CONVEGNO

ACCESSI VASCOLARI PER EMODIALISI: APPROCCIO INTEGRATO E STRATEGIE OPERATIVE

8 OTTOBRE 2026
AUDITORIUM
FONDAZIONE IRCCS
SAN GERARDO DEI TINTORI
MONZA

Tecniche di confezionamento chirurgiche

Dott.ssa Sara Colzani

Sistema Socio Sanitario
Regione Lombardia
ASST Brianza



Tecniche di confezionamento chirurgiche

FAV nativa

PRO

- ↑ sopravvivenza
- ↓ infezioni
- ↓ ospedalizzazione
- ↓ costi
- ↓ mortalità

CONTRO

- ↑ trombosi precoce
  mancata maturazione

Murad MH, Elamin MB, Sidawy AN, Malaga G, Rizvi AZ, Flynn DN, Casey ET, McCausland FR, McGrath MM, Vo DH, El-Zoghby Z, Duncan AA, Tracz MJ, Erwin PJ, Montori VM. Autogenous versus prosthetic vascular access for hemodialysis: a systematic review and meta-analysis. J Vasc Surg. 2008 Nov;48(5 Suppl):34S-47S

Tecniche di confezionamento chirurgiche

20-60% delle FAV non arrivano a maturazione

8.1 KDOQI considers it reasonable to conduct a careful history and physical exam by the operator and managing team prior to AV access creation to identify infection risks that should first be managed before proceeding with AV access creation (eg, dental infection, osteomyelitis, etc). (Expert Opinion)

8.2 KDOQI suggests that the choice of anesthesia for AVF creation should be based on the operator's discretion and best clinical judgment, as current evidence shows no difference between regional block or local anesthesia in terms of AVF usability, patency, interventions, or patient experience. (Conditional Recommendation, Low-Moderate Level of Evidence)

8.3 KDOQI considers it reasonable that the choice of anastomotic configuration and apposition method (eg, vascular clips, sutures) for AVF creation be based on the operator's discretion and best clinical judgment, as there is insufficient evidence to prefer one configuration or apposition method over another. (Expert Opinion)

8.4 KDOQI considers it reasonable that the choice of suture technique for AV access creation should be based on the operator's discretion and best clinical judgment, as there is insufficient evidence that any anastomotic suture technique is advantageous in terms of AV access patency or complications. (Expert Opinion)

Lok CE, Huber TS, Lee T, Shenoy S, Yevzlin AS, Abreo K, Allon M, Asif A, Astor BC, Glickman MH, Graham J, Moist LM, Rajan DK, Roberts C, Vachharajani TJ, Valentini RP; Natio
Kidney Foundation. KDOQI Clinical Practice Guideline for Vascular Access: 2019 Update. Am J Kidney Dis. 2020 Apr;75(4 Suppl 2):S1-S164

Tecniche di confezionamento chirurgiche

Dove allestire l'anastomosi?

lato arto superiore destro/sinistro
sede distale/prossimale



studio randomizzato

distale prossimale

Variable	Total (n=230)	Group A (n = 115)	Group B (n = 115)	*p*-value
Mean Age (Years±SD)	30±SD 6.5	31±SD 5.1	30±SD 6.9	0.529
Male Gender [n, (%)]	194 (84.3)	93 (80.9)	101 (87.9)	0.716
Atherosclerotic risk factors:				
Diabetes [n, (%)]	180 (78.2)	85 (74)	95 (82.6)	0.682
Hypertension [n, (%)]	130 (56.5)	71 (61.7)	59 (51.3)	0.659
Smoking [n, (%)]	100 (43.4)	62 (53.9)	38 (33)	0.392
All 3 risk factors [n, (%)]	99 (43)	51 (44.3)	48 (41.7)	0.559
Two risk factors [n, (%)]	95 (41.3)	47 (40.8)	48 (41.7)	0.571
Single risk factor [n, (%)]	36 (15.6)	17 (14.7)	19 (16.5)	0.323
BMI 25–30 [n, (%)]	61 (26.5)	30 (26)	31 (26.9)	0.441
BMI 31–35 [n, (%)]	103 (44.7)	54 (46.9)	49 (42.6)	0.397
BMI 36–40 [n, (%)]	54 (23.4)	26 (22.6)	28 (24.3)	0.524
BMI >40 [n, (%)]	12 (5.2)	5 (4.3)	7 (6)	0.671
Maturation rate and patency [n, (%)]:				
Maturation	149 (64.7)	51(44.3)	98 (85.2)	0.0045
Patency (6 months)	116 (50.4)	31 (26.9)	85 (73.9)	0.0039
Patency (12 months)	95 (41.3)	19 (16.5)	76 (66%)	0.0007

> sedi di incannulamento
< sindrome da furto
< rischio di alta portata
<stenosi venose centrali sintomatiche
> possibilità di successivo accesso

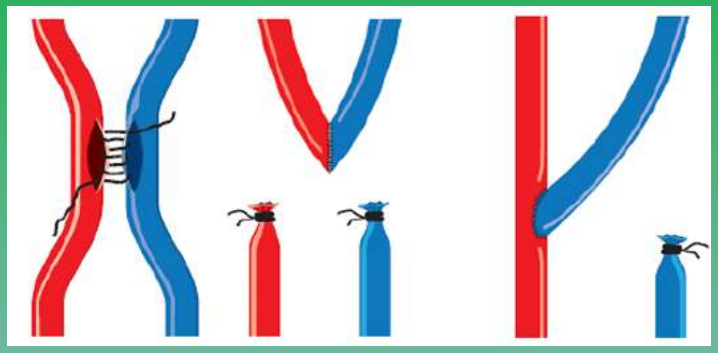
< pervietà primaria

Edgar B, Stevenson K, Aitken E, et al. A review of technical steps in the performance of arteriovenous fistula creation. The Journal of Vascular Access. 2026;27(1):90-101

Jamil M, Usman R, Ali K. Proximal Arterio Venous Fistula Creation - A Gold Standard In Chronic Renal Failure Patients With Multiple Comorbidities. J Ayub Med Coll Abbottabad. 2018 Jul-Sep;30(3):439-442

Tecniche di confezionamento chirurgiche

Quale morfologia di anastomosi?



60 pazienti
studio randomizzato
vena $\geq$ 2 mm
arteria $\geq$ 2 mm
L - L anastomosi 10 mm
1° giorno, 1° mese, 6° mese
percentuale di fallimento clinica ed eco

20% L - L 16.6% L – T

Table 1. Frequency of Patients Based on Age and Type of Treatment

Age, y	STS (%)	ETS (%)	P Value
10-20	2 (6.7)	1 (3.3)	0.06
21-30	6 (20)	1 (3.3)	0.1
31-40	0 (0)	2 (6.7)	0.06
>40	22 (73.3)	26 (86.6)	0.2
Total	30 (100)	30 (100)	0.1

Table 2. Frequency of Underlying Risk Factors and Confounding Factors in the Two Groups

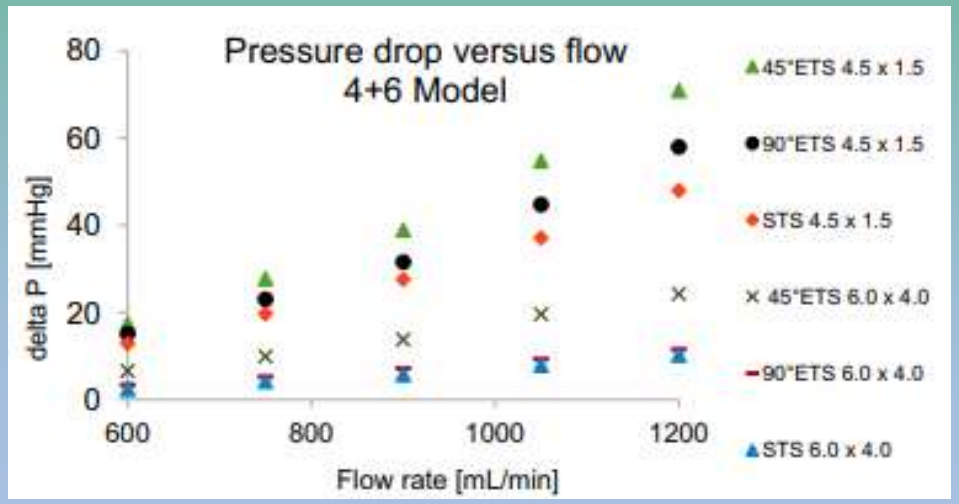
Groups	Diabetic Mellitus (%)	Hypertension (%)	PreviousVenous Catheter (%)
STS	10 (33.3)	21 (70)	16 (53.3)
ETS	9 (30)	21 (70)	18 (60)
P-value	0.06	0.08	0.06

