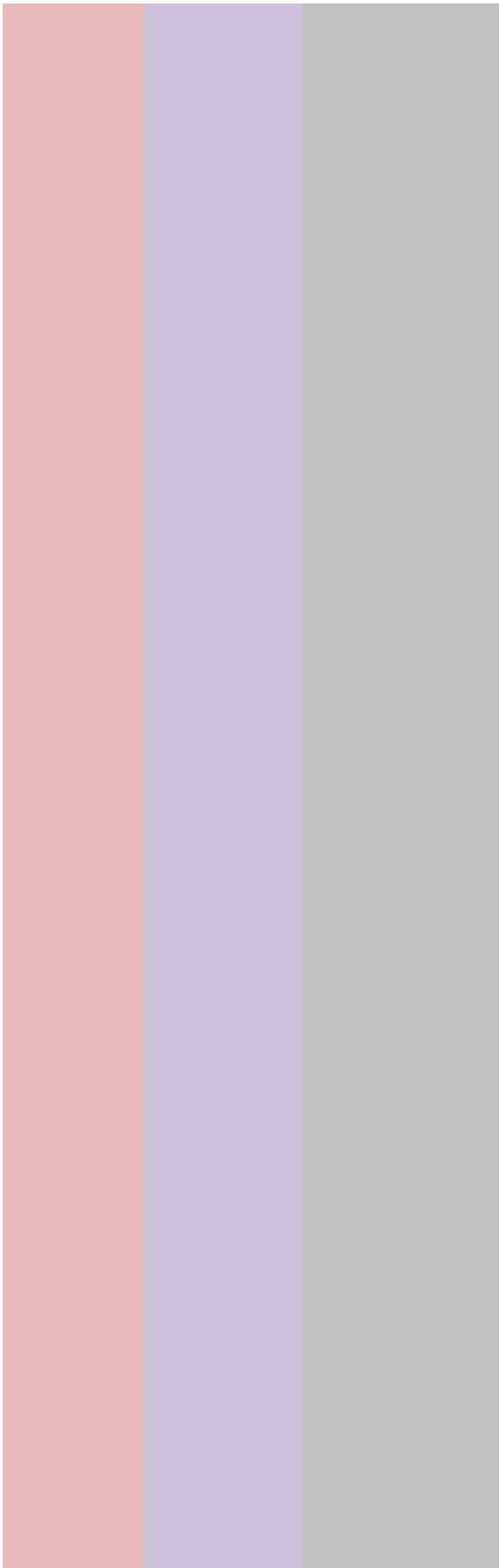
Errors

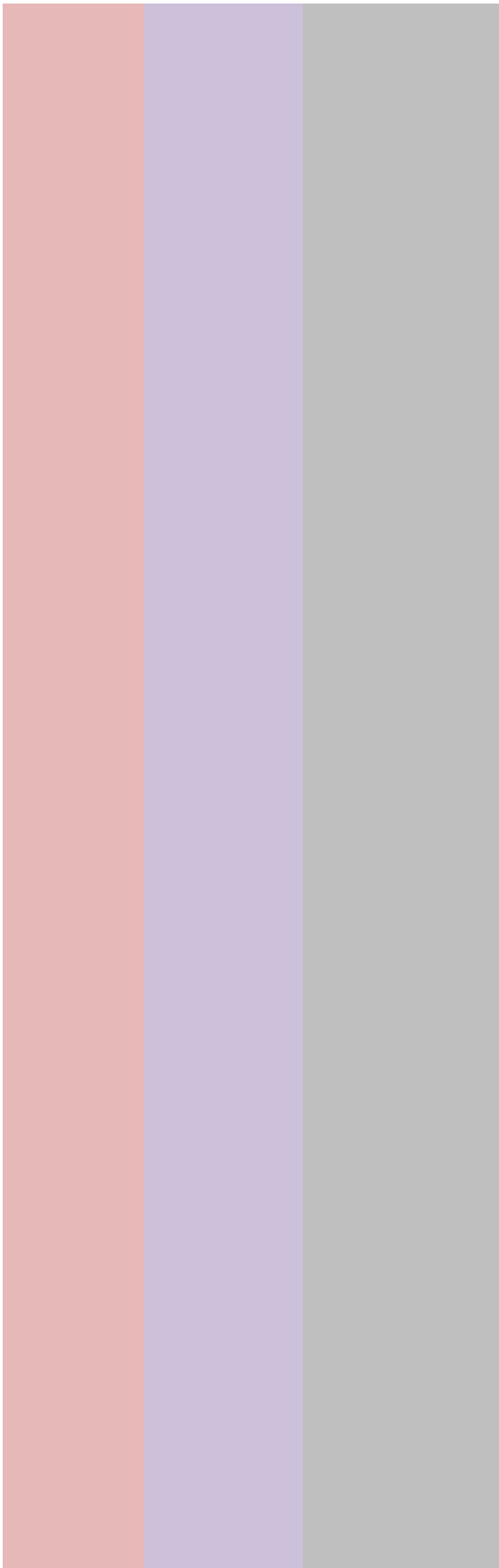
End product

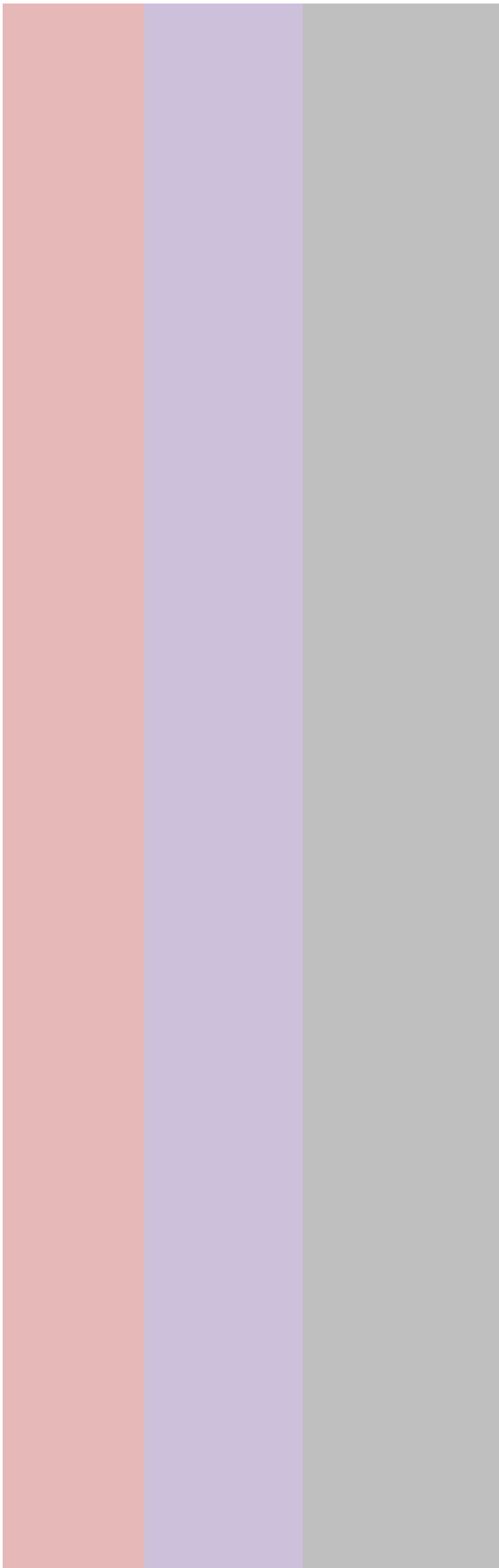
Complexity

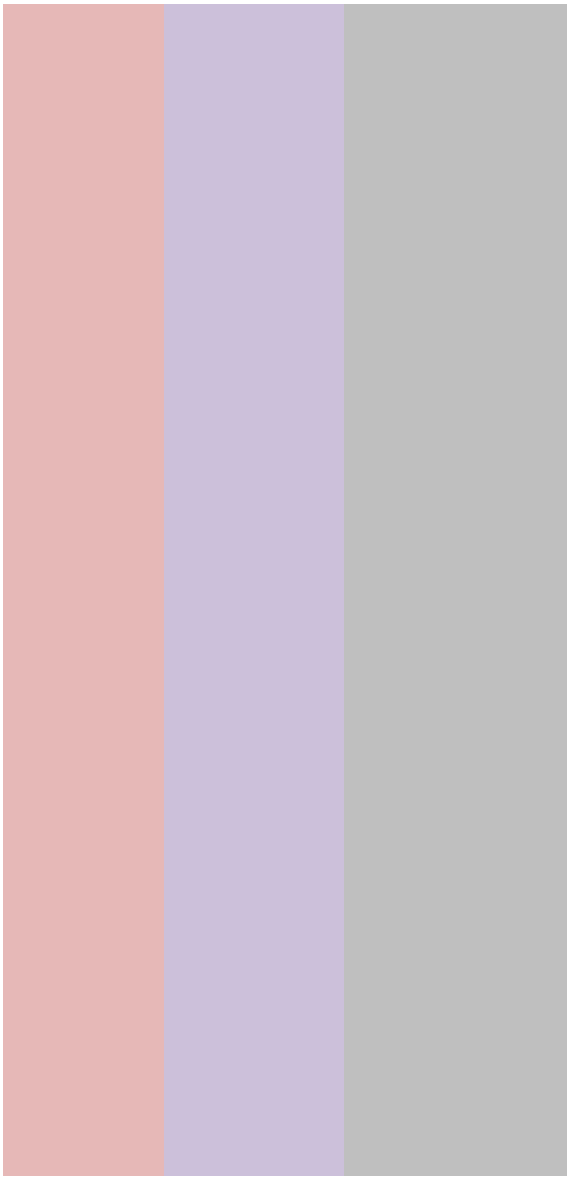
Instrument	Severity (a-e)	Location (pelvic)	Further info











Lateral

Resection

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

Distribution of errors during pelvis dissection

		<u>Task</u>					
	Code	6	7	8	9	10	
Right Anterior	1	0	0	0	0	0	
Right lateral attachement	2	0	0	0	0	0	
Right mesorectal buttock	3	0	0	0	0	0	
Posterior midline	4	0	0	0	0	0	
Left mesorectal buttock	5	0	0	0	0	0	
Left lateral attachment	6	0	0	0	0	0	
Left anterior	7	0	0	0	0	0	
	Total		0	0	0	0	0

Total

0

0

0

0

0

0

0

0

OCHRA Guide

Definitions

