Berliner DialyseSeminar

# Dialysezugänge: die aktuellsten Entwicklungen / Studien

**Markus Hollenbeck**
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Nephrologie, Rheumatologie, Intensivmedizin
Knappschaftskrankenhaus Bottrop

IAD
Interdisziplinäre Arbeitsgemeinschaft
Dialysezugang e.V.

KNAPPSCHAFT

KfH Kuratorium für Dialyse und Nierentransplantation e.V.
Gemeinnützige Körperschaft

**Der Inhalt des folgenden Vortrages ist Ergebnis des Bemühens um größtmögliche Objektivität und Unabhängigkeit.**

**Als Referent versichere ich, dass in Bezug auf den Inhalt des folgenden Vortrags keine Interessenskonflikte bestehen, die sich aus einem Beschäftigungsverhältnis, einer Beratertätigkeit oder Zuwendungen für Forschungsvorhaben, Vorträge oder andere Tätigkeiten ergeben.**

# Neuigkeiten für den Dialysezugang

- **Leitlinien**
- **Ultraschall am Dialysezugang**
- **Interventionelle Shuntanlagen**
- **Locklösungen**
- **Interdisziplinäre Shuntzentren**

Eur J Vasc Endovasc Surg (2018) 55, 757–818

# Editor's Choice – Vascular Access: 2018 Clinical Practice Guidelines of the European Society for Vascular Surgery (ESVS)☆

Jürg Schmidli [a,*], Matthias K. Widmer [a], Carlo Basile [a], Gianmarco de Donato [a], Maurizio Gallieni [a], Christopher P. Gibbons [a], Patrick Haage [a], George Hamilton [a], Ulf Hedin [a], Lars Kamper [a], Miltos K. Lazarides [a], Ben Lindsey [a], Gaspar Mestres [a], Marisa Pegoraro [a], Joy Roy [a], Carlo Setacci [a], David Shemesh [a], Jan H.M. Tordoir [a], Magda van Loon [a],

ESVS Guidelines Committee [b], Philippe Kolh, Gert J. de Borst, Nabil Chakfe, Sebastian Debus, Rob Hinchliffe, Stavros Kakkos, Igor Koncar, Jes Lindholt, Ross Naylor, Melina Vega de Ceniga, Frank Vermassen, Fabio Verzini,

ESVS Guidelines Reviewers [c], Markus Mohaupt, Jean-Baptiste Ricco, Ramon Roca-Tey

*J. Schmidli et al. EurJVascEndovascSurg 2018 (55) 757-818*

# Shuntverschluss:
# Revision so früh wie möglich

| Recommendation 31 | Class | Level | Refs. |
|---|---|---|---|
| For vascular access salvage after early thrombosis, thrombectomy and revision (if needed) should be performed as soon as possible. | I | C | 269–271 |

*J. Schmidli et al. EurJVascEndovascSurg 2018 (55) 757-818*

# Prä-OP Ultraschall

| Recommendation 8 | Class | Level | Refs |
|---|---|---|---|
| Pre-operative ultrasonography of bilateral upper extremity arteries and veins is recommended in all patients when planning the creation of a vascular access. | I | A | 106,107,109 |

*J. Schmidli et al. EurJVascEndovascSurg 2018 (55) 757-818*

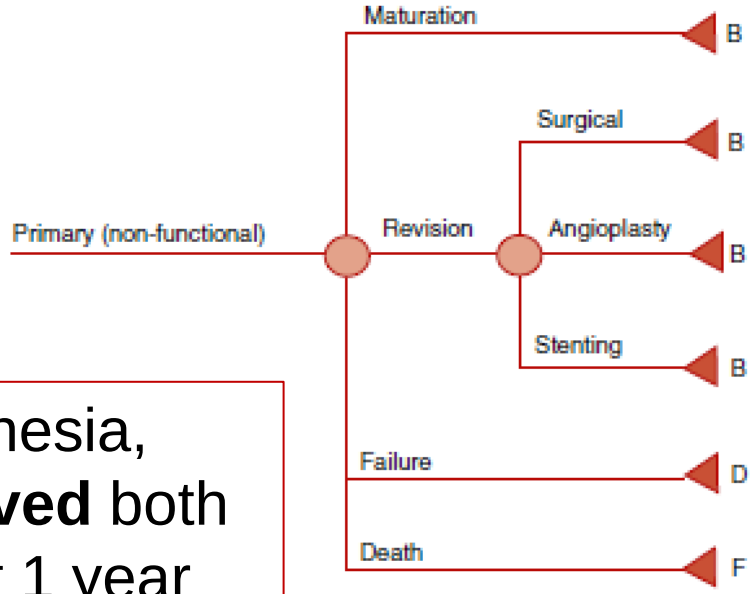
# Lokal – Regional-Anästhesie

| Recommendation 18 | Class | Level | Refs. |
|---|---|---|---|
| Regional anaesthesia should be considered in preference to local anaesthesia for vascular access surgery because of a possible improvement in access patency rate. | IIa | B | 169—174, 176 |

*J. Schmidli et al. EurJVascEndovascSurg 2018 (55) 757-818*

# Long-Term Functional Patency and Cost-Effectiveness of Arteriovenous Fistula Creation under Regional Anesthesia: a Randomized Controlled Trial

Emma Aitken,[1] Rachel Kearns,[2] Lucian Gaianu,[3] Andrew Jackson,[1] Mark Steven,[4] John Kinsella,[2] Marc Clancy,[1] and Alan Macfarlane[2]




<u>Conclusions:</u> Compared with local anesthesia, regional anesthesia **significantly improved** both **primary and functional AVF patency** at 1 year and is cost-effective

*E. Aitken et al.: JASN 2020 (31) 1871–82*

# Lokal – Regional-Anästhesie

Gefässchirurgie 2021 · 26:510–521
https://doi.org/10.1007/s00772-021-00824-7
Angenommen: 9. September 2021
Online publiziert: 13. Oktober 2021


Check for updates

## Neue Aspekte zum Ultraschall am Hämodialyseshunt

Isabell Jester[1] · Markus Hollenbeck[2]

[1] Interdisziplinäres Shunt-Zentrum Reinbek, Abteilung für Gefäßchirurgie und Gefäßmedizin, Krankenhaus Reinbek St.-Adolf-Stift, Reinbek, Deutschland

[2] Klinik für Innere Medizin II – Nephrologie, Rheumatologie und Intensivmedizin, Knappschaftskrankenhaus Bottrop und KfH Nierenzentrum Bottrop, Bottrop, Deutschland

*J. Jester et al. Gefäßchirurgie 2021 (26) 510-521*

## Vor Plexus Anästhesie

## Unter Plexus Anästhesie

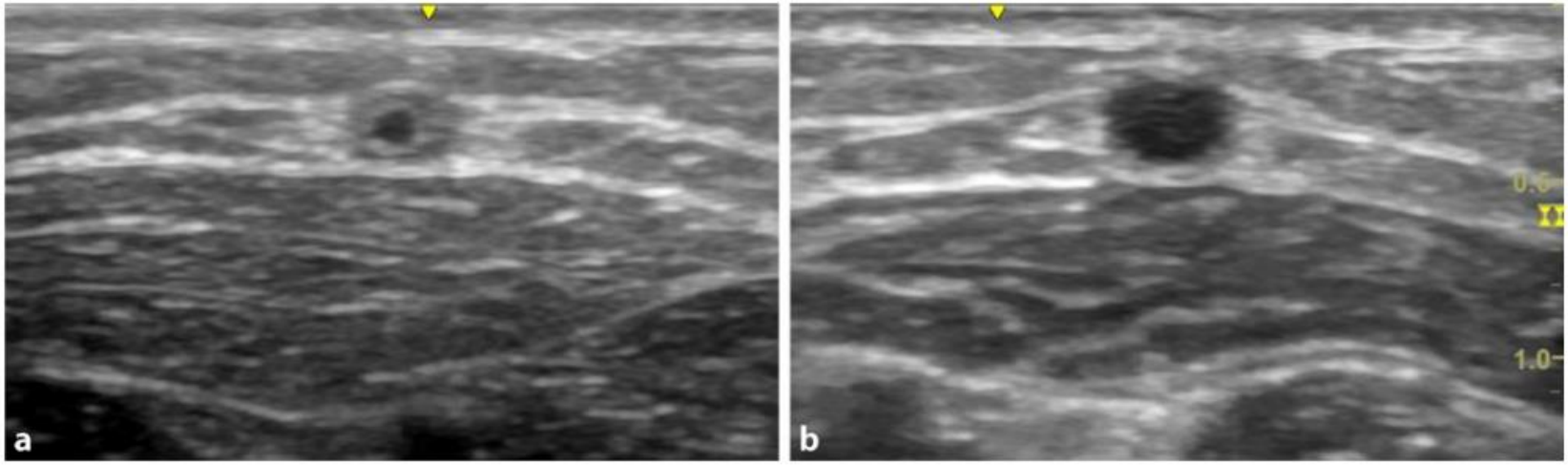



**Abb. 1** ◄ Wandverdickung durch Spasmus, **a** Sonographie vor Plexusanästhesie, **b** Sonographie nach Plexusanästhesie

*J. Jester et al. Gefäßchirurgie 2021 (26) 510-521*

**Abb. 6** ◄ Aufbau der intraoperativen Sonographie. Das Ultraschallgerät steht in Blickrichtung des Operateurs. Die nicht dominante Hand hält den Schallkopf. Die dominante Hand arbeitet endovaskulär auf den Schallkopf zu

*J. Jester et al. Gefäßchirurgie 2021 (26) 510-521*

Nephrol Dial Transplant (2019) 34: ii1–ii42
doi: 10.1093/ndt/gfz072

European Renal Best Practice

Nephrology Dialysis Transplantation

# Clinical practice guideline on peri- and postoperative care of arteriovenous fistulas and grafts for haemodialysis in adults

