CIERRE RUTINARIO DE LA FISTULA DESPUÉS DEL TRASPLANTE RENAL

IX JORNADA SOBRE EL ACCESO VASCULAR PARA HEMODIÁLISIS EN EL VALLÈS ORIENTAL

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29 de febrero de 2024

Índice

Contexto

- TR exitoso → FG > 30 ml/min tras el primer año de la IQ
- Poca previsión perdida de TR: Riesgo vs Beneficio
- Se cierran solo el 5% de las FAVn en pacientes con TR
- Motivos: IC, cosméticos, Sde. De hipoperfusión distal

Predicción función renal TR

Prediction system for risk of allograft loss in patients receiving kidney transplants: international derivation and validation study

Alexandre Loupy,[1,2] Olivier Aubert,[1,2] Babak J Orandi,[3] Maarten Naesens,[4] Yassine Bouatou,[1] Marc Raynaud,[1] Gillian Divard,[1] Annette M Jackson,[5] Denis Viglietti,[1,6] Magali Giral,[7] Nassim Kamar,[8] Olivier Thaunat,[9] Emmanuel Morelon,[9] Michel Delahousse,[10] Dirk Kuypers,[4] Alexandre Hertig,[11] Eric Rondeau,[11] Elodie Bailly,[11] Farsad Eskandary,[12] Georg Böhmig,[12] Gaurav Gupta,[13] Denis Glotz,[1,6] Christophe Legendre,[1,2] Robert A Montgomery,[14] Mark D Stegall,[15] Jean-Philippe Empana,[1,16] Xavier Jouven,[1] Dorry L Segev,[17] Carmen Lefaucheur[1,6]

BMJ 2019;366:l4923 | doi: 10.1136/bmj.l4923

CIERRE RUTINARIO DE FAV EN TR EXITOSO

A favor

- Impacto en la función cardiaca: masa ventricular
- ¿Reducción del riesgo CV?
- Sde. Hipoperfusión distal
- Cosmético

En contra

- AV óptimo e inmediato si fallo del injerto
- HTA post cierre de FAV
- Evita complicaciones (IQ, CVC)
- Perdida de árbol vascular para nuevo AV

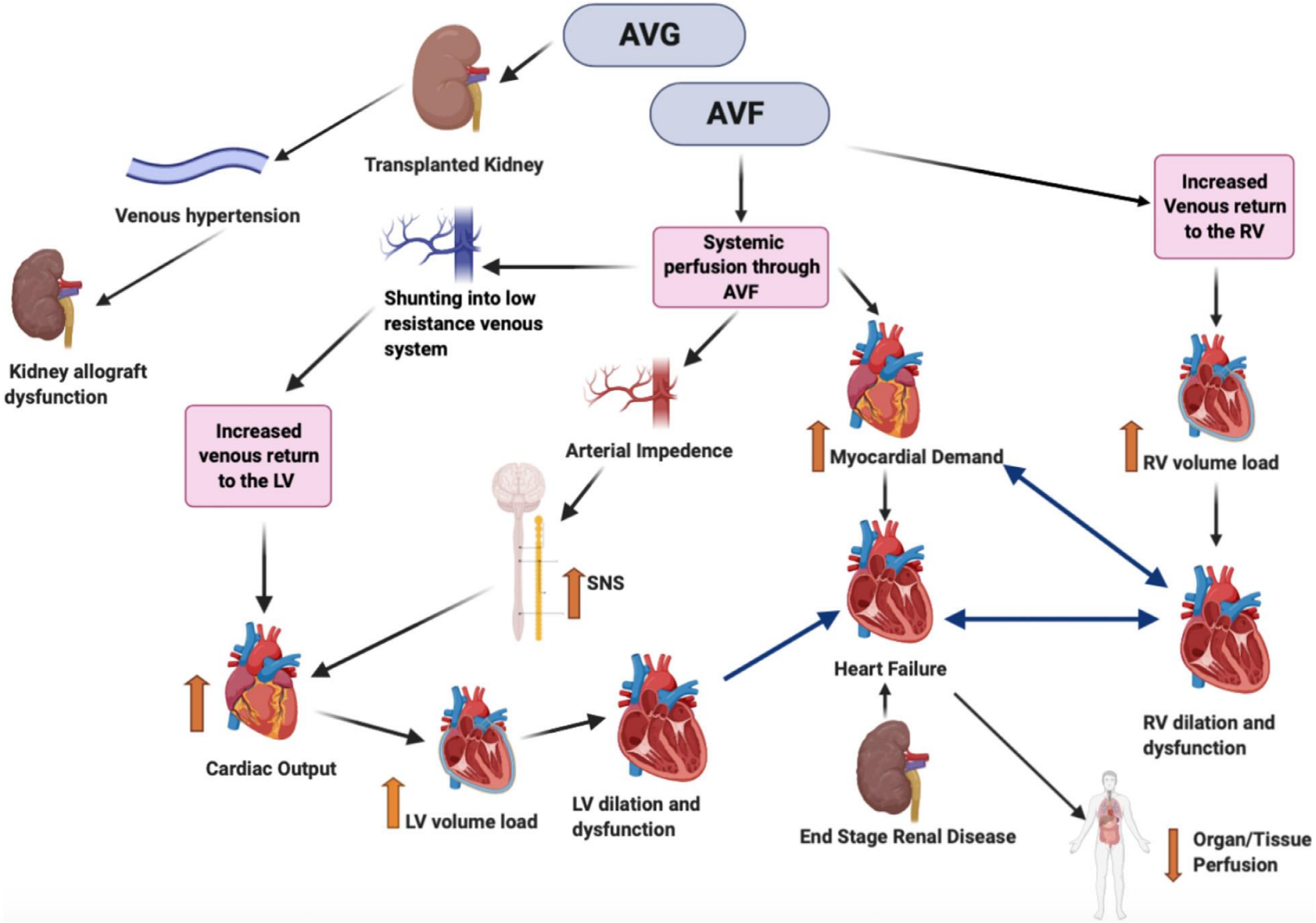
Impacto del cierre de FAV en sistema CV

POSITIVO

- ↓ diámetro VI en final diástole
- ↓ índice de masa del VI
- ↓ retorno venoso
- ↓ Pro-BNP
- ↓ gasto cardiaco

NEGATIVO

- ↑ TA diástolica
- ↑ resistencia arterial periférica
- ↑ presión de pulso
- ↓ oxigenación (entrega O_2)
- ↑ perdida de eFG



Zahra et al. High-output cardiac failure in hemodialysis patients

Factores de riesgo IC - FAV

- FAV proximal
- Sexo masculino
- Historia de múltiples IQ de AV
- Qa > 1500 ml/min
- Ratio Qa/GC > 0.3
- ICC con FEVI < 30%
- > 65 años

