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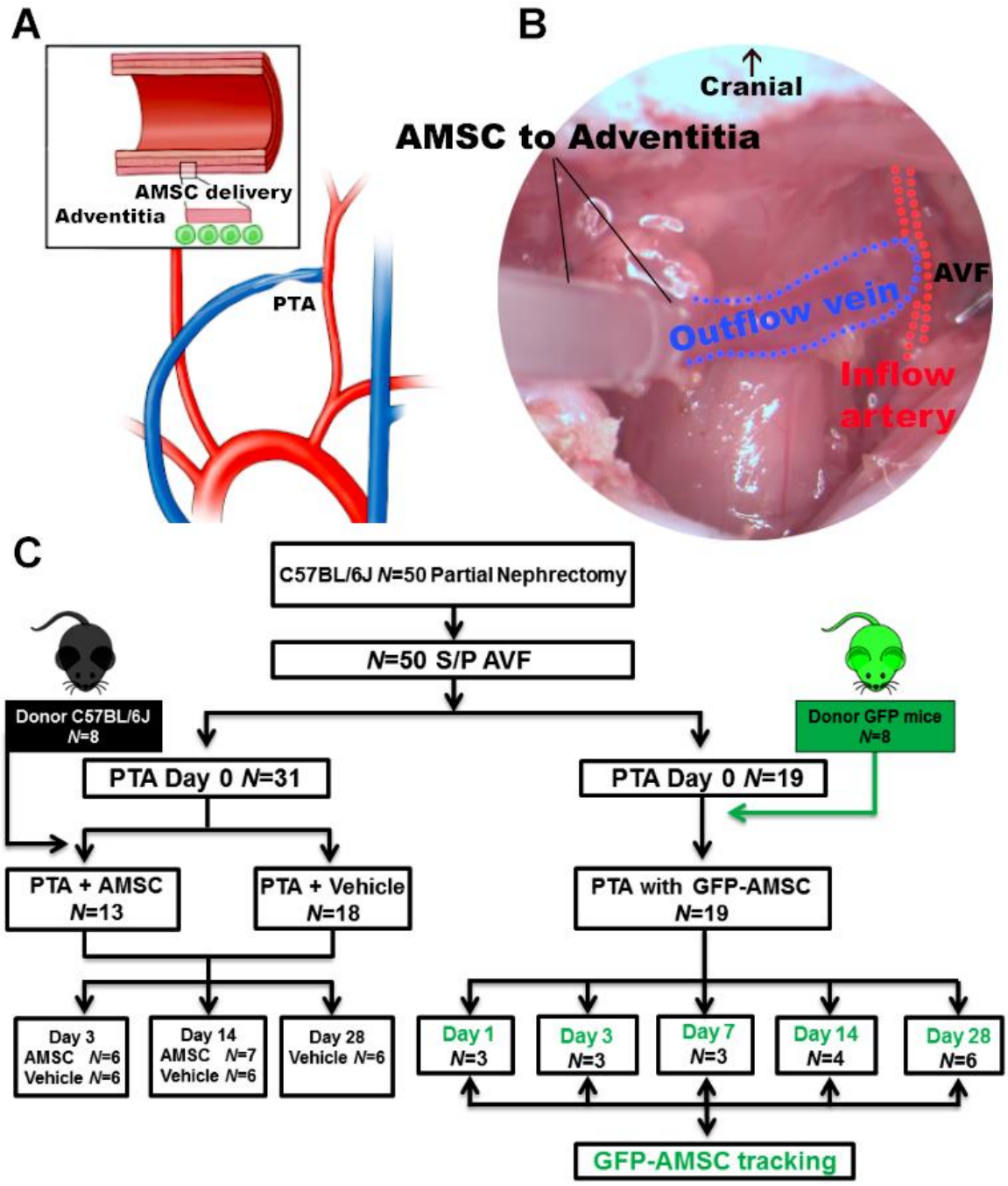