Maurizio Gallieni[1], Markus Hollenbeck[2], Nicholas Inston[3], Mick Kumwenda[4], Steve Powell[5], Jan Tordoir[6], Julien Al Shakarchi[7], Paul Berger[8], Davide Bolignano[9,10], Deirdre Cassidy[11], Tze Yuan Chan[12], Annemieke Dhondt[13], Christiane Drechsler[10,14], Tevfik Ecder[15], Pietro Finocchiaro[16], Maria Haller[10,17], Jennifer Hanko[18], Sam Heye[19], Jose Ibeas[20], Tamara Jemcov[21], Stephanie Kershaw[22], Aurangzaib Khawaja[23], Laura Labriola[24], Carlo Lomonte[25], Marko Malovrh[26], Anna Marti I. Monros[27], Shona Matthew[28], Damian McGrogan[7], Torsten Meyer[29], Sotirios Mikros[30], Ionut Nistor[10,31], Nils Planken[32], Ramon Roca-Tey[33], Rose Ross[34], Max Troxler[35], Sabine van der Veer[36], Raymond Vanholder[13], Frank Vermassen[13], Gunilla Welander[37], Teun Wilmink[38], Muguet Koobasi[10], Jonathan Fox[10,39], Wim Van Biesen[10,13] and Evi Nagler[10,13], for the ERBP Guideline Development Group on Vascular Access

*M. Gallieni et al. NDT 2019 (34) ii1 – ii42*

Nephrol Dial Transplant (2019) 34: ii1–ii42
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European Renal Best Practice

Nephrology Dialysis Transplantation

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4 Subgroups

1. Catheter related topics
2. Pre-operative related topics
3. **Peri-and postoperative topics**
4. Surveillance/maintenance/follow up related topics

*M. Gallieni et al. NDT 2019 (34) ii1 – ii42*

KDOQI®

KIDNEY DISEASE OUTCOMES QUALITY INITIATIVE

National Kidney Foundation

# KDOQI CLINICAL PRACTICE GUIDELINE FOR VASCULAR ACCESS: 2019 UPDATE

*Charmaine E. Lok, Thomas S. Huber, Timmy Lee, Surendra Shenoy, Alexander S. Yevzlin, Kenneth Abreo, Michael Allon, Arif Asif, Brad C. Astor, Marc H. Glickman, Janet Graham, Louise M. Moist, Dheeraj K. Rajan, Cynthia Roberts, Tushar J. Vachharajani, and Rudolph P. Valentini*

*Lok C et al: Am J Kidney Dis. 2020;75(4)(suppl 2):S1-S164*

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## Guideline 1. Patient First:

# ESKD Life-Plan and Vascular Access Choice

*Lok C et al: Am J Kidney Dis. 2020;75(4)(suppl 2):S1-S164*

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# Guideline 1. Patient First: ESKD Life-Plan

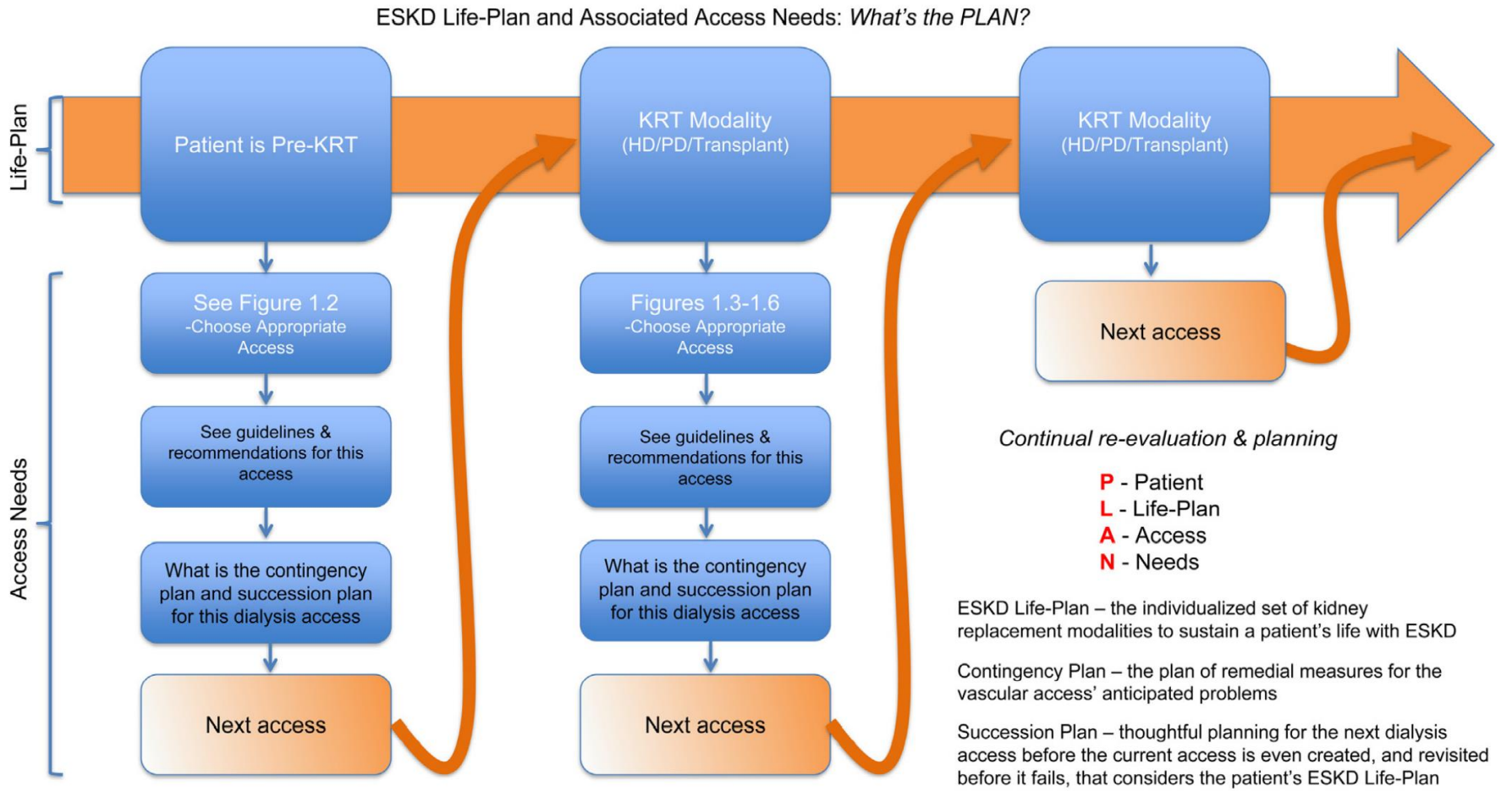



**Figure 1.1.** ESKD and Dialysis Access Life Plan: *What's the P-L-A-N*? Abbreviations: HD, hemodialysis; PD, peritoneal dialysis; KRT, kidney replacement therapy.

*Lok C et al: Am J Kidney Dis. 2020;75(4)(suppl 2):S1-S164*

# Guideline 1. Patient First: ESKD Life-Plan

## Statements:
## ESKD Life-Plan and Vascular Access Choice

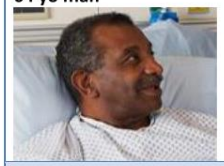
| Case | Description | ESKD Life-Plan Modality Choice | Dialysis Access | Comments |
|---|---|---|---|---|
| 14 yo girl  | Congenital cause of kidney damage, CKD nondialysis (eGFR 22 mL/min) has living donor for transplant, active – wants to be a teacher, right handed | 1. Living donor transplant<br>2. PD<br>3. Home NHD | 1. Transplant - NA<br>2. PD catheter<br>3. RC-AVF (left) | • Follow closely, long life anticipated<br>• Flexibility required - Life-Plan may change<br>• Life-Plan must consider multiple modalities and optimize dialysis access |
| 26 yo woman  | GN, on HD; failed PD with temporary CVC, has potential living donors, actively working during day, R hand dominant | 1. Home NHD<br>2. Transplant | 1. RC-AVF (left)<br>2. BC-AVF (left) | Anticipating patient will get transplant – reassess annually for change in Life-Plan and AV access needs |
| 48 yo man  | DM, HTN, AFib, obese. Copes poorly and non-adherent to medical management and presented needing to urgently start HD, works in outdoor maintenance, L handed | 1. IC-HD<br>2. Transplant wait list<br>3. PD may be possible later | 1. Early cannulation forearm loop graft (right)<br>2. BC-AVF<br>3. PD catheter | IC-HD most appropriate; poor self care makes patient poor home PD or HD candidate – may change over time – reassessment necessary |
| 64 yo man  | HTN, PCKD; ESKD on HD x7 years; R handed; Jehovah witness; sudden loss of RC-AVF (left) | 1. IC-HD<br>2. PD may be possible | 1. CVC (left, IJ)<br>2. BC-AVF (R)<br>3. PD catheter | Transplant not an option due to personal reasons; continue to preserve site for future HD access; patient reluctant to consider PD due to poor home situation |
| 77 yo woman  | Frail, DM, CAD, PVD, urgently started dialysis, with CVC, lives alone, R handed | 1. IC-HD<br>2. PD may be possible | 1. BC-AVF (left)<br>2. Upper arm graft (left)<br>3. PD catheter | Patient likely has limited life expectancy; focus on AV access and limiting CVC dependency vs preserving sites for future access |
| 88 yo man  | Palliative patient and very frail but still enjoys time with family | 1. IC-HD | 1. CVC (right IJ) | Patient preference for CVC vs graft for palliative patients |