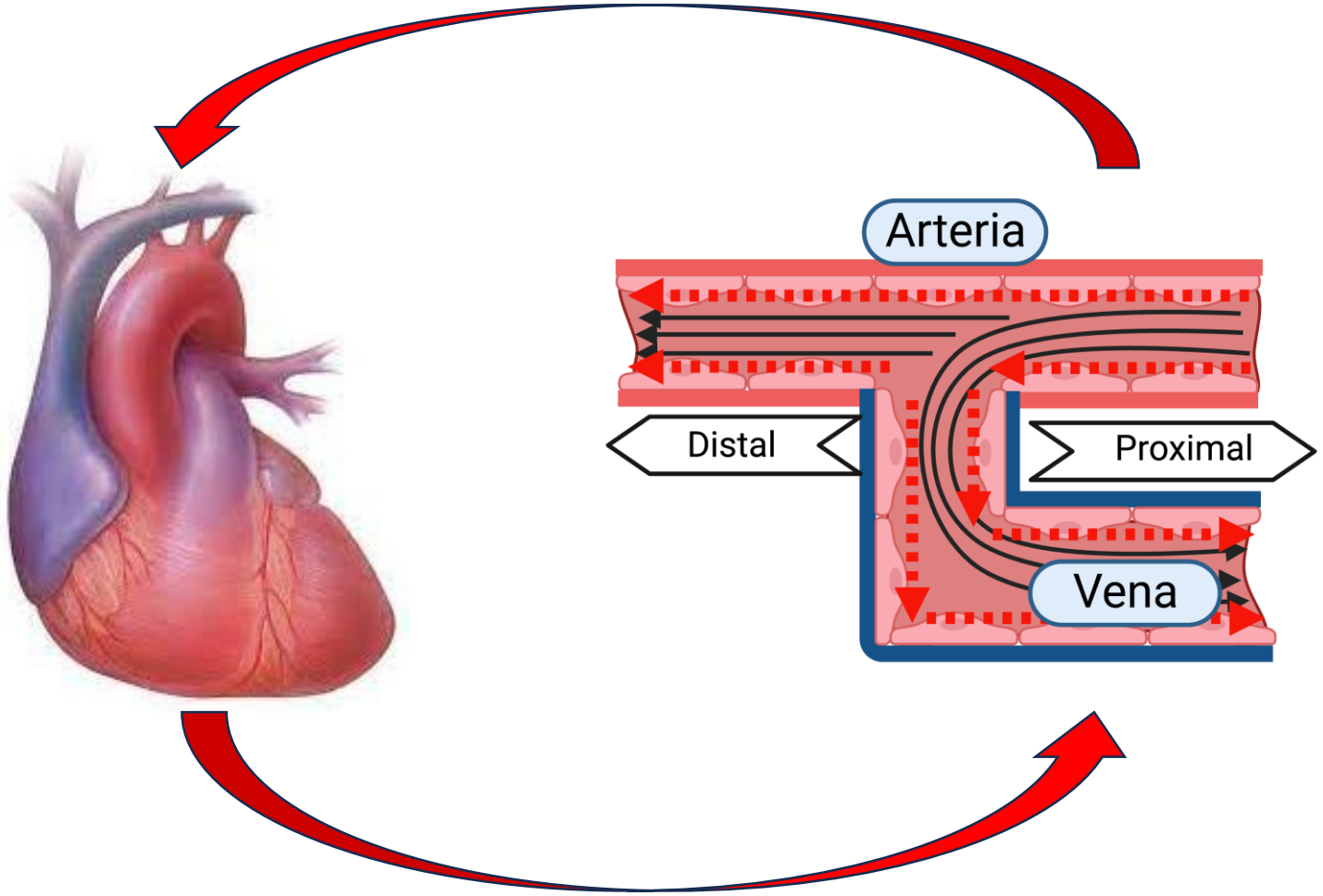


Table 2. Cardiac function in renal transplant patients before and after ligation of high-flow AVFs.

Reference	*n*	AVF flow	Normal LVVI	LVVI pre-ligation	LVVI post-ligation	*p*	Normal LVMI	LVMI pre-ECHO	LVMI post-ECHO	*p*
Van Duijnhoven et al.[28]	20	1790 ± 648	29–74	69.4 ± 16.2	62.9 ± 15.5	<0.01	44–102	135 ± 34.1	119.8 ± 23.2	<0.01
Unger et al.[29]	17	Large	29–74	29.5 ± 3.4	26.9 ± 2.9	<0.02	44–102	139 ± 44	127 ± 45	<0.02
Dundon et al.[30]	18	1590 ± 690	115–198	192 ± 52	167 ± 62	0.01	108–144	166 ± 56	149 ± 51	0.001

LVVI: left ventricular volume index; LVMI: left ventricular mass index; Pre-ECHO: echocardiogram before ligation; Post-ECHO: echocardiogram post ligation; Large: by exam, no flow given.
Cardiac function assessed by echocardiography for Van Duijnhoven et al.[28] and Unger et al.[29] and MRI for Dundon et al.[30]

¿Evidencia a favor del cierre de la FAV en TR?

2001

Effect of closure of the arteriovenous fistula on left ventricular dimensions in renal transplant patients

Elly C. M. van Duijnhoven[1], Emile C. M. Cheriex[2], Jan H. M. Tordoir[3], Jeroen P. Kooman[1] and Johannes P. van Hooff[1]

[1]Department of Internal Medicine, [2]Department of Cardiology, and [3]Department of Surgery, University Hospital Maastricht

2006

Arteriovenous fistula after renal transplantation: utility, futility or threat?

Philippe Unger[1] and Karl Martin Wissing[2]

[1]Department of Cardiology and [2]Department of Nephrology, Erasme Hospital, Université Libre de Bruxelles, Brussels, Belgium

2012

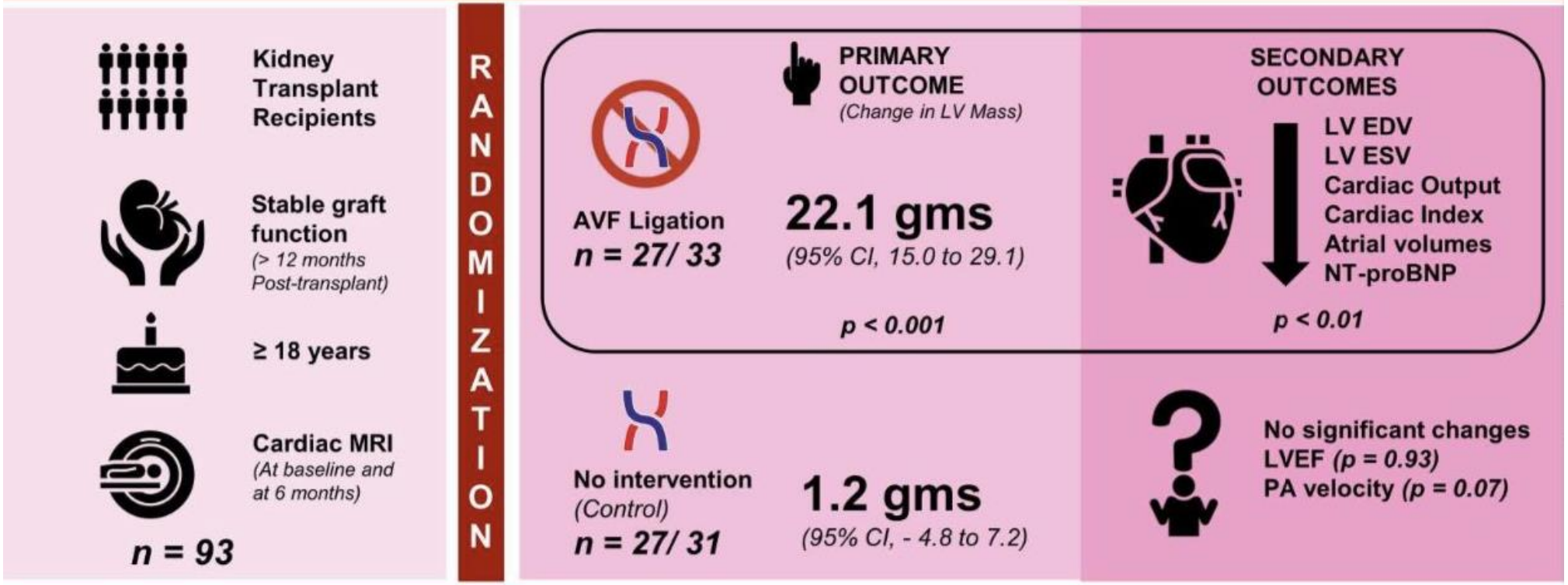
Should functioning AV fistulas be ligated after renal transplantation?