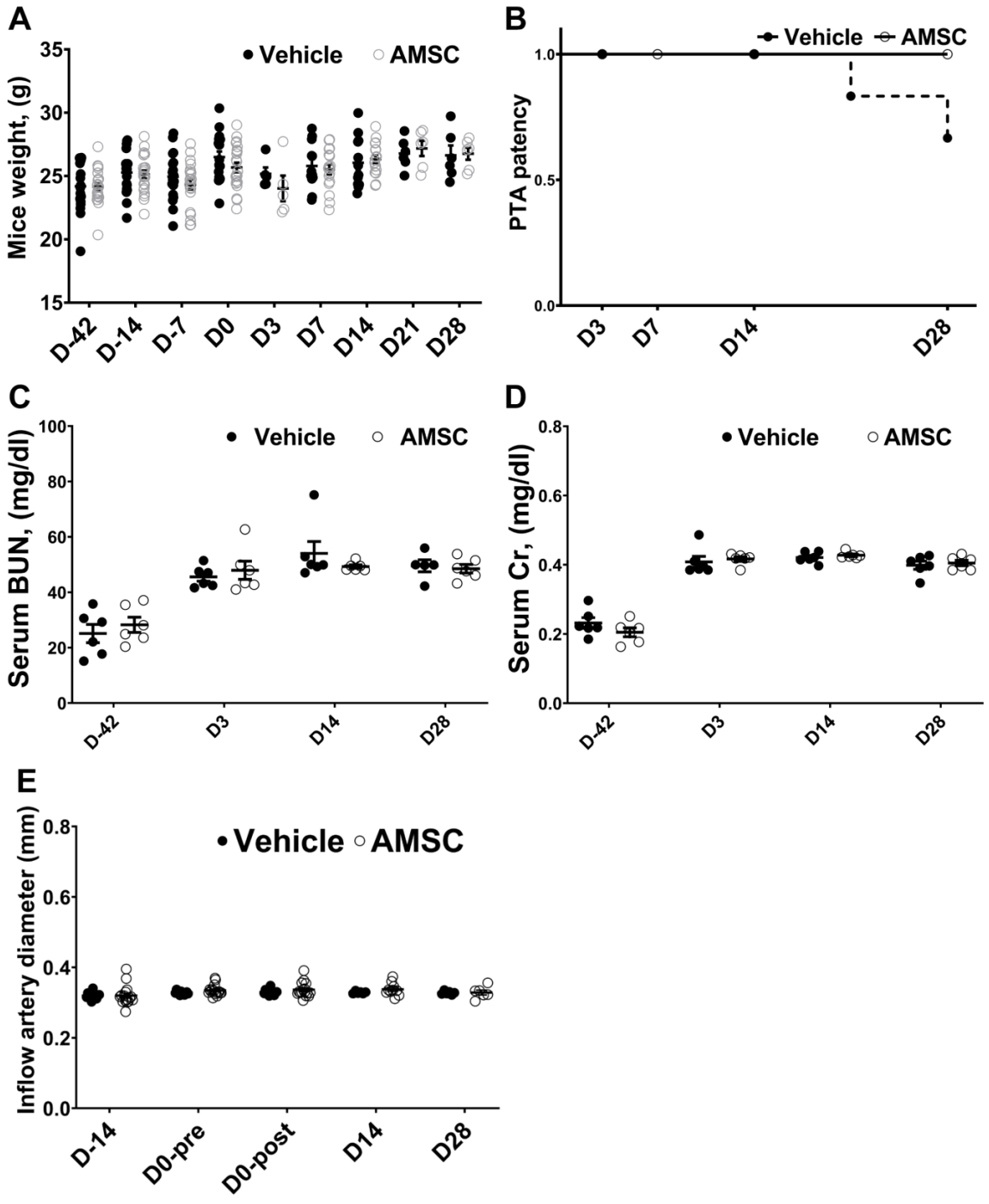
Supplementary Figure 1: Outline of the study



