

Table 1: Patient demographics.

Variables	Overall			Single/Double Graft(s) Group 1			Multivessel Group 2		
	MICS (N=111)	MS (N=111)	p-value	MIDCAB ^a (N=60)	MS (N=60)	p-value	MICS (N=51)	MS (N=51)	p-value
Age, mean (sd)	60.35 (10.14)	60.03 (9.04)	0.802	59.62 (10.11)	59.53 (10.10)	0.964	61.22 (10.20)	60.61 (7.66)	0.734
Male (%)	96 (86.5)	97 (87.4)	1	50 (83.3)	50 (83.3)	1	46 (90.2)	47 (92.2)	1
Race (%)			0.036			0.365			0.040
Chinese	78 (70.3)	61 (55.0)		40 (66.7)	32 (53.3)		38 (74.5)	29 (56.9)	
Indian	14 (12.6)	24 (21.6)		7 (11.7)	17 (28.3)		7 (13.7)	7 (13.7)	
Malay	15 (13.5)	24 (21.6)		10 (16.7)	11 (18.3)		5 (9.8)	13 (25.5)	
Others	4 (3.6)	2 (1.8)		3 (5.0)	0 (0.0)		1 (2.0)	2 (3.9)	
Smokers (%)	53 (47.7)	70 (63.1)	0.031	28 (46.7)	35 (58.3)	0.273	25 (49.0)	35 (68.6)	0.07
Diabetes (%)	47 (42.3)	50 (45.0)	0.787	24 (40.0)	23 (38.3)	1	23 (45.1)	27 (52.9)	0.552
Hypertension (%)	80 (72.1)	84 (75.7)	0.647	44 (73.3)	46 (76.7)	0.833	36 (70.6)	38 (74.5)	0.824
Hyperlipidaemia (%)	92 (82.9)	98 (88.3)	0.339	51 (85.0)	50 (83.3)	1	41 (80.4)	48 (94.1)	0.075
Renal disease (%)	9 (8.1)	5 (4.5)	0.407	8 (13.3)	2 (3.3)	0.099	1 (2.0)	3 (5.9)	0.610
COPD (%)	4 (3.6)	1 (0.9)	0.366	1 (1.7)	1 (1.7)	1	3 (5.9)	0 (0.0)	0.241
Cerebrovascular disease (%)	14 (12.6)	12 (10.8)	0.835	10 (16.7)	3 (5.0)	0.078	4 (7.8)	9 (17.6)	0.235
Previous PCI (%)	34 (30.6)	41 (36.9)	0.395	16 (26.7)	22 (36.7)	0.326	18 (35.3)	19 (37.3)	1
Peripheral vascular disease (%)	4 (3.6)	8 (7.2)	0.373	3 (5.0)	5 (8.3)	0.714	1 (2.0)	3 (5.9)	0.61
Ejection fraction, mean (sd)	55.21 (10.59)	53.23 (11.50)	0.185	56.53 (10.80)	53.85 (11.22)	0.189	53.69 (10.24)	52.51 (11.89)	0.594
Ejection fraction category (%)			0.144			0.160			0.513
Good [≥50%]	80 (72.7)	80 (72.1)		48 (81.4)	44 (73.3)		33 (64.7)	36 (70.6)	
Fair [30-49%]	20 (18.2)	29 (26.1)		9 (15.3)	15 (25.0)		11 (21.6)	14 (27.5)	
Poor [<30%]	3 (2.7)	2 (1.8)		2 (3.4)	1 (1.7)		1 (2.0)	1 (2.0)	
Preoperative IABP (%)	0 (0.0)	3 (2.7)	0.245	0 (0.0)	1 (1.7)	1	0 (0.0)	2 (3.9)	0.475
Preoperative NYHA 2 and above (%) ^b	55 (49.5)	60 (54.1)	0.591	29 (48.3)	30 (50.0)	1	26 (51.0)	30 (58.8)	0.551

EuroSCORE II, mean (sd)	1.20 (0.61)	1.18 (0.63)	0.846	1.25 (0.69)	1.24 (0.69)	0.936	1.14 (0.50)	1.12 (0.56)	0.825
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^a MIDCAB patients were matched to MS patients with single or double vessel CABG with the same age, gender and EuroSCORE II.