- Error - Something that has been done which was not intended by the actor, not desired by a set of rules or an external observer, or that led the task or system outside acceptable limits. (Senders W, Moray NP, eds. Human Error (Cause, Prediction, and Reduction) 1991; Bellagio Conference on Human Error). Analysis and Synthesis. Hillsdale, NJ: Lawrence A Erlbaum Associates; 1991.
- Consequential error - any action (or omission) that resulted in a negative consequence (e.g. bleeding, injury to mesorectum or hypogastric nerves), or increased the operating time of the procedure through necessitating corrective action.
- Non-consequential error - any action (or omission) that increased the likelihood of negative consequence and under different circumstances could have had a consequential effect.
- Instrument errors - inaccurate use of a laparoscopic tool
- Tissue errors - inappropriate interactions with the tissue

Spatial location

For errors observed during the pelvic dissection tasks, the spatial distribution of the error was recorded in one of seven zones [Figure 1]. A clock face was initially trialled for description of the location of errors within the pelvis, however this was found to be inconsistent, and therefore division of the mesorectum into lateral, anterior and posterior zones on the right and left side of the pelvis was identified as to be a more reliable approach. For posterior mesorectal dissection in the midline, it was difficult to consistently identify a border of left and right, therefore the midline sulcus formed between the mesorectal buttocks was designated a seventh “zone” for description of error location (Foster JD, Tech Coloproctol 2016)