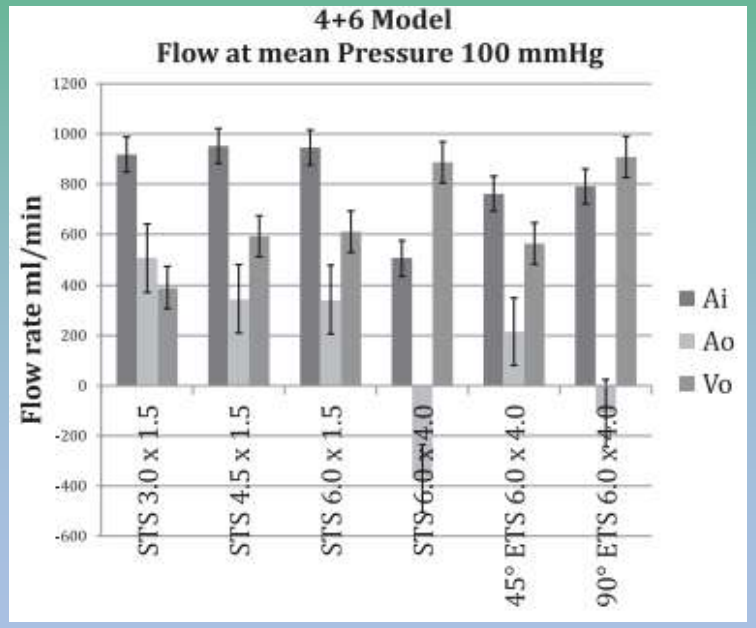
Mozaffar M, Fallah M, Lotfollahzadeh S, Sobhiyeh MR, Gholizadeh B, Jabbehdari S, Mahdi Z. Comparison of efficacy of side to side versus end to side arteriovenous fistulae formation in chronic renal failure as a permanent hemodialysis access. Nephrourol Mon. 2013 Jul 1;5(3):827-30

Tecniche di confezionamento chirurgiche

Quale morfologia/dimensione dell'anastomosi?

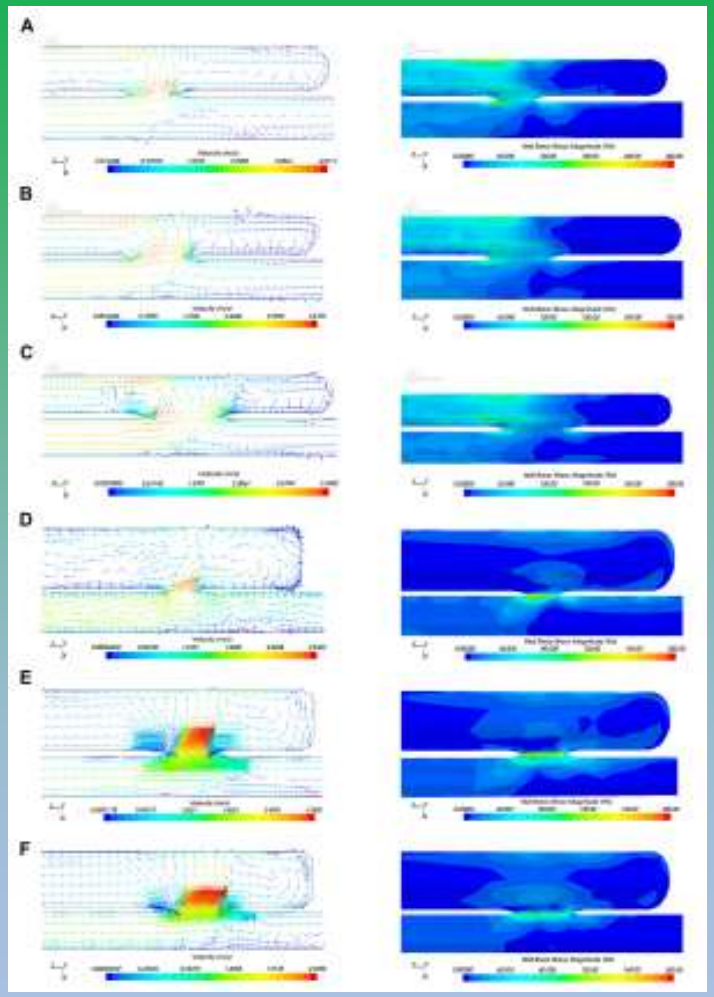
Model (artery + vein)	*Size, mm*	*STS*	*Short STS*	*Open STS*	*45° ETS*	*90° ETS*
3 + 3	3.0 × 1.5	X				
3 + 3	4.5 × 1.5	X	X	X	X	X
3 + 3	6.0 × 1.5	X				
4 + 6	3.0 × 1.5	X				
4 + 6	4.5 × 1.5	X	X	X	X	X
4 + 6	6.0 × 1.5	X				
4 + 6	6.0 × 4.0	X			X	X



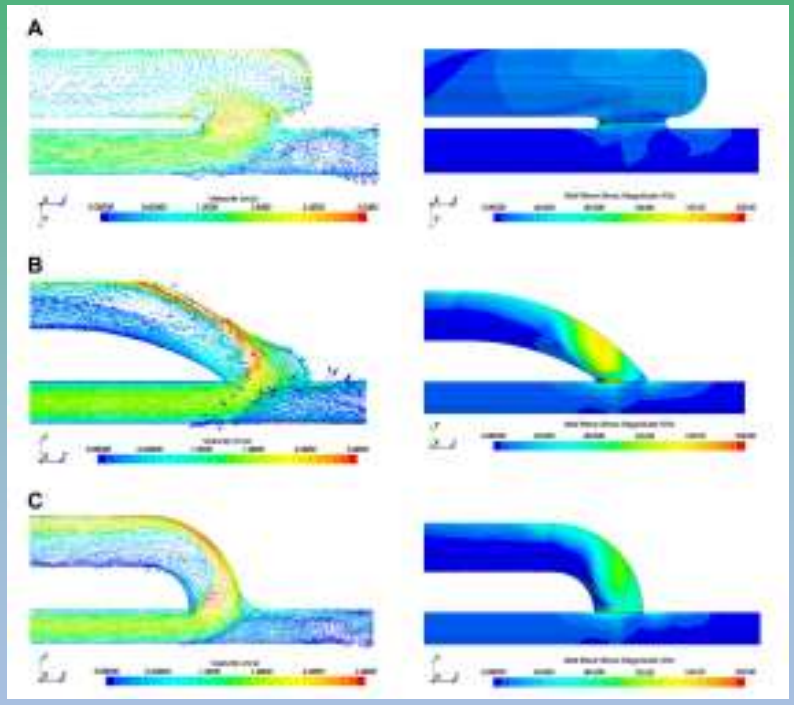


Hull JE, Balakin BV, Kellerman BM, Wrolstad DK. Computational fluid dynamic evaluation of the side-to-side anastomosis for arteriovenous fistula. J Vasc Surg. 2013 Jul;58(1):187-93

Tecniche di confezionamento chirurgiche



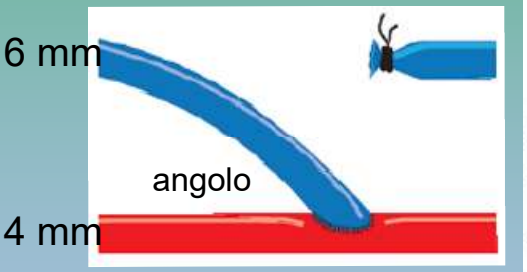
Quale morfologia/dimensione dell'anastomosi?