**Figure 2.2.** ESKD Life-Plan case examples. Abbreviation: ESKD, end-stage kidney disease.

# Guideline 1. Patient First: ESKD Life-Plan

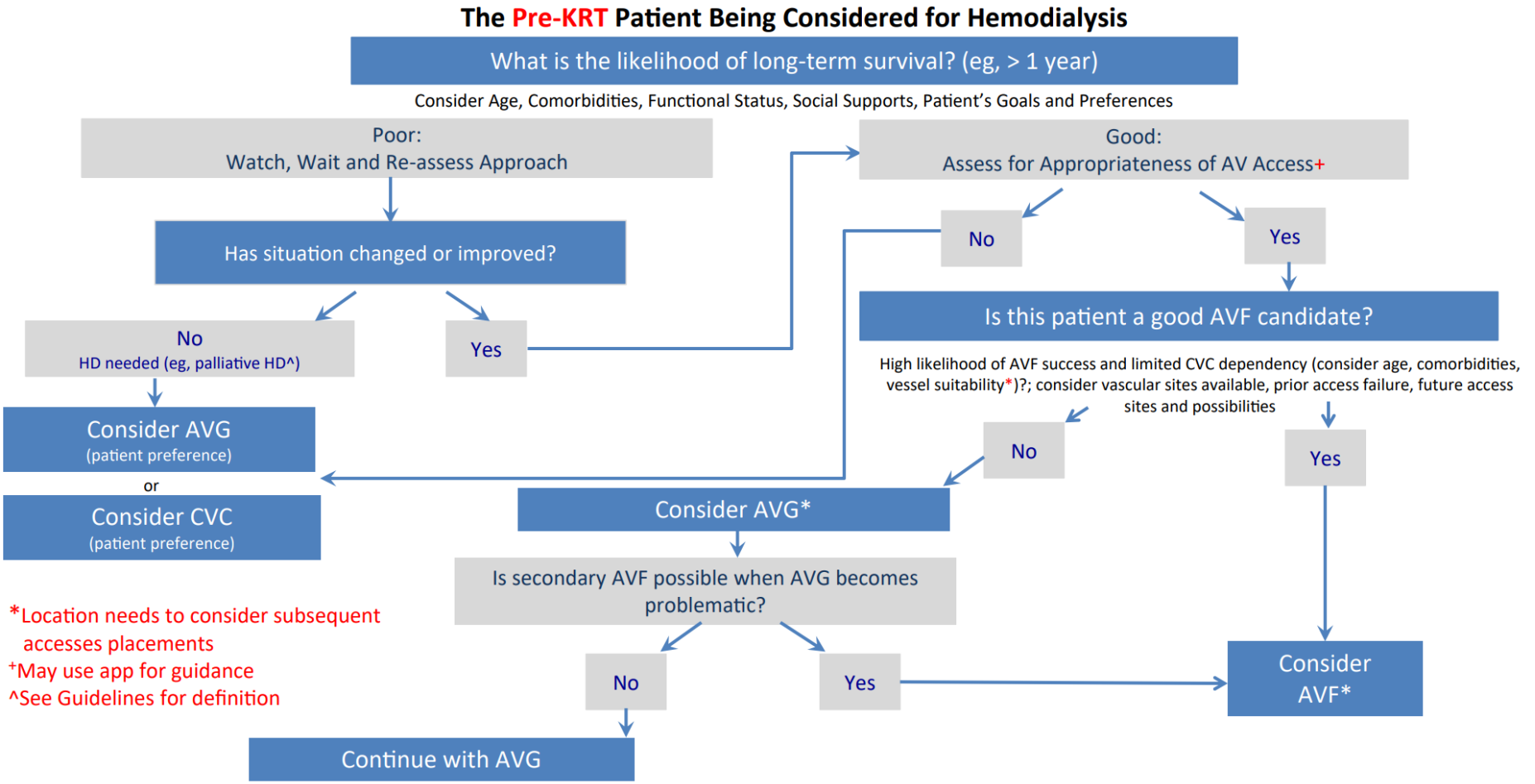
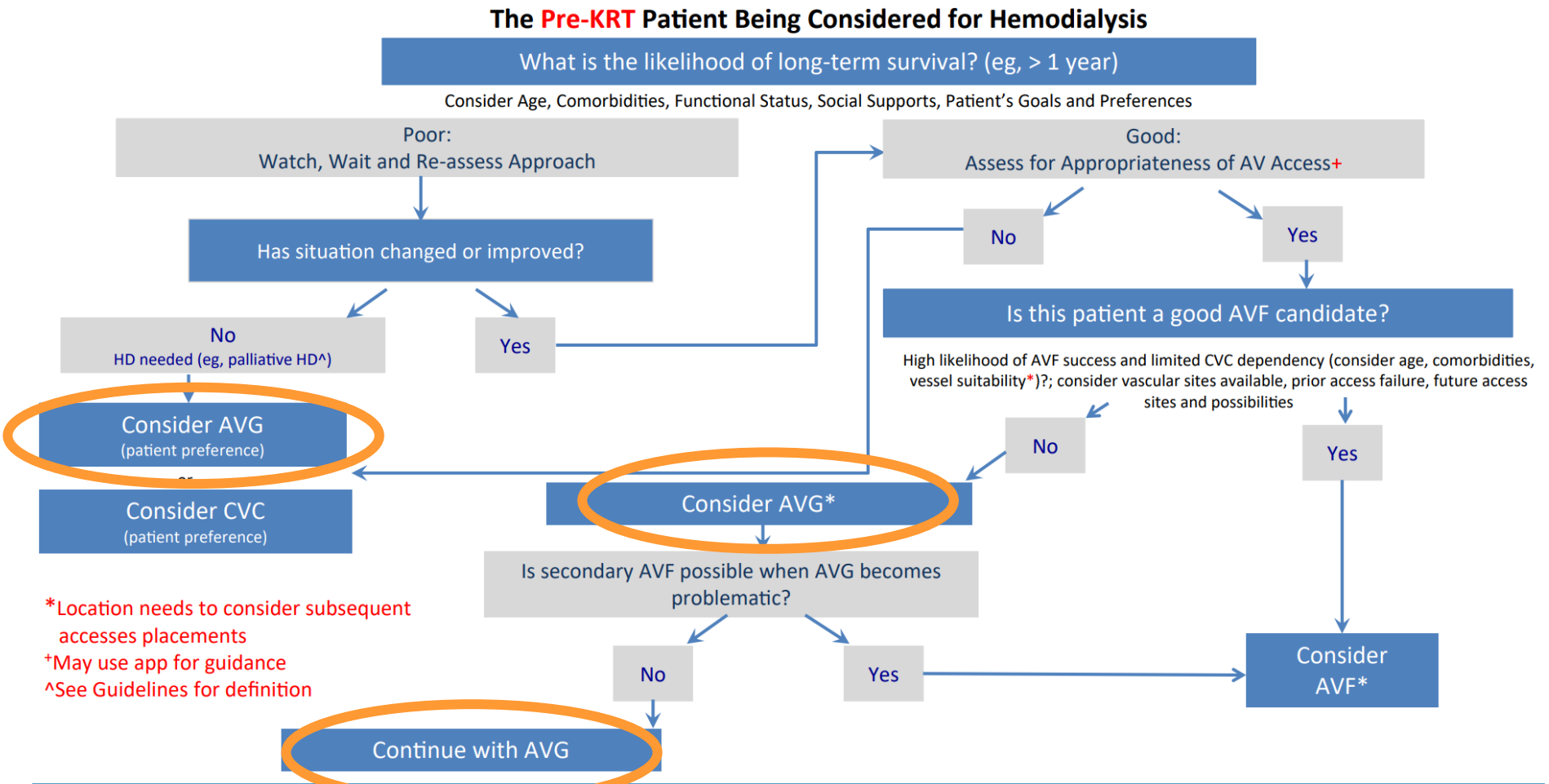



**Figure 1.2.** The pre-KRT patient being considered for hemodialysis. Abbreviations: AV, arteriovenous; AVF, arteriovenous fistula; CVC, central venous catheter; HD, hemodialysis; KRT, kidney renal replacement therapy; PD, peritoneal dialysis.

*Lok C et al: Am J Kidney Dis. 2020;75(4)(suppl 2):S1-S164*

# Guideline 1. Patient First: ESKD Life-Plan

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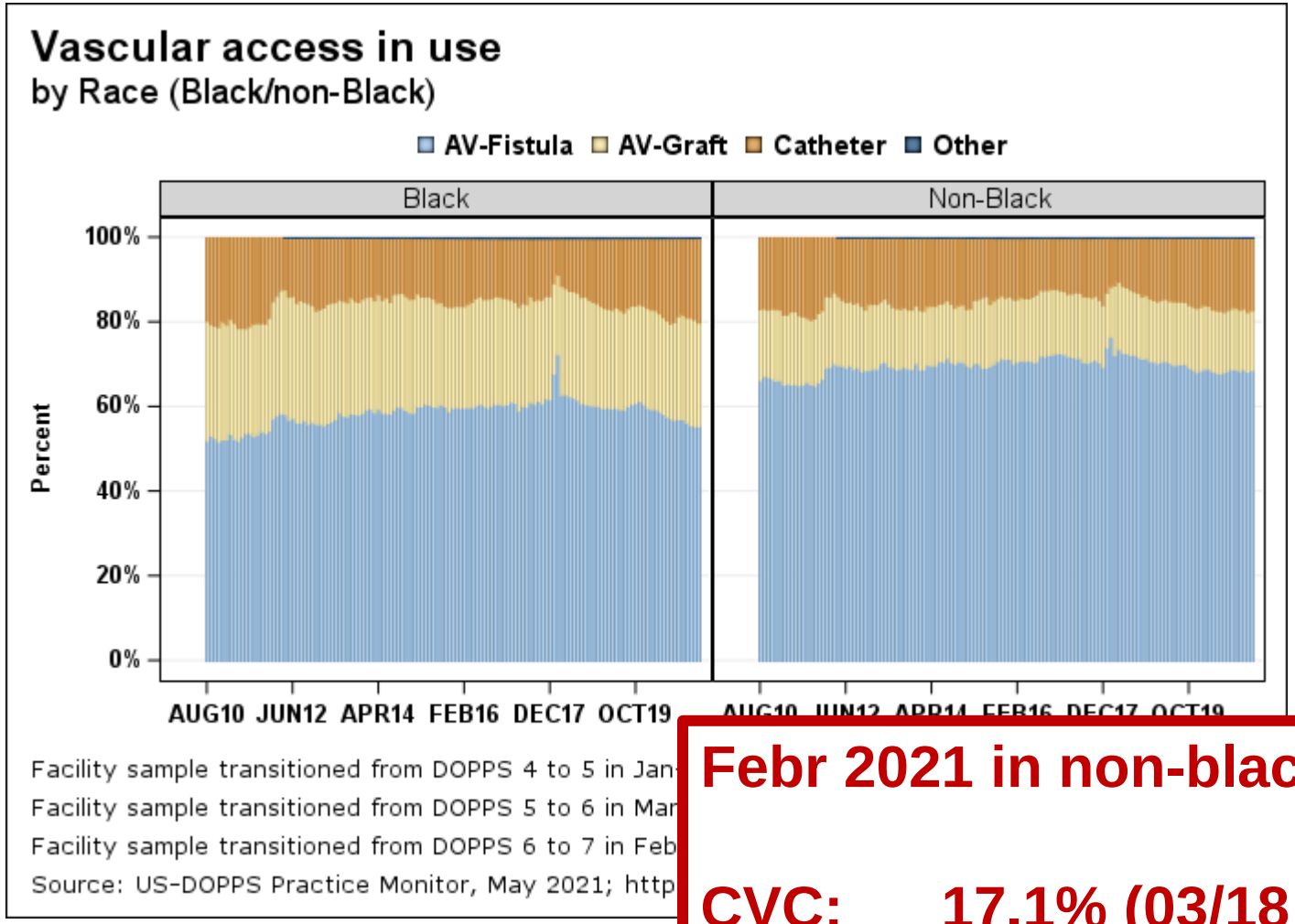
*Lok C et al: Am J Kidney Dis. 2020;75(4)(suppl 2):S1-S164*

