

Supplemental Materials

Full title:

A minimally invasive, translational method to deliver hydrogels to the heart through the pericardial space

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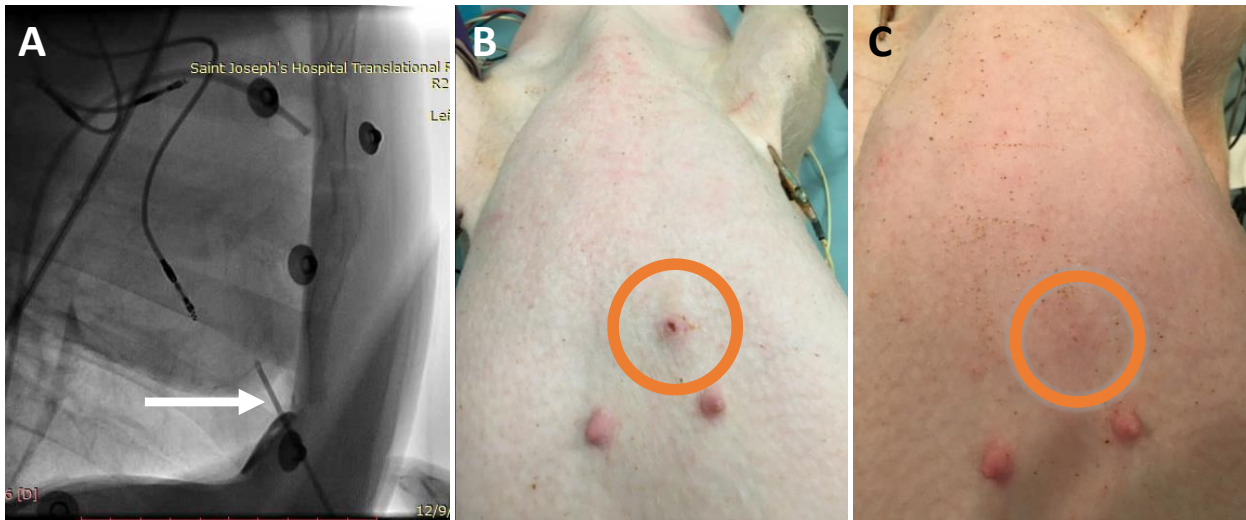
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Figure:



Supplemental Figure 1: Percutaneous sub-xiphoid pericardial access was minimally invasive leaving undetectable scar after 2 weeks. The pericardial space was accessed by micro-puncture needle from a sub-xiphoid approach (A). Needle (A, arrow) was guided by fluoroscopy placed in extreme lateral position. After 1 (B) and 2 (C) weeks, external scar had healed in all pigs (n=9). Animals were immediately mobile after the procedure.

Tables:

Supplemental Table 1: Invasive hemodynamic parameters before gel placement, immediately after gel placement, and after 4-6 weeks. Invasive hemodynamic measurements showed no elevation in heart rate nor filling pressures to suggest elevated pericardial pressure, constriction, nor tamponade.

	Heart rate (bpm)	Right atrial (mmHg)	RV peak (mmHg)	RV diastolic (mmHg)	Wedge (mmHg)	LV peak (mmHg)	LV diastolic (mmHg)
	mean SD	mean SD	mean SD	mean SD	mean SD	mean SD	mean SD
Pre-gel	92.8 ± 17.4	4.6 ± 2.3	21.1 ± 4.6	2.8 ± 2.4	7.9 ± 1.8	68.0 ± 5.8	6.6 ± 1.6
Post-gel, acute	76.6 ± 16.8	6.3 ± 1.4	23.8 ± 5.1	4.3 ± 2.8	8.5 ± 2.5	65.6 ± 4.5	6.7 ± 1.5
Post-gel, 4-6 weeks	78.8 ± 16.1	5.6 ± 1.8	23.1 ± 3.6	3.0 ± 2.5	7.6 ± 2.9	69.4 ± 3.9	5.5 ± 2.8
	95% CI	95% CI	95% CI	95% CI	95% CI	95% CI	95% CI
Pre-gel	78.2-107.3	2.7-6.6	17.3-25.0	0.8-4.7	6.4-9.4	62.7-73.3	5.2-8.0
Post-gel, acute	62.5-90.7	5.1-7.4	19.4-28.1	1.9-6.6	6.5-10.6	61.4-69.8	5.5-8.0
Post-gel, 4-6 weeks	65.3-92.26	4.2-7.1	20.2-26.1	0.9-5.1	5.2-10.1	65.8-73.0	3.2-7.8

Supplemental Table 2: White blood cell counts and serum markers of liver and kidney function 4 weeks after gel placement. Total white blood cell count, lymphocyte count, and neutrophil count remain stable or decline in all animals suggesting no overt inflammatory response. Liver and kidney function serum markers are stable after pericardial hydrogel delivery.