Hillary C. Yaffe, Stuart M. Greenstein

Abdominal Organ Transplant Service, Montefiore Medical Center, Albert Einstein College of Medicine, The Bronx, NY - USA

Does elective AVF ligation affect cardiovascular remodeling?

Circulation



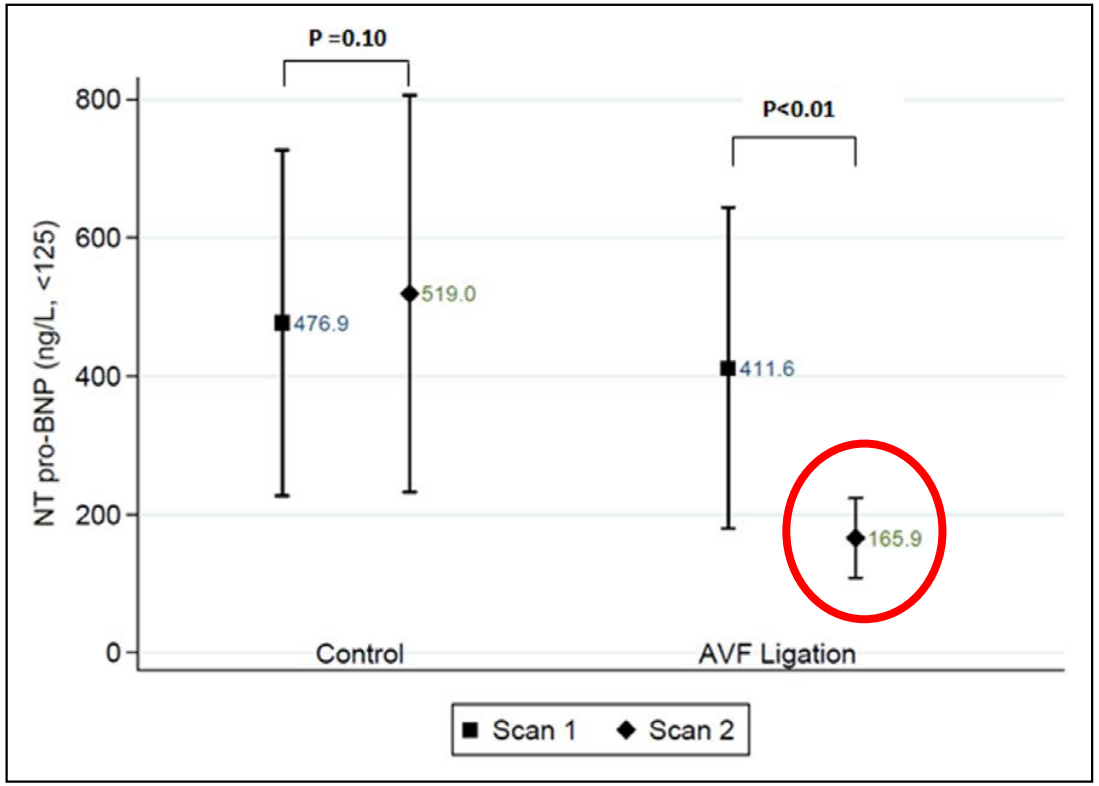
Conclusions Elective ligation of patent AVF in adults with stable kidney transplant function resulted in clinically significant reduction of LV myocardial mass.

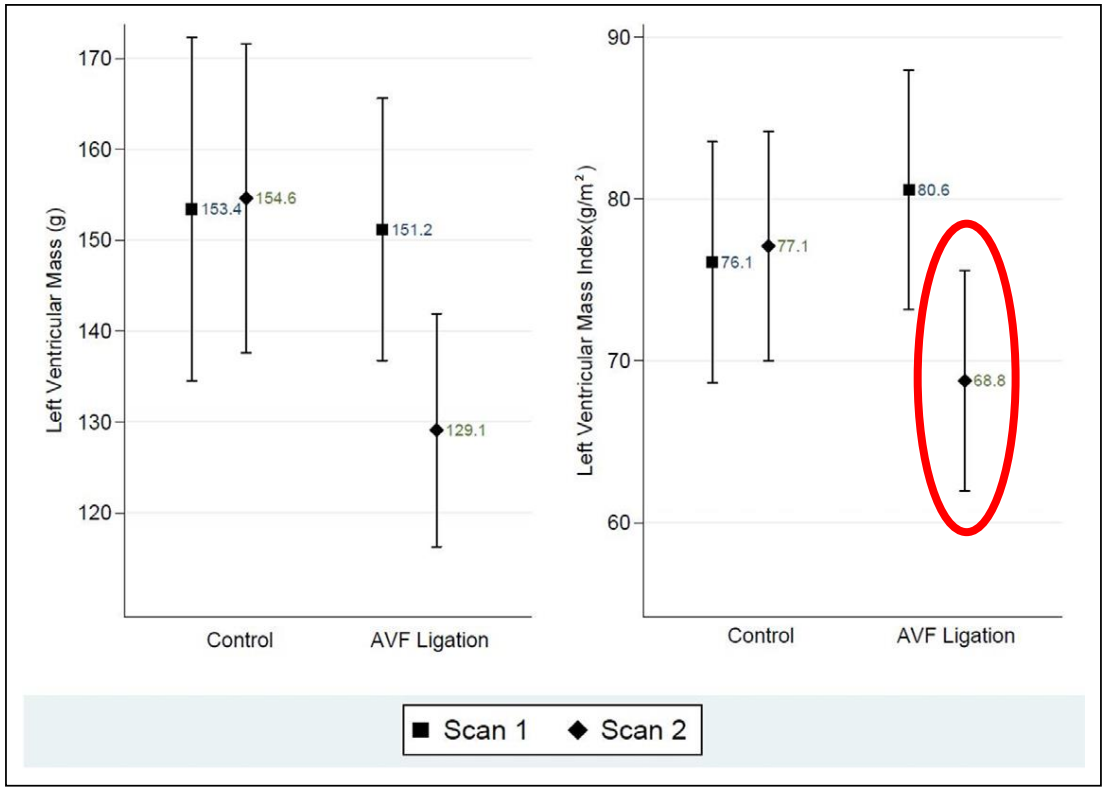
Rao NN, Stokes MB, Rajwani A, Ullah S, Williams K, King D, Macaulay E, Russell CH, Olakkengil S, et al. ***Effects of Arteriovenous Fistula Ligation on Cardiac Structure and Function in Kidney Transplant Recipients.*** Circulation 2019; 139: 2809-2818.

