

Memorial Sloan Kettering Cancer Center

# Technology and Improving Esophagectomy Outcomes

Daniela Molena, MD Associate Attending Director of Esophageal Surgery Thoracic Surgery Service Memorial Sloan Kettering Cancer Center New York, NY



#### 2021 Annual Meeting

The American Foregut Society presents AFS 2021: We're Back... Together! Gaylord Opryland | Nashville, TN September 23–26, 2021

#### Disclosures

- Consultant for Johnson & Johnson, Boston Scientific, BMS, Merck
- Steering Committee AstraZeneca
- First in-person meeting since 01/2020!!



## Technology and ultimate outcome

#### Use of ER for early esophageal cancer



Merkow RP, et al. J Natl Cancer Inst, 2014



## Investigating new imaging agents

#### PARPI-FL TOPICAL APPLICATION





Kossatz S. Nat Biomed Eng. 2020



#### **Targeted biopsies?**







N=12 Imaged 12 patients Data analysis in progress



Memorial Sloan Kettering Cancer Center

# The Virtual World

- Telemedicine visits
- Pre-habilitation for surgery
- Recovery





## **Technology in the Pre-operative Setting**

- Telemedicine in thoracic surgery
  - 299 new patients seen between March-June 2020 (52% reduction in volume from previous year)
  - 45 % were seen via telemedicine
  - 60% patients would prefer to continue telemedicine visits after the pandemic

Characteristic	Telemedicine (n=65)	In person (n=68)	Pa
Any			
complication			>0.999
Νο	42 (65)	43 (63)	
Yes	23 (35)	25 (37)	
Serious			
complication			0.326
Νο	62 (95)	61 (90)	
Yes	3 (5)	7 (10)	



## Technology in the Pre-operative Setting ç

# Mind Body Prehab for Thoracic Cancer Surgery

119 patients referred to the program100 patients approached and 66 patients enrolled after referral66% participation rateQuick Facts

- Launched in December of 2020
- Free virtual mind-body classes
- Classes available 2x per week
- Focus on **strength**, **relaxation**, and **breathing**





# Technology during Surgery

#### MIE and RAMIE

- Less traumatic
- Easier postoperative recovery
- Less postoperative pain
- Fewer wound and cardiopulmonary complications
- Enhanced visualization