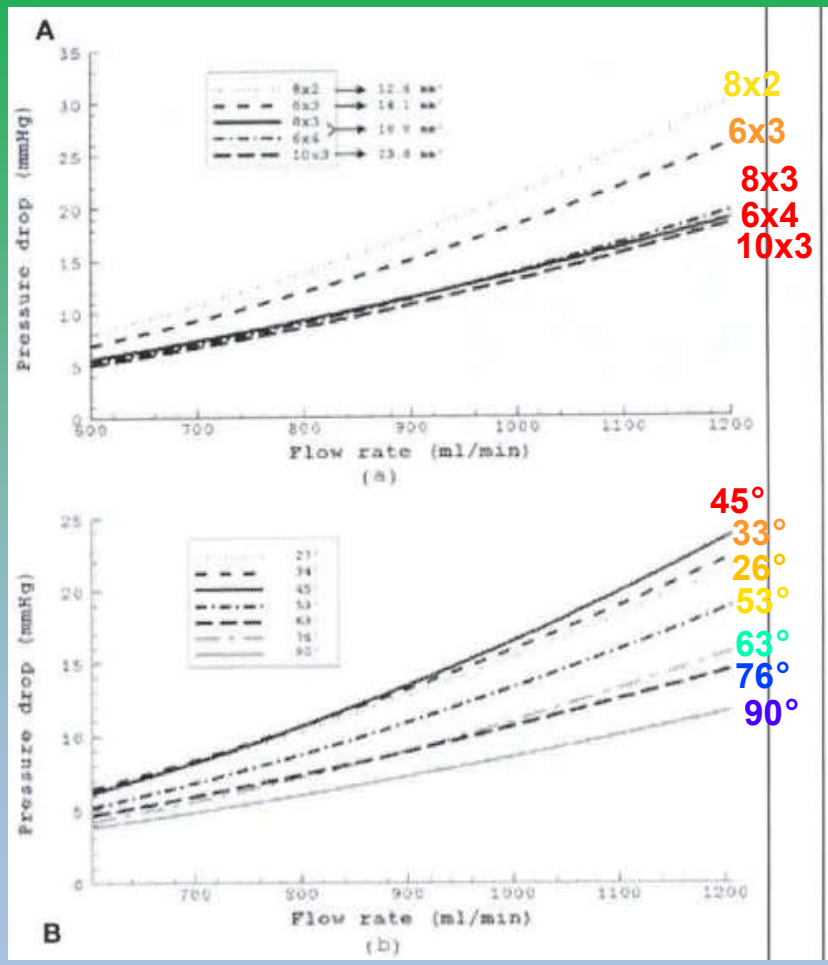


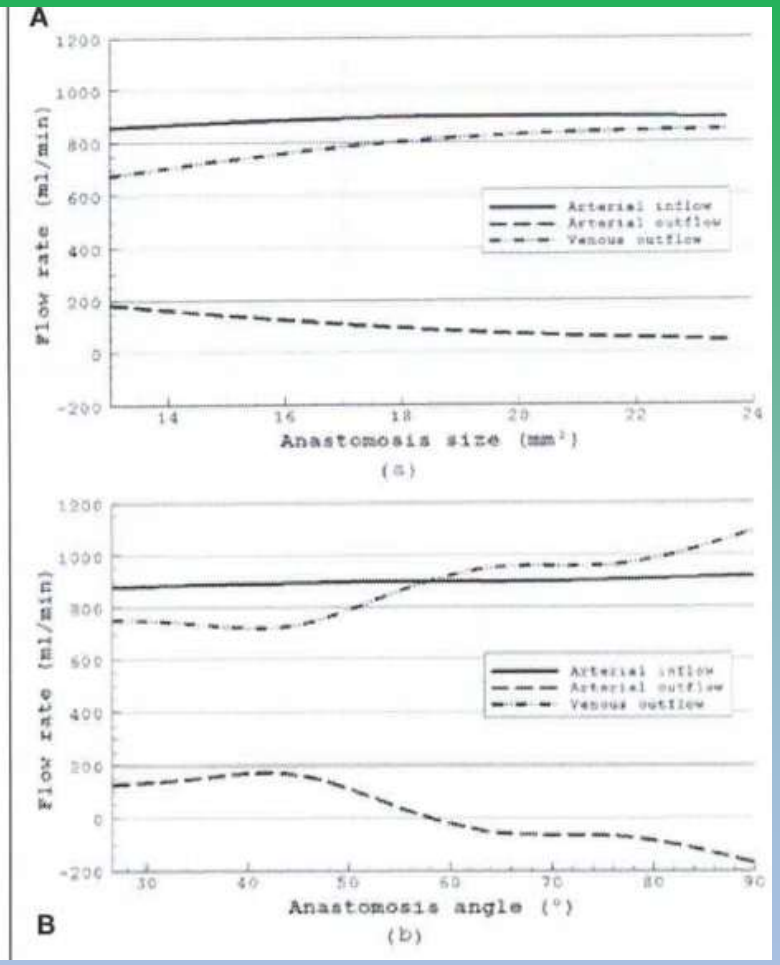
Hull JE, Balakin BV, Kellerman BM, Wrolstad DK. Computational fluid dynamic evaluation of the side-to-side anastomosis for arteriovenous fistula. J Vasc Surg. 2013 Jul;58(1):187-93

Quale morfologia/dimensione dell'anastomosi?