(A) Schematic of murine AVF and angioplasty model accompanied with adipose derived mesenchymal stem cells (AMSCs) transplanted to the adventitial layer after PTA procedure (inset). (B) Representative intraoperative image showed AMSCs were delivery to the adventitial layer of PTA treated outflow vein. (C) Schema of the

definitive experiment. AMSC, adipose derived mesenchymal stem cell; GFP, green fluorescent protein; PTA, percutaneous transluminal angioplasty; AVF, arteriovenous fistula; blue dashed line indicates the area of outflow vein; red dashed line indicates the inflow artery.

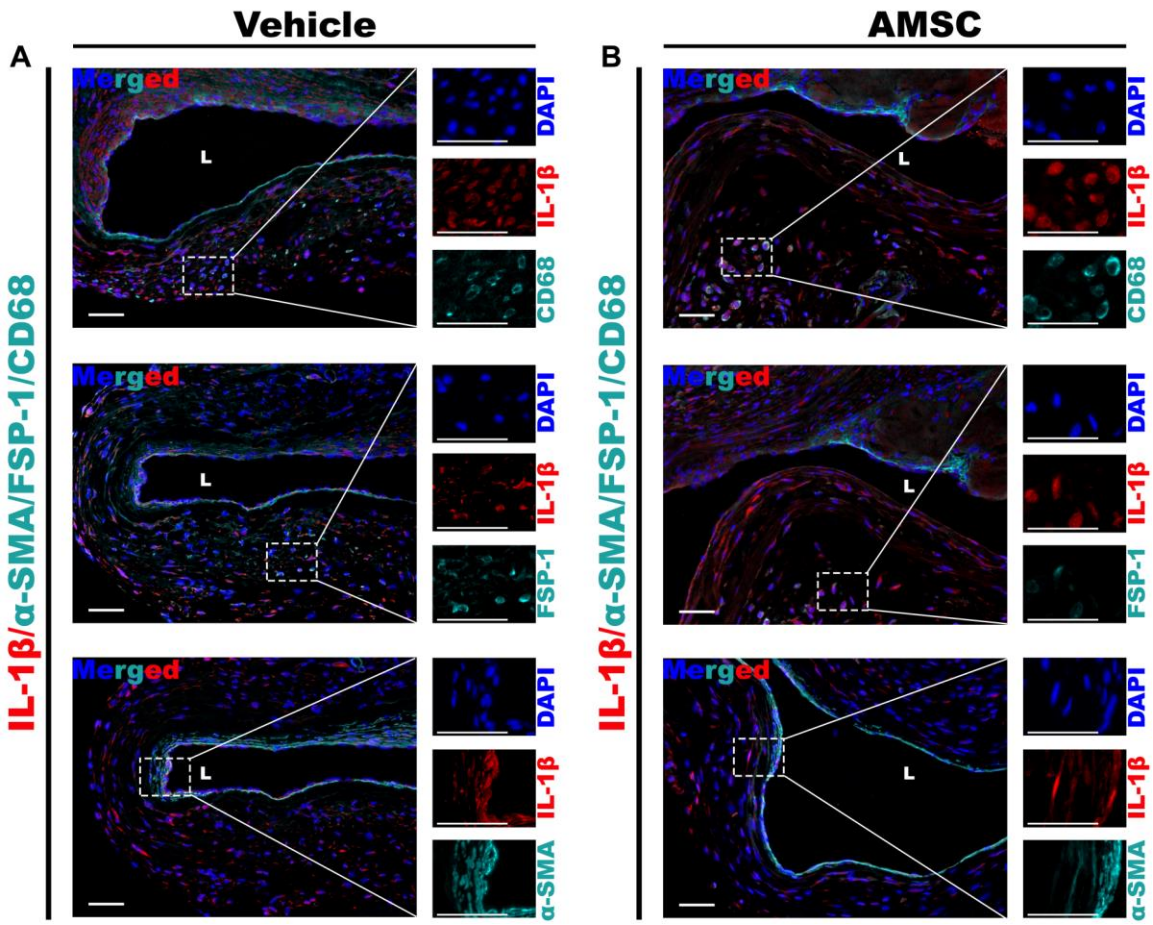
Supplementary Figure 2: Mice outcomes after AMSC transplantation and vehicle controls



(A) There was no significant difference in the average murine body weight between AMSC treated vessels compared to controls. (B) PTA plus AMSC vessels mice had