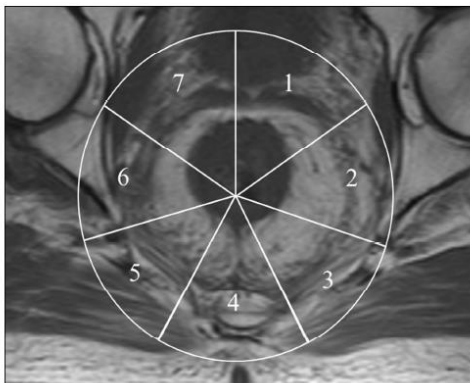


Figure 1. Axial section of mesorectum on MRI showing zones used for defining location of errors within the pelvis.
119x96mm (150 x 150 DPI)

Task sequence

Deviations in task sequence in which tasks performed were not logged as errors. Only execution errors were considered for this study.

ERRORS:

Dissection / Instrument use errors:

- A. Poor visualisation of instrument tip during dissection
- B. Overshoot of instrument movement
- C. Instrument applied with too little distance to structure
- D. Inappropriate use of diathermy / cutting (tip of instrument visualised)
- E. Too much/little energy applied with instrument
- F. Dissection performed in wrong direction
- G. Diathermy / dissection in wrong tissue plane (plane visible)
- H. Use of inappropriate instrument to dissect
- I. Cutting without lifting tissues from underlying structures

Retraction / Tissue handling errors:

- J. Avulsion of tissue
- K. Too much blunt force applied to tissue
- L. Traction applied with too much tension
- M. Traction applied with too little tension
- N. Traction applied in wrong direction
- O. Inappropriate handling of tumour
- P. Inappropriate grasping / blunt handling of other structure
- Q. Use of inappropriate instrument to retract

Consequences:

- 1. Bleeding (ooze)
- 2. Bleeding (significant / pulsatile)
- 3. Risk of mesorectal injury
- 4. Mesorectal injury breach of fascia only
- 5. Mesorectal injury into mesorectal fat
- 6. Mesorectal injury exposing rectal adventitia
- 7. Mesorectal injury into rectal musculature
- 8. Rectal perforation
- 9. Diathermy burn to viscus
- 10. Sharp injury to viscus
- 11. Blunt bowel injury
- 12. Perforating bowel injury
- 13. Diathermy burn to other structure
- 14. Sharp injury to other structure
- 15. Risk of injury to pelvic nerve
- 16. Injury to pelvic nerves
- 17. Injury to parietal pelvic fascia
- 19. Injury to ureter
- 20. Risk of injury to other structure
- 21. Injury to other structure
- 22. Delay in progress of procedure
- 23. Oncological compromise of operation

External Error Modes:

- a. Step is not done
- b. Step is partially completed
- c. Step is repeated
- d. Second step is done in addition
- e. Second step is done instead of first step
- f. Step is done out of sequence
- g. Step is done with too much force / speed / depth / distance / time / rotation
- h. Step is done with too little force / speed / depth / distance / time / rotation
- i. Step is done in wrong orientation/direction/point in space
- j. Step is done on/with the wrong object

Procedural errors = EEMs A–F.

Executional errors = EEMs G–J

Instrument

- 1. Hook Diathermy
- 2. Finger-switch diathermy
- 3. Diathermy forceps
- 4. Harmonic Scalpel / Ligasure
- 5. Blunt grasper (e.g. Johan)
- 6. Fine grasper
- 8. Swab
- 9. Suction
- 10. Scissors
- 11. Forceps
- 12. Stapler
- 13. Bowel clamp
- 14. Liga-clip applicator
- 15. Finger – blunt dissection
- 16. Retractor

Non-Error Events**Preparatory Step:**

- a. Adjust hold to improve visualisation
- b. Adjust hold to improve traction
- c. Adjust to hold separate structures
- d. Search for structure to dissect/divide
- e. Search for structure to avoid/preserve

