

L'ISCHÉMIE

QUELLES INDICATIONS POUR LE DRIL ??

Pr DELLA SCHIAVA Nellie, CHU LYON



 **Abords vasculaires pour hémodialyse**

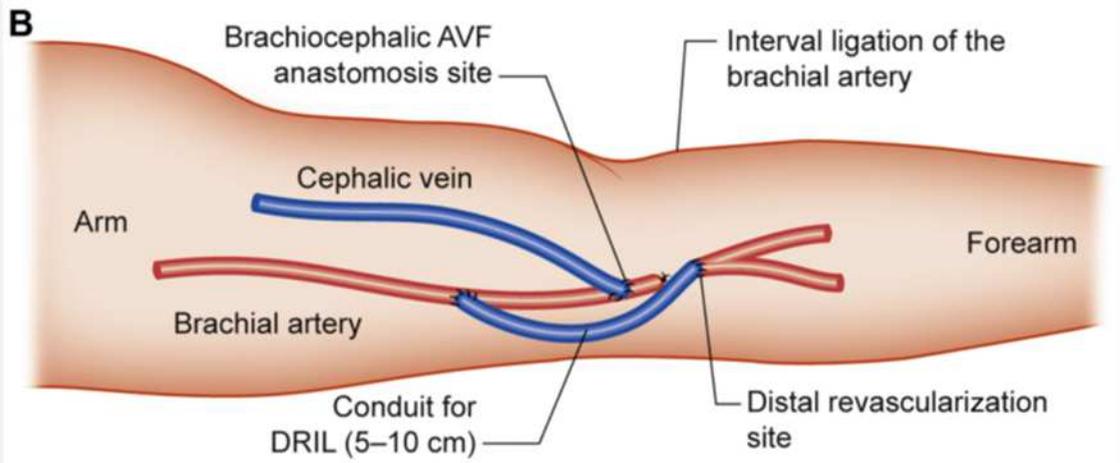
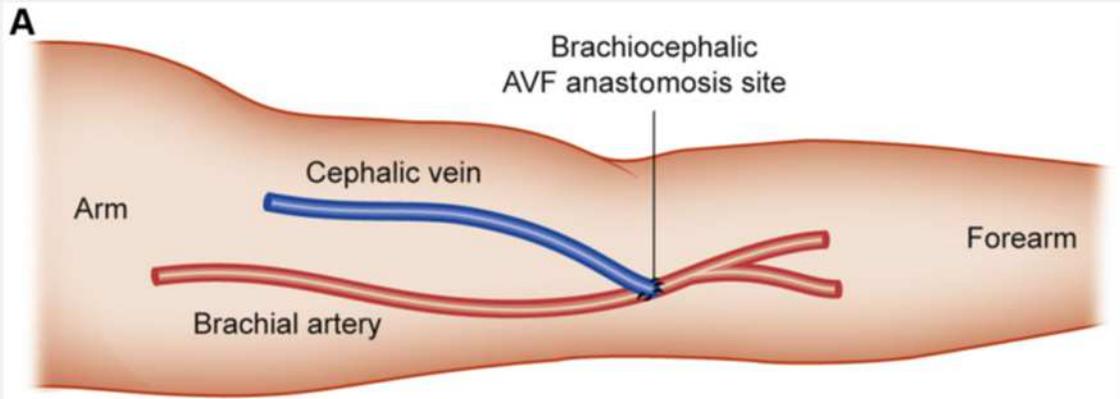
27^{ème} COURS-CONGRÈS
DE LA SOCIÉTÉ FRANCOPHONE
DE L'ABORD VASCULAIRE

5 > 7 JUIN 2024

PALAIS DES CONGRÈS D'AJACCIO

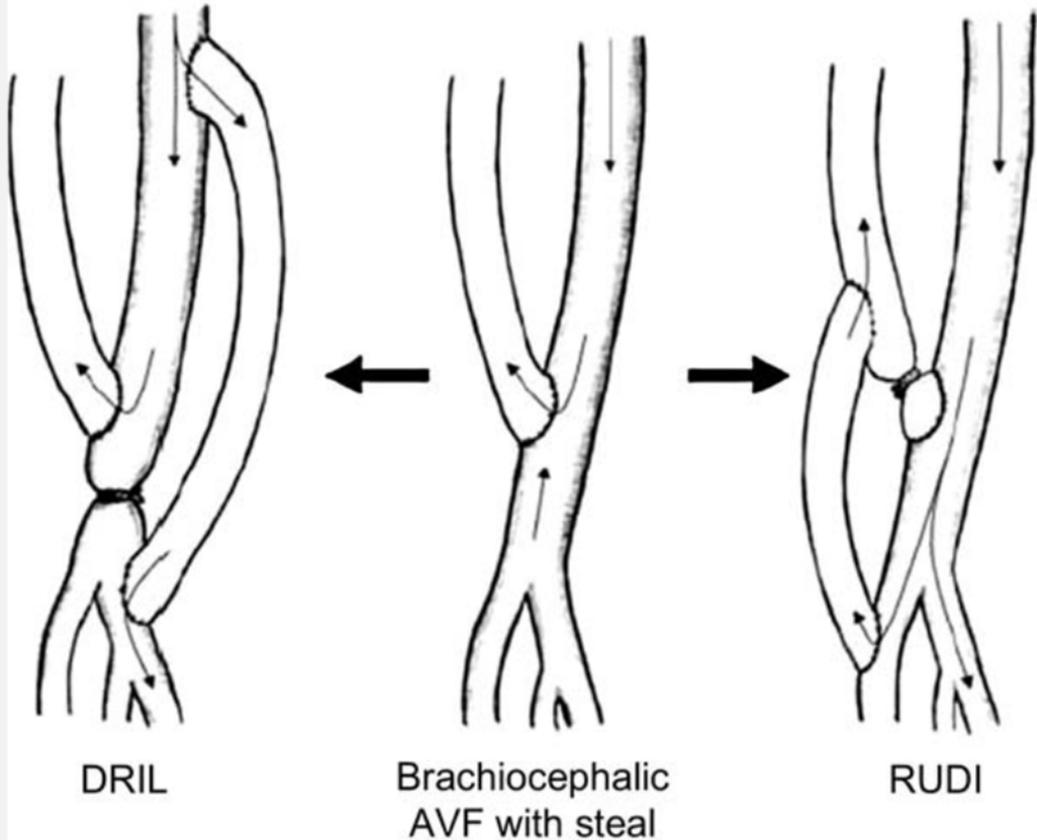
TECHNIQUE

- DRIL = Distal Revascularization and Interval Ligation
- Donc 2 temps opératoires
- On ne touche pas à l'anastomose de la FAV contrairement aux RUDI ou PAI