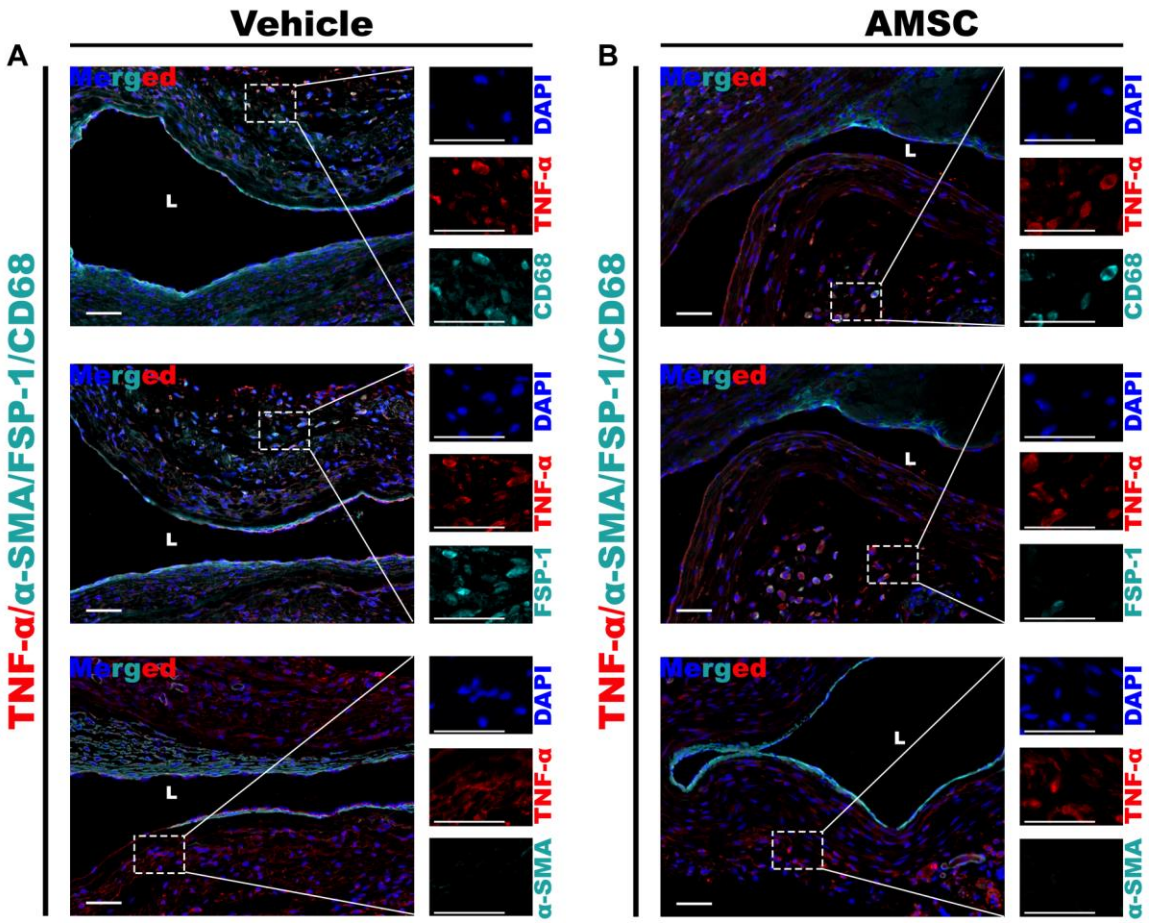
better patency compared to vehicle controls. (C-D) After partial nephrectomy surgeries, there is no difference in the average creatinine and BUN between the AMSC treated vessels compared to controls. (E) There was no significant difference in the average inflow artery diameter between AMSC treated vessels compared to controls. Each scatter plot bar graph represents the mean ± SEM of 6-10 animals. Two-way ANOVA with Bonferroni's correction and Mantel-Cox test were performed.

