Disclosure

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- ☐ I have the following potential conflicts of interest to report:
- ☐ Consulting
- ☐ Employment in industry
- ☐ Shareholder in a healthcare company
- ☐ Owner of a healthcare company
- ☐ Other(s)
- ☒ I do not have any potential conflict of interest

The Anatomical Snuffbox Fistula

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Guideline 3.3.

« In creating an AVF of the upper limb
the most distal position should be favored »

BPG; Nephrol Dial Transplant, 2007;22;Suppl 2;p88-p100

It is a fact: the more distal is the Arteriovenous Fistula (or AVF) the longer is the segment of the arterialized vein, the more space is available for punctures and also for re-interventions if these are needed.

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Also, the more distal is AVF, the fewer ischemic complications occurred as well as the lower the risk of vein hyperflow.

KDOQUI 2006 recommends creating the first AVF at the wrist:

GUIDELINE 2. SELECTION AND PLACEMENT OF HEMODIALYSIS ACCESS

A structured approach to the type and location of long-term HD accesses should help optimize access survival and minimize complications.

The access should be placed distally and in the upper extremities whenever possible. Options for fistula placement should be considered first, followed by prosthetic grafts if fistula placement is not possible. Catheters should be avoided for HD and used only when other options listed are not available.

2.1 The order of preference for placement of fistulae in patients with kidney failure who choose HD as their initial mode of KRT should be (in descending order of preference):

2.1.1 Preferred: Fistulae. (B)

2.1.1.1 A wrist (radiocephalic) primary fistula. (A)

2.1.1.2 An elbow (brachiocephalic) primary fistula. (A)

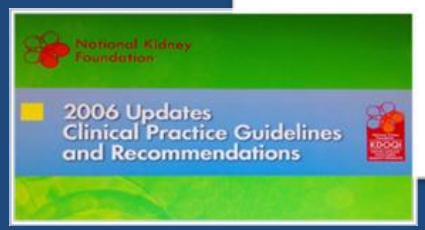
2.1.1.3 A transposed brachial basilic vein fistula: (B)

2.1.2 Acceptable: AVG of synthetic or biological material, such as: (B)

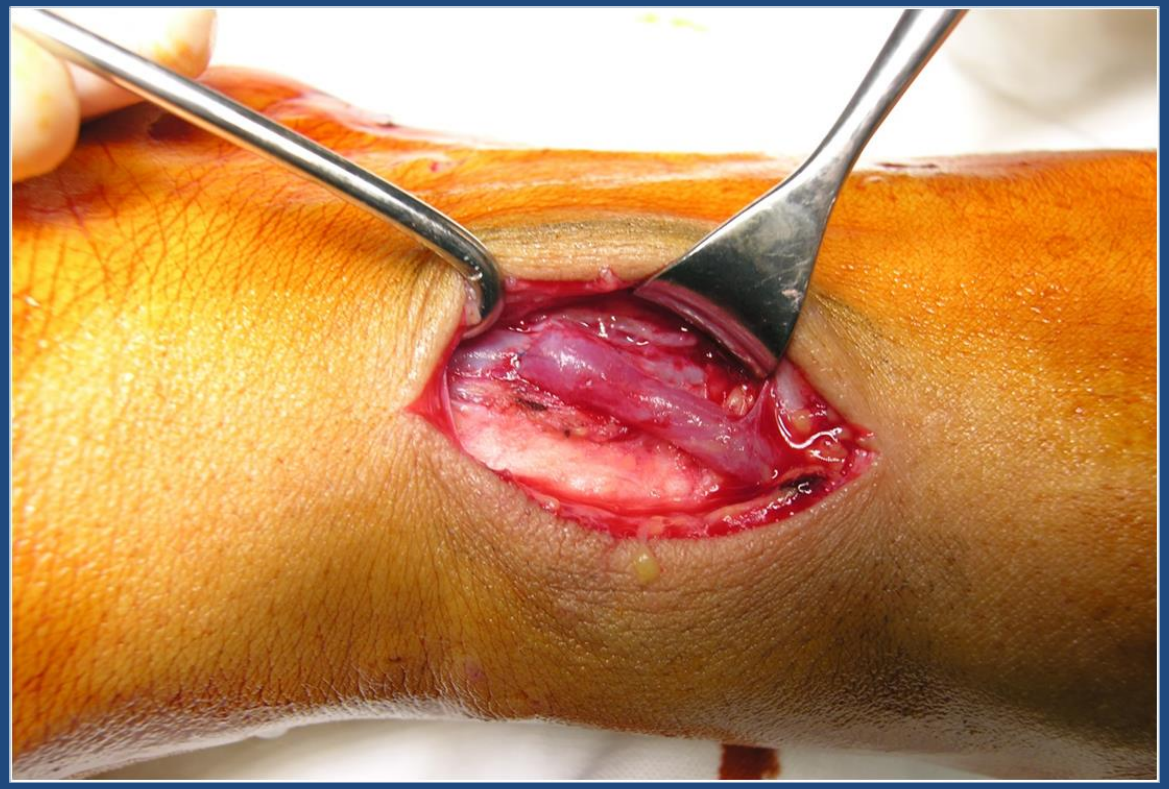
2.1.2.1 A forearm loop graft, preferable to a straight configuration.

