

Multimodal prehabilitation before major abdominal surgery: A retrospective study

ADL-I: activities of daily living-independent; ASA: American Society of Anesthesiologists; BMI: body mass index; CS: climbing steps; DVT: deep vein thrombosis; Hb: haemoglobin; IHD: ischaemic heart disease; LOS: length of stay; MILES: Management and Innovation for Longevity in Elderly Surgical patients; MIS: minimally invasive surgery; MOTS: moving on the spot; PE: pulmonary embolism; POD: postoperative day; RIB: resting in bed; STS: sit to stand; TOC: trial off catheter; 3-MinNS: 3-Minute Nutrition Screening

Supplementary Table S1a: Baseline demographics and preoperative details of colorectal (CLR) MILES group and CLR control group

	CLR MILES (n=230)	CLR Control (n=200)	p-value
Age, mean (years)	73.4±5.7	73.7±6.3	0.542
Height (m)	1.58±0.09	1.59±0.09	0.339
Preoperative Weight (kg)	59.9±12.4	59.9±12.7	0.989
Preoperative BMI	23.9±4.5	23.5±4.0	0.385
Gender			0.770
Female	97 (42.2)	88 (44.0)	
Male	133 (57.8)	112 (56.0)	
ASA			0.463
1	2 (0.9)	2 (1.0)	
2	138 (60.0)	105 (52.5)	
3	87 (37.8)	89 (44.5)	
4	3 (1.3)	4 (2.0)	
Hypertension			0.999
Yes	167 (72.6)	142 (72.8)	
No	63 (27.4)	53 (27.2)	
Diabetes			0.343
Yes	76 (33.0)	55 (28.5)	
No	154 (67.0)	138 (71.5)	
Hyperlipidemia			0.073
Yes	146 (63.8)	105 (54.7)	
No	83 (36.2)	87 (45.3)	
IHD			0.295
Yes	58 (25.2)	39 (20.5)	
No	172 (74.8)	151 (79.5)	
Stroke			0.384
Yes	17 (7.4)	19 (9.9)	
No	213 (92.6)	172 (90.1)	
Current Smoker			0.718
Yes	19 (8.3)	14 (7.1)	
No	211 (91.7)	184 (92.9)	
Ex-Smoker			0.454
Yes	39 (17.0)	40 (20.2)	
No	191 (83.0)	158 (79.8)	

ADL-I Premorbid			0.525
Yes	226 (98.3)	194 (97.0)	
No	4 (1.7)	6 (3.0)	
Clinic/Consent to Operation, mean (days)	22.1±16.5	17.1±14.4	0.001
Preoperative Albumin	37.1±5.9	37.3±5.4	0.794
Preoperative Hb	11.7±2.0	11.8±1.9	0.937
Cancer Resection			0.053
Yes	209 (90.9)	169 (84.5)	
No	21 (9.1)	31 (15.5)	
Edmonton Frail Scale Score, median	4 (0 – 13)	-	-
Physiotherapy Referral Required			-
Yes	171 (74.3)	-	
No	59 (25.7)	-	
3-MinNS Score, median	2 (0 – 8)	-	-
Dietician Referral Required			-
Yes	169 (73.5)	-	
No	61 (26.5)	-	
Hand Grip Strength, mean (kg)	19.8±8.5	-	-

Supplementary Table S1b: Perioperative details of CLR MILES group and CLR control group