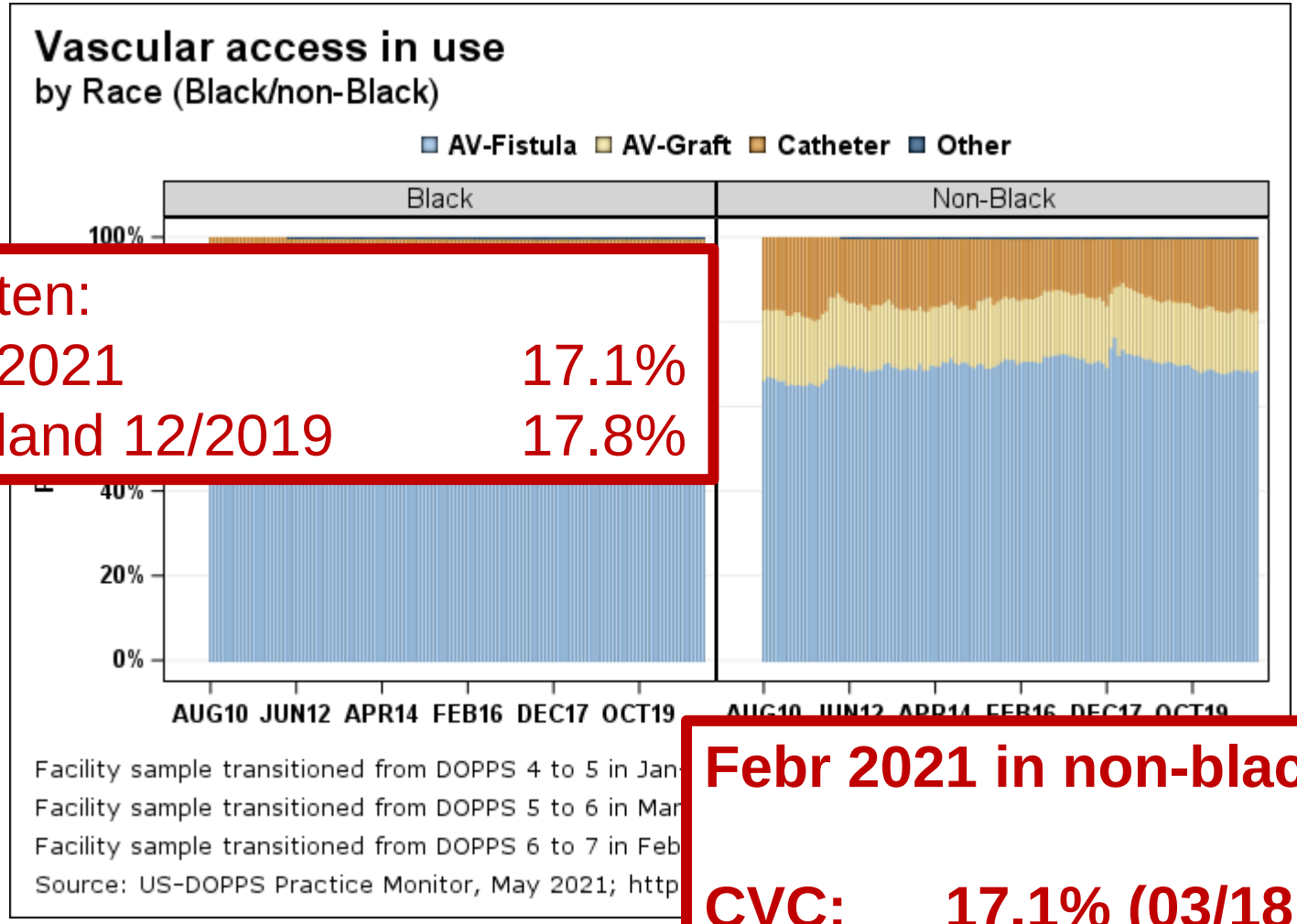
# Dialysezugänge - USA




**Febr 2021 in non-blacks:**

**CVC: 17.1% (03/18: 11.2%)**
**PTFE: 14.1%**
**AVF: 68.8%**

# Dialysezugänge - USA




CVC Raten:

| | |
|---|---|
| USA 02/2021 | 17.1% |
| Deutschland 12/2019 | 17.8% |

**Febr 2021 in non-blacks:**

| | |
|---|---|
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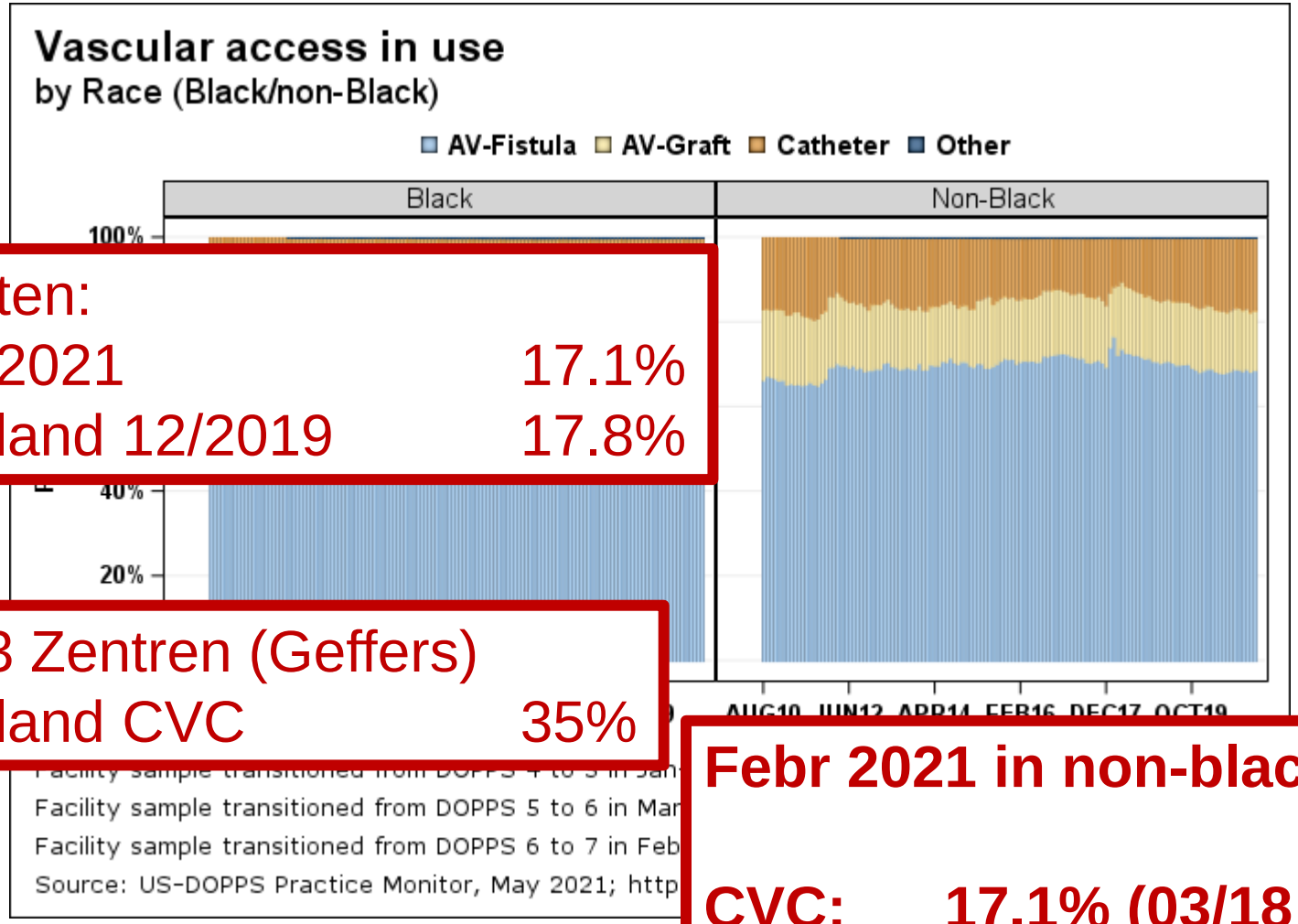
# Dialysezugänge - USA




CVC Raten:

| | |
|---|---|
| USA 02/2021 | 17.1% |
| Deutschland 12/2019 | 17.8% |

DIPS, 43 Zentren (Geffers)

| | |
|---|---|
| Deutschland CVC | 35% |

**Febr 2021 in non-blacks:**

| | |
|---|---|
| **CVC:** | **17.1% (03/18: 11.2%)** |
| **PTFE:** | **14.1%** |
| **AVF:** | **68.8%** |

KDOQI

# Guideline 1. Patient First: ESKD Life-Plan

## Statements: ESKD Life-Plan and Vascular Access Choice

**1.1 KDOQI considers it reasonable that each patient with progressive CKD and/or with an eGFR 15-20 mL/min/1.73 m2 or already on kidney replacement therapy should have an individualized ESKD Life-Plan that is regularly reviewed, updated, and documented on their medical record. (Expert Opinion)**

**1.2 KDOQI considers it reasonable to conduct an annual review and update of each patient's individualized ESKD Life-Plan, together with their health care team. (Expert Opinion)**

**1.3 KDOQI considers it reasonable that, in addition to regular monitoring, a minimum quarterly overall review and update of each patient's vascular access functionality, complication risks, and potential future dialysis access options be done together with their health care team. (Expert Opinion)**

*Lok C et al: Am J Kidney Dis. 2020;75(4)(suppl 2):S1-S164*

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KDOQI

## Statements: Education on ESKD Modalities and Dialysis Access

6.1 **KDOQI considers it reasonable for adult and pediatric patients with an eGFR <30 mL/min/1.73 $m^2$ (CKD G4) with progressive decline in kidney function, to be educated on all modalities of kidney replacement therapy (KRT) options, including transplantation, so that timely referral can be made for the appropriate modality and creation of a functional dialysis access, if necessary. (Expert Opinion)**