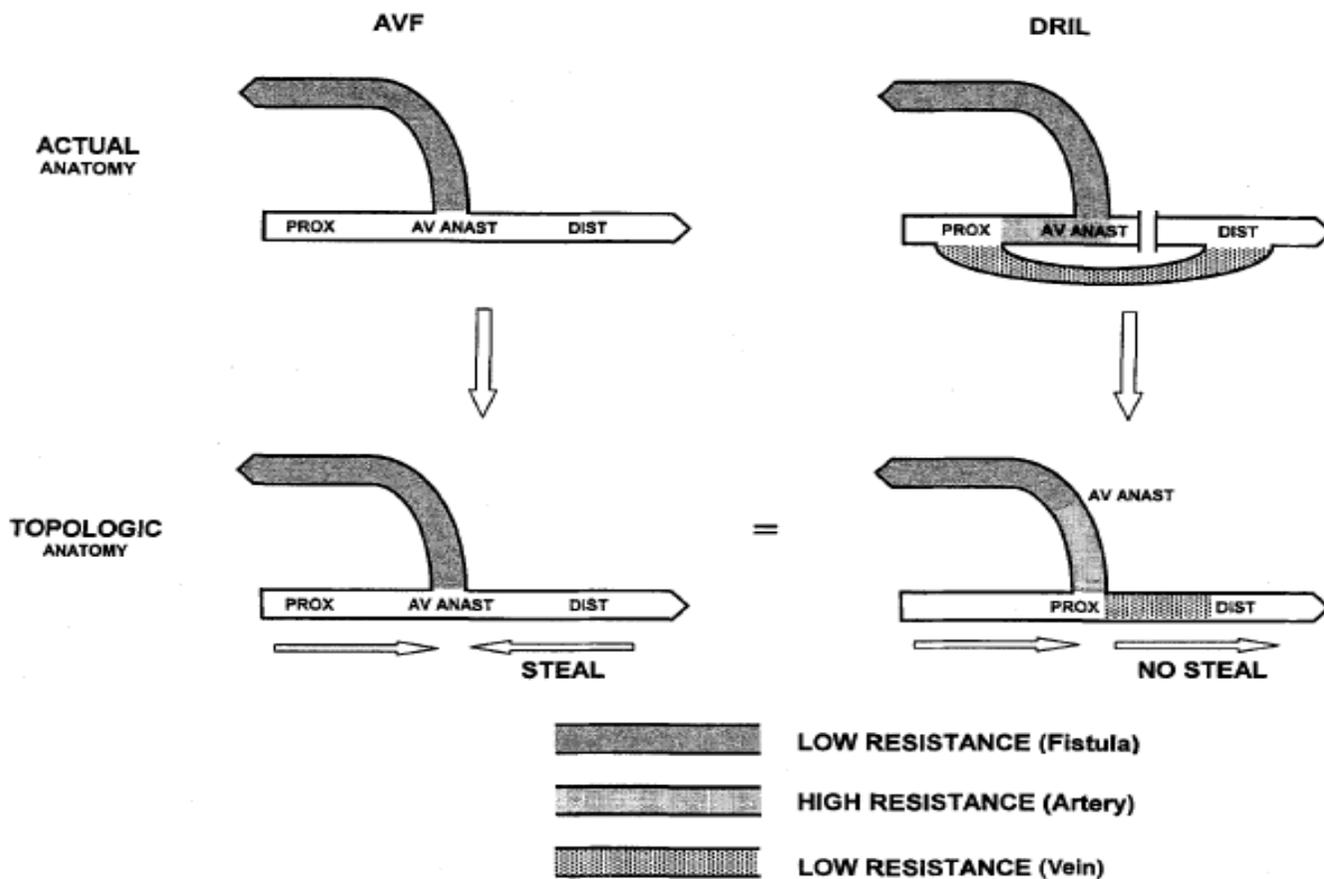


Kordzadeh A et al. A systematic review of distal revascularization and interval ligation for the treatment of vascular access-induced ischemia. JVS 2019.

Tynan-Cuisinier GS et al. Strategies for predicting and treating access induced ischemic steal syndrom. EJVES 2006



HÉMODYNAMIQUE DU DRIL



PLACE DU DRIL DANS L'ARSENAL DU TRAITEMENT DE L'ISCHÉMIE

1ère option = Ligature de FAV !

Ne pas oublier angioplastie artérielle si lésions d'inflow ou outflow

**Si hyperdébit = REDUCTION
1ère**

**Si pas d'hyperdébit =
revascularisation de la main**

FAV brachiale =
RUDI/PAI/banding

FAV distale = LPAR

FAV brachiale = DRIL

FAV distale = LDAR

PLACE DU DRIL DANS L'ARSENAL DU TRAITEMENT DE L'ISCHÉMIE

1ère option = Ligature de FAV !

Ne pas oublier angioplastie artérielle si lésions d'inflow ou outflow

**Si hyperdébit = REDUCTION
1ère**

**Si pas d'hyperdébit =
revascularisation de la main**

FAV brachiale =
RUDI/PAI/banding

FAV distale = LPAR

FAV brachiale = DRIL

FAV distale = LDAR

LES AUTRES TECHNIQUES EQUIVALENTES

**PAS VRAIMENT DE TECHNIQUE
EQUIVALENTE !!**

Pour moi pas de comparaison directe vraiment possible

**Si pas d'hyperdébit et FAV brachiale seule
alternative = FERMETURE DE FAV**

PROBLEMATIQUES TECHNIQUES

- Etat général du patient et espérance de vie ?
- Matériel pour le pontage ? -> type d'anesthésie ?
- Qualité des artères antébrachiales ?
- Attention au nerf médian sur l'abord au 1/3 moyen du bras !!

RÉSULTATS

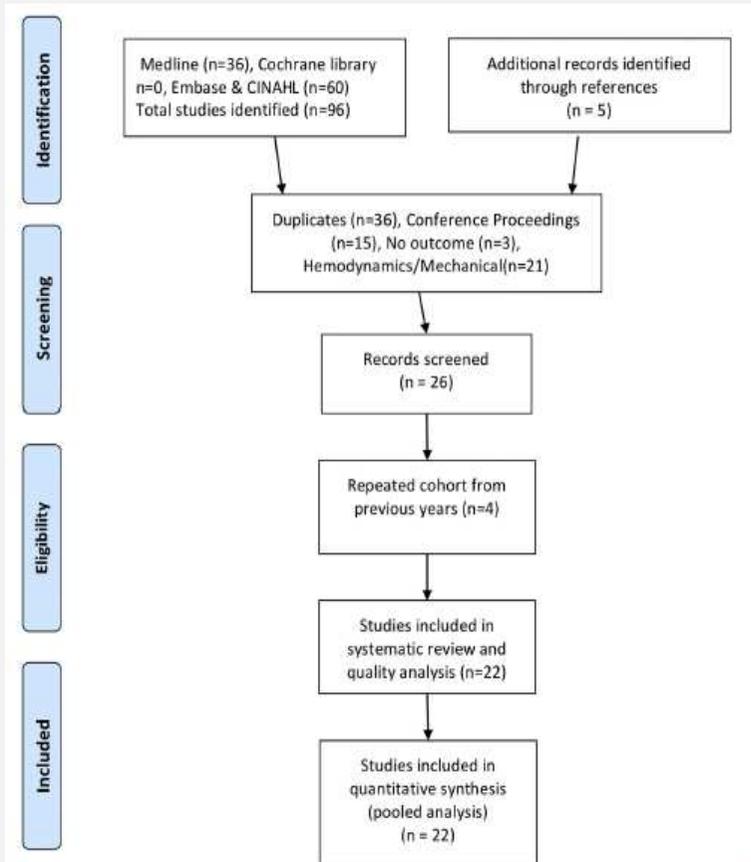


Table I. Total number of cases undergoing distal revascularization and interval ligation (DRIL), successful cases, percentage of success with follow-up, and time to ischemia after arteriovenous fistula (AVF) formation

Investigator and year	Total cases	Successful cases	Percentage success	Follow-up, months	Average time to steal, days
Huber et al. ¹³ 2016	13	13	100	*	*
Kudlaty et al. ¹³ 2016	5	4	80	26	152
Miskey et al. ¹⁴ 2016	21	17	81	36	330
Vaes et al. ¹⁵ 2015	1	1	100	12	*
Leake et al. ¹⁶ 2015	56	54	98	1	97
Kokkosis et al. ¹⁷ 2014	3	2	66	24	147
Kopriva et al. ¹⁸ 2014	10	4	40	26	306
Bojakowski et al. ¹⁹ 2013	3	3	100	36	600
Aimaq and Katz. ²¹ 2013	77	64	83	60	155
Anaya-Ayala et al. ²¹ 2012	31	24	77.5	12	229
Field et al. ²² 2009	6	6	100	*	*
Yu et al. ²³ 2008	24	23	95	50	150
Walz et al. ²⁴ 2007	36	31	86	12	149
Mwipatayi et al. ²⁵ 2006	12	10	83	6	30
Illig et al. ²⁶ 2005	9	6	67	6.5	330
Sessa et al. ²⁷ 2004	18	13	72	16	160
Korzets et al. ²⁸ 2003	9	8	89	13.5	198
Lazarides et al. ²⁹ 2003	23	23	100	12	83.5
Knox et al. ³⁰ 2002	52	30	61	32	*
Stierli et al. ³¹ 1998	6	2	33	*	*
Berman et al. ³² 1997	21	21	100	18	30
Haimov et al. ³³ 1996	23	20	87	24	*

*Lack of data from the recruited studies.