	CLR MILES (n=230)	CLR Control (n=200)	p-value
Final Incision MIS			0.555
Yes	113 (49.1)	98 (52.4)	
No	117 (50.9)	89 (47.6)	
Pain Score at Rest, mean			
POD 1	1.6±2.2	1.4±1.9	0.375
POD 2	0.8±1.5	0.8±1.5	0.799
POD 3	0.4±1.0	0.3±1.1	0.460
POD 4	0.2±0.6	0.2±0.9	0.689
POD 5	0.1±0.6	0.1±0.6	0.783
Pain Score on Movement, mean			
POD 1	3.9±2.5	3.7±2.2	0.446
POD 2	2.7±2.1	2.8±2.4	0.661
POD 3	1.6±1.7	1.7±2.1	0.601
POD 4	1.0±1.5	0.9±1.4	0.510
POD 5	0.9±1.3	0.9±1.5	0.760
Incentive spirometer volume, ml (SD) (ml)			
POD 1	700±326	729±308	0.501
POD 2	712±350	765±346	0.289
POD 3	778±419	881±339	0.128
POD 4	760±428	875±423	0.228
POD 5	769±344	766±452	0.973
Ambulation Distance (m)			
POD 1	35.4±45.7	17.6±29.0	0.001
POD 2	60.7±65.3	42.0±51.5	0.006
POD 3	72.0±63.9	51.1±49.0	0.004

POD 4	65.7±66.5	51.5±58.1	0.148
POD 5	71.1±73.8	61.0±67.6	0.395
POD 1 Physiotherapy			0.004
RIB to STS	87 (38.5)	90 (52.9)	
MOTS to CS	139 (61.5)	80 (47.1)	
POD 2 Physiotherapy			0.068
RIB to STS	38 (17.4)	39 (25.5)	
MOTS to CS	181 (82.6)	114 (74.5)	
POD 3 Physiotherapy			0.045
RIB to STS	26 (12.1)	27 (20.6)	
MOTS to CS	188 (87.9)	104 (79.4)	
POD 4 Physiotherapy			0.618
RIB to STS	28 (15.1)	18 (17.5)	
MOTS to CS	157 (84.9)	85 (82.5)	
POD 5 Physiotherapy			0.707
RIB to STS	20 (12.9)	14 (14.7)	
MOTS to CS	135 (87.1)	81 (85.3)	
1 st TOC Attempt Successful			0.376
Yes	203 (95.3)	150 (93.2)	
No	10 (4.7)	11 (6.8)	
Clavien			0.348
0	143 (62.2)	127 (63.5)	
I	19 (8.3)	27 (13.5)	
II	46 (20.0)	31 (15.5)	
IIIA	6 (2.6)	3 (1.5)	
IIIB	7 (3.0)	4 (2.0)	
IV	8 (3.5)	5 (2.5)	
V	1 (0.4)	3 (1.5)	
Clavien III and Above			0.248
Yes	25 (10.9)	15 (7.5)	
No	205 (89.1)	185 (92.5)	
Comprehensive Complication Index	10.5±16.4	8.7±16.8	0.256
Post Operative Pneumonia/Significant Atelectasis			0.260
Yes	26 (11.3)	16 (8.0)	
No	204 (88.7)	184 (92.0)	
Post Operative DVT/PE			0.999
Yes	1 (0.4)	1 (0.5)	
No	229 (99.6)	199 (99.5)	
Length of Stay Postoperation, mean (days)	12.8±28.4	9.4±13.8	0.107
Total Length of Stay, mean (days)	14.0±28.7	11.3±14.9	0.235
30-Day Readmission			0.039
Yes	41 (17.8)	21 (10.6)	
No	189 (82.2)	177 (89.4)	
Need Step Down Care			0.339
Yes	27 (11.7)	17 (8.5)	
No	203 (88.3)	182 (91.5)	

Step Down Care LOS, mean (days)	20.0±11.9	43.6±36.0	0.088
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Supplementary Table S1c: Subgroup analysis of CLR patients who underwent operation for cancer resection