*Note: For pediatric patients, calculate eGFR by Schwartz formula.*

*Lok C et al: Am J Kidney Dis. 2020;75(4)(suppl 2):S1-S164*

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# Patientenschulung CKD IV reduziert Mortalität

**The IMPACT (Incident Management of Patients, Actions Centered on Treatment) Program: A Quality Improvement Approach for Caring for Patients Initiating Long-term Hemodialysis**

*Steven M. Wilson, PhD,[1] John A. Robertson, MD,[2] Grace Chen, BS,[3] Pooja Goel, MHA,[2] Deborah A. Benner, MA, RD,[2] Mahesh Krishnan, MD, MPH, MBA,[1] Tracy J. Mayne, PhD,[1] and Allen R. Nissenson, MD[2]*

*AJKD 2012 (60 435-443)*

**Multidisciplinary predialysis education decreases the incidence of dialysis and reduces mortality—a controlled cohort study based on the NKF/DOQI guidelines**

I-Wen Wu[1,2], Shun-Yin Wang[1], Kuang-Hung Hsu[3], Chin-Chan Lee[1,2], Chiao-Yin Sun[1,2], Chi-Jen Tsai[1,2] and Mai-Szu Wu[1,2]

Nephrol Dial Transplant (2009) 24: 3426–3433

# Leitlinien

# Leitlinien

- **Kommunikation mit Partnern**
- **US vor Shunt und intraOP**
- **Shared decision / Schulung**
- **Quartalsvisite, Punktionsstrategie**

# Neuigkeiten für den Dialysezugang

- **Leitlinien**
- **Ultraschall am Dialysezugang**
- **Interventionelle Shuntanlagen**
- **Interdisziplinäre Shuntzentren**
- **Locklösungen**

# Ultraschall gesteuerte Shuntpunktion

JVA The Journal of Vascular Access

*Original research article*

The Journal of Vascular Access
2021, Vol. 22(4) 635–641

DOI: 10.1177/1129729820954725
journals.sagepub.com/home/jva
SAGE

## A randomised clinical trial of ultrasound guided cannulation of difficult fistulae for dialysis access

**Joshua Eves, Paris Cai, Ross Latham, Clement Leung, Daniel Carradice, Ian Chetter and George Smith**

*Eves J et al: Journal Vasc Access 2021 (22), 635-641*

# A randomised clinical trial of ultrasound guided cannulation of difficult fistulae for dialysis access

| | Ultraschall-gesteuerte Punktion n=170 | Tastbefund-gesteuerte Punktion n=176 | Signifikanz-Niveau |
|---|---|---|---|
| **zusätzlicher Nadelvorschub** | 77 | 99 | 0,007 |
| **zusätzliche Punktion an anderer Stelle** | 10 | 25 | 0,016 |
| **Punktionszeit 2 Nadeln** (sec) | 190 | 118 | 0,001 |
| Schmerz-Score | | | 0,802 |

*Eves J et al: Journal Vasc Access 2021 (22), 635-641*

# A randomised clinical trial of ultrasound guided cannulation of difficult fistulae for dialysis access

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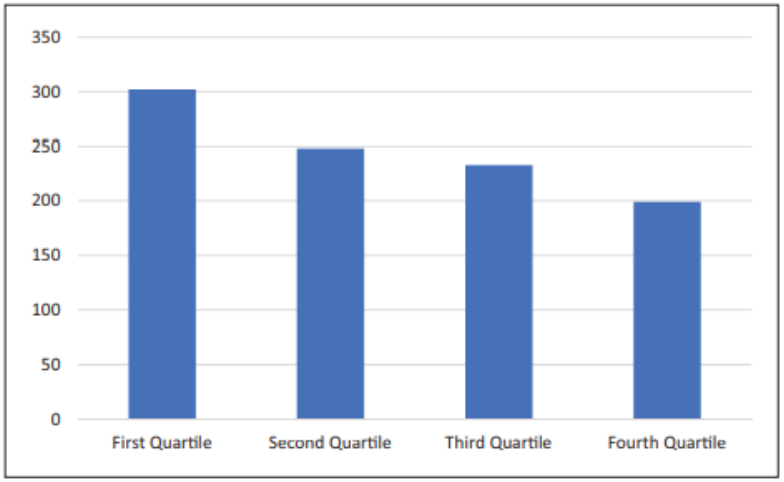



**Figure 2.** Mean time to complete USG cannulation during quartiles of trial duration.

**Mit zunehmender Erfahrung schneller**

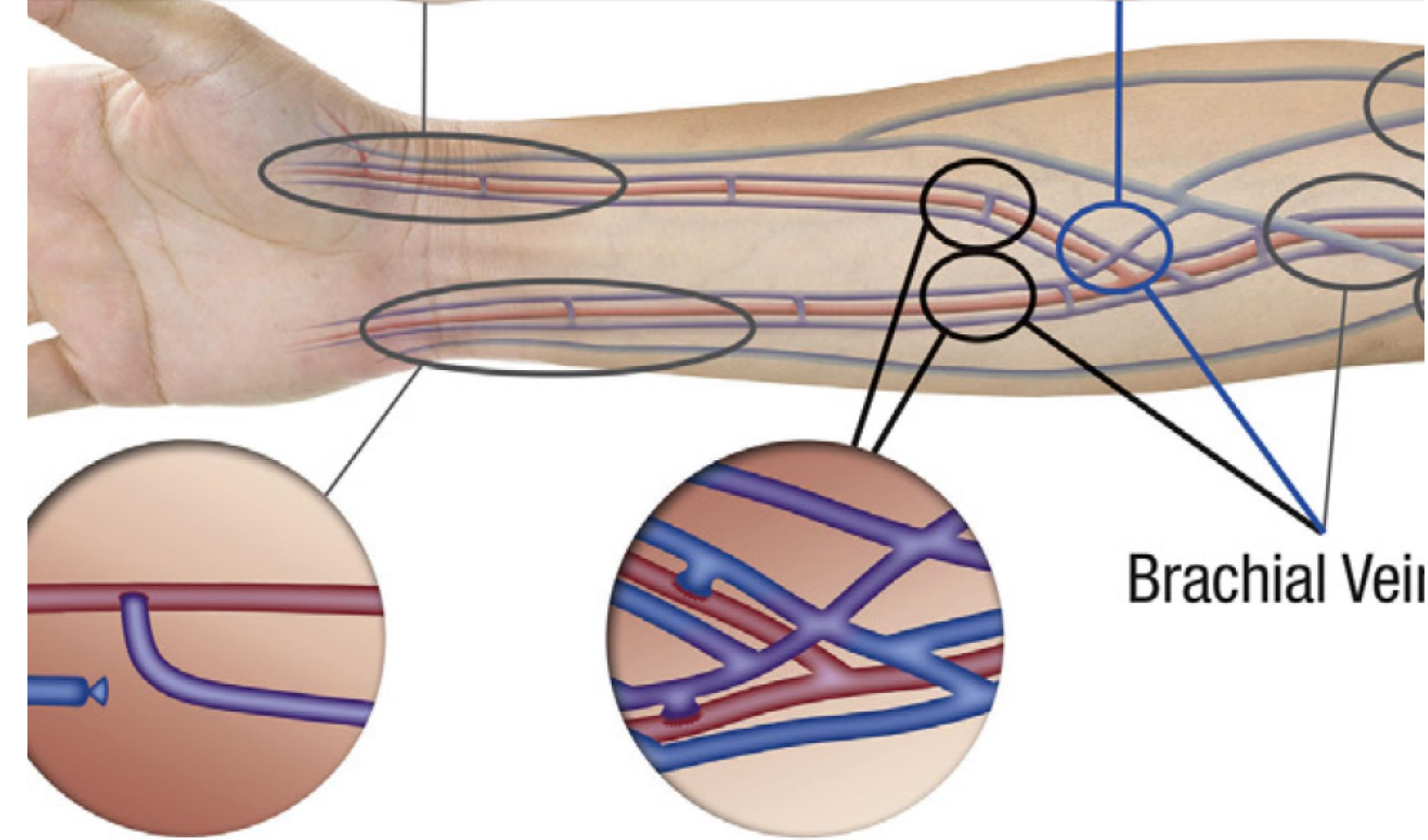
*Eves J et al: Journal Vasc Access 2021 (22), 635-641*

# Neuigkeiten für den Dialysezugang

- **Leitlinien**
- **Ultraschall am Dialysezugang**
- **Interventionelle Shuntanlagen**
- **Interdisziplinäre Shuntzentren**
- **Locklösungen**