RÉSULTATS

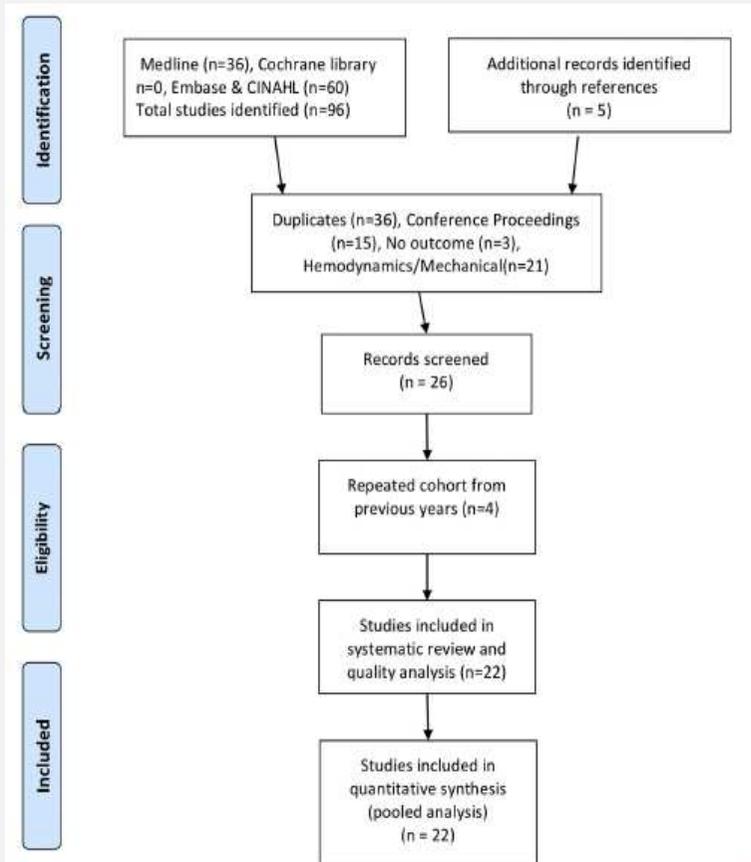


Table 1. Total number of cases undergoing distal revascularization and interval ligation (DRIL), successful cases, percentage of success with follow-up, and time to ischemia after arteriovenous fistula (AVF) formation

Investigator and year	Total cases	Successful cases	Percentage success	Follow-up, months	Average time to steal, days
Huber et al. ¹³ 2016	13	13	100	*	*
Kudlaty et al. ¹³ 2016	5	4	80	26	152
Misskey et al. ¹⁴ 2016	21	17	81	36	330
Vaes et al. ¹⁵ 2015	1	1	100	12	*
Leake et al. ¹⁶ 2015	56	54	98	1	97
Kokkosis et al. ¹⁷ 2014	3	2	66	24	147
Kopriva et al. ¹⁸ 2014	10	4	40	26	306
Bojakowski et al. ¹⁹ 2013	3	3	100	36	600
Aimaq and Katz. ²⁰ 2013	77	64	83	60	155
Anaya-Ayala et al. ²¹ 2012	31	24	77.5	12	229
Field et al. ²² 2009	6	6	100	*	*
Yu et al. ²³ 2008	24	23	95	50	150
Walz et al. ²⁴ 2007	36	31	86	12	149
Mwipatayi et al. ²⁵ 2006	12	10	83	6	30
Illig et al. ²⁶ 2005	9	6	67	6.5	330
Sessa et al. ²⁷ 2004	18	13	72	16	160
Korzets et al. ²⁸ 2003	9	8	89	13.5	198
Lazarides et al. ²⁹ 2003	23	23	100	12	83.5
Knox et al. ³⁰ 2002	52	30	61	32	*
Stierli et al. ³¹ 1998	6	2	33	*	*
Berman et al. ³² 1997	21	21	100	18	30
Haimov et al. ³³ 1996	23	20	87	24	*

*Lack of data from the recruited studies.

RÉSULTATS

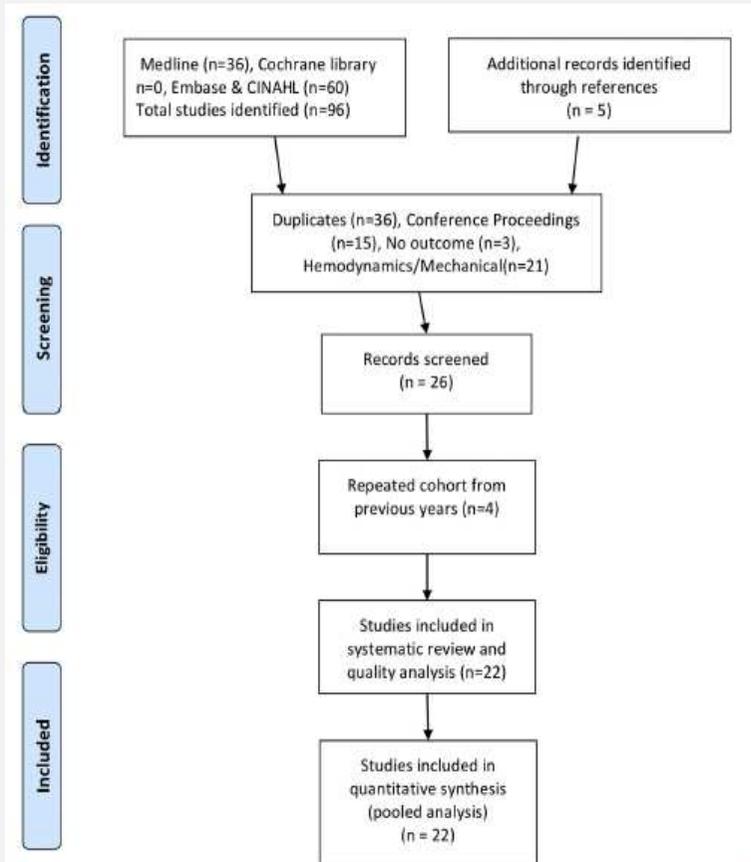


Table I. Total number of cases undergoing distal revascularization and interval ligation (DRIL), successful cases, percentage of success with follow-up, and time to ischemia after arteriovenous fistula (AVF) formation

Investigator and year	Total cases	Successful cases	Percentage success	Follow-up, months	Average time to steal, days
Huber et al. ¹² 2016	13	13	100	*	*
Kudlaty et al. ¹³ 2016	5	4	80	26	152
Miskey et al. ¹⁴ 2016	21	17	81	36	330
Vaes et al. ¹⁵ 2015	1	1	100	12	*
Leake et al. ¹⁶ 2015	56	54	98	1	97
Kokkosis et al. ¹⁷ 2014	3	2	66	24	147
Kopriva et al. ¹⁸ 2014	10	4	40	26	306
Bojakowski et al. ¹⁹ 2013	3	3	100	36	600
Aimaq and Katz. ²⁰ 2013	77	64	83	60	155
Anaya-Ayala et al. ²¹ 2012	31	24	77.5	12	229
Field et al. ²² 2009	6	6	100	*	*
Yu et al. ²³ 2008	24	23	95	50	150
Walz et al. ²⁴ 2007	36	31	86	12	149
Mwipatayi et al. ²⁵ 2006	12	10	83	6	30
Illig et al. ²⁶ 2005	9	6	67	6.5	330
Sessa et al. ²⁷ 2004	18	13	72	16	160
Korzets et al. ²⁸ 2003	9	8	89	13.5	198
Lazarides et al. ²⁹ 2003	23	23	100	12	83.5
Knox et al. ³⁰ 2002	52	30	61	32	*
Stierli et al. ³¹ 1998	6	2	33	*	*
Berman et al. ³² 1997	21	21	100	18	30
Haimov et al. ³³ 1996	23	20	87	24	*

*Lack of data from the recruited studies.