	MILES (n=209)	Control (n=169)	p-value
Metastatic Disease (preoperation)			0.437
Yes	14 (6.7)	15 (9.2)	
No	195 (93.3)	148 (90.8)	
Neoadjuvant Chemotherapy			0.016
Yes	49 (23.4)	21 (13.2)	
No	160 (76.6)	138 (86.8)	
Operation to Adjuvant, mean (days)			
Adjuvant Chemotherapy Required			0.349
Yes	101 (48.3)	72 (43.1)	
No	108 (51.7)	95 (56.9)	
Initiated Adjuvant Chemotherapy			0.029
Yes	83 (82.2)	47 (67.1)	
No	18 (17.8)	23 (32.9)	
Adherence to Chemotherapy Initiation Date			0.999
Yes	80 (96.4)	46 (97.9)	
No	3 (3.6)	1 (2.1)	
Completed Chemotherapy			0.343
Yes	51 (77.3)	40 (85.1)	
No	15 (22.7)	7 (14.9)	

Supplementary Table S2a: Baseline demographics and preoperative details of hepatectomy MILES group and hepatectomy control group

	Hepatectomy MILES (n=49)	Hepatectomy Control (n=25)	p-value
Age, mean (years)	71.5±4.6	73.0±5.2	0.215
Height (m)	1.64±0.08	1.60±0.09	0.109
Preoperative Weight (kg)	61.3±12.5	62.4±11.7	0.704
Preoperative BMI	23.6±4.5	24.3±4.4	0.513
Gender			0.271
Female	11 (22.4)	9 (36.0)	
Male	38 (77.6)	16 (64.0)	
ASA			0.788
1	1 (2.0)	0	
2	23 (46.9)	12 (48.0)	
3	24 (49.0)	13 (52.0)	
4	1 (2.0)	0	
Hypertension			0.775
Yes	37 (75.5)	20 (80.0)	
No	12 (24.5)	5 (20.0)	
Diabetes			0.326
Yes	19 (38.8)	13 (52.0)	
No	30 (61.2)	12 (48.0)	
Hyperlipidemia			0.799
Yes	33 (67.3)	16 (64.0)	
No	16 (32.7)	9 (36.0)	
IHD			0.245
Yes	9 (18.4)	8 (32.0)	
No	40 (81.6)	17 (68.0)	
Stroke			0.999
Yes	3 (6.4)	1 (4.0)	
No	44 (93.6)	24 (96.0)	
Current Smoker			0.999
Yes	8 (16.3)	4 (16.0)	
No	41 (83.7)	21 (84.0)	
Ex-Smoker			0.326
Yes	22 (44.9)	8 (32.0)	
No	27 (55.1)	17 (68.0)	
ADL-I Premorbid			0.342
Yes	48 (100.0)	24 (96.0)	
No	0	1 (4.0)	
Clinic/Consent to Operation, mean (days)	22.3±11.3	15.0±12.2	0.012
Preoperative Albumin	38.7±3.6	38.0±5.2	0.538
Preoperative Hb	12.3±1.7	12.5±1.9	0.675
Cancer Resection			0.400
Yes	46 (93.9)	22 (88.0)	
No	3 (6.1)	3 (12.0)	
Edmonton Frail Scale Score, median	3 (0 – 11)	-	-

Physiotherapy Referral Required			
Yes	20 (40.8)	-	-
No	29 (59.2)	-	-
3-MinNS Score, median	2 (0 – 6)	-	-
Dietician Referral Required			
Yes	28 (57.1)	-	-
No	21 (42.9)	-	-
Hand Grip Strength, mean (kg)	23.1±8.1	-	-

Supplementary Table S2b: Perioperative details of hepatectomy MILES group and hepatectomy control group