Visual Abstract by Edgar V. Lerma, MD, FASDIN

Table 1. Characteristics of the Patients at Baseline

Characteristic	Control Group (n=31)	AVF Ligation Group (n=33)	*P* Value
Age, y	59.9±10.2*	60.2±11.9	0.92
Male, n (%)	22 (71)	22 (67)	0.71
Median duration between AVF creation and kidney transplantation (IQR), mo†	20.2 (9.3–26.5)	17.7 (9.0–27.8)	0.79
Median duration between AVF creation and first scan (IQR), mo†	95.3 (74.8–149.7)	96.4 (43.7–180.6)	0.82
Median time from initiation of dialysis to transplantation (IQR), mo†	18.5 (12.4–23.7)	15.4 (6.5–25.0)	0.65
Median duration between transplantation and first CMR scan (IQR), mo†	78.7 (34.2–147.1)	83.7 (18.4–151.0)	0.55
Diabetes mellitus, n (%)	9 (29)	7 (21)	0.51
Hypertension, n (%)	24 (77)	28 (85)	0.29
Smoking, current or previous, n (%)	12 (39)	7 (21)	0.15
Peripheral vascular disease, n (%)	2 (6)	2 (6)	0.07
Prior ischemic heart disease, n (%)	5 (16)	3 (9)	0.42
Location of AVF, n (%)			
Forearm	14 (44)	17 (51)	0.59
Upper arm	17 (55)	16 (48)	
Medications, n (%)			
Calcineurin inhibitors	10 (32)	9 (26)	0.32
mTOR inhibitors	6 (19)	6 (19)	0.98
ACE inhibitor or ARB	9 (30)	8 (25)	0.38
β-Blockers	5 (15)	4 (12)	0.46
Statins	21 (67)	23 (70)	0.93





Rao et al *Circulation.* 2019;139:2809–2818. DOI: 10.1161/CIRCULATIONAHA.118.038505

Long-term effects of arteriovenous fistula (AVF) ligation on cardiovascular structure following kidney transplantation

Kidney360

Original RCT published in 2019

Kidney Transplant recipients

AVF ligation cohort
n=17

Observational cohort

Long-term F/U

5.1 years
(IQR 4.7-5.5)

Repeat Cardiac MR (CMR) imaging

PRIMARY ENDPOINTS Change in CMR-derived LVM and LVM index at long term follow-up from imaging at 6 months post index procedure

-17.6±23.0 g

LV Mass
p=0.006

-10.0±13.0 g/m²

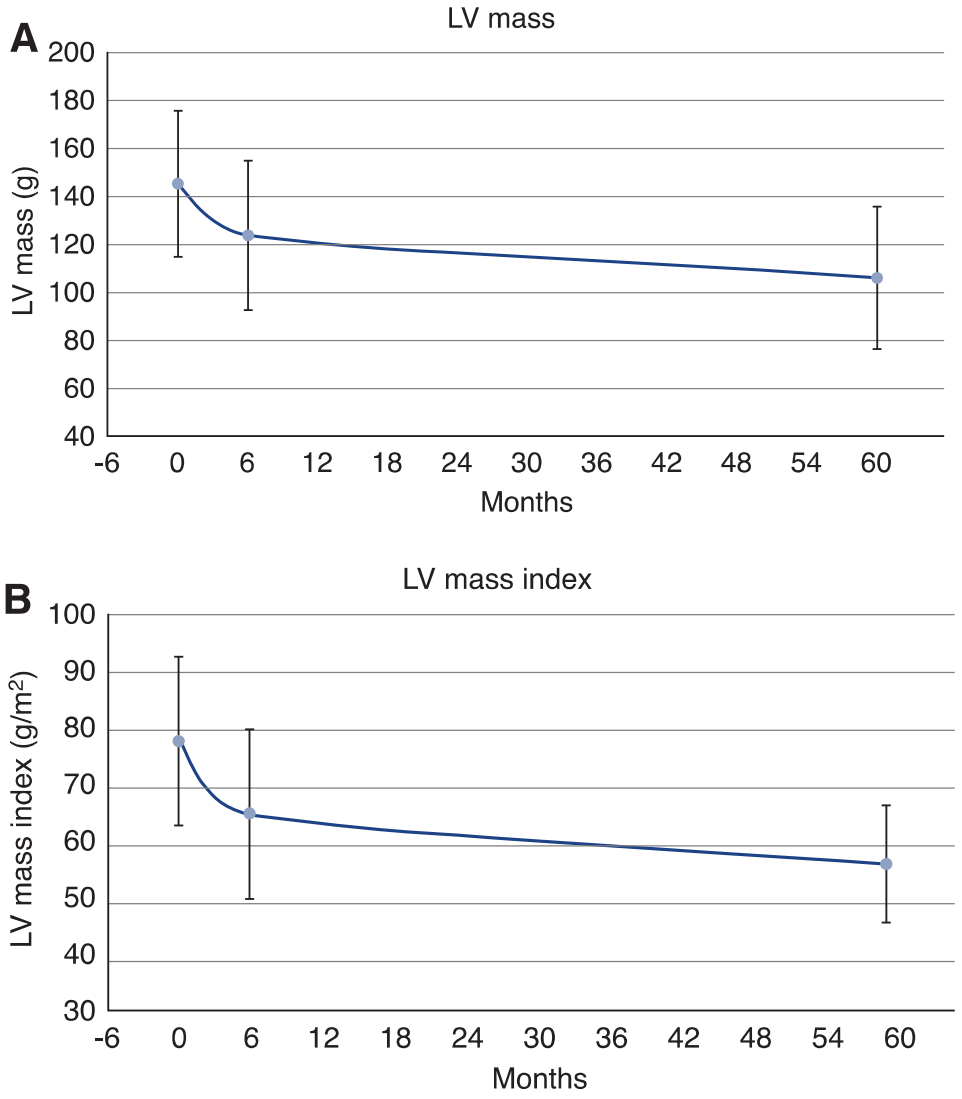
LV Mass Index (LVMI)
p=0.006

Conclusion The benefit of AVF ligation on LVM and LVM index regression appears to persist long-term. This has the potential to lead to a significant reduction in cardiovascular mortality.