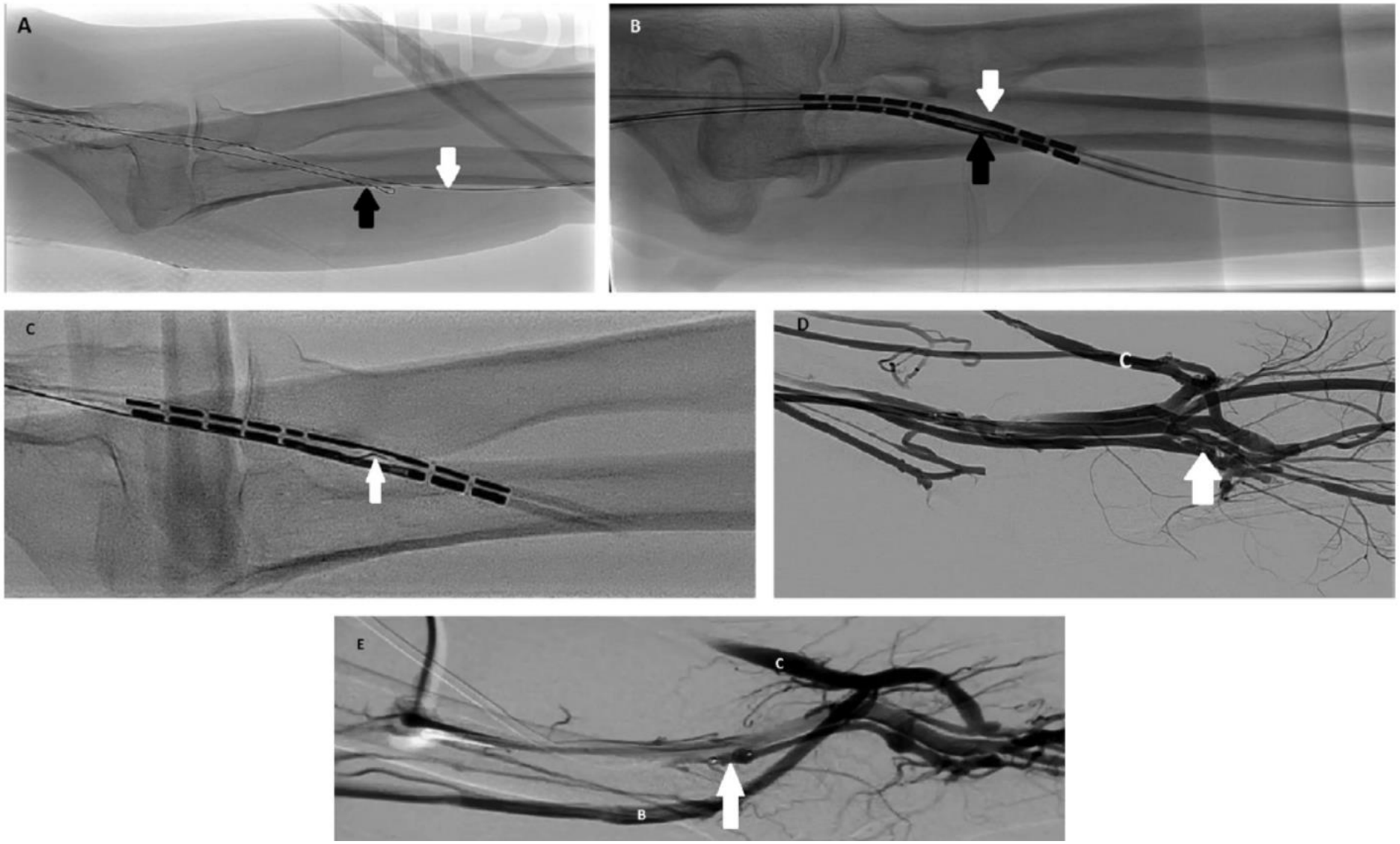
# Interventionelle Shuntanlage

## EverlinQ / WavelinQ®
## Ellipsys®

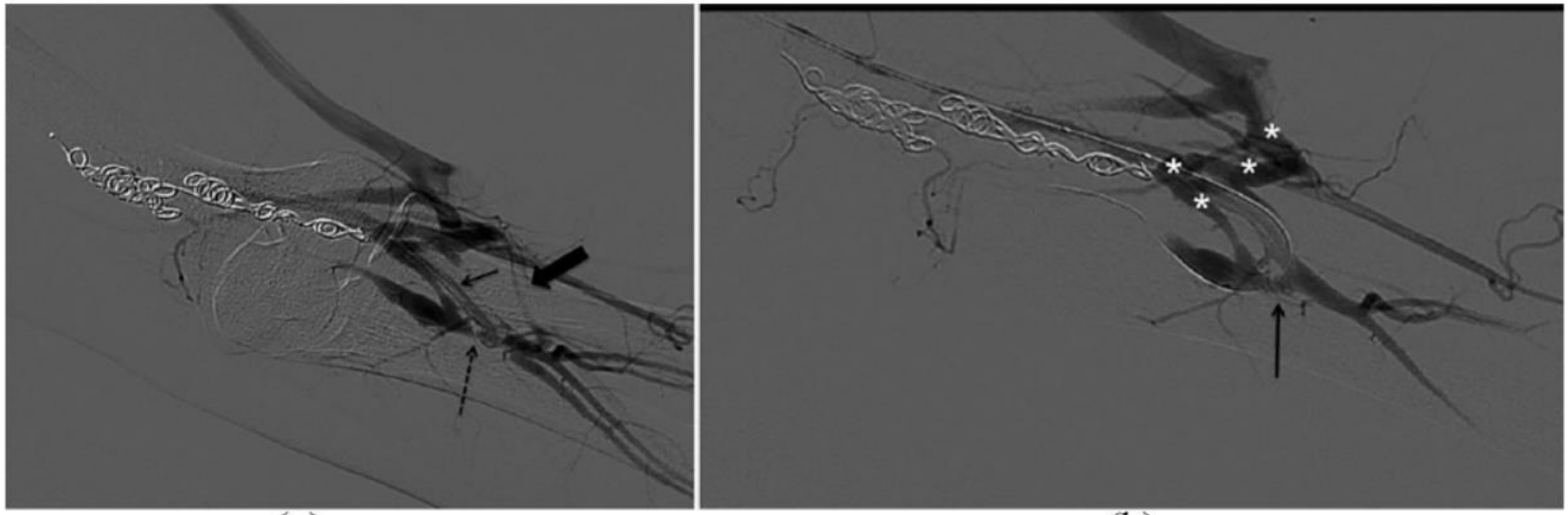



**WavelinQ™ 4F**

Ulnar-Ulnar or Radial-Radial

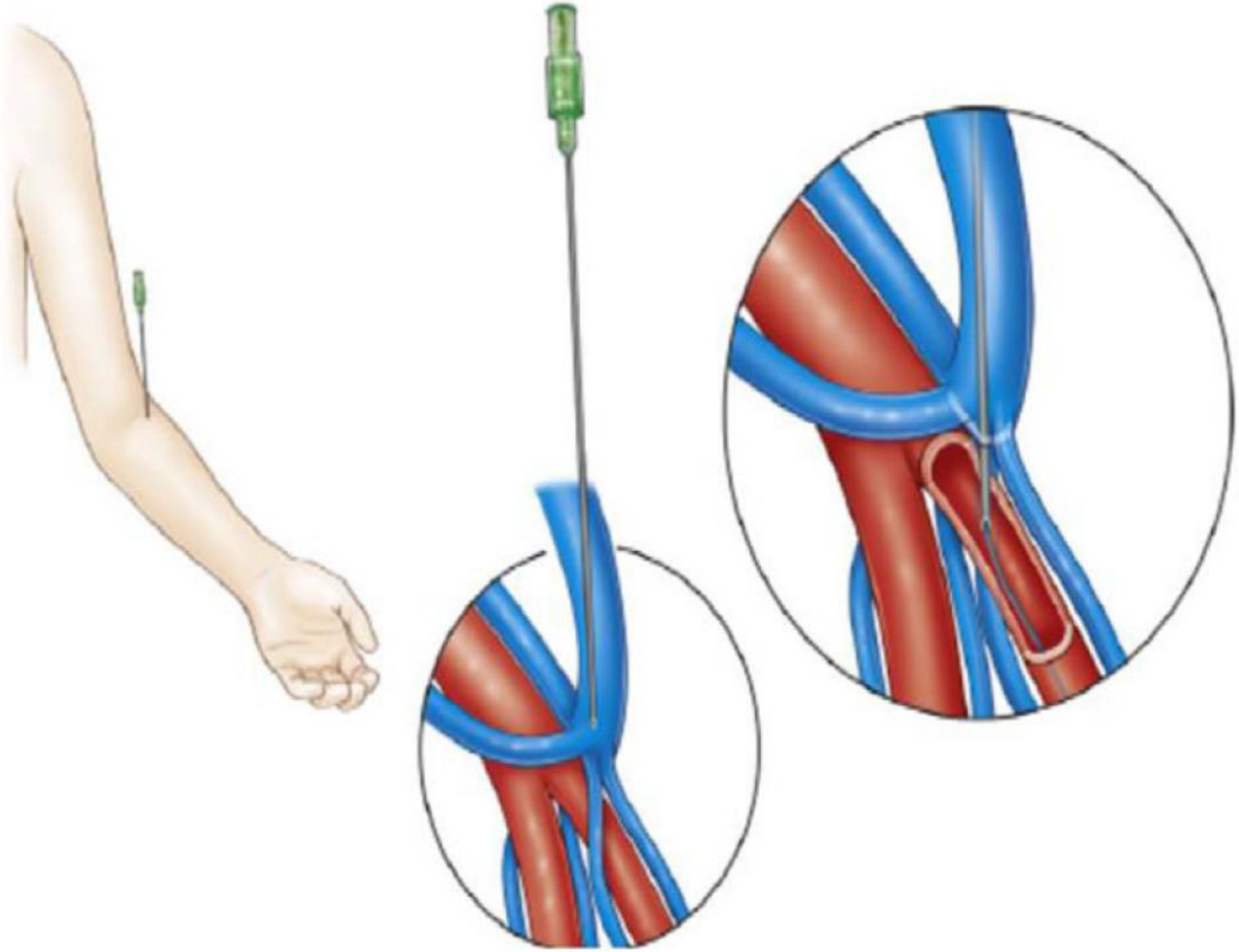

A
B
C
D
C
E
C
B

# EverlinQ / WavelinQ®

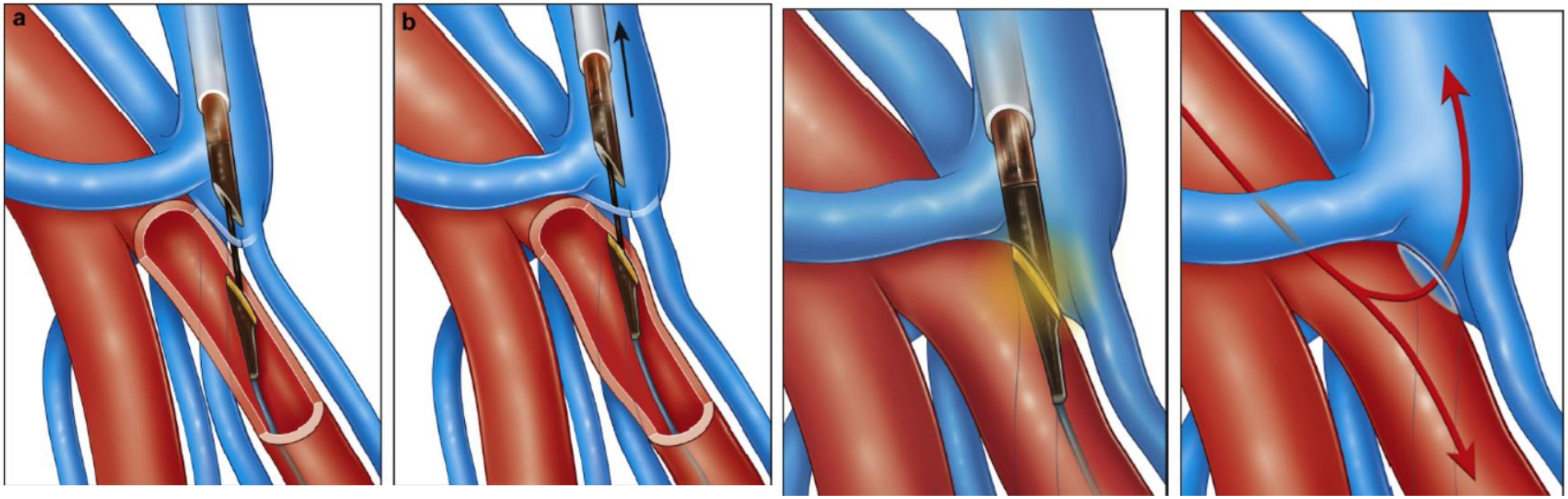


(a) (b)