	Hepatectomy MILES (n=49)	Hepatectomy Control (n=25)	p-value
Final Incision MIS			0.289
Yes	16 (32.7)	5 (20.0)	
No	33 (67.3)	20 (80.0)	
Pain Score at Rest, mean			
POD 1	2.1±2.1	1.6±1.9	0.452
POD 2	1.3±1.4	0.8±1.4	0.211
POD 3	0.6±1.0	0.8±1.5	0.571
POD 4	0.7±0.9	0.7±1.3	0.950
POD 5	1.0±0.05	1.1±0.2	0.034
Pain Score on Movement, mean			
POD 1	4.3±2.3	4.6±2.4	0.558
POD 2	3.7±2.0	4.0±1.7	0.589
POD 3	2.6±2.1	2.9±2.0	0.669
POD 4	2.5±2.1	1.8±1.3	0.491
POD 5	2.4±1.5	1.7±2.6	0.458
Incentive Spiro (ml)			
POD 1	644.4±373.9	529.4±304.7	0.274
POD 2	613.7±199.1	521.9±314.6	0.247
POD 3	608.7±210.9	580.8±355.6	0.768
POD 4	666.7±308.6	583.3±376.4	0.605
POD 5	568.2±252.3	593.8±265.2	0.833
Ambulation Distance (m)			
POD 1	28.2±39.4	13.2±22.6	0.050
POD 2	38.4±32.4	30.0±38.3	0.388
POD 3	61.7±62.2	52.7±56.9	0.623
POD 4	71.2±64.8	48.1±71.3	0.338
POD 5	56.2±60.2	73.6±63.4	0.428
POD 1 Physiotherapy			0.318
RIB to STS	23 (47.9)	15 (62.5)	
MOTS to CS	25 (52.1)	9 (37.5)	
POD 2 Physiotherapy			0.254
RIB to STS	10 (27.0)	9 (42.9)	
MOTS to CS	27 (73.0)	12 (57.1)	

POD 3 Physiotherapy RIB to STS MOTS to CS	7 (25.0) 21 (75.0)	5 (27.8) 13 (72.2)	0.999
POD 4 Physiotherapy RIB to STS MOTS to CS	1 (4.5) 21 (95.5)	5 (35.7) 9 (64.3)	0.024
POD 5 Physiotherapy RIB to STS MOTS to CS	1 (4.8) 20 (95.2)	3 (21.4) 11 (78.6)	0.279
1 st TOC Attempt Successful Yes No	41 (87.2) 6 (12.8)	23 (95.8) 1 (4.2)	0.410
Clavien 0 I II IIIA IIIB IV V	21 (43.8) 7 (14.6) 14 (29.2) 4 (8.3) 1 (2.1) 0 1 (2.1)	15 (60.0) 4 (16.0) 2 (8.0) 1 (4.0) 1 (4.0) 1 (4.0) 1 (4.0)	0.314
Clavien III and Above Yes No	6 (12.5) 42 (87.5)	4 (16.0) 21 (84.0)	0.727
Comprehensive Complication Index	14.1±18.2	12.2±22.6	0.688
Post Operative Pneumonia/Significant Atelectasis Yes No	11 (22.4) 38 (77.6)	2 (8.0) 23 (92.0)	0.197
Post Operative DVT/PE Yes No	0 49 (100.0)	1 (4.0) 24 (96.0)	0.338
Length of Stay Postoperation, mean (days)	8.8±7.5	9.8±8.0	0.611
Total Length of Stay, mean (days)	9.8±8.4	11.6±9.5	0.415
30-Day Readmission Yes No	4 (8.2) 45 (91.8)	3 (12.0) 22 (88.0)	0.682
Need Step Down Care Yes No	2 (4.1) 47 (95.9)	0 25 (100.0)	0.546
Step Down Care LOS, mean (days)	-	-	-

Supplementary Table S2c: Subgroup analysis of hepatectomy patients who underwent operation for cancer resection

	Hepatectomy MILES (n=46)	Hepatectomy Control (n=22)	p-value
Metastatic Disease (pre-operation) Yes	11 (23.9)	4 (18.2)	0.758

No	35 (76.1)	18 (81.8)	
Neoadjuvant Chemotherapy			0.756
Yes	9 (22.5)	4 (18.2)	
No	31 (77.5)	18 (81.8)	
Operation to Adjuvant, mean (days)	73.3±37.6	40.5±18.5	0.110
Adjuvant Chemotherapy Required			0.298
Yes	21 (46.7)	7 (31.8)	
No	24 (53.3)	15 (68.2)	
Initiated Adjuvant Chemotherapy			0.047
Yes	18 (94.7)	4 (57.1)	
No	1 (5.3)	3 (42.9)	
Adherence to Chemotherapy Initiation Date			0.999
Yes	17 (94.4)	4 (100.0)	
No	1 (5.6)	0	
Completed Chemotherapy			0.999
Yes	6 (60.0)	2 (66.7)	
No	4 (40.0)	1 (33.3)	