#### **MIE vs OPEN: TIME Trial**

Primary outcomes         Pulmonary infection within 2 weeks         16 (29%)         5 (9%)         0.005           Pulmonary infection in-hospital         19 (34%)         7 (12%)         0.005           Secondary outcomes         9 (34%)         7 (12%)         0.004           Short-term quality of lifet         14 (1-120)         11 (7-80)         0.044           Short-term quality of lifet         9 (36, 34-39)         42 (8, 39-46)         0.007           Mental component summary         36 (6; 34-39)         42 (8, 39-46)         0.007           Mental component summary         45 (11; 40-50)         46 (10; 41-50)         0.806           EORTC C30†         51 (21; 44-58)         61 (18; 56-67)         0.020           OES 18‡         71 (39; 25-49)         18 (26; 10-26)         0.008           Pain         19 (21; 13-26)         8 (11; 5-11)         0.002           Total lymph nodes retrieved*         21 (7-47)         20 (3-44)         0.852           Resection margin§         -         0         0.963           R1         5(9%)         1 (2%)         -           PstageT         -         0.943         -           0         0 (0%)         1 (2%)         -         -           11		00 (N=56)	MIO (N=59)	p value
Pulmonary infection within 2 weeks         16 (29%)         5 (9%)         0.005           Pulmonary infection in-hospital         19 (34%)         7 (12%)         0.005           Secondary outcomes         14 (1-120)         11 (7-80)         0.044           Short-term quality of life'         5         5         361         0.007           Short-term quality of life'         5         5         361         0.007           Mental component summary         36 (6; 34-39)         42 (8; 39-46)         0.007           Mental component summary         45 (11; 40-50)         46 (10; 41-50)         0.806           EORTC C30†         51 (21; 44-58)         61 (18; 56-67)         0.020           OES 18‡         7         37 (39; 25-49)         18 (26; 10-26)         0.008           Pain         19 (21; 13-26)         8 (11; 5-11)         0.002           Total lymph nodes retrieved*         21 (7-47)         20 (3-44)         0.852           Resection margin§         -         0.080         -           R1         5(9%)         1 (2%)         -         -           91         92(1)         -         -         -           R1         0 (0%)         1 (2%)         -         -         -<	Primary outcomes			
Pulmonary infection in-hospital         19 (34%)         7 (12%)         0-005           Secondary outcomes         V           Hospital stay (days)*         14 (1-120)         11 (7-80)         0-044           Short-term quality of life†         5         5         0         0-007           Short-term quality of life†         5         5         361         0-007           Mental component summary         36 (6; 34-39)         42 (8; 39-46)         0-007           Mental component summary         45 (11; 40-50)         46 (10; 41-50)         0-806           EORTC C30†         0	Pulmonary infection within 2 weeks	16 (29%)	5 (9%)	0.005
Secondary outcomes       14 (1-120)       11 (7-80)       0-044         Short-term quality of life†       5       9       0-007         Short-term quality of life†       5       9       0-007         Physical component summary       36 (6; 34-39)       42 (8; 39-46)       0-007         Mental component summary       45 (11; 40-50)       46 (10; 41-50)       0-806         EORTC C30†       0       0       0       0         Global health       51 (21; 44-58)       61 (18; 56-67)       0-020         OES 18‡       0       0       0       0       0         Pain       19 (21; 13-26)       8 (11; 5-11)       0-002         Total lymph nodes retrieved*       21 (7-47)       20 (3-44)       0-852         Resection margin§       0       0       0       0       0         R0       47 (84%)       54 (92%)       -       -         pStage¶       0       0 (0%)       1 (2%)       -       -         II       4 (7%)       4 (7%)       4 (7%)       -       -         III       16 (29%)       17 (29%)       -       -       -         III       14 (25%)       11 (19%)       -       - <td>Pulmonary infection in-hospital</td> <td>19 (34%)</td> <td>7 (12%)</td> <td>0.005</td>	Pulmonary infection in-hospital	19 (34%)	7 (12%)	0.005