Supplementary Figure 3: Co-staining for IL-1β/CD68/FSP-1/α-SMA



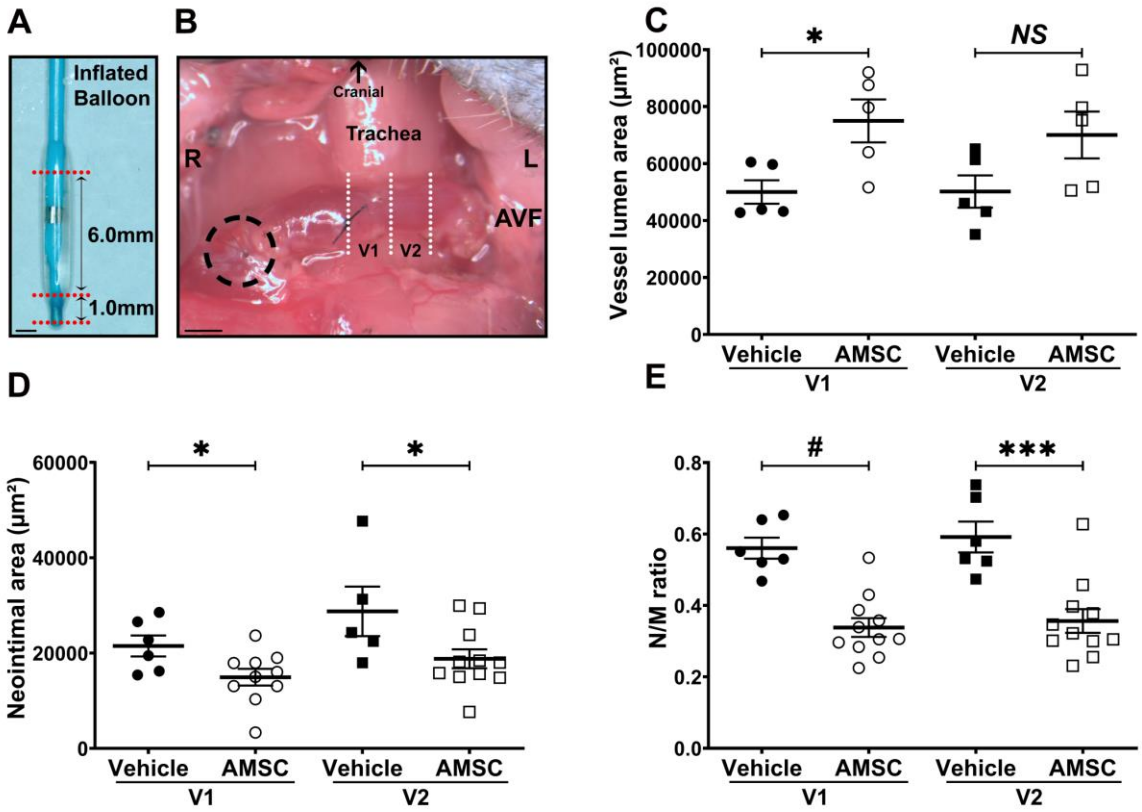
Representative sections from vehicle and AMSC treated mice at day 14. (A) In the vehicle vessel co-staining of IL-1β/CD68, IL-1β/FSP-1 and IL-1β/α-SMA showed that IL-1β positive cells were co-localized with CD68 (+) cells, FSP-1 (+) and α-SMA (+) cells. (B) In the AMSC treated vessel, IL-1β positive cells were mainly co-localized with CD68 (+) cells, and partially co-localized with FSP-1 (+) and α-SMA (+) cells. L, lumen. Blue is for DAPI nuclei staining. IL-1β (+) cells stain red. CD68, FSP-1 or α-SMA positive cells stain turquoise. Scale bar is 50μm.