^b Excluded 7 patients with missing information

Table 2: Procedure and intraoperative data.

Variables	Overall			Single/Double Graft(s) Group 1			Multivessel Group 2		
	MICS (N=111)	MS (N=111)	p- value	MIDCAB ^a (N=60)	MS (N=60)	p- value	MICS (N=51)	MS (N=51)	p- value
Number of grafts (%)			0.001			<0.001			1
1	60 (54.1)	34 (30.6)		60 (100.0)	34 (56.7)		0 (0.0)	0 (0.0)	
2	38 (34.2)	64 (57.7)		0 (0.0)	26 (43.3)		38 (74.5)	38 (74.5)	
3	13 (11.7)	13 (11.7)		0 (0.0)	0 (0.0)		13 (25.5)	13 (25.5)	
Operative urgency (%)			0.004			0.013			0.119
Elective	96 (86.5)	78 (70.3)		54 (90.0)	43 (71.7)		42 (82.4)	35 (68.6)	
Urgent	15 (13.5)	33 (29.7)		6 (10.0)	17 (28.3)		9 (17.6)	15 (31.4)	
CABG Category (%)			<0.001			<0.001			<0.001
Off-pump	54 (48.6)	33 (29.7)		50 (84.7)	24 (40.0)		4 (8.9)	9 (17.6)	
On-pump beating	33 (31.7)	8 (7.2)		9 (15.3)	5 (8.3)		24 (53.3)	3 (5.9)	
Cardioplegic arrest	17 (16.3)	70 (63.1)		0 (0.0)	31 (51.7)		17 (37.8)	39 (76.5)	
Cardiopulmonary bypass duration, mean (sd)	135.17 (61.75)	107.28 (54.22)	0.009	101.14 (42.27)	92.58 (54.86)	0.699	140.98 (63.05)	119.88 (50.98)	0.097
Aortic cross clamp duration, mean (sd)	70.88 (28.51)	54.93 (21.08)	0.011	-	44.65 (18.90)	-	63.10 (19.25)	70.88 (28.51)	0.237
Length of procedure, mean (sd)	284.99 (86.83)	244.24 (65.01)	<0.001	235.95 (62.70)	229.38 (64.28)	0.574	349.29 (70.80)	261.73 (62.02)	<0.001

^a MIDCAB patients were matched to MS patients with single or double vessel CABG with the same age, gender and EuroSCORE II.

Table 3: Transfusion and laboratory data

Variables	Overall			Single/Double Graft(s) Group 1			Multivessel Group 2		
	MICS (N=111)	MS (N=111)	p-value	MIDCAB ^a (N=60)	MS (N=60)	p-value	MICS (N=51)	MS (N=51)	p-value
Number of patients who received packed red cells intraoperatively (%) ^b	6 (5.8)	11 (9.9)	0.383	0 (0.0)	5 (8.3)	0.071	6 (13.3)	6 (11.8)	1
Packed red cells transfusion volume in ml, mean (sd) ^b	416.67 (129.10)	477.27 (175.17)	0.47	0	500.0 (176.78)	-	416.67 (129.10)	458.33 (188.19)	0.664
Number of patients who received platelets intraoperatively (%) ^b	24 (21.6)	16 (14.4)	0.222	4 (6.7)	4 (6.7)	1	20 (39.2)	12 (23.5)	0.135
Platelets transfusion volume in ml, mean (sd) ^b	261.9 (109.3)	312.8 (122.5)	0.177	289.3 (45.9)	321.8 (63.2)	0.437	256.4 (118.1)	309.8 (139.0)	0.256
Number of patients who received fresh frozen plasma intraoperatively (%) ^b	13 (12.5)	9 (8.1)	0.403	3 (5.1)	4 (6.7)	1	10 (22.2)	5 (9.8)	0.164
Fresh frozen plasma transfusion volume in ml, mean (sd) ^b	615.38 (674.04)	500.00 (125.00)	0.62	583.33 (381.88)	562.50 (125.00)	0.921	625.00 (756.91)	450.00 (111.80)	0.622
Difference in haemoglobin pre and post operation, mean (sd) ^c	2.22 (1.81)	3.08 (2.01)	0.002	1.59 (1.47)	3.18 (2.00)	<0.001	3.18 (1.86)	2.96 (2.03)	0.613
Difference in creatinine pre and post operation, mean (sd) ^d	-8.0 (22.9)	-11.4 (20.5)	0.278	-5.1 (29.2)	-12.0 (24.5)	0.187	-11.8 (10.1)	-10.7 (15.2)	0.708
Postoperative lactate, mean (sd) ^e	2.44 (1.89)	2.69 (1.99)	0.403	1.96 (1.06)	2.57 (2.10)	0.072	3.06 (2.48)	2.81 (1.90)	0.634