Hospital stay (days)*       14 (1-120)       11 (7-80)       0-044         Short-term quality of life†       S         SF 361        0-007         Mental component summary       36 (6; 34-39)       42 (8; 39-46)       0-007         Mental component summary       45 (11; 40-50)       46 (10; 41-50)       0-806         EORTC C30†        0       0       0         Global health       51 (21; 44-58)       61 (18; 56-67)       0-020         OES 18‡         19 (21; 13-26)       8 (11; 5-11)       0-002         Total lymph nodes retrieved*       21 (7-47)       20 (3-44)       0.852         Resection margin§       0       0 (3%)       1 (2%)       -         pstage¶       0       0 (0%)       1 (2%)       -         0       0 (0%)       1 (2%)       -       -         18       16 (29%)       17 (29%)       -       -         19       14 (7%)       4 (7%)       -       -         10       0 (0%)       1 (2%)       -       -       -         11       14 (25%)       11 (19%)       -       -       -       -         11       14 (25%) <t< td=""><td>Secondary outcomes</td><td></td><td></td><td></td></t<>	Secondary outcomes			
Short-term quality of life†         SF 36†         Physical component summary       36 (6; 34–39)       42 (8; 39–46)       0.007         Mental component summary       45 (11; 40–50)       46 (10; 41–50)       0.806         EORTC C30†       61 (18; 56–67)       0.020         Global health       51 (21; 44–58)       61 (18; 56–67)       0.020         OES 18‡       7       7       0.002       0.002         Pain       19 (21; 13–26)       8 (11; 5–11)       0.002         Total lymph nodes retrieved*       21 (7–47)       20 (3–44)       0.852         Resection margin§       0.080       7       8       9         R1       5 (9%)       1 (2%)       -       0.903         0       0 (0%)       1 (2%)       -       0.9043         0       0 (0%)       1 (2%)       -       -         11       16 (29%)       17 (29%)       -       -         11       14 (25%)       11 (19%)       -       -         110       14 (25%)       11 (19%)       -       -         111       14 (25%)       11 (19%)       -       -       -         11       14 (25%)       11 (19%) <td< td=""><td>Hospital stay (days)*</td><td>14 (1-120)</td><td>11 (7-80)</td><td>0.044</td></td<>	Hospital stay (days)*	14 (1-120)	11 (7-80)	0.044
SF 361       Physical component summary       36 (6; 34-39)       42 (8; 39-46)       0.007         Mental component summary       45 (11; 40-50)       46 (10; 41-50)       0.806         EORTC C301       51 (21; 44-58)       61 (18; 56-67)       0.020         OES 18‡       7       7 (39; 25-49)       18 (26; 10-26)       0.008         Pain       19 (21; 13-26)       8 (11; 5-11)       0.002         Total lymph nodes retrieved*       21 (7-47)       20 (3-44)       0.852         Resection margin§       0       0.00%       -         R0       47 (84%)       54 (92%)       -         R1       5 (9%)       1 (2%)       -         0       0 (0%)       1 (2%)       -         IIa       16 (29%)       17 (29%)       -         IIb       6 (11%)       9 (15%)       -         IV       5 (9%)       4 (7%)       -         No residual tumour or lymph-node metastasis       7 (13%)       9 (15%)       -         Mortality         0 (0%)       1 (2%)       -       -         10       0.0%       1 (2%)       -       -         0       0.0%)       1 (2%)       -       - <td< td=""><td>Short-term quality of life†</td><td></td><td></td><td></td></td<>	Short-term quality of life†			
Physical component summary         36 (6; 34-39)         42 (8; 39-46)         0.007           Mental component summary         45 (11; 40-50)         46 (10; 41-50)         0.806           EORTC C30†	SF 36†			
Mental component summary         45 (11; 40–50)         46 (10; 41–50)         0.806           EORTC C30†         51 (21; 44–58)         61 (18; 56–67)         0.020           OES 18‡         71alking         37 (39; 25–49)         18 (26; 10–26)         0.008           Pain         19 (21; 13–26)         8 (11; 5–11)         0.002           Total lymph nodes retrieved*         21 (7–47)         20 (3–44)         0.852           Resection margin§         0.008         -         -           R0         47 (84%)         54 (92%)         -           R1         5 (9%)         1 (2%)         -           0         0 (0%)         1 (2%)         -           Ila         16 (29%)         17 (29%)         -           Ilb         6 (11%)         9 (15%)         -           IV         5 (9%)         4 (7%)         -           IV         5 (9%)         4 (7%)         -           IN         12 (25%)         11 (19%)         -           IV         5 (9%)         4 (7%)         -           No residual tumour or lymph-node metastasis         7 (13%)         9 (15%)         -           Mortality           0 (0%)         1 (2%)         -	Physical component summary	36 (6; 34-39)	42 (8; 39-46)	0.007