Supplementary Table S3a: Baseline demographics and preoperative details of pancreas surgery MILES group and pancreas surgery control group

	Pancreas Surgery MILES (n=46)	Pancreas Surgery Control (n=28)	p-value
Age, mean (years)	72.3±5.9	72.9±5.6	0.691
Height (m)	1.60±0.09	1.61±0.11	0.601
Preoperative Weight (kg)	63.3±15.4	59.8±10.9	0.302
Preoperative BMI	25.0±5.8	23.0±3.4	0.063
Gender			0.630
Female	22 (47.8)	11 (39.3)	
Male	24 (52.2)	17 (60.7)	
ASA			0.307
1	0	0	
2	29 (63.0)	15 (53.6)	
3	15 (32.6)	13 (46.4)	
4	2 (4.3)	0	
Hypertension			0.069
Yes	36 (78.3)	16 (57.1)	
No	10 (21.7)	12 (42.9)	
Diabetes			0.627
Yes	20 (43.5)	10 (35.7)	
No	26 (56.5)	18 (64.3)	
Hyperlipidemia			0.215
Yes	32 (69.6)	15 (53.6)	
No	14 (30.4)	13 (46.4)	
IHD			0.755
Yes	9 (19.6)	4 (14.3)	
No	37 (80.4)	24 (85.7)	
Stroke			0.999
Yes	4 (8.9)	2 (7.1)	
No	41 (91.1)	26 (92.9)	
Current Smoker			0.635
Yes	2 (4.4)	2 (7.1)	
No	43 (95.6)	26 (92.9)	
Ex-Smoker			0.573
Yes	11 (24.4)	5 (17.9)	
No	34 (75.6)	23 (82.1)	
ADL-I Premorbid			-
Yes	46 (100)	28 (100)	
No	0	0	
Clinic/Consent to Operation, mean (days)	24.5±16.9	20.3±17.8	0.311
Preoperative Albumin	35.7±6.9	38.0±5.8	0.152
Preoperative Hb	13.0±3.9	12.2±1.8	0.316
Cancer Resection			0.146
Yes	43 (93.5)	23 (82.1)	
No	3 (6.5)	5 (17.9)	
Edmonton Frail Scale Score, median	3 (0 – 14)	-	-

Physiotherapy Referral Required			
Yes	20 (43.5)	-	-
No	26 (56.5)	-	-
3-MinNS Score, median	2.5 (0 – 6)	-	-
Dietician Referral Required			
Yes	32 (69.6)	-	-
No	14 (30.4)	-	-
Hand Grip Strength, mean (kg)	19.7±6.1	-	-

Supplementary Table S3b: Perioperative details of pancreas surgery MILES group and pancreas surgery control group