^a MIDCAB patients were matched to MS patients with single or double vessel CABG with the same age, gender and EuroSCORE II.

^b 7 patients with missing intraoperative transfusion information.

^c Excluded 17 patients who received intraoperative packed red cell transfusion and 10 patients with missing laboratory data.

^d Excluded 17 patients with missing laboratory data.

^e Excluded 55 patients with Missing laboratory data

Table 4: Postoperative outcomes of matched pairs.

Variables	Overall			Single/Double Graft(s) Group 1			Multivessel Group 2		
	MICS (N=111)	MS (N=111)	p-value	MIDCAB ^a (N=60)	MS (N=60)	p-value	MICS (N=51)	MS (N=51)	p-value
n	111	111		60	60		51	51	
Postoperative length of stay, mean (sd)*	6.5 (2.5)	7.5 (3.5)	<0.001	6 (3.0)	7.5 (3.0)	0.013	6.0 (1.5)	7.5 (4.0)	0.011
Reopening (%)	2 (1.8)	5 (4.5)	0.450	0 (0.0)	2 (3.3)	0.480	2 (3.9)	3 (5.9)	1
Permanent pacemaker (%)	0 (0.0)	2 (1.8)	0.480	0 (0.0)	2 (3.3)	0.480	0 (0.0)	0 (0.0)	1
New onset atrial fibrillation (%)	6 (5.8)	12 (10.9)	0.268	3 (5.1)	4 (6.8)	1	3 (6.7)	8 (15.7)	0.288
Postoperative IABP (%)	4 (3.6)	1 (0.9)	0.371	3 (5.9)	0 (0.0)	0.248	1 (1.7)	1 (1.7)	1
Neurological complications^b (%)	0 (0.0)	2 (1.8)	0.480	0 (0.0)	1 (1.7)	1	0 (0.0)	1 (2.0)	1
Surgical site infections (%)	1 (1.1)	1 (0.9)	1	1 (1.8)	0 (0.0)	1	0 (0.0)	1 (2.0)	1
Non-surgical site infections^c (%)	3 (2.7)	6 (5.4)	0.505	1 (1.7)	2 (3.3)	1	2 (3.9)	4 (7.8)	0.683
Prolonged ventilation ^d (%)	0 (0.0)	6 (5.4)	0.041	0 (0.0)	4 (6.7)	0.134	0 (0.0)	2 (3.9)	0.480
Pneumonia (%)	2 (2.2)	3 (2.7)	1	1 (1.8)	1 (1.7)	1	1 (2.8)	2 (3.9)	1
Pleural effusion requiring drainage (%)	5 (4.8)	4 (3.6)	0.931	4 (6.8)	2 (3.4)	0.675	1 (2.2)	2 (3.9)	1
Acute renal injury (%)	2 (1.8)	3 (2.7)	1	1 (1.7)	1 (1.7)	1	1 (2.0)	2 (3.9)	1
30-day mortality (%)	0 (0.0)	2 (1.8)	0.480	0 (0.0)	0 (0.0)	1	0 (0.0)	2 (3.9)	0.480

*Rounded to nearest half-day

^a MIDCAB patients were matched to MS patients with single or double vessel CABG with the same age, gender and EuroSCORE II.