Tecniche di confezionamento chirurgiche

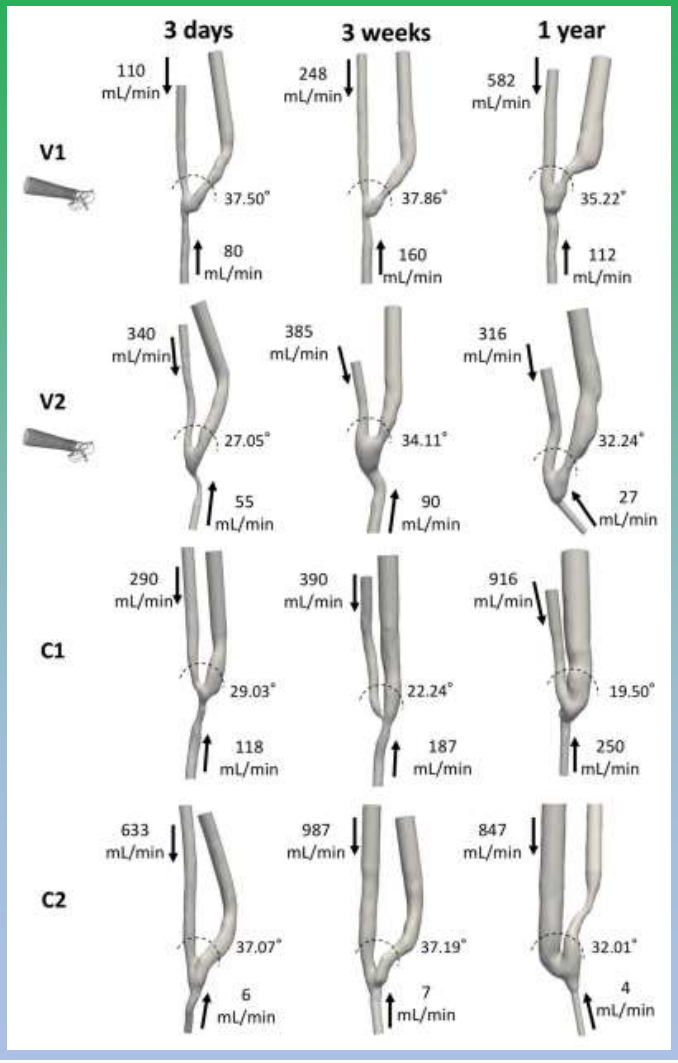




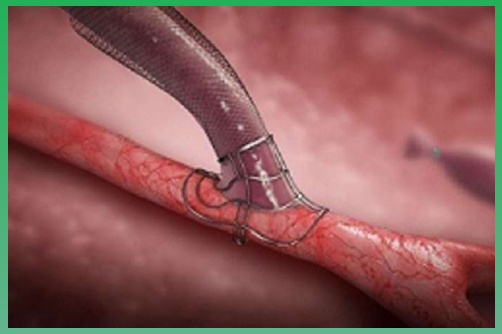


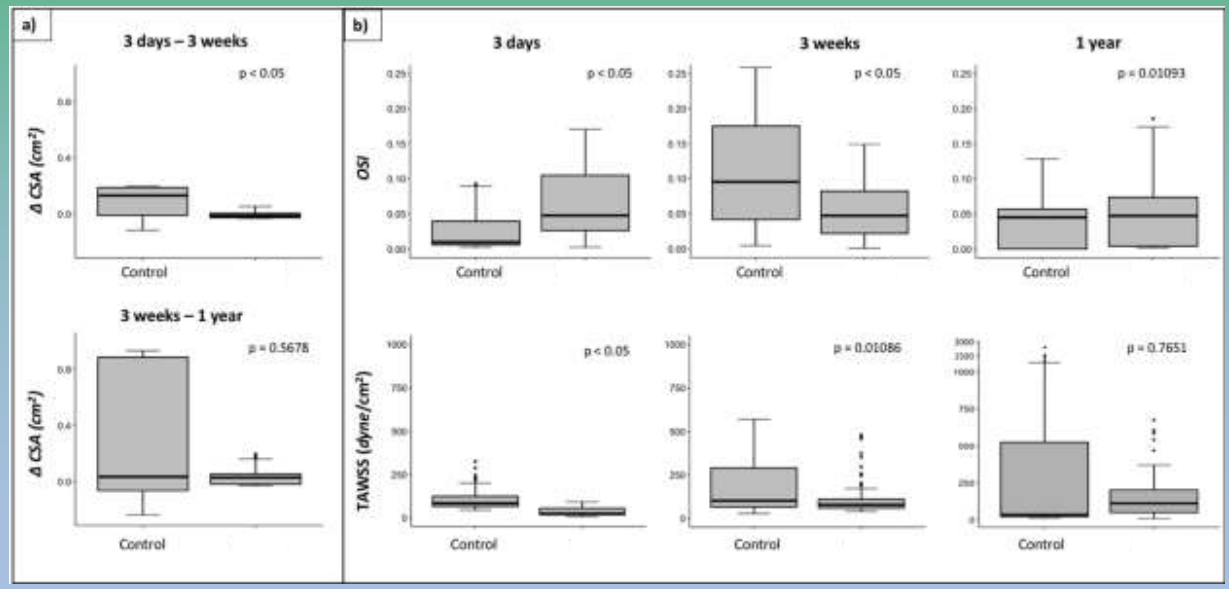
Van Canneyt K, Pourchez T, Eloot S, Guillame C, Bonnet A, Segers P, Verdonck P. Hemodynamic impact of anastomosis size and angle in side-to-end arteriovenous fistulae: a computer analysis. J Vasc Access. 2010 Jan-Mar;11(1):52-8

Quale morfologia/dimensione dell'anastomosi?



Tecniche di confezionamento chirurgiche

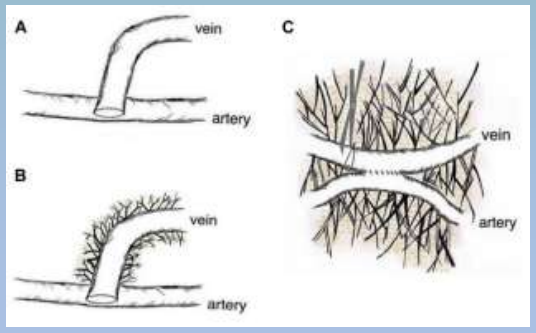




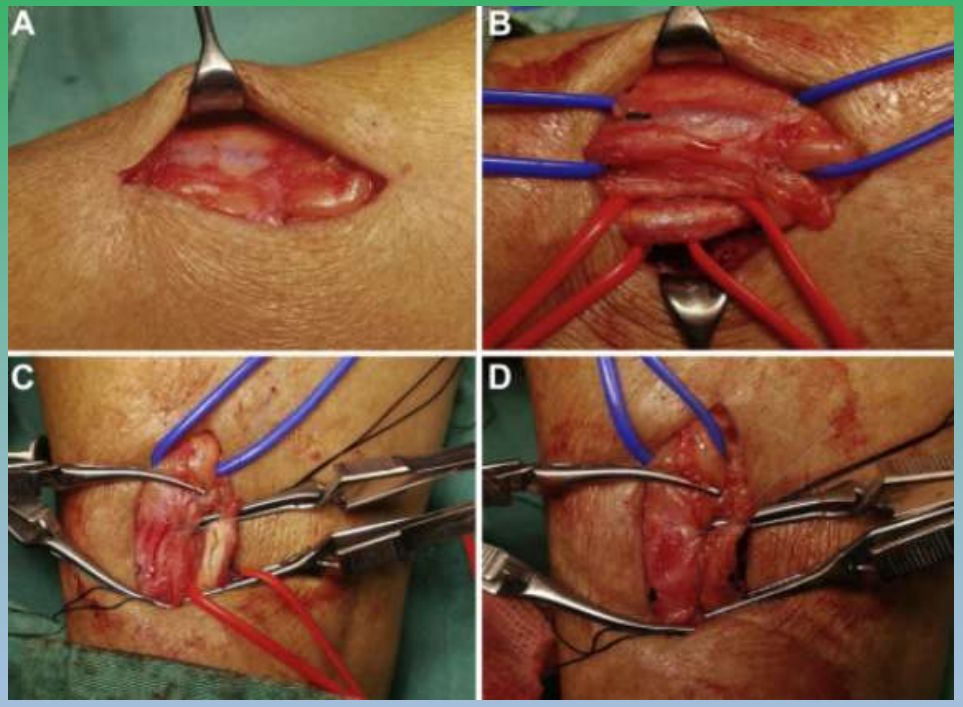
Bozzetto M, Soliveri L, Poloni S, Brambilla P, Curtò D, Condemi GC, Cefalì P, Spina I, Villa A, Caroli A, Remuzzi A. Arteriovenous fistula creation with V[redacted] A feasibility study to reveal hemodynamic implications. J Vasc Access. 2024 Jan;25(1):60-70

Tecniche di isolamento dei vasi





Tecniche di confezionamento chirurgiche



Wang Xiaohe, Zhang Yuanyuan, Liu Zhen, Hou Guocun, A modified no-touch technique for anastomosis to create a radiocephalic arteriovenous fistula, Journal of Vascular Surgery Cases, Innovations and Techniques, Volume 7, Issue 4, 2021, Pages 686-690

Tecniche di confezionamento chirurgiche

Table II. Characteristics of included studies

	Methods		Participants						Others
Study	Study design	Follow-up	*n* (total), male	Country	Age in years (mean)	Intervention (s) vs control	Outcomes	Results	Was the cephalic vein inflated?
Hörer, 2016[7]	Prospective pilot study	1, 6, and 12 months	31, (17 males)	Örebro, Sweden	63	NTT $n = 31$	1. Primary patency at 1 and 6 months and 1 year. 2. Secondary patency at 1 and 6 months and 1 year.	1. Primary patency at 1, 6, and 12 months was 84%, 64%, and 54%.[a] 2. Secondary patency at 1, 6, and 12 months was 97%, 84%, and 80%.[a]	No
ElMallah, 2018[17]	Prospective comparative study	1, 3, and 6 months	80, (46 males)	Shebin El Kom, Egypt	58.30	NTT ($n = 40$) vs Conventional technique- ($n = 40$)	1. Primary patency at 1, 3, and 6 months. 2. Secondary patency at 1, 3, and 6 months.	1. Primary patency was not significantly different between the 2 groups at 1 and 3 months but was significantly better in the NTT group at 6 months. 2. Secondary patency was not significantly different between the 2 groups at 1 and 3 months but was significantly better in the NTT group at 6 months.	No

isolamento dei vasi

radio-cefalica

Bhojani MF, Malik J, Mumtaz A, Sophie Z, Waseem S. Beyond Conventional: A Systematic Review of Non-Conventional Techniques for Radio-Cephalic Arteriovenous Fistula. Ann Vasc Surg. 2025 Jan;110(Pt B):306-316.