Tania Salehi, Nicholas J Montarello, Nishant Juneja, *et al.* ***Long-term Impact of Arteriovenous Fistula Ligation on Cardiac Structure and Function in Kidney Transplant Recipients – A 5-year Follow-up Observational Cohort Study.*** *Kidney360.* DOI: 10.34067/KID.0000692021. **Visual Abstract by Edgar Lerma, MD, FASN**

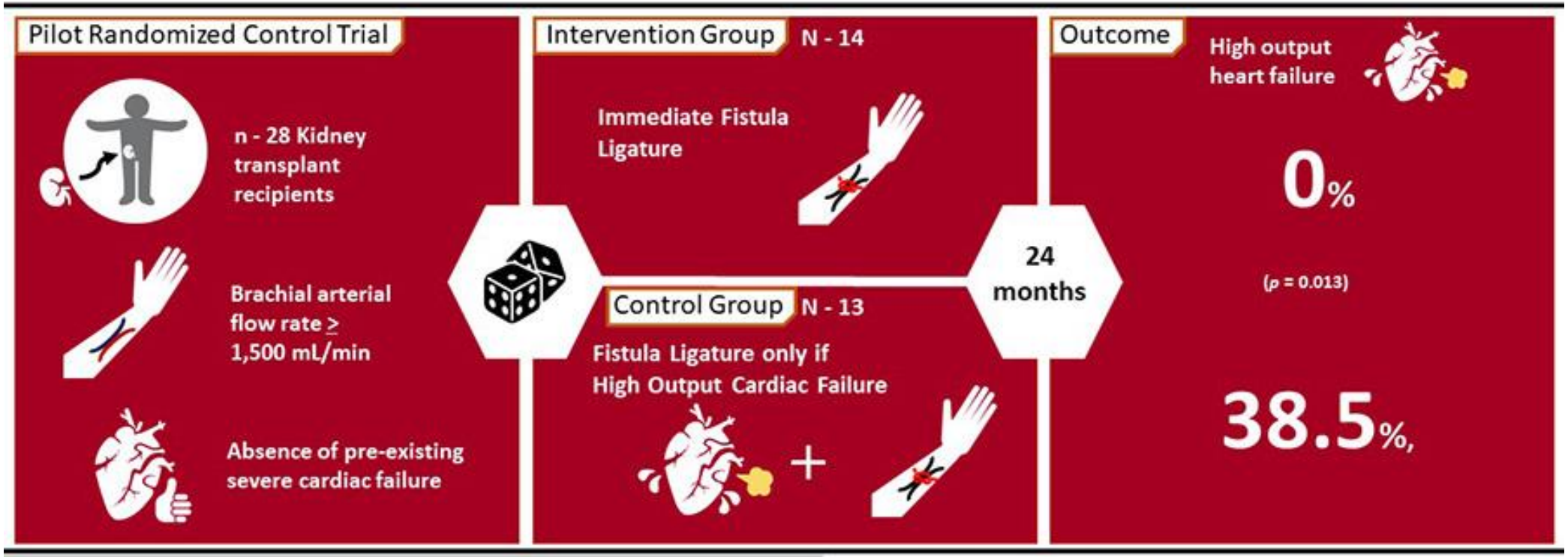
Table 1. Five-year cohort baseline characteristics

Characersitics	Control Group, $N=22$	Arteriovenous Fistula Ligation Group, $N=23$	P Value
Age, yr	64.1±9.3	64.3±12.1	0.23
Men, no. (%)	16 (72.7)	14 (60.9)	0.42
BMI, kg/m^2	28.8±5.5	28.0±4.2	0.22
Diabetes (%)	6 (27.3)	9 (39.1)	0.42
Hypertension (%)	18 (81.8)	23 (100)	0.05
Smoking status (%)	1 (4.5)	2 (8.7)	0.64
IHD (%)	3 (13.6)	6 (26.1)	0.33
PVD (%)	0 (0.0)	1 (4.3)	0.51
Stroke (%)	0 (0.0)	1 (4.3)	0.51
Immunosuppressive medication (%)			
CNI	16 (72.7)	14 (60.9)	0.40
Mycophenolate	16 (69.6)	16 (69.6)	0.82
Azathioprine	3 (13.6)	4 (17.4)	0.73
Prednisolone	16 (69.6)	23 (100)	0.007
mTOR inhibitors	6 (27.3)	7 (30.4)	0.82
Cardiovascular medication (%)			
ACEi/ARB	11 (50)	14 (60.9)	0.27
β-blocker	15 (68.2)	14 (60.9)	0.61
CCB	12 (54.5)	5 (21.7)	0.02
Diuretic	4 (18.2)	3 (13.0)	0.63
Antiplatelet therapy	5 (22.7)	5 (21.7)	0.94
Statin	10 (45.5)	12 (52.2)	0.65



Does Prophylactic Ligature of AV Fistula Prevent High Output Heart Failure After Kidney Transplantation?

American Journal of Nephrology



Conclusion: Prophylactic ligature of high-flow AV fistulas after kidney transplantation can avoid high-output heart failure, and a more liberal approach to close AV fistulas might be justified.

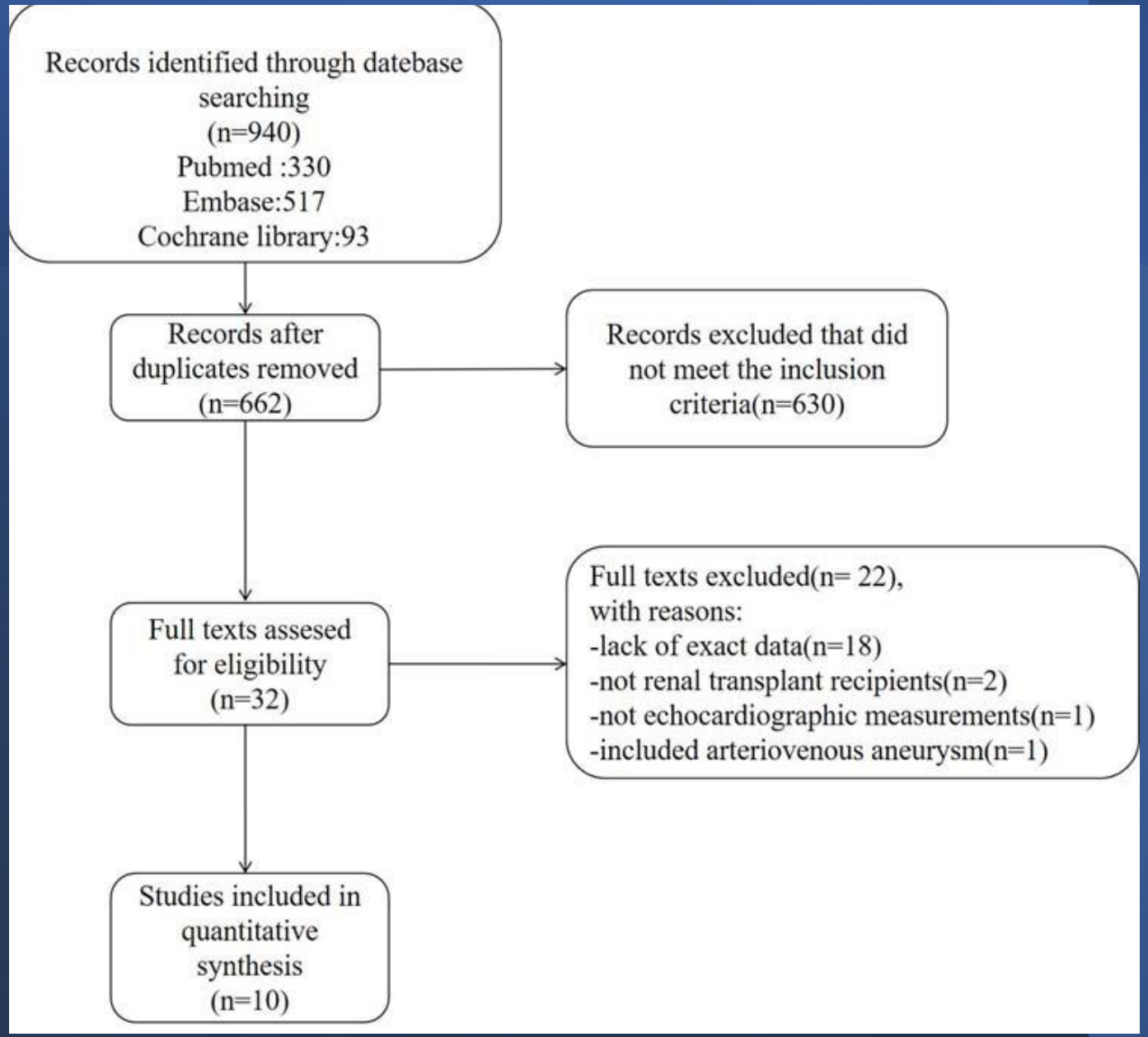
Hetz P, Pirklbauer M, Müller S, Posch L, Gummerer M, Tiefenthaler M: Prophylactic Ligature of AV Fistula Prevents High Output Heart Failure after Kidney Transplantation. Am J Nephrol DOI: 10.1159/000508957