RÉSULTATS

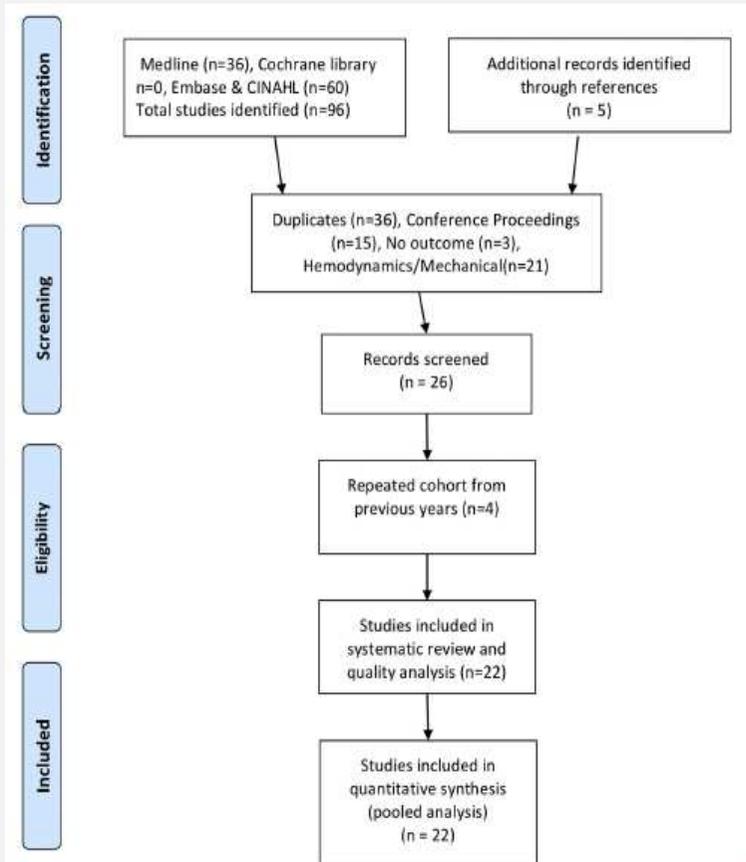


Table I. Total number of cases undergoing distal revascularization and interval ligation (DRIL), successful cases, percentage of success with follow-up, and time to ischemia after arteriovenous fistula (AVF) formation

Investigator and year	Total cases	Successful cases	Percentage success	Follow-up, months	Average time to steal, days
Huber et al. ¹² 2016	13	13	100	*	*
Kudlaty et al. ¹³ 2016	5	4	80	26	152
Miskey et al. ¹⁴ 2016	21	17	81	36	330
Vaes et al. ¹⁵ 2015	1	1	100	12	*
Leake et al. ¹⁶ 2015	56	54	98	1	97
Kokkosis et al. ¹⁷ 2014	3	2	66	24	147
Kopriva et al. ¹⁸ 2014	10	4	40	26	306
Bojakowski et al. ¹⁹ 2013	3	3	100	36	600
Aimaq and Katz. ²⁰ 2013	77	64	83	60	155
Anaya-Ayala et al. ²¹ 2012	31	24	77.5	12	229
Field et al. ²² 2009	6	6	100	*	*
Yu et al. ²³ 2008	24	23	95	50	150
Walz et al. ²⁴ 2007	36	31	86	12	149
Mwipatayi et al. ²⁵ 2006	12	10	83	6	30
Illig et al. ²⁶ 2005	9	6	67	6.5	330
Sessa et al. ²⁷ 2004	18	13	72	16	160
Korzets et al. ²⁸ 2003	9	8	89	13.5	198
Lazarides et al. ²⁹ 2003	23	23	100	12	83.5
Knox et al. ³⁰ 2002	52	30	61	32	*
Stierli et al. ³¹ 1998	6	2	33	*	*
Berman et al. ³² 1997	21	21	100	18	30
Haimov et al. ³³ 1996	23	20	87	24	*

*Lack of data from the recruited studies.

RÉSULTATS

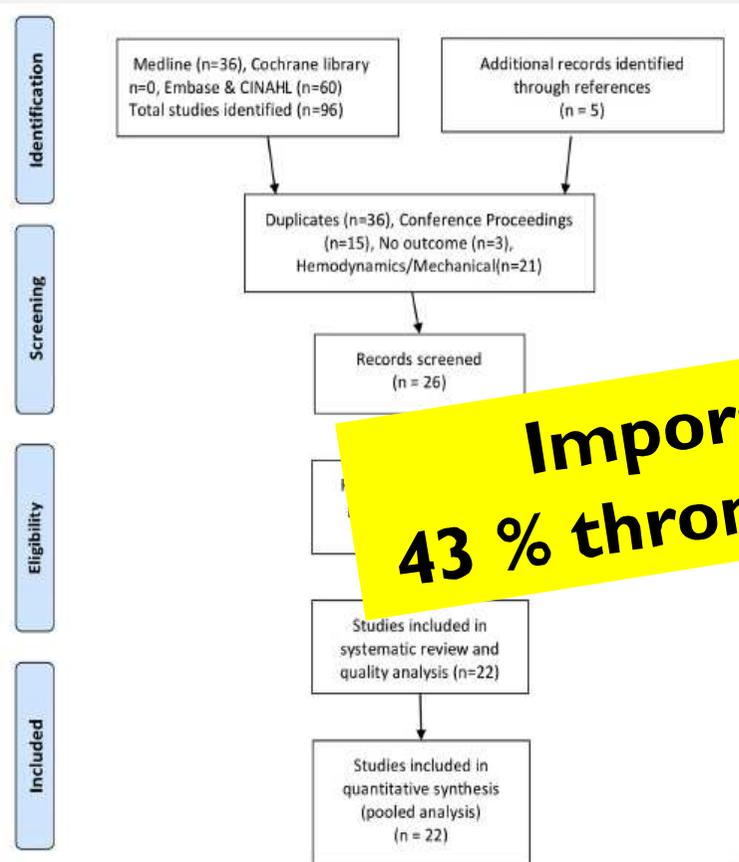


Table I. Total number of cases undergoing distal revascularization and interval ligation (DRIL), successful cases, percentage of success with follow-up, and time to ischemia after arteriovenous fistula (AVF) formation

Investigator and year	Total cases	Successful cases	Percentage success	Follow-up, months	Average time to steal, days
Huber et al. ¹² 2016	13	13	100	*	*
Kudlaty et al. ¹³ 2016	5	4	80	26	152
Miskey et al. ¹⁴ 2016	21	17	81	36	330
Vaes et al. ¹⁵ 2015	1	1	100	12	*
Leake et al. ¹⁶ 2015	56	54	96	1	97
Kokkosis et al. ¹⁷ 2014	3	4	100	4	147
Kopriva et al. ¹⁸ 2014	3	3	100	1	306
Prin...	3	3	100	1	600
...	3	3	100	1	155
...	3	3	100	12	229
...	3	3	100	*	*
...	3	23	95	50	150
...	36	31	86	12	149
Mwipatayi et al. ²⁵ 2006	12	10	83	6	30
Illig et al. ²⁶ 2005	9	6	67	6.5	330
Sessa et al. ²⁷ 2004	18	13	72	16	160
Korzets et al. ²⁸ 2003	9	8	89	13.5	198
Lazarides et al. ²⁹ 2003	23	23	100	12	83.5
Knox et al. ³⁰ 2002	52	30	61	32	*
Stierli et al. ³¹ 1998	6	2	33	*	*
Berman et al. ³² 1997	21	21	100	18	30
Haimov et al. ³³ 1996	23	20	87	24	*

*Lack of data from the recruited studies.