# Ellipsys®



# Ellipsys®



# Comparison of Outcomes of Percutaneous Arteriovenous Fistulae Creation by Ellipsys and WavelinQ Devices

Robert Shahverdyan, MD, Gerald Beathard, MD, PhD,
Nasir Mushtaq, PhD, MBBS, MPH, Terry F. Litchfield,
Peter R. Nelson, MD, MS, and William C. Jennings, MD

**100 Patienten monozentrisch, ein Operateur, nicht randomisiert**
**Mittlere Follow up Zeit 187 Tage (0-760)**

**Ellipsys versus WavelinQ**

*R. Shahverdyan et al: J Vasc Interv Radiol 2020; 31:1365–72*

# Comparison of Outcomes of Percutaneous Arteriovenous Fistulae Creation by Ellipsys and WavelinQ Devices

| | **Ellipsys** | **EverlinQ / WavelinQ** | **Sign.** |
|---|---|---|---|
| Patienten (n) | 65 | 35 | |
| Technischer Erfolg (%) | **100** | **97** | |
| OP Zeit (Min.) | 14 | 63 | P<0.001 |
| Reifung nach 4 Wochen (%) | 68.3 | 54.3 | |
| Dialyse über AVF | 31/39 pat. (79.5%) | 14/24 pat. (58%) | |
| Interventionen / Patientenjahr (n) | **0.96** | **0.46** | |
| Shuntverschluss (%) | 15.4 | 37.1 | P<0.0137 |
| Shuntfluss n 6 Mo (ml/min) | 750 (70-1000) | 1000 (480-1600) | |
| Sekundäre Offenheit n. 12 Mo (%) | 82 | 60 | P<0.05 |

*R. Shahverdyan et al: J Vasc Interv Radiol 2020; 31:1365–72*

KfH

AJKD

Original Investigation

# Comparison of Ellipsys Percutaneous and Proximal Forearm Gracz-Type Surgical Arteriovenous Fistulas

*Robert Shahverdyan, Gerald Beathard, Nasir Mushtaq, Terry F. Litchfield, Shant Vartanian, Klaus Konner, and William C. Jennings*

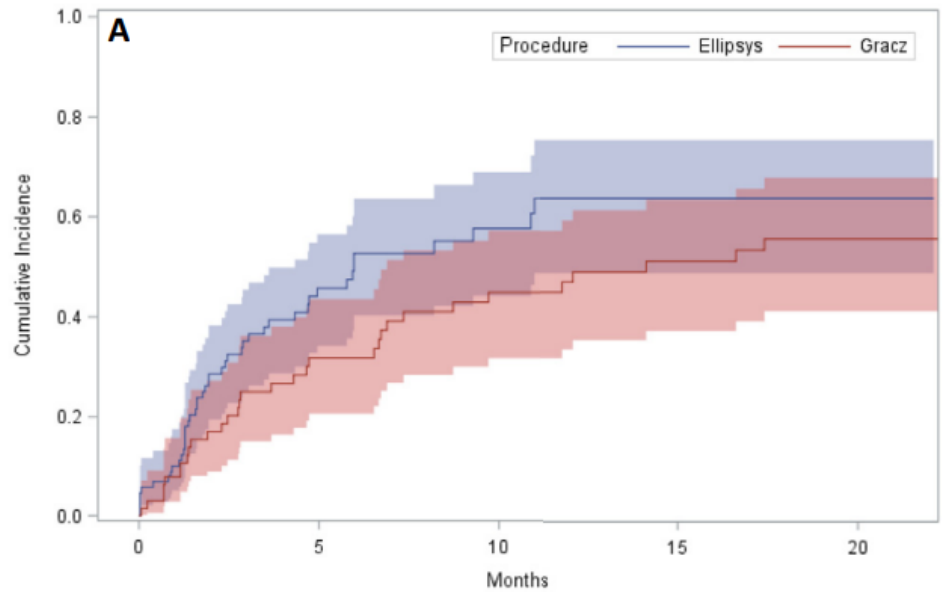
**Multizentrisch**
**Retrospektiv**

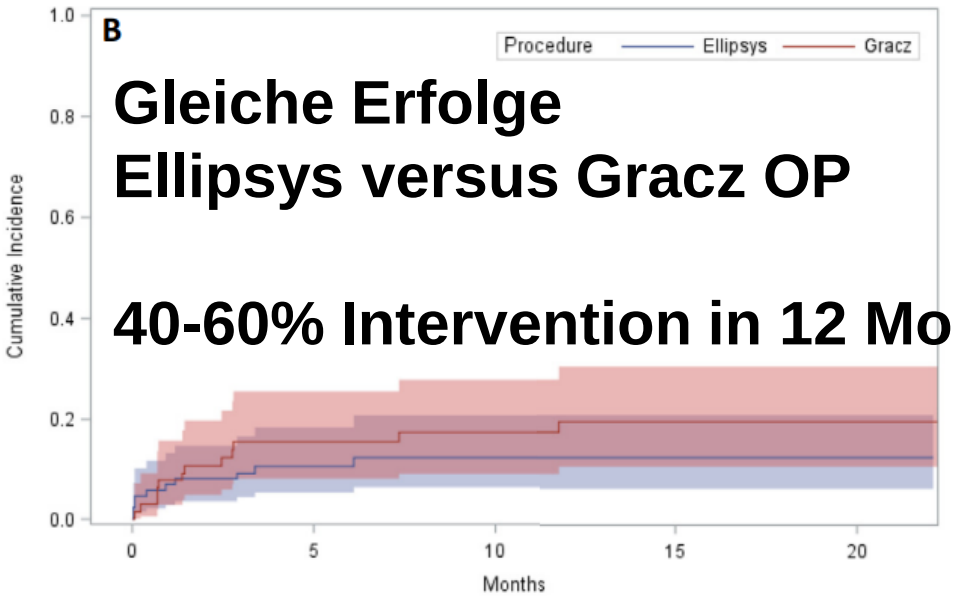
**Interventionell versus OP**
**Ellipsys versus Gracz OP**

*R. Shahverdyan et al: AJKD 2021; 78:520-529*

# Comparison of Ellipsys Percutaneous and Proximal Forearm Gracz-Type Surgical Arteriovenous Fistulas

*Robert Shahverdyan, Gerald Beathard, Nasir Mushtaq, Terry F. Litchfield, Shant Vartanian, Klaus Konner, and William C. Jennings*




**Gleiche Erfolge**
**Ellipsys versus Gracz OP**

**40-60% Intervention in 12 Mo**

| Procedure Type | | Months | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 0 | 3 | 6 | 9 | 12 | 15 | 18 | 21 |
| Ellipsys (pAVF) | Number at risk | 89 | 48 | 27 | 18 | 11 | 8 | 5 | 2 |
| | Cumulative incidence | 0 | 0.35 | 0.53 | 0.55 | 0.64 | 0.64 | 0.64 | 0.64 |
| Gracz (sAVF) | Number at risk | 69 | 46 | 37 | 30 | 26 | 23 | 20 | 15 |
| | Cumulative incidence | 0 | 0.25 | 0.32 | 0.43 | 0.47 | 0.51 | 0.56 | 0.56 |

| Procedure Type | | Months | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 0 | 3 | 6 | 9 | 12 | 15 | 18 | 21 |
| Ellipsys (pAVF) | Number at risk | 89 | 67 | 51 | 38 | 30 | 18 | 10 | 4 |
| | Cumulative incidence | 0 | 0.09 | 0.11 | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 |
| Gracz (sAVF) | Number at risk | 69 | 52 | 45 | 42 | 39 | 38 | 35 | 26 |
| | Cumulative incidence | 0 | 0.16 | 0.16 | 0.17 | 0.20 | 0.20 | 0.20 | 0.20 |

*R. Shahverdyan et al: AJKD 2021; 78:520-529*

# Early experience and observations in endovascular dialysis fistula re-intervention

Robert G Jones[1], Aurangzaib Khawaja[2], Karen Tullett[2] and Nicholas G Inston[2]

*R. Jones et al: JVA 2020; 21:818-825*

# Early experience and observations in endovascular dialysis fistula re-intervention

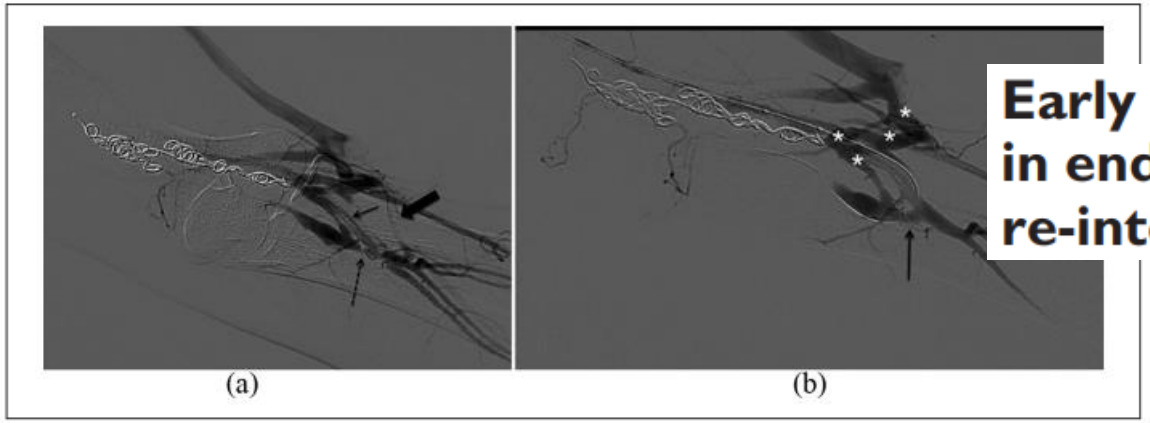



**Figure 4.** (a) A 45-year-old male with a left arm Wavelinq endoAVF created 2 years previously, experiencing low flow on dialysis and drop in clearance. Diagnostic angiogram via 3-French brachial artery access (thin black arrow) demonstrated near occlusion of the perforator (thick black arrow) and a juxta-anastomotic stenosis in the deep ulnar vein (thin dotted arrow). Collaterals are now seen communicating the endoAVF to the cephalic vein behind the artery due to severe perforator stenosis. Flow via these collaterals is impeded due to the juxta-anastomotic deep venous stenosis. The previously placed coils in deep brachial veins are from the index procedure and 1 year post-creation to assist flow diversion. (b) Angioplasty of the perforator via access into the fistularised cephalic vein was unsuccessful, due to severe elastic recoil. The juxta-anastomotic venous stenosis was successfully angioplastied with a 5-mm diameter balloon (arrow) via the arterial access (note: guidewire). Improved flow was seen through the perforator collaterals in a "z-shaped" configuration, delineated here by white asterisks. Dialysis improved following this intervention.