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Global health       51 (21; 44–58)       61 (18; 56–67)       0-020         OES 18‡	EORTC C30†			
OES 18‡       37 (39; 25-49)       18 (26; 10-26)       0.008         Pain       19 (21; 13-26)       8 (11; 5-11)       0.002         Total lymph nodes retrieved*       21 (7-47)       20 (3-44)       0.852         Resection margin\$       0.008       0.008         R0       47 (84%)       54 (92%)          R1       5 (9%)       1 (2%)          pStage¶       0.9943           0       0 (0%)       1 (2%)          IIa       16 (29%)       17 (29%)          IIb       6 (11%)       9 (15%)          IV       5 (9%)       4 (7%)          No residual tumour or lymph-node metastasis       7 (13%)       9 (15%)          Mortality          0.0%       1 (2%)          30-day mortality       0 (0%)       1 (2%)	Global health	51 (21; 44-58)	61 (18; 56-67)	0.020
Talking       37 (39; 25-49)       18 (26; 10-26)       0.008         Pain       19 (21; 13-26)       8 (11; 5-11)       0.002         Total lymph nodes retrieved*       21 (7-47)       20 (3-44)       0.852         Resection margin§       0.008       0.008         R0       47 (84%)       54 (92%)          R1       5 (9%)       1 (2%)          pStage¶       0       0(0%)       1 (2%)          Ila       16 (29%)       17 (29%)          Ilb       6 (11%)       9 (15%)          IV       5 (9%)       4 (7%)          No residual tumour or lymph-node metastasis       7 (13%)       9 (15%)          Mortality         0       0(0%)       1 (2%)          30-day mortality       0 (0%)       1 (2%)	OES 18‡			
Pain         19 (21; 13-26)         8 (11; 5-11)         0.002           Total lymph nodes retrieved*         21 (7-47)         20 (3-44)         0.852           Resection margin\$         0.008         0.008           R0         47 (84%)         54 (92%)            R1         5 (9%)         1 (2%)            pStage¶         0         0 (0%)         1 (2%)            0         0 (0%)         1 (2%)             Ila         16 (29%)         17 (29%)             Ilb         6 (11%)         9 (15%)             IV         5 (9%)         4 (7%)             No residual tumour or lymph-node metastasis         7 (13%)         9 (15%)            Mortality            0.0%         1 (2%)            30-day mortality         0 (0%)         1 (2%)	Talking	37 (39; 25-49)	18 (26; 10-26)	0.008
Total lymph nodes retrieved*       21 (7-47)       20 (3-44)       0.852         Resection margin\$       0.080         R0       47 (84%)       54 (92%)          R1       5 (9%)       1 (2%)          pStage¶       0 (0%)       1 (2%)          0       0 (0%)       1 (2%)          Il       4 (7%)       4 (7%)          Ila       16 (29%)       17 (29%)          Ilb       6 (11%)       9 (15%)          IV       5 (9%)       4 (7%)          No residual tumour or lymph-node metastasis       7 (13%)       9 (15%)          Mortality         0 (0%)       1 (2%)        0.590         30-day mortality       0 (0%)       1 (2%)	Pain	19 (21; 13-26)	8 (11; 5-11)	0.002
Resection margin§         0.080           R0         47 (84%)         54 (92%)            R1         5 (9%)         1 (2%)            pStage¶         0.943             0         0 (0%)         1 (2%)            1         4 (7%)         4 (7%)            1         16 (29%)         17 (29%)            11a         16 (29%)         17 (29%)            11b         6 (11%)         9 (15%)            111         14 (25%)         11 (19%)            11V         5 (9%)         4 (7%)            No residual tumour or lymph-node metastasis         7 (13%)         9 (15%)            Mortality             0.590           30-day mortality         0 (0%)         1 (2%)	Total lymph nodes retrieved*	21 (7-47)	20 (3-44)	0.852