Visual Abstract by Aakash Shingada @aakashshingada

Meta-Analysis > Ann Vasc Surg. 2020 Feb;63:287-292. doi: 10.1016/j.avsg.2019.06.040.
Epub 2019 Sep 16.

To Ligate or Not to Ligate: A Meta-analysis of Cardiac Effects and Allograft Function following Arteriovenous Fistula Closure in Renal Transplant Recipients

Huanhuan Zheng [1], Shuangshan Bu [2], Yan Song [3], Meifang Wang [3], Jianyong Wu [4], Jianghua Chen [3]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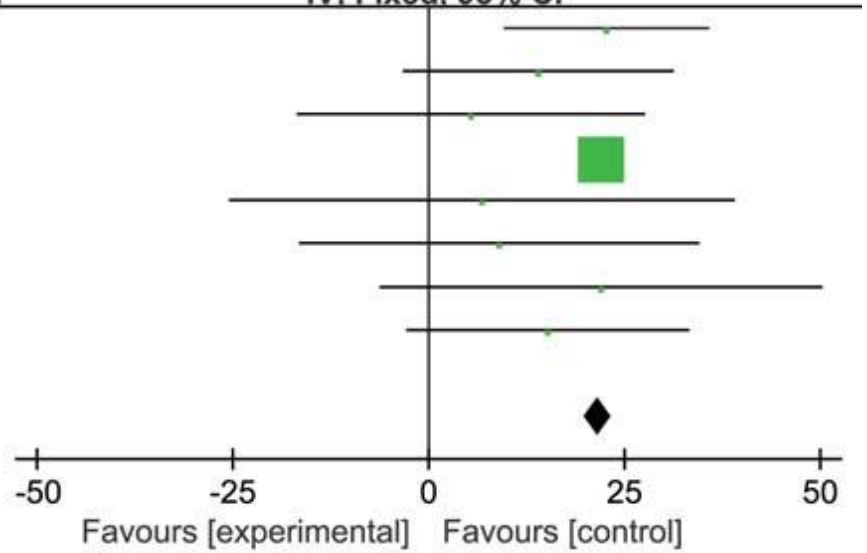
Pubmed :330
Embase:517
Cochrane library:93
Records after duplicates removed
(n=662)
Records excluded that did not meet the inclusion criteria(n=630)
Full texts assesed for eligibility
(n=32)
Full texts excluded(n= 22),
with reasons:
-lack of exact data(n=18)
-not renal transplant recipients(n=2)
-not echocardiographic measurements(n=1)
-included arteriovenous aneurysm(n=1)
Studies included in quantitative synthesis
(n=10)

Impacto del cierre sobre la LVM

Study or Subgroup	Patent AVF Mean	SD	Total	No patent AVF Mean	SD	Total	Weight	Mean Difference IV, Fixed, 95% CI
Cridlig 2008	135.1	30.3	38	112.4	28	38	1.7%	22.70 [9.58, 35.82]
De Lima 1999	156	38	39	142	30	22	1.0%	14.00 [-3.30, 31.30]
Glowinski 2012	118.5	26.3	9	113.1	21.6	9	0.6%	5.40 [-16.83, 27.63]
Kolonko 2014	152	6.5	67	130	4.25	95	94.6%	22.00 [20.22, 23.78]
Sheashaa 2004	176.3	41.4	34	169.5	61.3	17	0.3%	6.80 [-25.49, 39.09]
UNGER 2002	141	37	17	132	39	17	0.5%	9.00 [-16.55, 34.55]
Unger 2004	139	44	17	117	40	17	0.4%	22.00 [-6.27, 50.27]
van Duijnhoven 2001	135	34.1	20	119.8	23.2	20	0.9%	15.20 [-2.88, 33.28]
Total (95% CI)			**241**			**235**	**100.0%**	**21.67 [19.94, 23.39]**

Heterogeneity: Chi² = 5.22, df = 7 (P = 0.63); I² = 0%

Test for overall effect: Z = 24.59 (P < 0.00001)



Ann Vasc Surg. 2020 Feb;63:287-292. doi: 10.1016/j.avsg.2019.06.040.

Efectos sobre la calidad de vida?

RENAL FAILURE
2021, VOL. 43, NO. 1, 113–122
https://doi.org/10.1080/0886022X.2020.1865171