Supplementary Figure 4: Co-staining for TNF-α/CD68/FSP-1/α-SMA



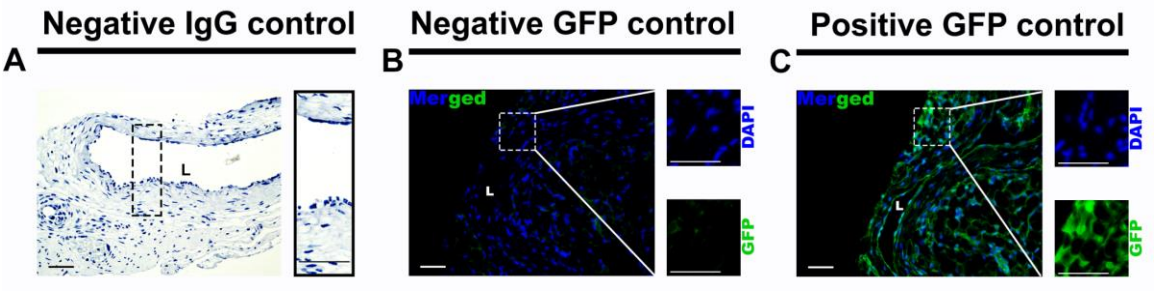
Representative sections from vehicle and AMSC treated mice at day 14. (A) In the vehicle outflow vein co-staining of TNF-α/CD68, TNF-α/FSP-1 and TNF-α/α-SMA showed that TNF-α positive cells were co-localized with CD68 (+) cells and FSP-1 (+) cells, but not with α-SMA (+) cells. (B) In the AMSC treated outflow vein, TNF-α positive cells were mainly co-localized with CD68 (+) cells and partially co-localized with FSP-1 (+) cells, but not with α-SMA (+) cells. L, lumen. Blue is for DAPI nuclei staining. TNF-α (+) cells stain red. CD68, FSP-1 or α-SMA positive cells stain turquoise. Scale bar is 50μm.

Supplementary Figure 5: Tissue processing after the PTA procedure



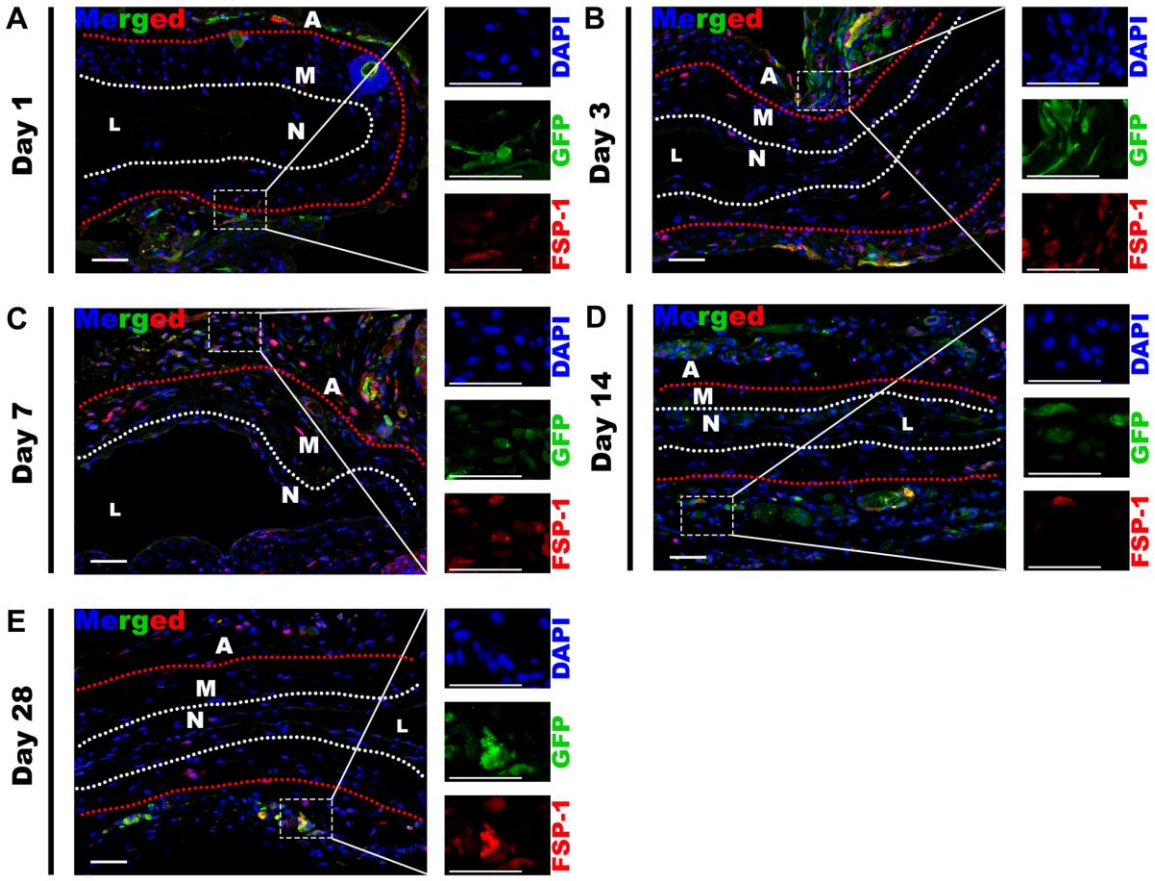
(A) Representative inflated balloon catheter *in vitro*. PTA mainly affected the V1 and V2 segments. (B) Representative intraoperative image post PTA procedure. For each mouse, we analyzed the outflow vein from 3.0 mm (V1) to 2.0 mm (V2) of the anastomosis. (C) At day 14 there was significant increase in the vessel lumen area of the V1 segment from AMSC mice compared to vehicle mice, but no significant difference in the V2 segment. (D-E) At day 14 AMSC treated mice presented significant decreasing in the neointimal area and N/M ratio in the V1 and V2 segments. R, right side; L, left side; AVF, arteriovenous fistula; dashed circle indicates the PTA puncture point closed to V1 segment. Scale bar is 1mm. Significant differences are indicated *p<0.05, **p<0.01, ***p<0.001.