	Pancreas Surgery MILES (n=46)	Pancreas Surgery Control (n=28)	p-value
Final Incision MIS			0.305
Yes	17 (39.5)	7 (25.0)	
No	26 (60.5)	21 (75.0)	
Pain Score at Rest, mean			
POD 1	2.1±1.8	1.5±1.6	0.134
POD 2	1.6±1.8	1.1±1.6	0.304
POD 3	0.7±1.2	0.7±1.1	0.956
POD 4	1.0±1.3	0.4±0.8	0.106
POD 5	0.6±1.0	0.3±0.8	0.253
Pain Score on Movement, mean			
POD 1	4.6±2.1	3.9±1.6	0.155
POD 2	3.4±1.9	3.4±1.6	0.938
POD 3	2.8±2.1	3.4±2.0	0.242
POD 4	2.2±1.5	2.8±2.2	0.344
POD 5	2.0±1.7	2.6±2.7	0.449
Incentive Spiro (ml)			
POD 1	618.8±312.2	657.9±501.5	0.740
POD 2	629.0±307.0	745.0±232.2	0.156
POD 3	681.8±329.0	636.1±273.8	0.641
POD 4	640.2±314.8	781.8±623.4	0.368
POD 5	806.8±277.4	919.2±579.0	0.442
Ambulation Distance (m)			
POD 1	9.5±21.9	11.4±25.2	0.726
POD 2	41.5±44.0	28.7±47.8	0.271
POD 3	66.0±59.6	39.8±42.0	0.093
POD 4	58.2±41.4	36.1±49.6	0.126
POD 5	97.7±79.3	75.0±84.4	0.339
POD 1 Physiotherapy			0.781
RIB to STS	32 (72.7)	22 (78.6)	
MOTS to CS	12 (27.3)	6 (21.4)	
POD 2 Physiotherapy			0.020
RIB to STS	10 (25.0)	15 (55.6)	
MOTS to CS	30 (75.0)	12 (44.4)	
POD 3 Physiotherapy			0.055

RIB to STS MOTS to CS	4 (12.9) 27 (87.1)	8 (36.4) 14 (63.6)	
POD 4 Physiotherapy RIB to STS MOTS to CS	5 (16.1) 26 (83.9)	6 (30.0) 14 (70.0)	0.304
POD 5 Physiotherapy RIB to STS MOTS to CS	1 (3.2) 30 (96.8)	5 (22.7) 17 (77.3)	0.071
1 st TOC Attempt Successful Yes No	40 (93.0) 3 (7.0)	27 (96.4) 1 (3.6)	0.999
Clavien 0 I II IIIA IIIB IV V	11 (23.9) 11 (23.9) 18 (39.1) 2 (4.3) 0 3 (6.5) 1 (2.2)	11 (39.3) 2 (7.1) 9 (32.1) 3 (10.7) 1 (3.6) 1 (3.6) 1 (3.6)	0.277
Clavien III and Above Yes No	6 (13.0) 40 (87.0)	6 (21.4) 22 (78.6)	0.352
Comprehensive Complication Index	19.6±19.6	17.6±21.5	0.683
Post Operative Pneumonia/Significant Atelectasis Yes No	8 (17.4) 38 (82.6)	5 (17.9) 23 (82.1)	0.999
Post Operative DVT/PE Yes No	0 46 (100)	0 28 (100)	-
Length of Stay Postoperation, mean (days)	13.9±13.9	12.7±11.5	0.708
Total Length of Stay, mean (days)	18.8±16.7	15.2±12.0	0.328
30-Day Readmission Yes No	11 (24.4) 34 (75.6)	6 (21.4) 22 (78.6)	0.999
Need Step Down Care Yes No	6 (13.3) 39 (86.7)	4 (14.3) 24 (85.7)	0.999
Step Down Care LOS, mean (days)	27.0±7.4	27.8±4.5	0.865

Supplementary Table S3c: Subgroup analysis of pancreas surgery patients who underwent operation for cancer resection

	Pancreas Surgery MILES (n=43)	Pancreas Surgery Control (n=23)	p-value
Metastatic Disease (preoperation) Yes	0	0	-

No	46 (100.0)	23 (100.0)	
Neoadjuvant Chemotherapy			0.406
Yes	6 (14.6)	1 (4.3)	
No	35 (85.4)	22 (95.7)	
Operation to Adjuvant, mean (days)	67.1±22.2	61.3±19.6	0.476
Adjuvant Chemotherapy Required			0.999
Yes	26 (61.9)	15 (65.2)	
No	16 (38.1)	8 (34.8)	
Initiated Adjuvant Chemotherapy			0.001
Yes	25 (100.0)	9 (60.0)	
No	0	6 (40.0)	
Adherence to Chemotherapy Initiation Date			0.999
Yes	21 (84.0)	8 (88.9)	
No	4 (16.0)	1 (11.1)	
Completed Chemotherapy			0.999
Yes	12 (85.7)	7 (77.8)	
No	2 (14.3)	2 (22.2)	