Tecniche di confezionamento chirurgiche

Table II. Continued

	Methods		Participants						Others
Study	Study design	Follow-up	*n* (total), male	Country	Age in years (mean)	Intervention (s) vs control	Outcomes	Results	Was the cephalic vein inflated?
Hastaoğlu, 2019[18]	NR	1 week, 1, 3, 6, and 12 months	169, (107 males)	Istanbul, Turkey	59.5	NTT ($n = 74$) vs Conventional technique ($n = 95$)	1. Primary patency rate at 1 year. 2. Secondary patency rate at 1 year.	1. Primary patency was not significantly different between the 2 groups. 2. Secondary patency was not significantly different between the 2 groups.	Yes
Hou, 2022[16]	Retrospective pilot study	NR	100, (65 males)	China	56.86	MNTT ($n = 40$) vs Conventional Technique ($n = 60$)	1. Primary unassisted patency at 8 weeks, 6 months, and 12 months. 2. Maturation rate.	1. Primary unassisted patency was higher in the MNTT group. 2. Maturation rates were higher in the MNTT group.	No
Wang, 2023[15,19]	Retrospective cohort	NR	103, (62 males)	China	60	MNTT ($n = 63$) vs Conventional technique ($n = 40$)	1. Primary patency rate at 3, 6, 9 months, and 1 year. 2. AVF maturation rate at 2, 4, and 8 weeks.	1. Primary patency was significantly better at 1 year. 2. AVF maturation rates at 2, 5, and 8 weeks were 54.0% (34/63), 85.7% (54/63), and 90.5% (57/63), respectively.[a]	Yes

isolamento dei vasi

radio-cefalica

Bhojani MF, Malik J, Mumtaz A, Sophie Z, Waseem S. Beyond Conventional: A Systematic Review of Non-Conventional Techniques for Radio-Cephalic Arteriovenous Fistula. Ann Vasc Surg. 2025 Jan;110(Pt B):306-316.

Tecniche di confezionamento chirurgiche



apertura dei vasi

studio randomizzato

62 pz
criteri

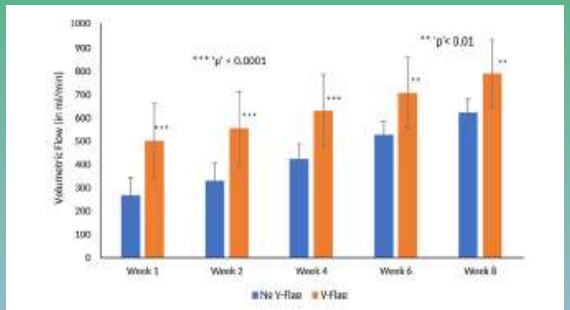


Figure 6 Graph displaying the volumetric flow rates across the AVF at different timepoints of follow-up in both groups.

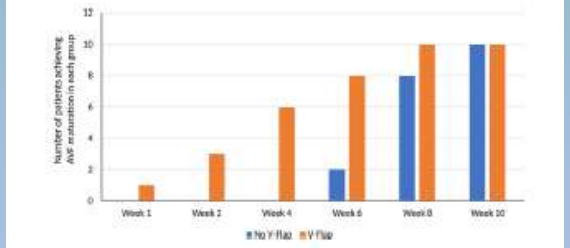


Figure 7 Graph displaying the number of patients achieving AVF maturation at different timepoints of follow-up in both groups.

distale

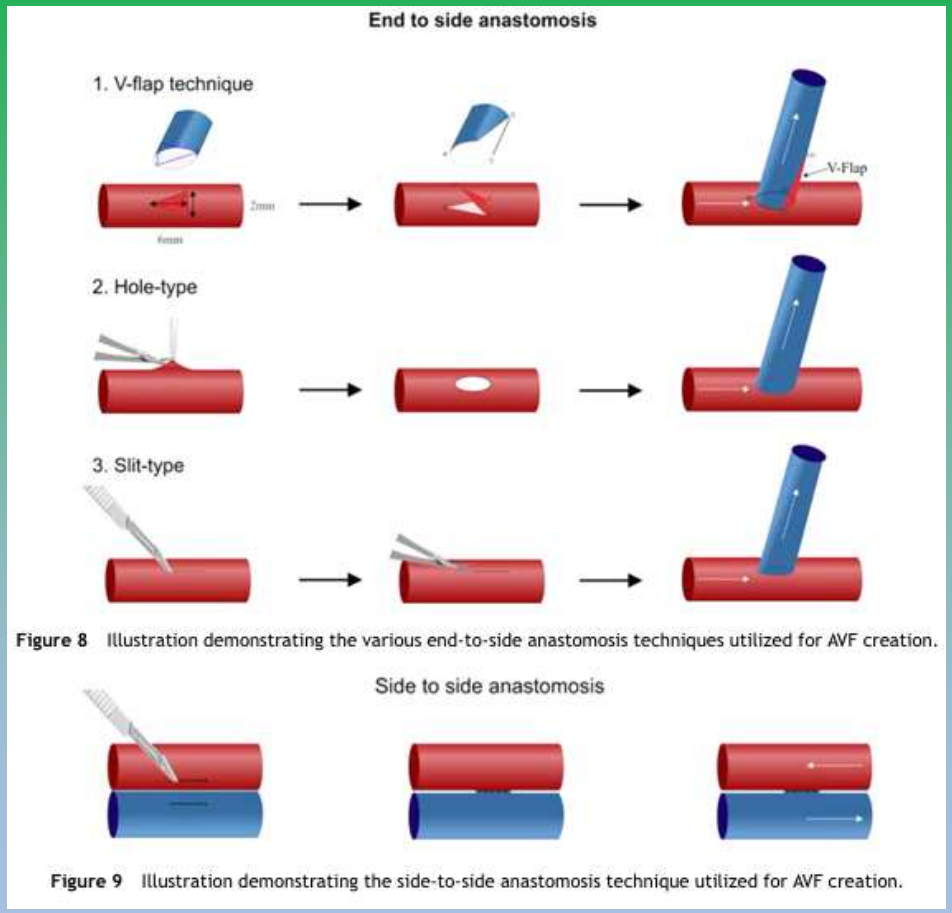
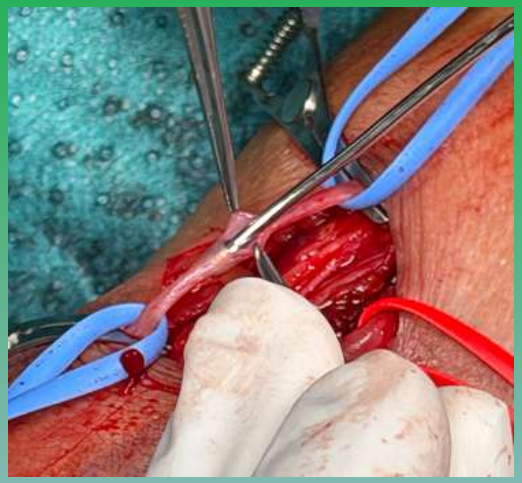


Figure 8 Illustration demonstrating the various end-to-side anastomosis techniques utilized for AVF creation.

Figure 9 Illustration demonstrating the side-to-side anastomosis technique utilized for AVF creation.

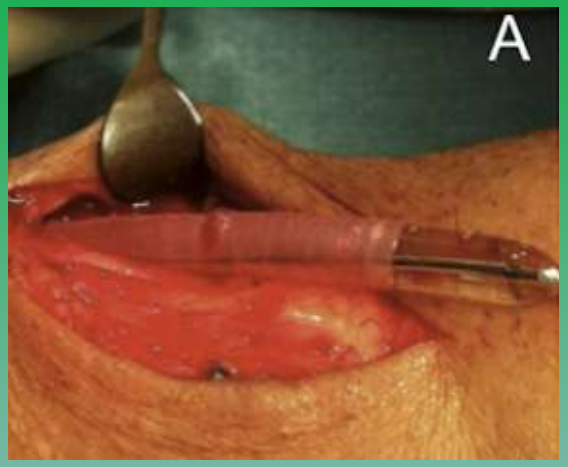
Suresh A, Gupta A, Kumar V. Distally based V-flap on the artery in an end-to-side anastomosis for arteriovenous fistula creation - A randomized controlled pilot study. J Plast Reconstr Aesthet Surg. 2022 Sep;75(9):3174-3181