Supplementary Figure 6: Negative and positive control staining



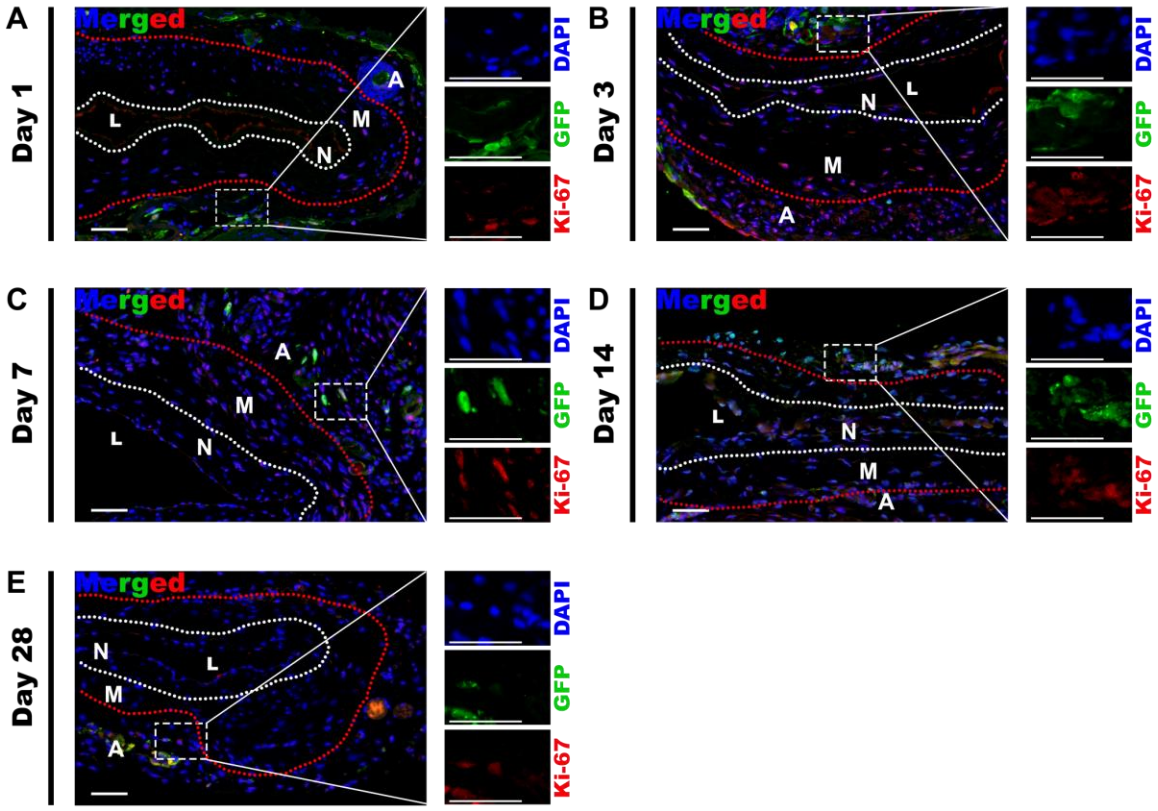
(A-B) Representative negative controls for immunohistochemical IgG staining and GFP immunofluorescence staining are shown. (C) Representative positive control for GFP immunofluorescence staining in the jugular vein from a GFP mouse. L, lumen. Scale bar is 50μm.