^b comprises for permanent stroke, TIA, delirium

^c UTI or sepsis

^d Prolonged ventilation defined as ventilation > 24 hours postoperatively

Table 5: Long-term outcomes

Variables	Overall			Single/Double Graft(s) Group 1			Multivessel Group 2		
	MICS (N=111)	MS (N=111)	p- value	MIDCAB ^a (N=60)	MS (N=60)	p- value	MICS (N=51)	MS (N=51)	p- value
1-year mortality (%)	2 (1.8)	2 (1.8)	1	2 (3.3)	0 (0.0)	0.480	0 (0.0)	2 (3.9)	0.480
One-Year NYHA 2 and above (%) ^b	2 (2.0)	11 (10.1)	0.030	1 (1.8)	6 (10.0)	0.136	1 (2.2)	5 (10.2)	0.246
Post op PCI reintervention (%) ^b	0 (0.0)	1 (0.9)	1	0 (0.0)	1 (1.7)	1	0 (0.0)	0 (0.0)	1
Post op myocardial infarction (%) ^b	0 (0.0)	1 (0.9)	1	0 (0.0)	1 (1.7)	1	0 (0.0)	0 (0.0)	1
Post op heart failure (%) ^b	0 (0.0)	2 (1.8)	0.389	0 (0.0)	1 (3.4)	0.38	0 (0.0)	0 (0.0)	1

^a MIDCAB patients were matched to MS patients with single or double vessel CABG with the same age, gender and EuroSCORE II.

^b Excluded 11 patients who have yet to been followed up 2-years postoperatively, were lost of follow-up, or had missing information

Figure 1: Pie chart showing the composition of CABG.

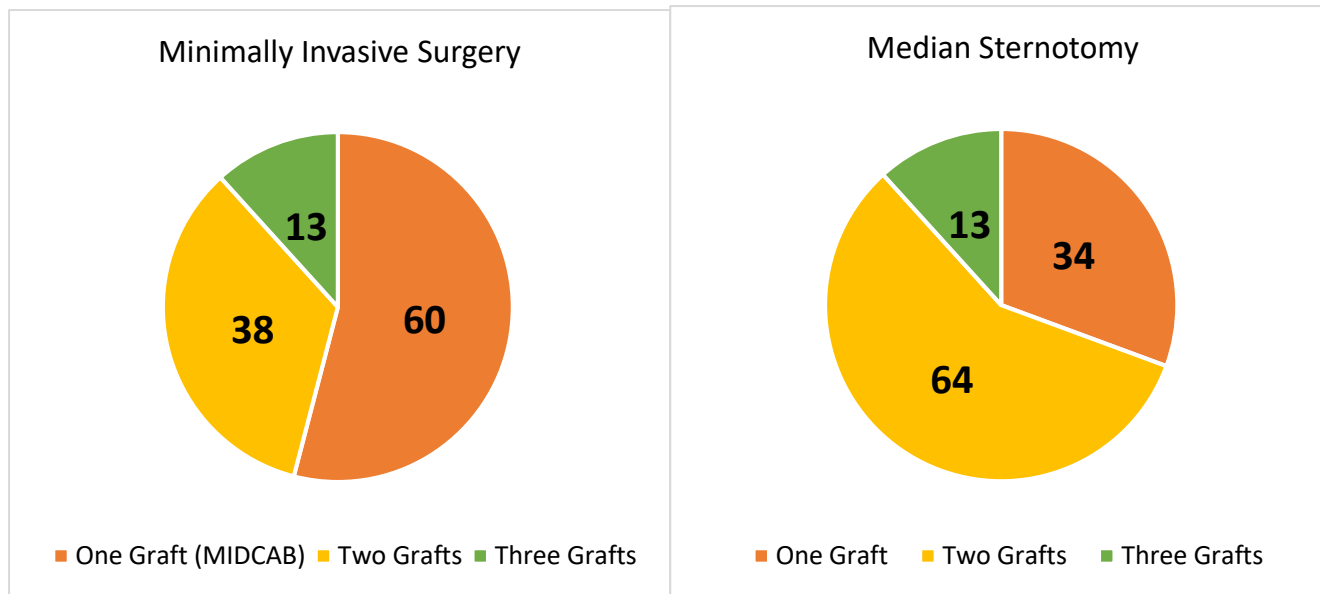


Figure 2: Kaplan-Meier curve showing the survival probability between the minimally invasive group versus the open sternotomy group.