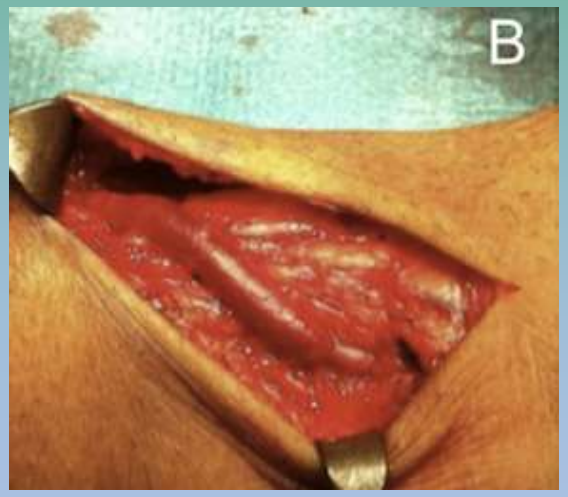
dilatazione della vena





Tecniche di confezionamento chirurgiche

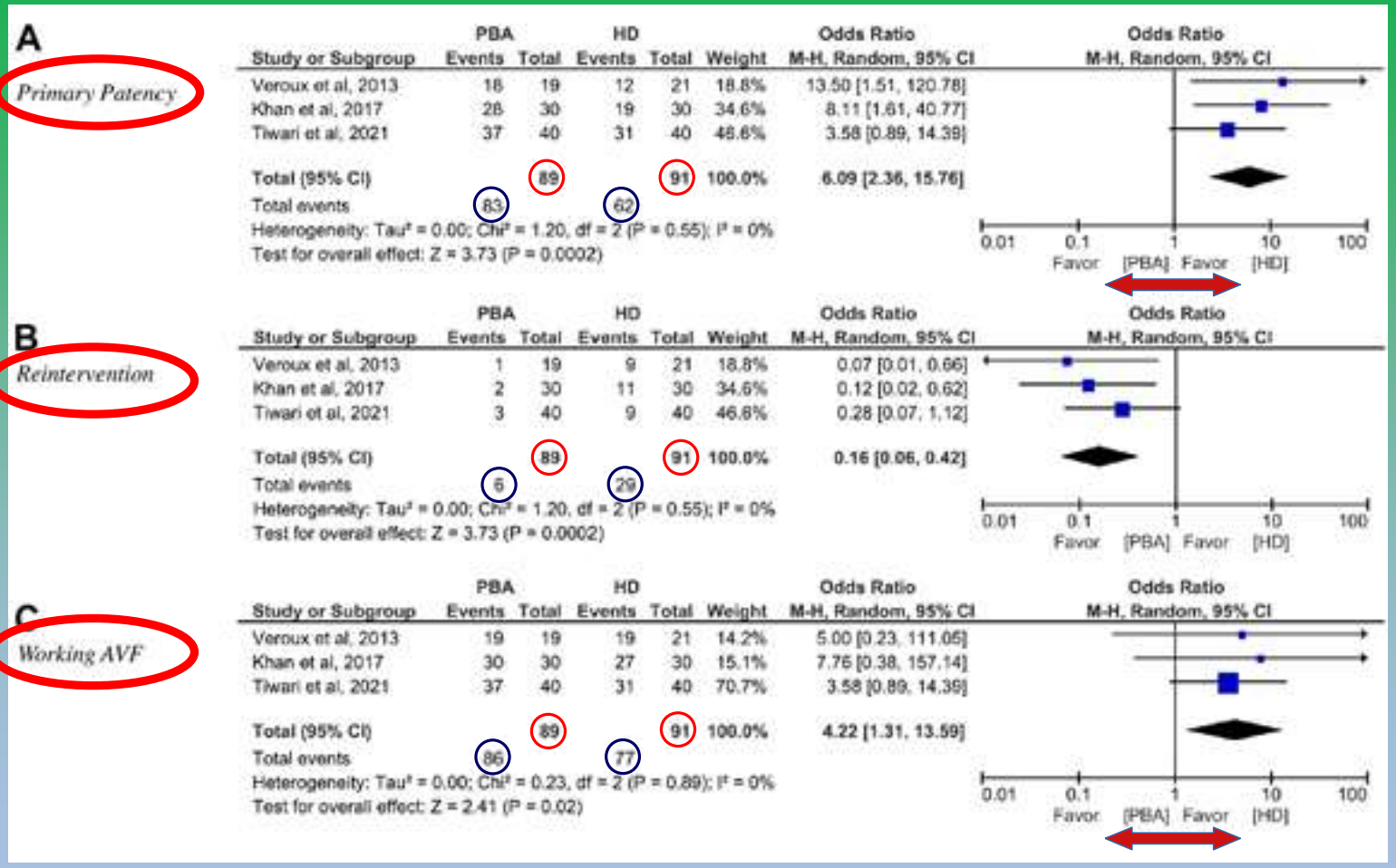




Veroux P, Giaquinta A, Tallarita T, Sinagra N, Virgilio C, Zerbo D, Gloviczki P, Veroux M. Primary balloon angioplasty of small (≤2 mm) cephalic veins improves primary patency of arteriovenous fistulae and decreases reintervention rates. J Vasc Surg. 2013 Jan;57(1):131-6

dilatazione della vena

Tecniche di confezionamento chirurgiche



distale
vena cefalica ≤ 2 mm
diametro finale 4 mm

6 mesi di follow up
no cieco
vena cefalica < 3 mm

Sattari SA, Sattari AR, Hicks CW, Howard JF, Shoucair S, Almanzar A, Bannazadeh M, Arnold MW. Primary Balloon Angioplasty Versus Hydrostatic Dilation for Arteriovenous Fistula Creation in Patients with Small-Caliber Cephalic Veins: A Systematic Review and Meta-Analysis. Ann Vasc Surg. 2022 Nov;87:351-361

Tecniche di confezionamento chirurgiche

e l'arteria?

Case Reports > J Vasc Access. 2006 Jan-Mar;7(1):38-42. doi: 10.1177/112972980600700108.

Ultrasound guided brachial arterial angioplasty during the creation of a radio-cephalic arteriovenous fistula: a case report

M Napoli [1], A Montinaro, F Russo, A Valletta, A De Pascalis, S Proia, M Aprile, L Alfonso, P Patruno, E Buongiorno

> J Vasc Access. 2023 Mar;24(2):300-304. doi: 10.1177/11297298211017029. Epub 2021 Jul 2.

The intraoperative intravascular lithotripsy to recruit a calcified radial artery for creating a distal radio-cephalic fistula

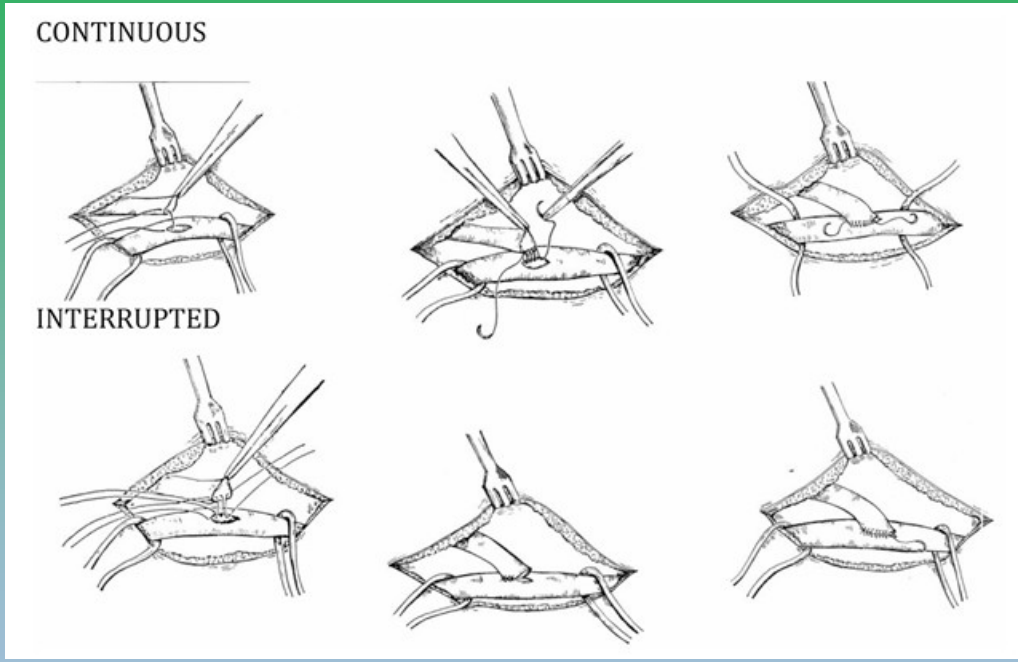
Marcello Napoli [1], Silvia Barbarini [1], Paolo Ria [1], Anna Zito [1], Maria Luisa Lefons [1], Antonio De Pascalis [1]