**Importance du conduit utilisé
 43 % thrombose avec le PTFE >> GVS**

RÉSULTATS

Distal revascularization–interval ligation:
A durable and effective treatment for ischemic
steal syndrome after hemodialysis access

Robert C. Knox, MD, Scott S. Berman, MD, FACS, John D. Hughes, MD, FACS,
Andrew T. Gentile, MD, and Joseph L. Mills, MD, FACS, *Tucson, Ariz*

52 patients, 32 mois de suivi

Table II. Outcome of DRIL procedure versus indication

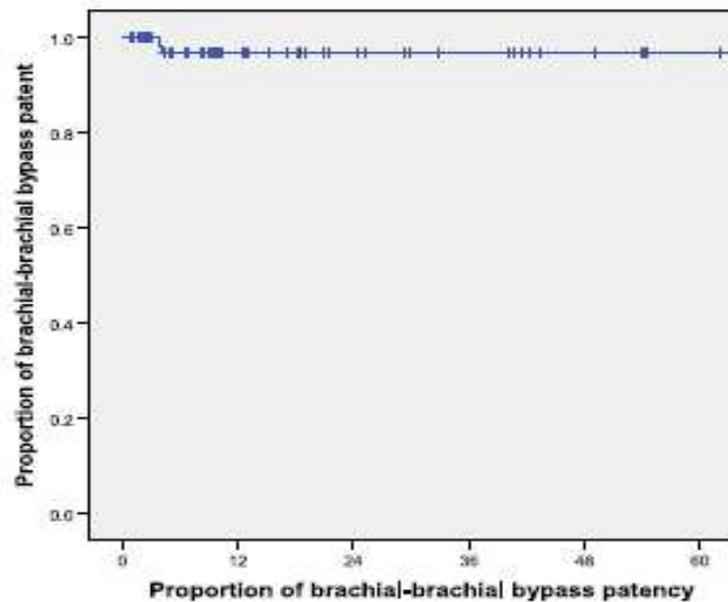
<i>Outcome</i>	<i>Indication for DRIL (n = 55)</i>				<i>Totals</i>
	<i>Rest pain</i>	<i>Tissue loss</i>	<i>Loss of function</i>	<i>Pain on HD</i>	
Complete relief	16	10	3	1	30 (55%)
Improved	9	4	1	0	14 (25%)
No change	2	0	0	0	2 (4%)
Healed amps	0	6	0	0	6 (11%)
Failure/ligated	1	2	0	0	3 (5%)

RÉSULTATS

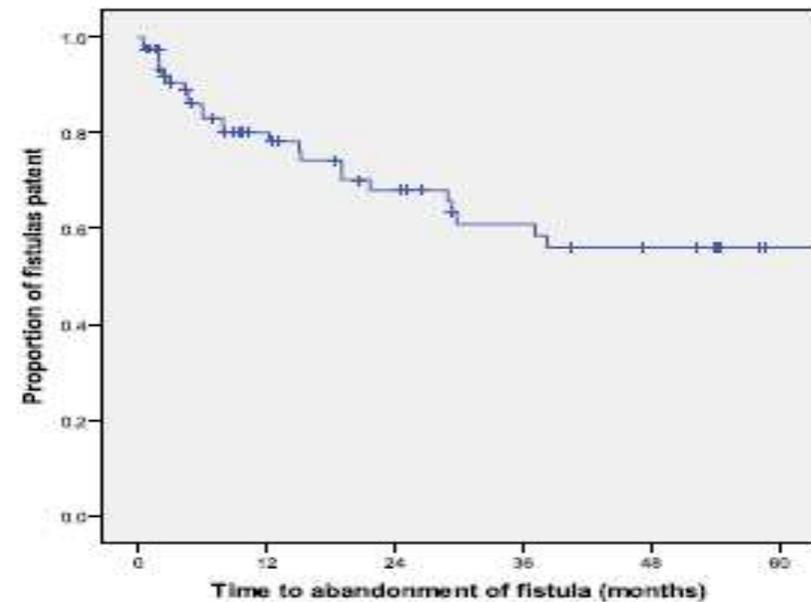
Using distal revascularization with interval ligation as the primary treatment of hand ischemia after dialysis access creation

Rahim Aimaq, MD,^a and Steven G. Katz, MD,^b Pasadena and Los Angeles, Calif

77 patients, 60 mois de suivi



Months	0	12	24	36	48	60
Number at risk	81	45	35	30	25	21
Standard error (%)	0	2.1	2.1	2.1	2.1	2.1
Cum. patency (%)	100	96.9	96.9	96.9	96.9	96.9



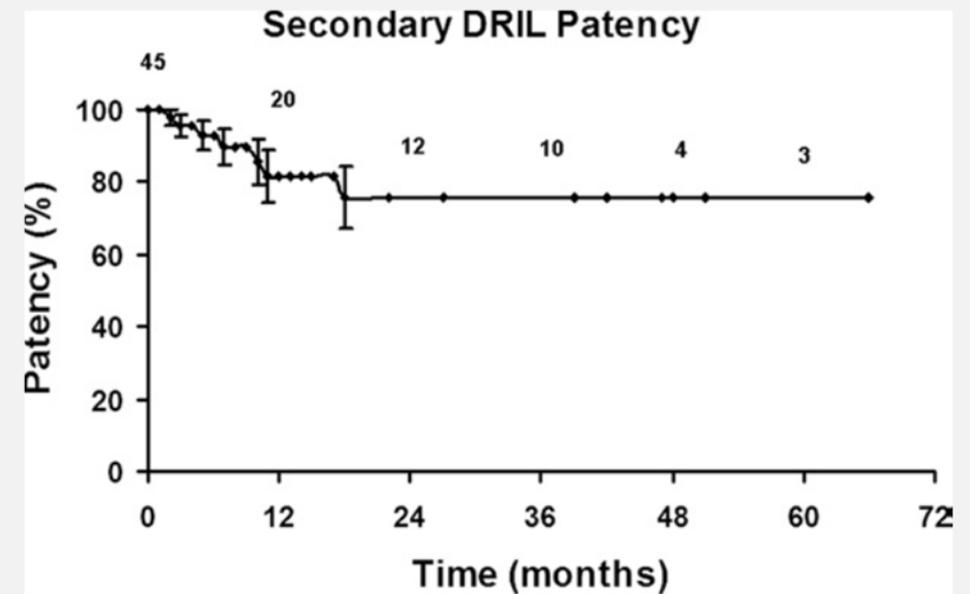
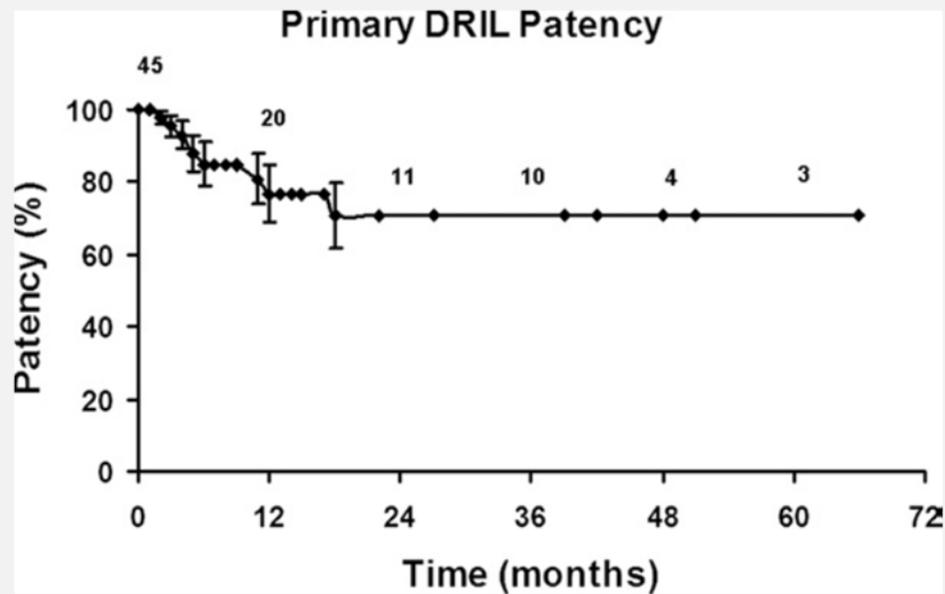
Months	0	12	24	36	48	60
Number at risk	81	44	32	25	21	15
Standard error (%)	0	4.8	6.1	6.7	7	7
Cum. patency (%)	100	80	68	60.9	56	56