Supplementary Table S4a: Baseline demographics and preoperative details of patients (with at least two weeks from clinic/consent to operation) in MILES group vs control group

	MILES (n=233)	Control (n=119)	p-value
Age, mean (years)	73.2±5.9	73.3±6.0	0.780
Height (m)	1.59±0.09	1.59±0.10	0.602
Preoperative Weight (kg)	59.5±12.5	59.5±12.1	0.984
Preoperative BMI	23.7±4.6	23.3±3.8	0.439
Gender			0.820
Female	95 (40.8)	50 (42.0)	
Male	138 (59.2)	69 (58.0)	
ASA			0.066
1	3 (1.3)	1 (0.8)	
2	139 (59.7)	59 (49.6)	
3	86 (36.9)	59 (49.6)	
4	5 (2.1)	0	
Hypertension			0.799
Yes	172 (73.8)	85 (72.0)	
No	61 (26.2)	33 (28.0)	
Diabetes			0.719
Yes	78 (33.5)	37 (31.4)	
No	155 (66.5)	81 (68.6)	
Hyperlipidemia			0.044
Yes	160 (69.0)	68 (57.6)	
No	72 (31.0)	50 (42.4)	
IHD			0.490
Yes	52 (22.3)	22 (18.8)	
No	181 (77.7)	95 (81.2)	
Stroke			0.304
Yes	16 (7.0)	12 (10.2)	
No	214 (93.0)	106 (89.8)	
Current Smoker			0.704
Yes	21 (9.1)	12 (10.2)	
No	211 (90.9)	106 (89.8)	
Ex-Smoker			0.687
Yes	55 (23.7)	25 (21.2)	
No	177 (76.3)	93 (78.8)	
ADL-I Premorbid			0.233
Yes	229 (98.7)	115 (96.6)	
No	3 (1.3)	4 (3.4)	
Clinic/Consent to Operation, mean (days)	29.1±14.4	28.4±14.4	0.685
Preoperative Albumin	37.1±6.0	37.9±5.1	0.343
Preoperative Hb	12.1±2.4	12.0±1.8	0.835
Cancer Resection			0.001
Yes	207 (88.8)	89 (74.8)	
No	26 (11.2)	30 (25.2)	
Edmonton Frail Scale Score, median	4 (0 – 14)	-	-
Physiotherapy Referral Required			-

Yes	150 (64.4)	-	
No	83 (35.6)	-	
3-MinNS Score, median	2 (0 – 8)	-	-
Dietician Referral Required			
Yes	164 (70.4)	-	
No	69 (29.6)	-	
Hand Grip Strength, mean (kg)	20.0±8.1	-	-

Supplementary Table S4b: Perioperative details of patients (with at least two weeks from clinic/consent to operation) in MILES group vs control group

	MILES (n=233)	Control (n=119)	p-value
Final Incision MIS			0.730
Yes	97 (42.0)	51 (44.3)	
No	134 (58.0)	64 (55.7)	
Pain Score at Rest, mean			
POD 1	1.8±2.2	1.4±2.0	0.152
POD 2	1.0±1.6	0.7±1.4	0.144
POD 3	0.5±1.1	0.3±0.9	0.115
POD 4	0.3±0.7	0.3±1.0	0.694
POD 5	0.2±0.7	0.1±0.6	0.341
Pain Score on Movement, mean			
POD 1	4.0±2.5	3.9±2.0	0.676
POD 2	3.0±2.1	2.8±2.2	0.677
POD 3	1.8±1.9	2.2±2.2	0.152
POD 4	1.4±1.7	1.3±1.6	0.626
POD 5	1.2±1.5	1.4±1.8	0.445
Incentive Spiro (ml)			
POD 1	669±333	677±290	0.874
POD 2	692±340	708±315	0.767
POD 3	741±407	759±321	0.808
POD 4	687±395	731±374	0.625
POD 5	722±346	678±373	0.619
Ambulation Distance (m)			
POD 1	31.2±44.0	16.2±28.7	<0.001
POD 2	55.0±55.1	38.3±55.1	0.022
POD 3	67.0±58.7	43.8±52.0	0.008
POD 4	69.0±65.0	55.5±66.7	0.243
POD 5	78.6±81.3	77.5±78.8	0.937
POD 1 Physiotherapy			0.009
RIB to STS	98 (43.6)	62 (59.6)	
MOTS to CS	127 (56.4)	42 (40.4)	
POD 2 Physiotherapy			0.004
RIB to STS	40 (19.3)	34 (34.7)	
MOTS to CS	167 (80.7)	64 (65.3)	
POD 3 Physiotherapy			0.008
RIB to STS	23 (12.8)	22 (26.8)	
MOTS to CS	157 (87.2)	60 (73.2)	