R0       47 (84%)       54 (92%)          R1       5 (9%)       1 (2%)          pStage¶       0.943        0.943         0       0 (0%)       1 (2%)          I       4 (7%)       4 (7%)          Ila       16 (29%)       17 (29%)          Ilb       6 (11%)       9 (15%)          Ill       14 (25%)       11 (19%)          IV       5 (9%)       4 (7%)          No residual tumour or lymph-node metastasis       7 (13%)       9 (15%)          Mortality         00(0%)       1 (2%)        0.590         30-day mortality       0 (0%)       1 (2%)	Resection margin§			0.080
R1     5 (9%)     1 (2%)        pStage¶     0.943       0     0 (0%)     1 (2%)        I     4 (7%)     4 (7%)        Ila     16 (29%)     17 (29%)        Ilb     6 (11%)     9 (15%)        III     14 (25%)     11 (19%)        IV     5 (9%)     4 (7%)        No residual tumour or lymph-node metastasis     7 (13%)     9 (15%)        Mortality       0 (0%)     1 (2%)        30-day mortality     0 (0%)     1 (2%)	RO	47 (84%)	54 (92%)	
pStage¶         0.943           0         0 (0%)         1 (2%)            I         4 (7%)         4 (7%)            Ila         16 (29%)         17 (29%)            Ilb         6 (11%)         9 (15%)            III         14 (25%)         11 (19%)            IV         5 (9%)         4 (7%)            No residual tumour or lymph-node metastasis         7 (13%)         9 (15%)            Mortality           0 (0%)         1 (2%)          0 590           30-day mortality         0 (0%)         1 (2%)	R1	5 (9%)	1 (2%)	
0         0 (0%)         1 (2%)            I         4 (7%)         4 (7%)            Ila         16 (29%)         17 (29%)            Ilb         6 (11%)         9 (15%)            III         14 (25%)         11 (19%)            IV         5 (9%)         4 (7%)            No residual tumour or lymph-node metastasis         7 (13%)         9 (15%)            Mortality           0 (0%)         1 (2%)            J0-day mortality         0 (0%)         1 (2%)	pStage¶			0.943
I     4 (7%)     4 (7%)        Ila     16 (29%)     17 (29%)        Ilb     6 (11%)     9 (15%)        Ill     14 (25%)     11 (19%)        IV     5 (9%)     4 (7%)        No residual tumour or lymph-node metastasis     7 (13%)     9 (15%)        Mortality       0 (0%)     1 (2%)        30-day mortality     0 (0%)     1 (2%)	0	0 (0%)	1 (2%)	
IIa     16 (29%)     17 (29%)        IIb     6 (11%)     9 (15%)        III     14 (25%)     11 (19%)        IV     5 (9%)     4 (7%)        No residual tumour or lymph-node metastasis     7 (13%)     9 (15%)        Mortality       0 (0%)     1 (2%)        30-day mortality     0 (0%)     1 (2%)	1	4 (7%)	4 (7%)	
IIb         6 (11%)         9 (15%)            III         14 (25%)         11 (19%)            IV         5 (9%)         4 (7%)            No residual tumour or lymph-node metastasis         7 (13%)         9 (15%)            Mortality           0 (0%)         1 (2%)            30-day mortality         0 (0%)         1 (2%)	lla	16 (29%)	17 (29%)	
III         14 (25%)         11 (19%)            IV         5 (9%)         4 (7%)            No residual tumour or lymph-node metastasis         7 (13%)         9 (15%)            Mortality           0590             30-day mortality         0 (0%)         1 (2%)            In-hospital mortality         1 (2%)         2 (3%)	IIb	6 (11%)	9 (15%)	
IV     5 (9%)     4 (7%)        No residual tumour or lymph-node metastasis     7 (13%)     9 (15%)        Mortality       0 (0%)     1 (2%)        30-day mortality     0 (0%)     1 (2%)        In-hospital mortality     1 (2%)     2 (3%)	ш	14 (25%)	11 (19%)	
No residual tumour or lymph-node metastasis         7 (13%)         9 (15%)            Mortality           0.590         0.590           30-day mortality         0 (0%)         1 (2%)            In-hospital mortality         1 (2%)         2 (3%)	IV	5 (9%)	4 (7%)	
Mortality           0.590           30-day mortality         0 (0%)         1 (2%)            In-hospital mortality         1 (2%)         2 (3%)	No residual tumour or lymph-node metastasis	7 (13%)	9 (15%)	
30-day mortality         0 (0%)         1 (2%)            In-hospital mortality         1 (2%)         2 (3%)	Mortality			0.590
In-hospital mortality 1 (2%) 2 (3%) ···	30-day mortality	0 (0%)	1 (2%)	
	In-hospital mortality	1 (2%)	2 (3%)	