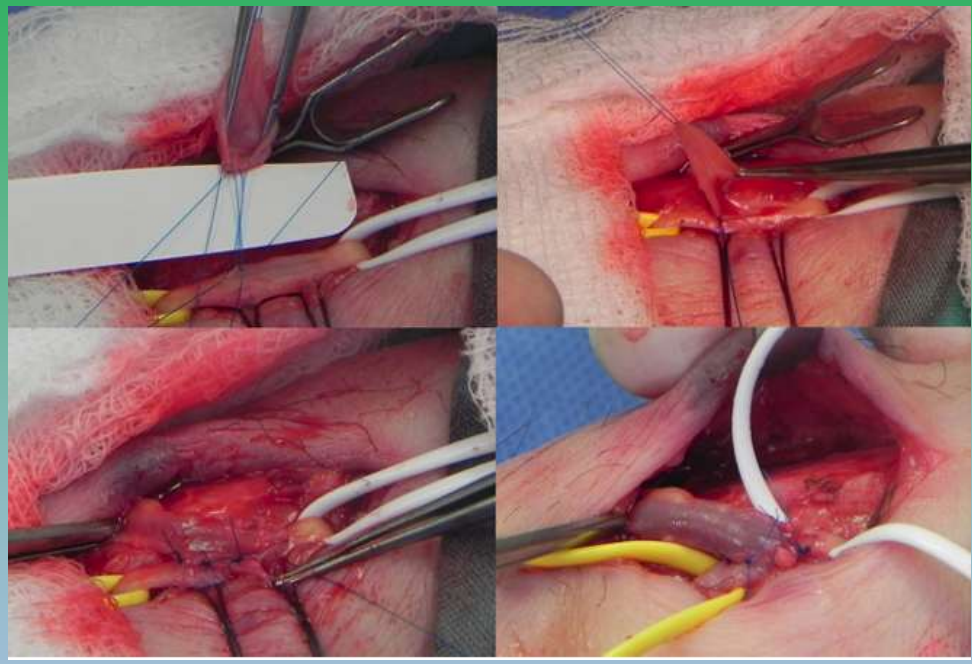
Napoli M, Montinaro A, Russo F, Valletta A, De Pascalis A, Proia S, Aprile M, Alfonso L, Patruno P, Buongiorno E. Ultrasound guided brachial arterial angioplasty during the creation of a radio-cephalic arteriovenous fistula: a case report. J Vasc Access. 2006 Jan-Mar;7(1):38-42

Napoli M, Barbarini S, Ria P, Zito A, Lefons ML, De Pascalis A. The intraoperative intravascular lithotripsy to recruit a calcified radial artery for creating a distal radio-cephalic fistula. J Vasc Access. 2023 Mar;24(2):300-304

Tecniche di confezionamento chirurgiche

tipi di sutura





studio randomizzato
in cieco

Aitken E, Jeans E, Aitken M, Kingsmore D. A randomized controlled trial of interrupted versus continuous suturing techniques for radiocephalic fistulas. J Vasc Surg. 2015 Dec;62(6):1575-82

Tecniche di confezionamento chirurgiche

tipi di sutura

continua
> semplice
> veloce

a punti staccati
> compliance ed allargamento con aumento della portata

Table II. Radial artery and cephalic vein diameters and radial artery blood flow preoperatively

	Continuous	*Interrupted*	P *value*
Radial artery, mm	2.16 (0.27)	2.14 (0.24)	.71
Cephalic vein, mm	2.59 (0.61)	2.41 (0.43)	.14
Blood flow in radial artery, mL/min	44.3 (13.2)	43.7 (12.9)	.76

Table III. Comparison of patency rates

	Continuous	*Interrupted*	P *value*
Patency at 6 weeks	47 (17)	71 (32)	.01
Functional patency at 6 weeks	36 (13)	52 (22)	.18
Immediate patency	93 (39)	67 (24)	<.01
Thrill on discharge	83 (35)	53 (19)	<.01
Bruit on discharge	88 (37)	56 (20)	<.01

clinica
clinica+eco

78 pazienti

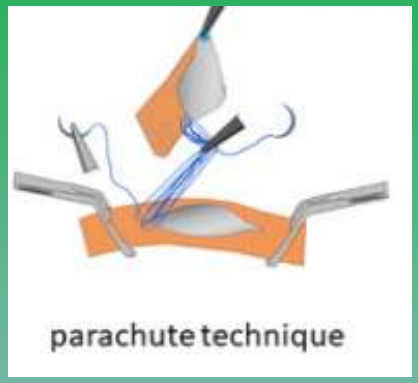
3 pazienti con stenosi anastomotica **I**
1 paziente con sanguinamento **I**
3 pazienti assenza thrill **C**

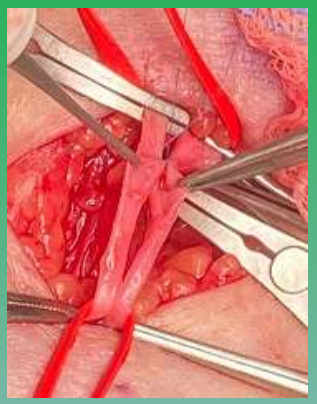
} revisione chirurgica

Aitken E, Jeans E, Aitken M, Kingsmore D. A randomized controlled trial of interrupted versus continuous suturing techniques for radiocephalic fistulas. J Vasc Surg. 2015 Dec;62(6):1575-82

Tecniche di confezionamento chirurgiche

tipi di sutura





studio randomizzato

100 pz

	paracadute	ancora	
primary patency 30 gg	96%	80%	p=0.014
maturazione 6 w	85%	80%	p=0.352

Mabrouk M, Atta I, Fouda A, Ismail K, Ismail T, Gawish R, Elkassaby M. Anchor versus parachute suturing technique in arteriovenous fistula creation for hemodialysis. Vascular. 2025 Aug;33(4):902-909

tipi di sutura

Tecniche di confezionamento chirurgiche



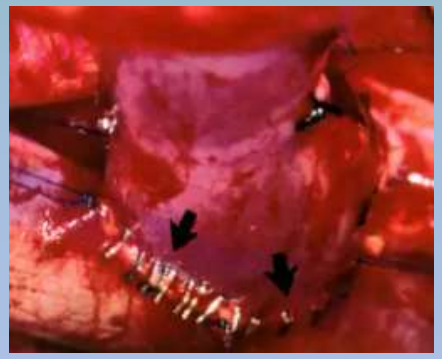


TABLE II

Mean Time to Construct Anastomoses

	VCS Clip (n = 42)	Suture (n = 47)	P
Autologous	14 (n = 21)	22 (n = 19)	0.0001
Graft	26 (n = 15)	30 (n = 19)	0.04
Graft revision	19 (n = 6)	24 (n = 9)	0.35

Mean time to construct anastomoses is given in minutes. Comparisons were made using t tests.
VCS = vascular clipping system.

TABLE III

Evaluation of Bleeding

	VCS Clip (n = 46)	Suture (n = 49)	P
Autologous			0.001
None	9	2	
Minimal	7	17	
Moderate	5	0	
Severe	1	1	
Not reported	0	0	
Grafts			0.36
None	2	0	
Minimal	10	14	
Moderate	6	5	
Severe	0	0	
Not reported	0	0	
Graft revisions			0.06
None	2	0	
Minimal	1	7	
Moderate	3	3	
Severe	0	0	
Not reported	0	0	

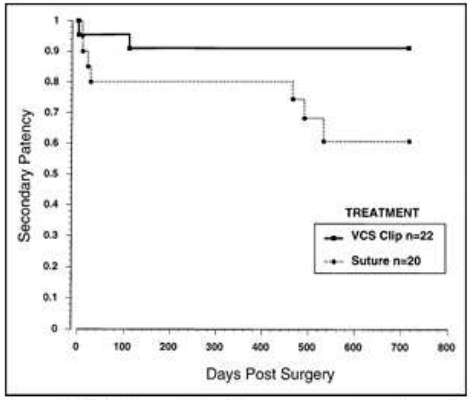


Figure 1. Life-table analysis of 2-year secondary patency for autologous fistula patients.