RÉSULTATS

Midterm outcome after the distal revascularization and interval ligation (DRIL) procedure

Thomas S. Huber, MD, PhD,^a Michael P. Brown, DO,^{a,b} James M. Seeger, MD,^a and W. Anthony Lee, MD,^a Gainesville, Fla

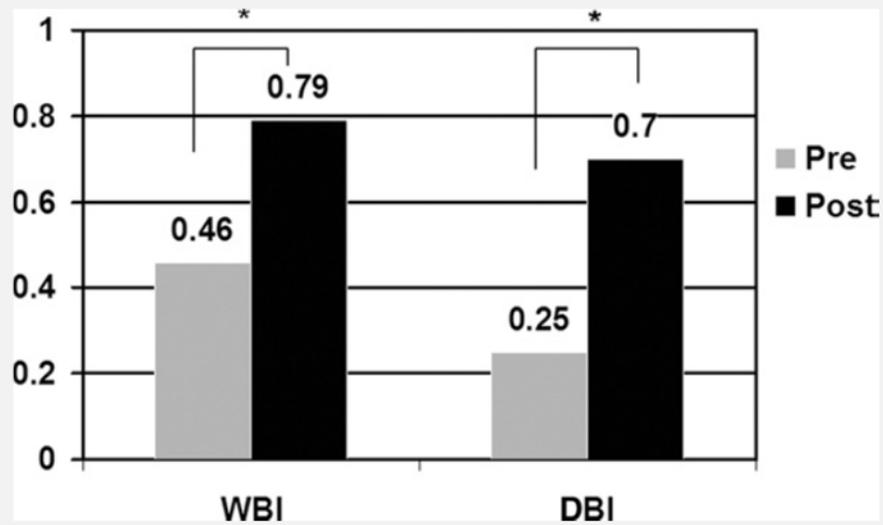
61 patients, suivi 5 ans



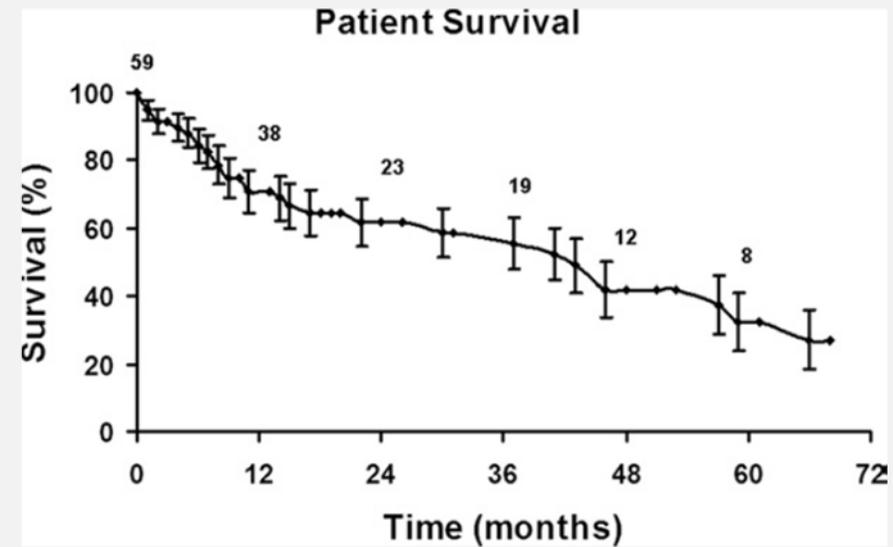
RÉSULTATS

Midterm outcome after the distal revascularization and interval ligation (DRIL) procedure

Thomas S. Huber, MD, PhD,^a Michael P. Brown, DO,^{a,b} James M. Seeger, MD,^a and W. Anthony Lee, MD,^a Gainesville, Fla



61 patients, suivi 5 ans



COMPARAISON AUX AUTRES TECHNIQUES

Distal Revascularization and Interval Ligation for the Management of Dialysis Access Steal Syndrome

Fanny S. Alie-Cusson, Karthik Bhat, Juhi Ramchandani, Samuel N. Steerman, David J. Dexter, and Jean M. Panneton, Norfolk, VA

DRIL = 89 patients, autres = 165
Suivi 6 mois

DRIL Procedures (n=89)

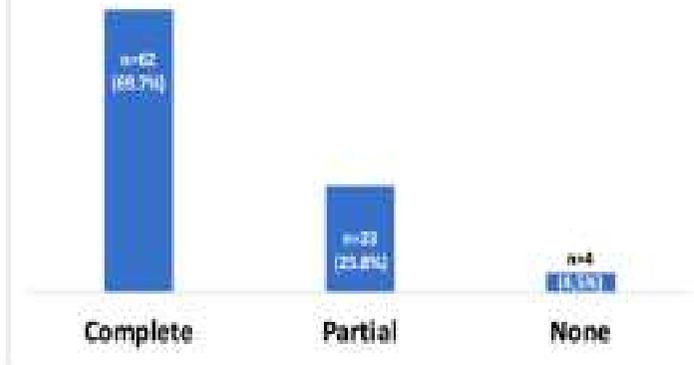


Fig. 3. Symptom resolution.

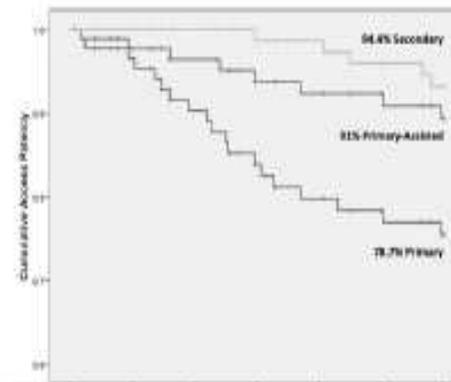


Fig. 1. Access patency at 6 months post DRIL.

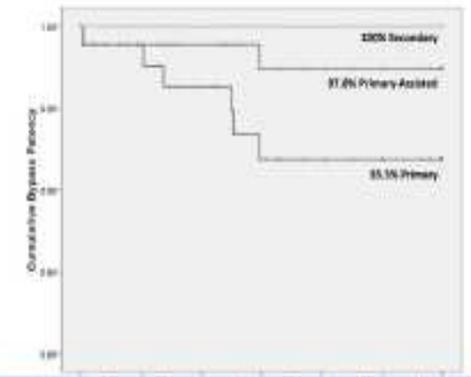


Fig. 2. Bypass patency at 6 months post DRIL.

Time (months)	0	1	2	3	4	5	6
Number at Risk	88	83	77	73	71	69	66
Standard Error	0.011	0.017	0.081	0.021	0.025	0.029	0.032