POD 4 Physiotherapy RIB to STS MOTS to CS	23 (14.9) 131 (85.1)	12 (16.7) 60 (83.3)	0.844
POD 5 Physiotherapy RIB to STS MOTS to CS	17 (12.4) 120 (87.6)	10 (14.3) 60 (85.7)	0.828
1 st TOC Attempt Successful Yes No	201 (93.9) 13 (6.1)	88 (91.7) 8 (8.3)	0.470
Clavien 0 I II IIIA IIIB IV V	132 (56.9) 23 (9.9) 54 (23.3) 10 (4.3) 4 (1.7) 7 (3.0) 2 (0.9)	76 (63.9) 12 (10.1) 14 (11.8) 5 (4.2) 5 (4.2) 3 (2.5) 4 (3.4)	0.093
Clavien III and Above Yes No	26 (11.2) 206 (88.8)	17 (14.3) 102 (85.7)	0.396
Comprehensive Complication Index	11.8±17.4	10.8±20.9	0.633
Post Operative Pneumonia/Significant Atelectasis Yes No	34 (14.6) 199 (85.4)	11 (9.2) 108 (90.8)	0.179
Post Operative DVT/PE Yes No	1 (0.4) 232 (99.6)	0 119 (100.0)	0.999
Length of Stay Postoperation, mean (days)	11.1±14.5	9.6±10.4	0.343
Total Length of Stay, mean (days)	12.7±15.8	11.3±11.8	0.407
30-Day Readmission Yes No	38 (16.4) 194 (83.6)	13 (11.1) 104 (88.9)	0.203
Need Step Down Care Yes No	29 (12.5) 203 (87.5)	9 (7.6) 109 (92.4)	0.204
Step Down Care LOS, mean (days)	21.6±12.0	37.5±18.4	0.015

Supplementary Table S4c: Subgroup analysis of patients (with at least two weeks from clinic/consent to operation) who underwent operation for cancer resection

	MILES (n=207)	Control (n=89)	p-value
Metastatic Disease (preoperation) Yes No	21 (10.1) 186 (89.9)	5 (5.7) 82 (94.3)	0.267
Neoadjuvant Chemotherapy Yes	49 (24.4)	14 (16.1)	0.124

No	152 (75.6)	73 (83.9)	
Operation to Adjuvant, mean (days)	63.5±29.4	49.2±13.1	0.001
Adjuvant Chemotherapy Required			0.161
Yes	100 (48.8)	35 (39.3)	
No	105 (51.2)	54 (60.7)	
Initiated Adjuvant Chemotherapy			0.018
Yes	85 (87.6)	24 (68.6)	
No	12 (12.4)	11 (31.4)	
Adherence to Chemotherapy Initiation Date			0.999
Yes	79 (92.9)	23 (95.8)	
No	6 (7.1)	1 (4.2)	
Completed Chemotherapy			0.568
Yes	45 (76.3)	20 (83.3)	
No	14 (23.7)	4 (16.7)	