TABLE IV

Other Events

	VCS Clip (n = 46)	Suture (n = 49)	P
Transplant	4	2	0.43
Death	3	10	0.05
Regained kidney function	0	1	1.00
Venous obstruction	0	1	1.00
Venous hypertension	1	0	0.48
Aneurysm	1	0	0.48
Infection	0	2	0.50
Steal syndrome	1	0	0.48
Swollen arm	1	0	0.48

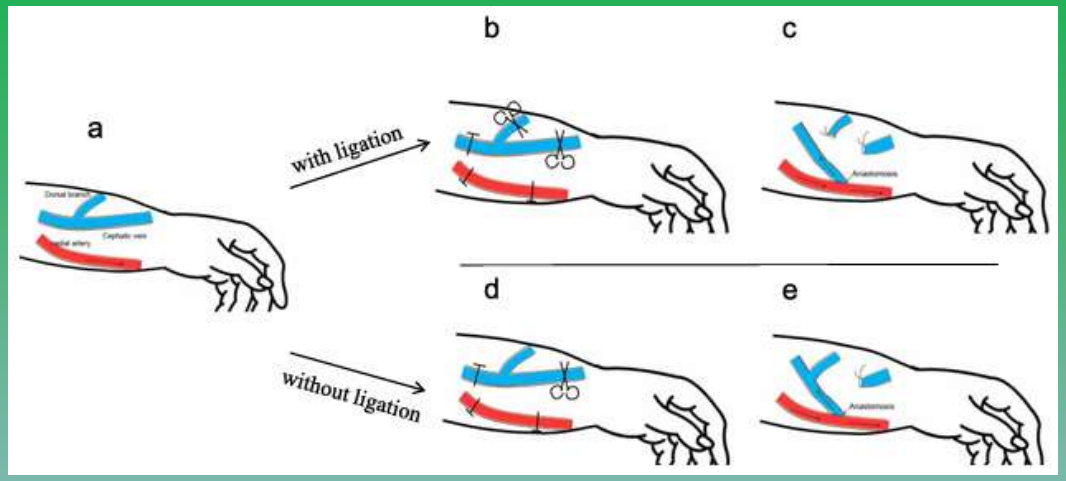
studio randomizzato

Clark J Zeebregts, Wolff M Kirsch, Jan J van den Dungen, Yong H Zhu, Reinout van Schilfgaarde, Five years' world experience with nonpenetrating clips for vascular anastomoses, The American Journal of Surgery, Volume 187, Issue 6, 2004, 751-760

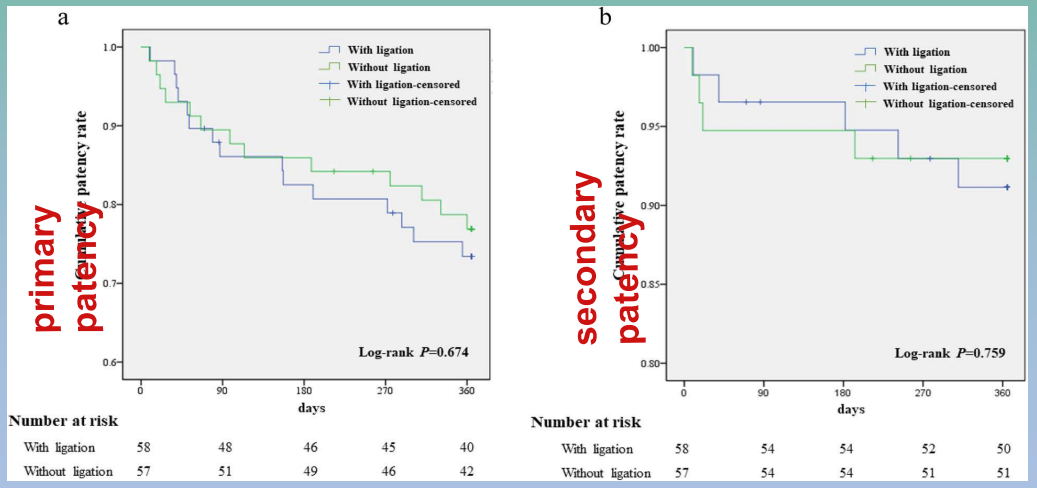
Mital, D., Foster, P., Jensik, S., del Rio, J., Sankary, H., McChesney, L., & Williams, J. (1996). Renal transaplantation without sutures using the vascular clipping system for renale artery and vein anastomosis A new techinque. Transplantation, 62(8), 1171–1173

Tecniche di confezionamento chirurgiche

gestione dei rami venosi



studio randomizzato
115 pz cinesi
FAV radio-cefalica



Zhang H, Zhu G, Yan L, Lu Y, Shao F. Does ligation of the dorsal branch of the cephalic vein affect the patency of a distal forearm arteriovenous fistula? A randomised study. BMC Nephrol. 2020 Apr 29;21(1):155

Tecniche di confezionamento chirurgiche

sclerodermia
morfea

cardiopatia ischemica

cardiopatia ischemica
cardiopatia ischemica

precedente
CVC

tx
fegato

ictu
s

nascita	età intervento	diabete	vasculopatia	dataFAV	accesso	procedura1f	funzionante d	funzionante ora
15/11/1965	60	1	0	14/01/26	prossimalizzata destra	1	1	1
17/06/1957	68	1	0	28/01/26	Mid arm sinistra	1	1	1
28/07/1965	60	1	0	28/01/26	prossimalizzata destra	0	1	1
27/07/1958	67	1	1	04/02/26	mid arm sinistra	0	1	1
16/10/1938	87	0	0	04/02/26	mid arm sinistra	0	1	1
20/12/1942	83	1	0	18/02/2026	mid arm sinistra	0	1	1
19/09/1955	70	0	1	18/02/2026	prossimalizzata sinistra	1	1	1
23/05/1944	81	1	1	25/03/2026	prossimalizzata sinistra	0	1	1
04/12/1968	57	0	1	15/04/2026	distale destra	1	1	1
08/04/1954	71	1	1	11/03/2026	mid arm destra	1	1	1
18/06/1993	32	0	0	26/03/2026	mid arm sinistra	0	1	1
03/12/1942	83	1	0	29/04/2026	prossimalizzata sinistra	1	1	1
26/03/1943	83	0	0	07/05/2026	mid arm destra	0	1	1
19/11/1951	74	0	0	13/05/2026	prossimalizzata destra	0	1	1
26/03/1947	79	1	1	15/04/2026	mid arm sinistra	0	1	1
12/04/1987	39	0	0	07/05/2026	mid arm destra	1	1	1
20/12/1948	77	0	0	13/05/2026	prossimalizzata sinistra	1	1	0
28/02/1952	74	0	0	11/03/2026	mid arm sinistra	0	1	1
17/01/1941	85	0	1	20/05/2026	mid arm sinistra	0	1	1
15/01/1953	73	0	0	09/06/2026	mid arm sinistra	0	1	1
16/05/1946	80	0	1	09/06/2026	mid arm destra	0	1	1
22/04/1965	61	0	0	10/06/2026	prossimalizzata destra	1	1	1
02/02/1951	75	0	1	20/05/2026	mid arm sinistra	0	1	1
04/07/1964	61	1	1	01/07/2026	prossimalizzata sinistra	0	1	1
09/05/1952	74	0	0	10/06/2026	mid arm sinistra	0	1	1
01/06/1950	76	1	1	07/07/2026	mid arm destra	0	1	1
11/05/1951	75	0	1	01/07/2026	mid arm sinistra	0	1	1
27/06/1935	91	0	1	08/07/2026	mid arm destra	0	1	1
20/04/1957	69	0	1	08/07/2026	prossimalizzata destra	1	1	1
20/12/1943	82	1	0	07/07/2026	prossimalizzata destra	0	1	1
	71,6	11	14			9	29	28

Tecniche di confezionamento chirurgiche