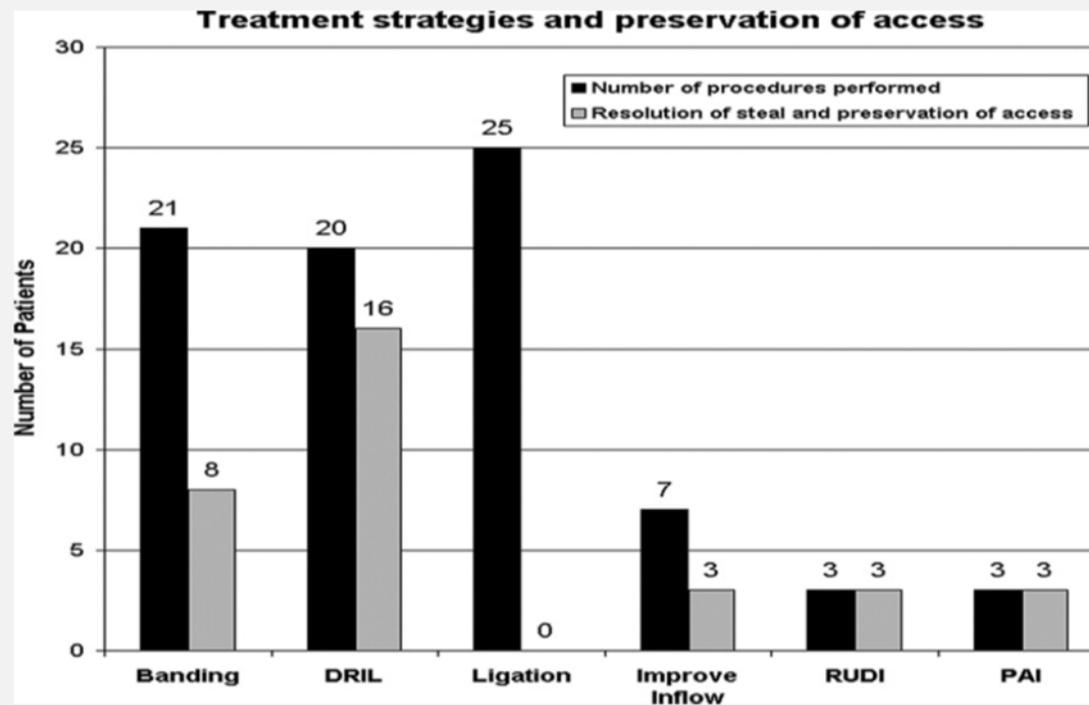
Time (months)	0	1	2	3	4	5	6
Number at Risk	88	83	77	73	71	63	56
Standard Error	0.011	0.017	0.091	0.021	0.025	0.029	0.032

COMPARAISON AUX AUTRES TECHNIQUES

Treatment strategies of arterial steal after arteriovenous access

NavYash Gupta, MD,^a Theodore H. Yuo, MD,^b Gerhardt Konig IV, MS,^b Ellen Dillavou, MD,^b Steven A. Leers, MD,^b Rabih A. Chaer, MD,^b Jae S. Cho, MD,^b and Michel S. Makaroun, MD,^b
Evanston, Ill; and Pittsburgh, Pa

70 Patients dont DRIL = 21

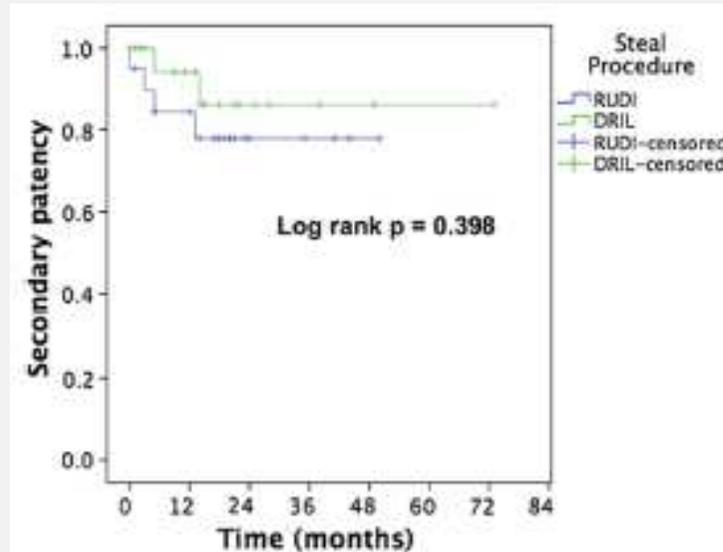
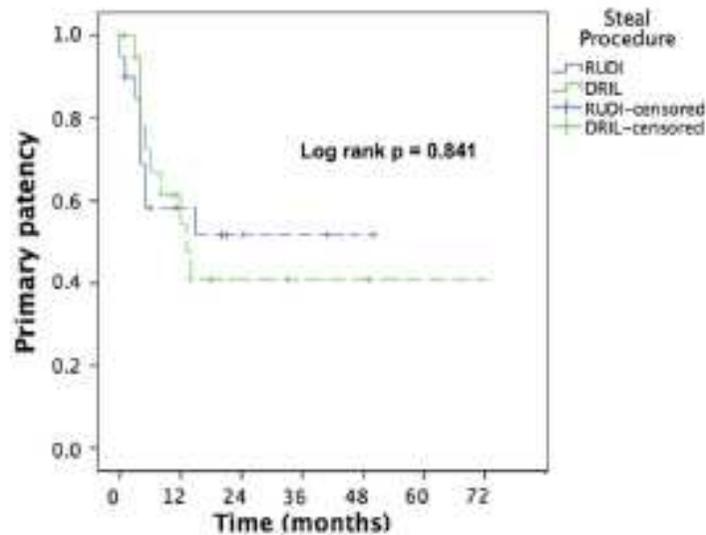


COMPARAISON AUX AUTRES TECHNIQUES

A comparison of revision using distal inflow and distal revascularization-interval ligation for the management of severe access-related hand ischemia

Jonathan Misskey, MD,^a Cathevine Yang, BSc,^b Shaun MacDonald, MD, FRCSC,^{a,c}
Keith Baxter, MD, MSc, FRCS(C),^{a,d} and York Hsiang, MBChB, MHSc, FRCS(C),^{a,d} Vancouver, British Columbia, Canada

DRIL = 21/RUDI = 20



Succès clinique

DRIL = 81 %

RUDI = 90 %

IPS gain

RUDI = 0,26

DRIL = 0,22

COMPARAISON AUX AUTRES TECHNIQUES

Management and outcomes of dialysis access-associated steal syndrome

Andrew E. Leake, MD,^a Daniel G. Winger, MS,^b Steven A. Leers, MD,^a Navyash Gupta, MD,^c and Ellen D. Dillavou, MD,^a *Pittsburgh, Pa; and Evanston, Ill*

DRIL = 59/autres = 126

Table III. Primary end points by procedure type

<i>Procedure (No.)</i>	<i>Access preserved, %</i>	<i>Improvements of steal symptoms, %</i>	<i>30-day complications, %</i>	<i>30-day mortality, %</i>
Ligation (61)	0	93	8.2	1.4
DRIL (56)	100	98	7.1	6.8
RUDI (19)	95	89	37	5
Banding (37)	89	75	47	3.8
PAI (9)	100	100	44	0
DRAL (13)	100	100	0	0
Total (216)	64	90	19	3.5

Table IV. Complications by procedure

<i>Procedure (No.)</i>	<i>Continued steal, %</i>	<i>Thrombosis, %</i>	<i>Bleeding, %</i>	<i>Infection, %</i>	<i>Total, %</i>
Ligation (61)	0	0	3.3	5	8.2
DRIL (56)	0	0	1.9	5.6	7.1
RUDI (19)	5.6	5.6	22	5.6	37
Banding (37)	33	11	0	2.8	47
PAI (9)	22	0	0	22	44
DRAL (13)	0	0	0	0	0
Total (190)	6.9	2.3	3.2	4.6	19

COMPARAISON AUX AUTRES TECHNIQUES

Management and outcomes of dialysis access-associated steal syndrome

Andrew E. Leake, MD,^a Daniel G. Winger, MS,^b Steven A. Leers, MD,^a Navyash Gupta, MD,^c and Ellen D. Dillavou, MD,^a *Pittsburgh, Pa; and Evanston, Ill*

DRIL = 59/autres = 126

Table III. Primary end points by procedure type

<i>Procedure (No.)</i>	<i>Access preserved, %</i>	<i>Improvements of steal symptoms, %</i>	<i>30-day complications, %</i>	<i>30-day mortality, %</i>
Ligation (61)	0	93	8.2	1.4
DRIL (56)	100	98	7.1	6.8
RUDI (19)	95	89	37	5
Banding (37)	89	75	47	3.8
PAI (9)	100	100	44	0
DRAL (13)	100	100	0	0
Total (216)	64	90	19	3.5