Biere SS et al. Lancet 2012;379:1887-1892



Straatman J et al. Annals of Surgery 2017





#### **RAMIE vs OPEN: ROBO Trial**



Van der Sluis PC. Ann Surg 2019;269:621-630

#### **MIE vs OPEN: Meta-analysis**

	Mortality				Morbidity		
Study ID		OR (95% Cl)	% Weight	Study ID		OR (95% CI)	% Weight
Nguyen 2000		0.64 (0.02, 16.49)	0.45	Osugi 2003		0.80 (0.41, 1.57)	2.50
Braghetto 2006		0.61 (0.17, 2.24)	2.93	Van den Broek 2004		0.14 (0.03, 0.74)	1.17
Shiraishi 2006		0.35 (0.10, 1.22)	3.24	Braghetto 2006		0.41 (0.20, 0.81)	3.33
Smithers 2007		0.80 (0.20, 3.13)	1.97	Smithers 2007		0.83 (0.53, 1.30)	5 64
Benzoni 2007	*	0.44 (0.02, 12.01)	0.53	Fabian 2008		0.83 (0.27, 2.54)	0.88
Fabian 2008	*	0.46 (0.05, 4.43)	1.16	Parameswaran 2000	1	0.92 (0.37, 2.34)	1 20
Saha 2009	*	0.32 (0.01, 7.12)	0.81	Saha 2000	les l	0.95 (0.10 2.07)	0.47
Zingg 2009		0.57 (0.11, 2.91)	1.89	Sana 2009		0.65 (0.16, 3.97)	4.07
Pham 2010		1.61 (0.26, 10.13)	0.82	Zingg 2009		2.00 (0.96, 4.20)	1.2/
Safranek 2010	*	1.88 (0.19, 18.58)	0.54	Pham 2010		2.39 (0.96, 5.99)	0.79
Schr?der 2010		0.47 (0.18, 1.23)	5.46	Perry 2010		0.38 (0.09, 1.55)	0.86
Berger 2011		1.02 (0.26, 4.01)	1.83	Berger 2011		0.60 (0.29, 1.25)	2.44
Lee 2011		0.40 (0.11, 1.40)	3.65	Nafteux 2011		1.37 (0.71, 2.65)	2.04
Nafteux 2011		1.57 (0.22, 11.44)	0.68	Yamasaki 2011		0.57 (0.31, 1.03)	3.87
Yamasaki 2011		0.19 (0.01, 4.06)	1.13	Maas 2012	- + · ·	0.37 (0.17, 0.84)	2.53
Biere 2012		2.95 (0.30, 29.20)	0.44	Briez 2012		0.38 (0.24, 0.62)	7.06
Maas 2012		0.33 (0.01, 8.21)	0.67	Kinjo 2012		0.48 (0.26, 0.88)	4.02
Briez 2012		0.19 (0.04, 0.88)	4.44	Sundaram 2012		0.58 (0.25, 1.31)	1.98
Mamidanna 2012	-	0.92 (0.67, 1.26)	36.48	Tsujimoto 2012	-	0.99 (0.32, 3.12)	0.78
Sihag 2012		0.39 (0.02, 8.26)	0.75	Ichikawa 2013		0.64 (0.40, 1.02)	5.70
Sundaram 2012		2.49 (0.22, 28.34)	0.39	Parameswaran 2013		0.98 (0.34, 2.82)	0.92
Tsujimoto 2012 -		0.21 (0.02, 1.95)	1.93	Takeno 2013		1.05 (0.63, 1.77)	3.70
Javidtar 2012	-	0.76 (0.19, 3.02)	2.18	Kubo 2014		0.81 (0.46, 1.44)	3.46
Bailey 2013		0.78 (0.10, 5.90)	0.95	Schneider 2014		2 15 (0 71 6 57)	0.52
Ichikawa 2013		0.06 (0.00, 1.05)	3.68	Deiko 2015		0.83 (0.30, 2.34)	1.04
Kitagawa 2013		2.14 (0.19, 24.45)	0.42	Kauppi 2015		0.65 (0.30, 2.34)	9.07
Noble 2013		1.00 (0.06, 16.42)	0.44	Gao 2011		0.56 (0.34, 1.23)	3.07
Parameswaran 2013		0.84 (0.08, 8.61)	0.67	Shop 2012		1 12 (0 58 2 16)	2 22
Fakeno 2013		0.46 (0.15, 1.44)	4.5/	01012012		1.12 (0.06, 2.16)	0.77
Schoelder 2014		0.64 (0.07, 3.82)	0.54	LIU 2012		0.51 (0.27, 0.95)	3.//
Gao 2011		0.67 (0.03, 13.27)	1.46	Mao 2012		0.96 (0.38, 2.46)	1.18
Shop 2012		0.33 (0.03, 3.27)	0.60	Wang 2012		0.65 (0.46, 0.91)	11.22
Liu 2012		0.35 (0.04, 3.43)	1 20	MU 2014	and the second se	1.03 (0.56, 1.90)	2./1
Wang 2012		0.22 (0.05, 1.00)	4 39	Meng 2014		0.40 (0.22, 0.75)	4.15
MU 2014		0.81 (0.05, 13.00)	0.50	Chen 2015		0.65 (0.29, 1.47)	1.92
Meng 2014 -		0.23 (0.03, 2.08)	1.83	Yang 2015		0.44 (0.21, 0.92)	2.85
112015	-	0.66 (0.19, 2.31)	3.04	Li 2015		0.74 (0.46, 1.21)	5.08
Overall (I-squared = 0.0%, p = 0.944)	0	0.67 (0.54, 0.83)	100.00	Overall (I-squared = 38.5%, p = 0.0	012)	0.70 (0.63, 0.78)	100.00
oreran (roquinda = c.o.o, p = c.o.o)	Ť	0.07 (0.04, 0.00)	100.00		2		
.00343	1	291		.0269	1	37.2	
3 8% (124/137	9) MIE vs 4 5%	(437/9753)	OF	41% (1206/2	907) MIE vs 4	8% (1486/308/	4) OF
5.0/0 (124/45/	$\frac{3}{100} = \frac{3}{100} = \frac{3}{100}$	(-57)5755)				0/0 (1+00/ 500-	, 01
OR=0.668, 95%	SCI=0.5-0.8, p<	0.05		OR=0.7, 95%	CI=0.6-0.8, p<	0.05	