Animal ID	White blood cell count (x 10 ⁹ /L)					Lymphocytes (x 10 ⁹ /L)					Neutrophils (x 10 ⁹ /L)				
	Baseline	2 weeks	Δ from baseline	4 weeks	Δ from baseline	Baseline	2 weeks	Δ from baseline	4 weeks	Δ from baseline	Baseline	2 weeks	Δ from baseline	4 weeks	Δ from baseline
1	23.1	17.3	-5.8	11.2	-11.9	13.9	8.5	-5.4	4.6	-9.3	8.1	7.6	-0.5	6.1	-2
2	11.9	12.7	0.8	12.4	0.5	6.7	6.4	-0.3	6.3	-0.4	4.7	6	1.3	5.2	0.5
3	17.28	15.74	-1.54	13.49	-3.79	9.55	10.56	1.01	9.02	-0.53	7.64	5.09	-2.55	4.37	-3.27
4	12.93	9.37	-3.56	9.79	-3.14	8.51	5.91	-2.6	6.58	-1.93	4.36	3.36	-1	3.16	-1.2
5	15.69	11.32	-4.37	11.6	-4.09	10.78	5.45	-5.33	6.36	-4.42	4.82	4.76	-0.06	3.86	-0.96
6	15.75	14.18	-1.57	16.49	0.74	10.04	9.51	-0.53	16.49	6.45	5.64	4.61	-1.03	7.97	2.33
7	10.07	10.38	0.31	10.09	0.02	7.71	7.24	-0.47	6.75	-0.96	2.29	3.07	0.78	3.28	0.99
8	7.58	6.49	-1.09	8.13	0.55	3.72	6.49	2.77	5.33	1.61	2.97	1.6	-1.37	2.27	-0.7
mean	14.3	12.2	-2.1	11.6	-2.6	8.9	7.5	-1.4	7.7	-1.2	5.1	4.5	-0.6	4.5	-0.5
SD	4.49	3.31	2.14	2.39	4.00	2.82	1.71	2.71	3.54	4.24	1.90	1.73	1.15	1.72	1.65

Animal ID	Alanine aminotransferase (U/L)					Total bilirubin (mg/dL)					Creatinine (mg/dL)				
	Baseline	2 weeks	Δ from baseline	4 weeks	Δ from baseline	Baseline	2 weeks	Δ from baseline	4 weeks	Δ from baseline	Baseline	2 weeks	Δ from baseline	4 weeks	Δ from baseline
1	34	36	2	26	-8	0.1	0.1	0	0.1	0	0.9	1	0.1	1	0.1
2	56	49	-7	49	-7	0.1	0.1	0	0.1	0	1.2	1.1	-0.1	1.3	0.1
3	44	49	5	43	-1	0.3	0.2	-0.1	0.2	-0.1	1.8	1.4	-0.4	1.8	0
4	43	42	-1	43	0	0.3	0.3	0	0.3	0	1	1.7	0.7	1.6	0.6
5	64	61	-3	75	11	0.2	0.2	0	0.2	0	2.4	1.7	-0.7	2.2	-0.2
6	56	74	18	65	9	0.2	0.2	0	0.2	0	1.6	1.8	0.2	1.5	-0.1
7	53	71	18	61	8	0.2	0.2	0	0.2	0	1.1	1.4	0.3	1.4	0.3
8	49	47	-2	94	45	0.4	0.2	-0.2	0.2	-0.2	2	1.7	-0.3	1.7	-0.3
mean	49.9	53.6	3.8	57.0	7.1	0.2	0.2	0.0	0.2	0.0	1.5	1.5	0.0	1.6	0.1
SD	8.80	12.77	8.86	19.97	15.81	0.10	0.06	0.07	0.06	0.07	0.50	0.28	0.41	0.34	0.27