Table IV. Complications by procedure

<i>Procedure (No.)</i>	<i>Continued steal, %</i>	<i>Thrombosis, %</i>	<i>Bleeding, %</i>	<i>Infection, %</i>	<i>Total, %</i>
Ligation (61)	0	0	3.3	5	8.2
DRIL (56)	0	0	1.9	5.6	7.1
RUDI (19)	5.6	5.6	22	5.6	37
Banding (37)	33	11	0	2.8	47
PAI (9)	22	0	0	22	44
DRAL (13)	0	0	0	0	0
Total (190)	6.9	2.3	3.2	4.6	19

RÉSULTATS DU DRIL : FACTEURS PRONOSTIQUES

Prediction of graft patency and mortality after distal revascularization and interval ligation for hemodialysis access-related hand ischemia

Salvatore T. Scali, MD,^a Catherine K. Chang, MD,^a Dan Raghinaru, MS,^b Michael J. Daniels, ScD,^c Adam W. Beck, MD,^a Robert J. Feezor, MD,^a Scott A. Berceci, MD, PhD,^a and Thomas S. Huber, MD, PhD,^a Gainesville, Fla; and Austin, Tex

126 patients, 50 mois de suivi

Table V. Independent predictors of all-cause patient mortality after distal revascularization and interval ligation (*DRIL*) determined using multivariable Cox proportional hazard regression analysis.

Predictor ^a	HR	CI	P value
Age >40 years	8.3	2.5-33.3	.0004
Grade 3 ischemia	2.6	1.5-4.6	.0008
Complication from DRIL	2.4	1.3-4.5	.004
Smoking history (past/current)	2.2	1.3-4	.007
No prior access procedures	0.5	0.3-0.9	.02

Taux complications = 27%, mortalité J30 2%

Mortalité 78 % à 5 ans

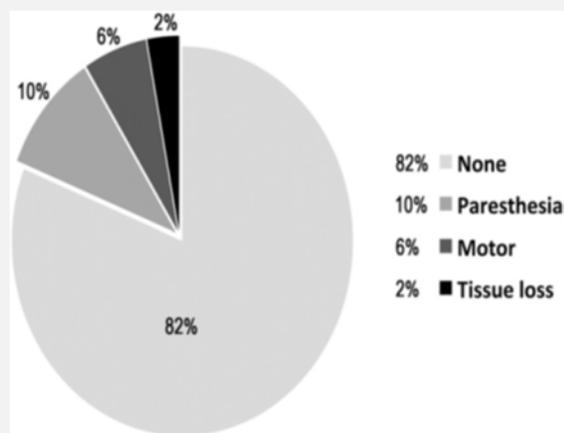


Table IV. Univariate predictors of loss of distal revascularization and interval ligation (*DRIL*) primary patency

Predictor ^a	HR	CI	P value
≥2 prior access creations	4.1	1.6-10.4	.004
Nonautogenous brachial-cephalic/brachial-basilic access ^b	3.4	1.4-8.3	.009
Complication from DRIL	3.3	1.2-8.9	.02
Autogenous vein conduit	0.2	0.06-0.58	.004
Autogenous brachial-cephalic upper arm direct access	0.2	0.04-0.8	.02

RÉSULTATS DU DRIL : FACTEURS PRONOSTIQUES

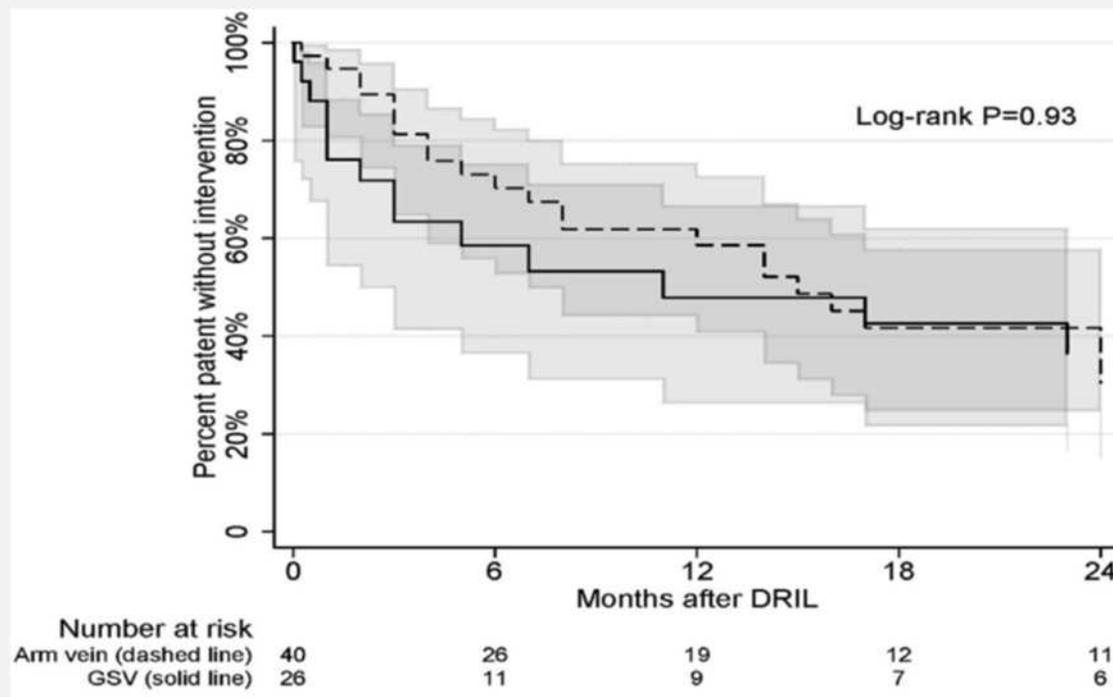
Distal revascularization and interval ligation for dialysis access-related ischemia is best performed using arm vein conduit

M. Libby Weaver, MD,^a Courtenay M. Holscher, MD, PhD,^a Alexis Graham, MD,^a and Thomas Reifsnyder, MD,^b
Baltimore, Md

Table II. Outcomes stratified by vein conduit used

Outcome	GSV group	Arm vein group	P value
Patients	26 (39)	40 (61)	NA
Wound complication	12 (46)	4 (11)	.003
Steal syndrome resolution			.88
No resolution	0 (0)	1 (3)	
Partial resolution	16 (62)	24 (63)	
Complete resolution	10 (38)	13 (34)	
Access ligated	2 (8)	1 (3)	.56

GSV, Great saphenous vein; NA, not applicable.
Data presented as number (%) or median (interquartile range).



MON EXPERIENCE DU DRIL

10 ans > 1500 créations de FAV

- Patients avec ischémie main sur FAV = 30 environ
- 2 groupes de patients
 - Hyperdébit -> réduction -> guérison = 80 %
 - Pas d'hyperdébit = patients très précaires = fermeture et KT !!
- **2 DRIL**
 - 1 décès précoce pontage et FAV perméables
 - 1 décès à 2 ans pontage et FAV perméables

MON AVIS SUR LE DRIL

JVA

ISSN 1129-7298

J Vasc Access 2017; 18 (1): 1-2

DOI: 10.5301/jva.5000628

EDITORIAL

The DRIL procedure for arteriovenous access ischemic steal: a controversial approach

Ingemar Davidson¹, Gerald Beathard², Maurizio Gallieni³, John Ross⁴

Anastomose distale difficile sur artères calcifiées avec lésions sous jacentes

Nécessité **AG** pour prélèvement saphène

Ligature artère brachiale -> ischémie sévère si thrombose de pontage : **ne vaut-il pas mieux perdre la FAV ?**

MA CONCLUSION

- Permet de conserver FAV et DOIGTS

MAIS

- Technique « ANECDOTIQUE » mais à connaître car seule possibilité parfois
- Dans l'arsenal, En balance avec Fermeture de FAV ++
- Bien évaluer espérance de vie patient : **RCP néphro/chir**
- Si pas de veine saphène résultats médiocres : faut il faire le DRIL ??
- Pourquoi des différences de résultats entre les techniques car **les patients ne sont pas comparables !!**

ET VOUS VOUS EN FAITES SOUVENT ??