Supplementary Figure 7: Fibroblast specific protein 1 (FSP-1) staining for AMSC tracking experiment



Representative sections co-stained for GFP (+)/ FSP-1 (+). (A-C) At 1, 3, and 7 days post AMSC delivery, there was no co-staining for GFP (+)/ FSP-1 (+). All the GFP (+) cells were observed in the adventitia. (D-E) FSP-1 (+) cells were observed throughout the vessel wall. GFP (+) cells are partially positive for FSP-1. L, lumen; A, adventitia; M, media; N, neointima; white and red dashed lines indicate three layers of outflow vein. Blue is for DAPI nuclei staining, GFP (+) cells stain green, FSP-1 (+) cells stain red. Scale bar is 50μm.

Supplementary Figure 8: Proliferation (Ki-67) staining for AMSC tracking experiment



Representative sections co-stained for GFP (+)/ Ki-67 (+). GFP (+) cells are observed in the adventitia. (A-B) At 1 and 3 days post AMSCs delivery, there was co-staining for GFP (+)/ Ki-67 (+). (C-E) is from day 7 to day 28, there were less Ki-67 positive cells in the PTA treated vessels in the adventitia, and there was co-staining for GFP (+)/ Ki-67 (+). L, lumen; A, adventitia; M, media; N, neointima; white and red dashed lines indicate three layers of outflow vein. Blue is for DAPI nuclei staining, GFP (+) cells stain green, Ki-67 (+) cells stain red. Scale bar is 50μm.

Supplementary Table 1: Primer information for qRT-PCR

Gene	Forward	Reverse
IL-1β	GAGGACATGAGCACCTTCTTT	GCCTGTAGTGCAGTTGTCTAA
TNF-α	ACCACGCTCTTCTGTCTACT	GTTTGTGAGTGTGAGGGTCTG
TBP1	AAGGGAGAATCATGGACCAG	CCGTAAGGCATCATTGGACT

Supplementary Table 2: Antibodies used for immunohistochemistry and immunofluorescence staining

Antibodies	Host	Catalog number	Provider	Dilution
IgG	rabbit	sc-2027	Santa Cruz	
α-SMA	rabbit	ab5694	Abcam	1:1000
α-SMA	mouse	ab7817	Abcam	1:400
Ki-67	rabbit	ab9260	EMD Millipore	1:350
FSP-1	rabbit	07-2274	EMD Millipore	1:1000
FSP-1	mouse	188-11191	RayBiotech	1:500
CD68	rabbit	ab125212	Abcam	1:4000
CD68	mouse	ab955	Abcam	1:2000
iNOS	rabbit	NB300-605	Novus Biologicals	1:2000
Arg-1	rabbit	NBP1-32731	Novus Biologicals	1:1500
MYH11	rabbit	ab53219	Abcam	1:800
FAP-1	rabbit	ab207178	Abcam	1:500
TNF-α	rabbit	C10265	Assay Biotechnology	1:3000
IL-1β	rabbit	ab9722	Abcam	1:800
GFP	chicken	ab13970	Abcam	1:1000
Alexa Fluor® 488	goat	ab150169	Abcam	1:1000
Alexa Fluor® 594	donkey	711-585-152	Jackson Immunoresearch	1:1000
Alexa Fluor® 647	goat	A32728	Invitrogen	1:1000