## Revisionen Wavelinq

- Interventionell
- Operativ kaum zugänglich
- Neuland

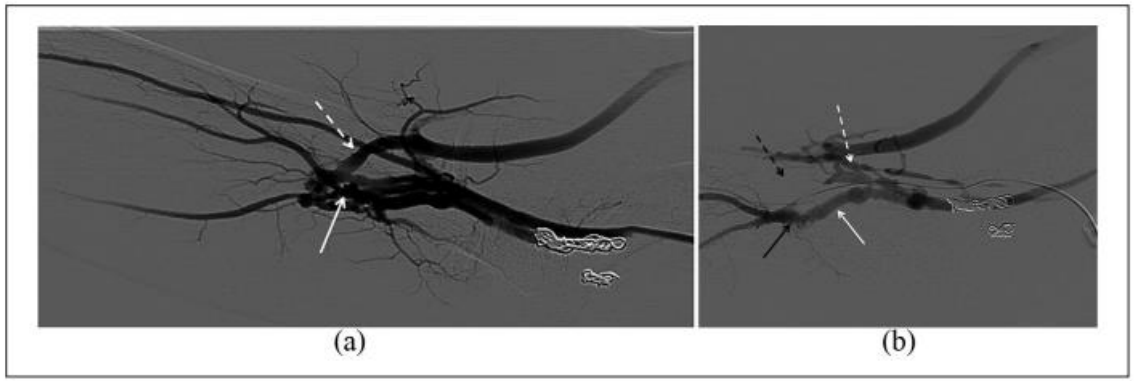



**Figure 5.** (a) A 64-year-old male with a successful right arm Wavelinq endoAVF. The level of the fistula is shown with the solid white arrow and the perforator with the dotted white arrow. Also, note primary coil embolization of the deep brachial vein. Poor flows on dialysis encountered on multiple occasions over next 2 years, requiring two angioplasty procedures to juxta-anastomotic venous segment stenosis with improvement each time. The previously placed coils are from the index procedure in the brachial vein and a side branch. (b) Angiogram 22 months post-creation demonstrating perforator occlusion (dotted black arrow) and development of perforator collaterals (dotted white arrow), which now drain the fistula into the cephalic vein. The solid white arrow demonstrates the dilated deep vein and the solid black arrow the AV anastomosis, which was also the site of previous stenosis. A small collateral has also developed that communicates with the brachial vein above the level of the embolization coils, potentially further compromising flow into the cephalic fistula.

*R. Jones et al: JVA 2020; 21:818-825*

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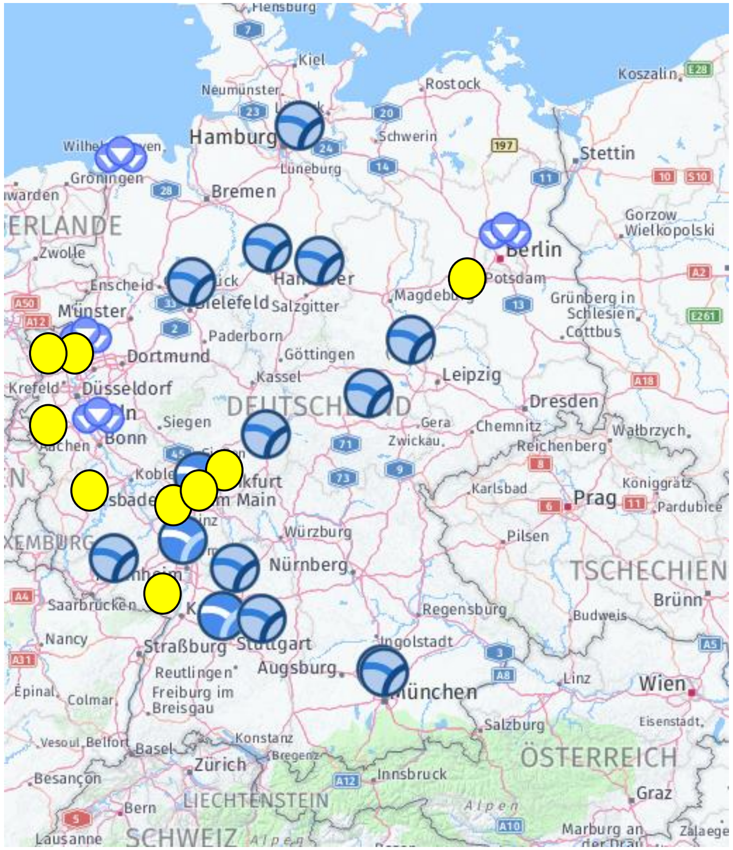
# Neuigkeiten für den Dialysezugang

- **Leitlinien**
- **Ultraschall am Dialysezugang**
- **Interventionelle Shuntanlagen**
- **Interdisziplinäre Shuntzentren**
- **Locklösungen**



| Einrichtung |
|---|
| Krankenhaus St. Elisabeth und St. Barbara Halle (Saale) GmbH |
| Vivantes Klinikum im Friedrichshain Berlin |
| St. Joseph Krankenhaus |
| Ernst von Bergmann Klinikum |
| Krankenhaus St. Adolfstift |
| Ammerland Klinik Westerstede |
| Klinikum Leer gGmbH |
| KRH Klinikum Siloah |
| Evangelisches Klinikum Bethel |
| Klinikum Fulda gAG |
| Städtisches Klinikum Braunschweig gGmbH |
| Alfried Krupp Krankenhaus Essen Rüttenscheid |
| Universitätsmedizin Essen |
| Knappschaftskrankenhaus Bottrop GmbH |
| Johanniter Krankenhaus Rheinhausen |
| Krankenhaus Merheim, Kliniken der Stadt Köln |
| Krankenhaus Düren, akad. Lehrkrankenhaus der RWTH Aachen |
| Gemeinschaftskrankenhaus Bonn |
| Marienhaus Klinikum Mainz |
| AGAPLESION MARKUS KRANKENHAUS |
| Ketteler Krankenhaus Offenbach |
| Klinikum Darmstadt GmbH |
| Kreiskrankenhaus Bergstraße GmbH |
| Universitätsklinikum des Saarlandes |
| Klinikum der Stadt Ludwigshafen |
| GRN-Klinik Schwetzingen |
| Kreiskliniken Böblingen gGmbH, Kliniken Sindelfingen |
| Alb Fils Kliniken |
| SLK-Klinikum am Plattenwald |
| ISAR Kliniken GmbH |
| Kliniken Dritter Orden gGmbH |
| Sophien- und Hufeland-Klinikum gGmbH |

Mehrere zertifizierte Einrichtungen

Mehrere Standorte

Shunt-Referenzzentrum

Regionales Shuntzentrum

● Audit oder Ausschussentscheidung ausstehend

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# Wo stehen wir?

| | |
|---|---|
| **Gültige Zertifikate** | **23** |
| **Regionales Shuntzentrum** | 5 |
| **Shunt-Referenzzentrum** | 18 |
| **“Aktive“ Verfahren*** | **32** |
| **Regionales Shuntzentrum** | 11 |
| **Shunt-Referenzzentrum** | 21 |
| • d.h. Verfahren ist eingeleitet, Audit / Ausschussbewertung noch ausstehend | |
| **Eingegangene Anfragen** | **7** |
| **Regionales Shuntzentrum** | 6 |
| **Shunt-Referenzzentrum** | 1 |

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Stand 01.10.2021

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# Bakteriämierisiko von Dialysezugängen

| Zugangsform | Bakterämien pro 1000 Behandlungstage | Relatives Risiko |
|---|---|---|
| **Nicht getunnelte ZVDK**<br>- Femoral<br>- Jugularis<br>- Subclavia | **5,0**<br>7,6<br>5,6<br>2,7 | **63** |
| **Getunnelte ZVDK**<br><br>Mit "modernen" Locklösungen und/oder exzellenter Hygiene | **3.5**<br>**Geffers 2.2 / 1000**<br>**0,3 bis 0,8** | **44**<br><br>**4-10** |
| **PTFE-Prothesenshunts** | **0,18** | **2** |
| **native AV-Shunts** | **0,08** | **1** |

*nach Hollenbeck et al.: NephroNews 2014 (16), 13-21*

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# Infektionsraten CVC

**Agarwal A, et al.: Lock-IT-100-Trail**
**(Heparin versus Neutrolin (Taurolidin/Citrat/Heparin)**
Poster 441. Presented at: National Kidney Foundation Spring Clinical Meetings 2019:

**Infection rate:**

| | | |
|---|---|---|
| **Heparin** | **0.46/1000 d** | |
| **Neutrolin®** | **0.13/1000 d** | **p<0,001** |

**Erste PRT der zeigt, dass Taurolidin Vorteile hat**

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- **Interventionelle Shuntanlage**
  - Funktioniert
  - anscheinend nicht der OP überlegen
  - viele Interventionen
  - hochkomplexe Re-Eingriffe
  - m.E. nur wenn keine periphere Fistel möglich
  - anscheinend keine steile Lernkurve
- **Interdisziplinäre Zusammenarbeit**
  - läuft
- **Taurolidin:**
  - akademischer Ritterschlag

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