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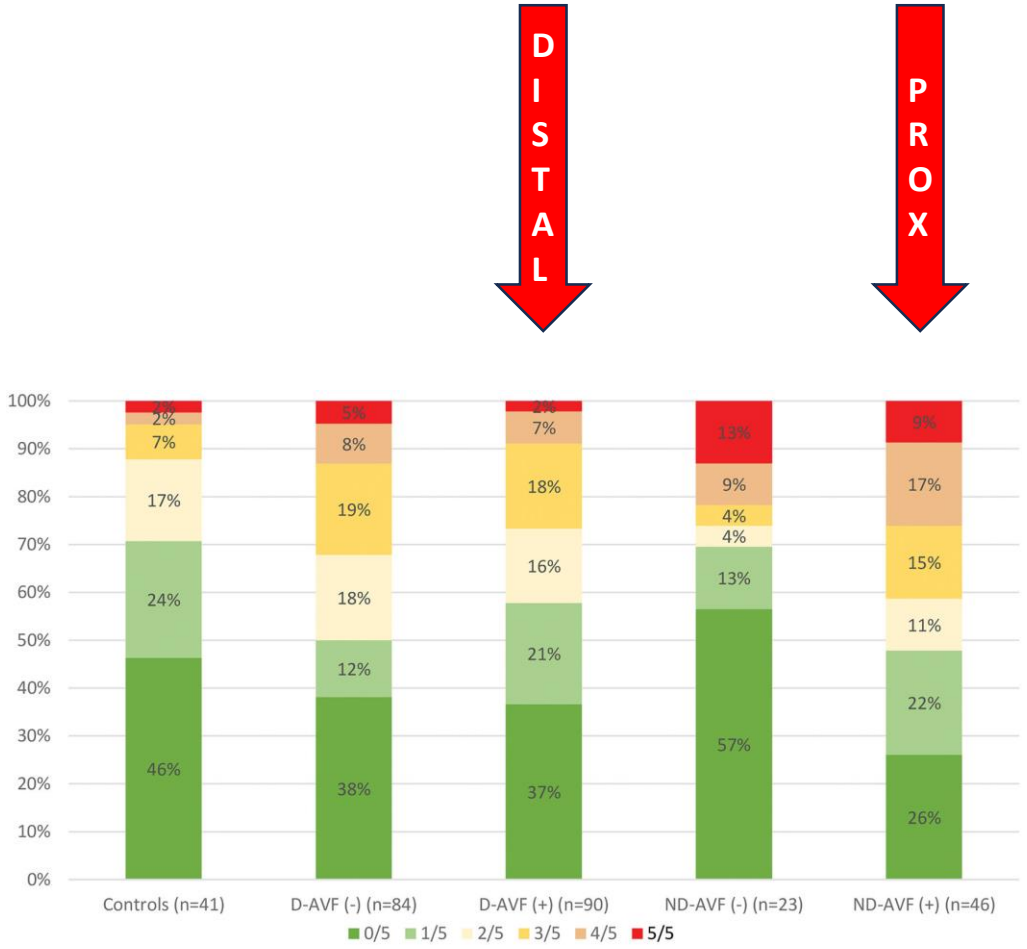
CLINICAL STUDY

OPEN ACCESS Check for updates

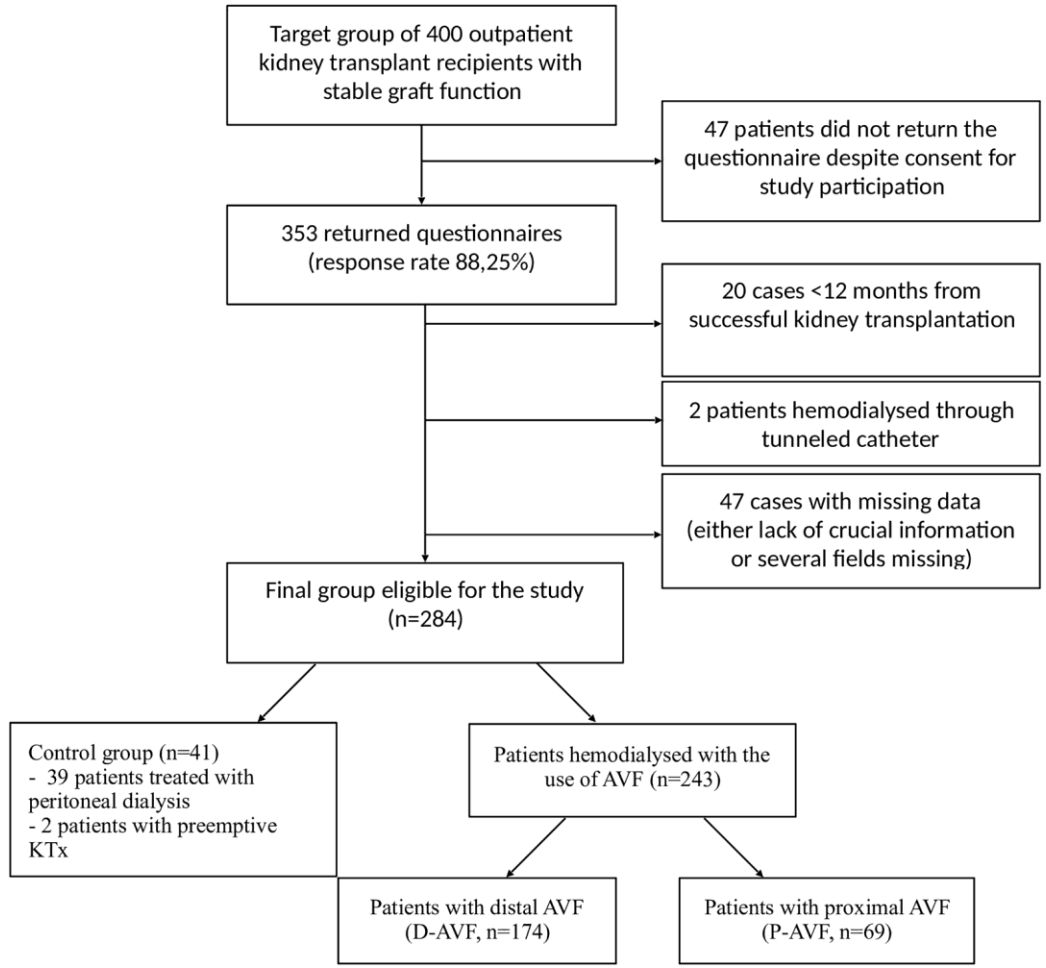
The impact of location and patency of the arteriovenous fistula on quality of life of kidney transplant recipients

Krzysztof Letachowicz[a], Klaudia Bardowska[b], Tomasz Królicki[b], Dorota Kamińska[a], Mirosław Banasik[a], Karolina Zajdel[b], Oktawia Mazanowska[a], Katarzyna Madziarska[a], Dariusz Janczak[c] and Magdalena Krajewska[a]

[a]Department of Nephrology and Transplantation Medicine, Wroclaw Medical University, Wroclaw, Poland; [b]Faculty of Medicine, Wroclaw Medical University, Wroclaw, Poland; [c]Department of Vascular, General and Transplantation Surgery, Wroclaw Medical University, Wroclaw, Poland



Disnea – Edemas – Fatiga - Tolerancia al ejercicio – Palpitaciones - TODOS



K. LETACHOWICZ ET AL.

Alternativas al cierre definivo?

Alternativa: disminución del Qa

- Clínica de ICC + evidencia ecocardiográfica +/- RMI
- Paciente joven con TR funcionante (< 50 años)
- FG < 30 ml/min
- Alto riesgo de complicaciones

> Ann Vasc Surg. 2016 Feb;31:85-90. doi: 10.1016/j.avsg.2015.08.012. Epub 2015 Nov 23.