Recovery mechanisms:

- f. Continue uninterrupted
- g. Perform step previously omitted
- h. Requires repetition of step
- j. Corrective action within subtask
- k. Change in subtask/sequence

Other events:

- l. Cleaning of camera
- m. Inadequate camera view
- n. Port dislocation
- o. Port adjustment
- p. Additional action/event

Example 1: Miskovic D, Surg Endosc 2012

Table 2 Summary of error types and consequences		
	Instrument	Tissue
Total errors (<i>n</i> = 399)	143	256
Examples of common errors (<i>n</i>)	Poor visualization (61)	Too much blunt force (70)
	Overshooting (16)	Wrong plane (50)
	Little distance to structure (15)	Too much tension (48)
	Too little use of energy (12)	Wrong direction of dissection (38)
	Additional attempt (11)	Wrong direction of traction (24)
Errors with consequence (<i>n</i> = 165)	28	137
Bleed (ooze)	20	120
Bleed (pulsating)	–	3
Blunt bowel injury	5	8
Perforating bowel injury	–	3
Contamination	–	1
Injury to mesentery	–	2

Example 2: Foster JD Tech Protocol 2016

Categories and frequency of observed execution errors (total *n*=335)

Error Type		Frequency
Instrument Use Errors:	Diathermy / dissection in wrong tissue plane (plane visible)	107
	Dissection performed in wrong direction	29
	Too much/little energy applied with instrument	20
	Overshoot of instrument movement	10
	Poor visualisation of instrument tip during dissection	10
	Instrument applied with too little distance to structure	9
	Cutting without lifting tissues from underlying structures	7
	Inappropriate use of diathermy / cutting (tip of instrument visualised)	5
	Use of inappropriate instrument to dissect	2
Retraction / Tissue Handling Errors:	Too much blunt force applied to tissue	48
	Traction applied in wrong direction	43
	Traction applied with too little tension	13
	Avulsion of tissue	12
	Use of inappropriate instrument to retract	11
	Inappropriate grasping / blunt handling of other structure	5
	Traction applied with too much tension	4
	Inappropriate handling of tumour	0

Categories and frequency of consequences of observed consequential errors (total n=299)

Consequence	Frequency
Bleeding	86
Mesorectal fascia injury	76
Mesorectal injury into fat	91
Mesorectal injury exposing muscle	11
Diathermy burn to viscus	11
Sharp injury to viscus	4
Blunt bowel injury	1
Sharp injury to other structure	2
Traction to pelvic nerve	2
Injury to pelvic nerve	6
Injury to ureter	0
Injury to other structure	1
Delay in progress	6
Oncological compromise	2

Table 1 [EAES classification of intraoperative adverse events in laparoscopic surgery - PubMed \(nih.gov\)](#)

Table 1 The intraoperative adverse event classification

From: [EAES classification of intraoperative adverse events in laparoscopic surgery](#)

Grade	Intraoperative adverse event classification	Percentage of adverse events identified from laparoscopic TME case video review pilot (%)	Examples in laparoscopic colorectal surgery
1	Minor error, no damage or corrective action required	60.1	Peritoneal tear; tissue avulsion from excess traction
2	Minor consequential error requiring corrective action but no change in post-operative care	37.1	Bleeding requiring a corrective step (swab/diathermy), wrong plane dissection—identified and corrected, serosal injury
3	Consequential error requiring major corrective action and/or change in post-operative pathway	2.4	Splenic capsule tear; re-do anastomosis; enterotomy, unplanned stoma
4	Life-threatening complication that requires major or immediate corrective action which led to a significant alteration of the post-operative pathway which may include re-operation or intensive care admission	0.1	Visceral injury; major haemorrhage; any complication necessitating ITU admission
5	Major consequential error resulting in death	0	Major vessel injury, air embolus

The five categories cover all observed intraoperative events by basing the grouping of the therapeutic consequences of the event. Illustrative examples for each category are shown. The vast majority of observed adverse events were seen to be grades I and II with fewer serious events identified