Yibulayin W et al. World Journal of Surgical Oncology 2016



#### **Gastric Perfusion**



- Critical for healing of any anastomosis
- Acutely impaired during esophagectomy
- Lacking reliable assessment tools



#### No demarcation





# **Tip demarcation**





Memorial Sloan Kettering Cancer Center

#### Minimally invasive Ivor Lewis esophagectomy in 10 steps TCVS

Caitlin Harrington, MD • Daniela Molena, MD 🔗 🖂

TECHNIQUES

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#### MSK data on 778 patients after trimodality

- Better OS and DFS with higher number of nodes removed, especially in downstaged patients
- For patients with minimal response the improvement peaked with 20-25 nodes removed



## Number and location of lymph nodes





## Can we predict lymphatic drainage?

- 9 patients
- ICG injected at 4 quadrants around tumor
- 88.9% left gastric a.
- 11.1% diaphragmatic nodes
- 33.3% positive nodes all identified within first basin





https://www.mskcc.org/pdf/cancer-care/patient-education/minimally-invasive-esophagectomy-pathway

#### **Minimally Invasive Esophagectomy Pathway**

Surgery date: \_\_\_\_\_ Expected discharge date: \_\_\_\_\_

These are goals for your recovery. Your experience may not follow this pathway exactly. Your doctor or nurse will tell you what to expect.