Treatment of High Flow Arteriovenous Fistulas after Successful Renal Transplant Using a Simple Precision Banding Technique

Georgios Gkotsis [1], William C Jennings [2], Jan Malik [3], Alexandros Mallios [1], Kevin Taubman [1]

Affiliations + expand

PMID: 26616507 DOI: 10.1016/j.avsg.2015.08.012

Banding Size	Access Flow (ml/min)		Pulse Rate (rate/min)		Cardiac Murmur		Dyspnea		Palpitation	
Diameter (mm)	Pre-Banding	Post-Banding	Pre-Banding	Post-Banding	Pre-Banding	Post-Banding	Pre-Banding	Post-Banding	Pre-Banding	Post-Banding
3	3045	622	78	68	No		No		No	
3	1789	488	90	72	Yes	Resolved	No		Yes	Resolved
3	2288	622	98	72	No		Yes	Resolved	Yes	Resolved
3.5	1780	598	82	64	Yes	Resolved	No		Yes	Resolved
3.5	1342	550	92	72	Yes	Resolved	No		No	
3.5	1148	510	84	82	No		No		No	
3.5	2850	540	110	82	No		No		Yes	Resolved
4	3320	599	78	62	Yes	Resolved	Yes	Resolved	No	
4	2650	876	92	68	Yes	Resolved	No		No	
4	2510	632	86	72	Yes	Resolved	No		No	
ligated	1220	0	92	64	No		Yes	Resolved	No	
4	2444	528	90	70	Yes	Resolved	No		No	

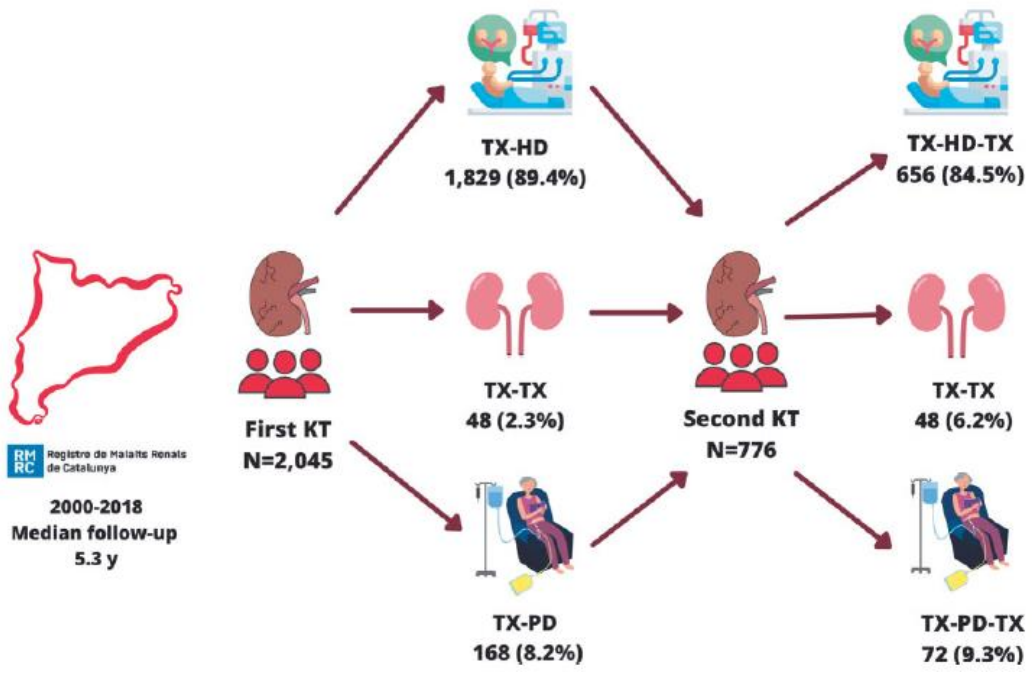
Ann Vasc Surg. 2016 Feb;31:85–90. doi: 10.1016/j.avsg.2015.08.012. Epub 2015 Nov 23.

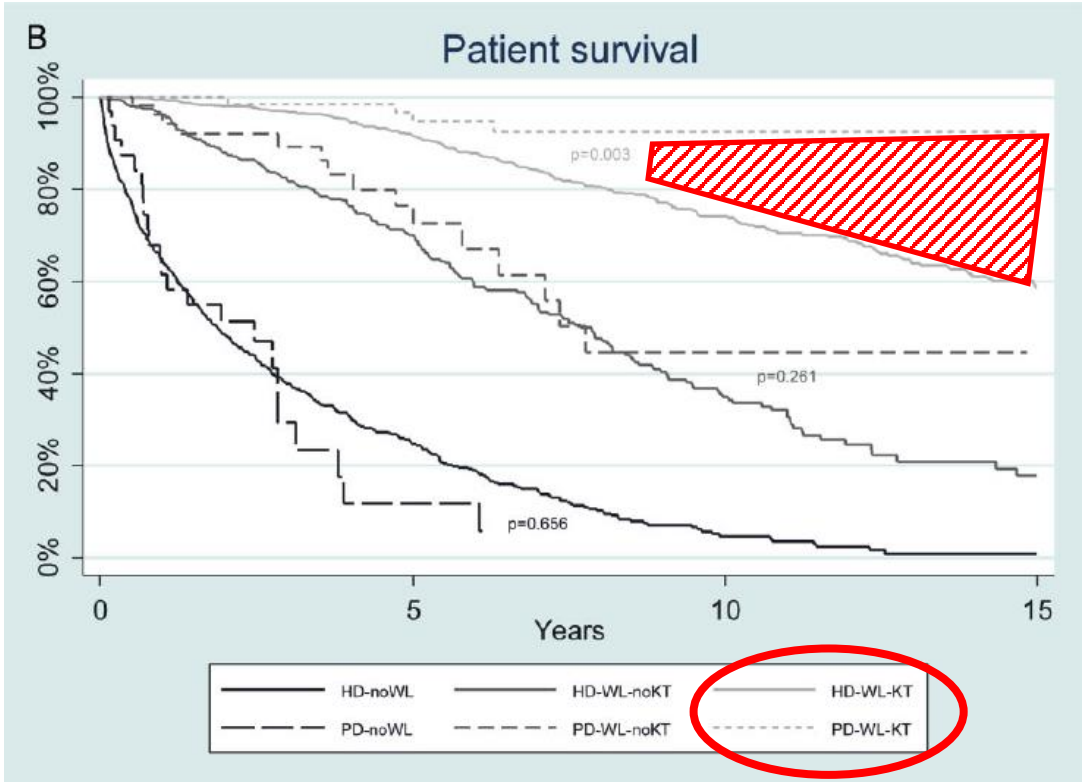
ORIGINAL ARTICLE

Effect of kidney replacement therapy modality after first kidney graft failure on second kidney transplantation outcomes

Carlos Couceiro [1], Inés Rama [1], Jordi Comas [2], Núria Montero [1,3,4], Anna Manonelles [1,3,4], Sergi Codina [1,3], Alexandre Favà [1,3], Edoardo Melilli [1,3], Ana Coloma [1,3], Maria Quero [1,3,4], Jaume Tort [2] and Josep M. Cruzado [1,3,4]

Clinical Kidney Journal, 2022, vol. 15, no. 11, 2046–2055





Clinical Kidney Journal, 2022, vol. 15, no. 11, 2046–2055

Conclusiones

El cierre definitivo de las FAV en TR exitoso es muy controvertido

En la presencia de ICC con FAV de alto flujo en TR funcionante, se debe considerar el cierre de la FAV

Se intuye que el cierre de FAVs de alto flujo podría mejorar el pronóstico CV a largo plazo

Una alternativa al cierre son las IQ de reducción de Qa

La diálisis peritoneal es una excelente alternativa de TRS tras el fallo del TR

Faltan estudios sobre el impacto del cierre de la FAV Y el pronóstico CV en pacientes con TR exitoso