	Before Surgery	Day of Surgery	Day 1 After Surgery
What should I do?	<ul> <li>Buy a wedge pillow.</li> <li>From now until surgery, exercise 30 minutes (such as walking 1 mile) every day.</li> <li>Brush your teeth after you eat.</li> <li>Stop smoking 2 or more weeks before surgery.</li> <li>Plan your ride home after surgery.</li> <li>The night before surgery:</li> <li>Wash with Hibiclens<sup>*</sup></li> </ul>	<ul> <li>Wash with Hibiclens in the morning.</li> <li>Brush your teeth.</li> </ul>	<ul> <li>Raise the head of your bed to 30 degrees.</li> <li>Use your incentive spirometer 10 times each hour you're awake.</li> <li>Do coughing &amp; deep breathing exercises.</li> <li>Sit up in your chair.</li> <li>Walk 5 laps around the nursing unit.</li> <li>Brush your teeth and use mouth rinses 3 or more times a day.</li> <li>Learn about caring for your incisions and feeding tube.</li> </ul>
What tests, procedures, and medical devices should I expect?	<ul> <li>Presurgical testing appointment:</li> <li>Bring a list of all medications you take.</li> <li>Your nurse practitioner may order more tests or appointments.</li> </ul>	<ul> <li>Placed before surgery:</li> <li>Intravenous (IV) line</li> <li>Compression boots</li> <li>Placed during surgery:</li> <li>Chest tubes</li> <li>Feeding tube</li> <li>Urinary (Foley<sup>®</sup>) catheter</li> <li>Nasogastric (NG) tube</li> </ul>	<ul> <li>Chest tubes</li> <li>NG tube</li> <li>Fluids in your IV line</li> <li>Chest x-ray</li> <li>Blood tests</li> <li>Weight measurement</li> <li>Urinary catheter may be removed</li> </ul>



# **Nutrition Optimization**

sophagectomy Post-Operative Day 2 Feeding Algorithm [3 (	orders of 4 are selected]				
Requested For	ck to use algorithm>	Linkstone (Linkston Coast Data (ad se			
Aduit Pormuia:	J-Tube (Jejunostomy Tube)	30	1 C		
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Order         Reas           Image: Consult         Patien	on: nt on Post-Esophagectomy				
Order □ I TPN Consult (Inpatient) ☑ I Esophagectomy Feeding Protocol	Esophagectomy Tube Feeding Algori Esoph Day 2	agectomy Post-Operative 2 Tube Feeding Algorithm			
	Hemodynamically Stable?	⊙ Yes O No			
	Glucose > 200	⊖ Yes ⊙ No			
	K+ > 5	⊖ Yes ⊙ No	Carr R. M	Iolena D. Cance	r
	Osmolite 1.5		Medicine	In Press	-
	POD 2: Initiate tube feeding	s at 30 ml per hour for 24 hours	Wiedichie		
	POD 3: Increase tube feedin	g rate by 10 ml every 8 hours to 50 ml/hour x 24 ho	urs		
Drug Info	Thereafter, refer to Clinical recommendations for advar	Dietitian nutrition assessment for patient-specific neement to 24-hour tube feeding and cycled tube fe	eding		
	goal rates		_		
		Median (IQR)	Pre	Post	p-value
		Length of Stay	10 (8-13)	8 (7-11)	0.003
		Wt Loss at FU	4 (0.8-6.6)	3 (0.2-4.9)	0.014
		Days to CLD	8 (6-11)	7 (6-8)	0.001
		Days to Feeding Tube	29 (21-48)	25 (19-39)	0.03 <sub>31</sub>

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#### **Post-operative Recovery Tracker**







#### Conclusions

- Technology has been integral part of surgery
- Pre- and post-operative tools for patients' engagement can form a winning partnership
- Tools for intra-operative imaging need to be further developed
- Partnership with industry can help improve the outcomes of surgery



# Thank you!

Email: <u>molenad@mskcc.org</u> Twitter: @Daniela\_Molena @MSK\_Thoracic





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