2.1.2.2 Upper-arm graft.

2.1.2.3 Chest wall or "necklace" prosthetic graft or lower-extremity fistula or graft; all upper-arm sites should be exhausted.

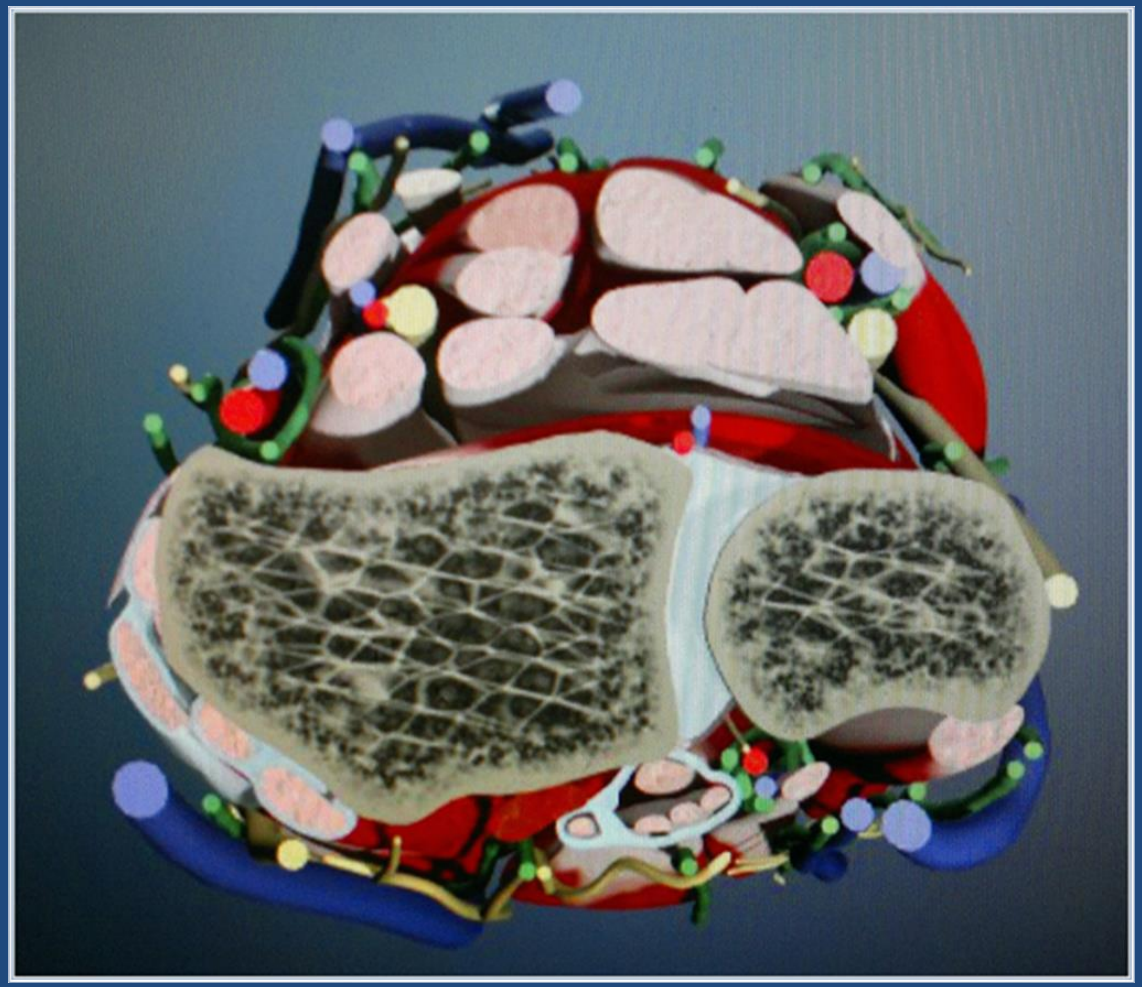


It has been generally admitted that the best location of the anastomosis of the radiocephalic AVF is at the wrist.



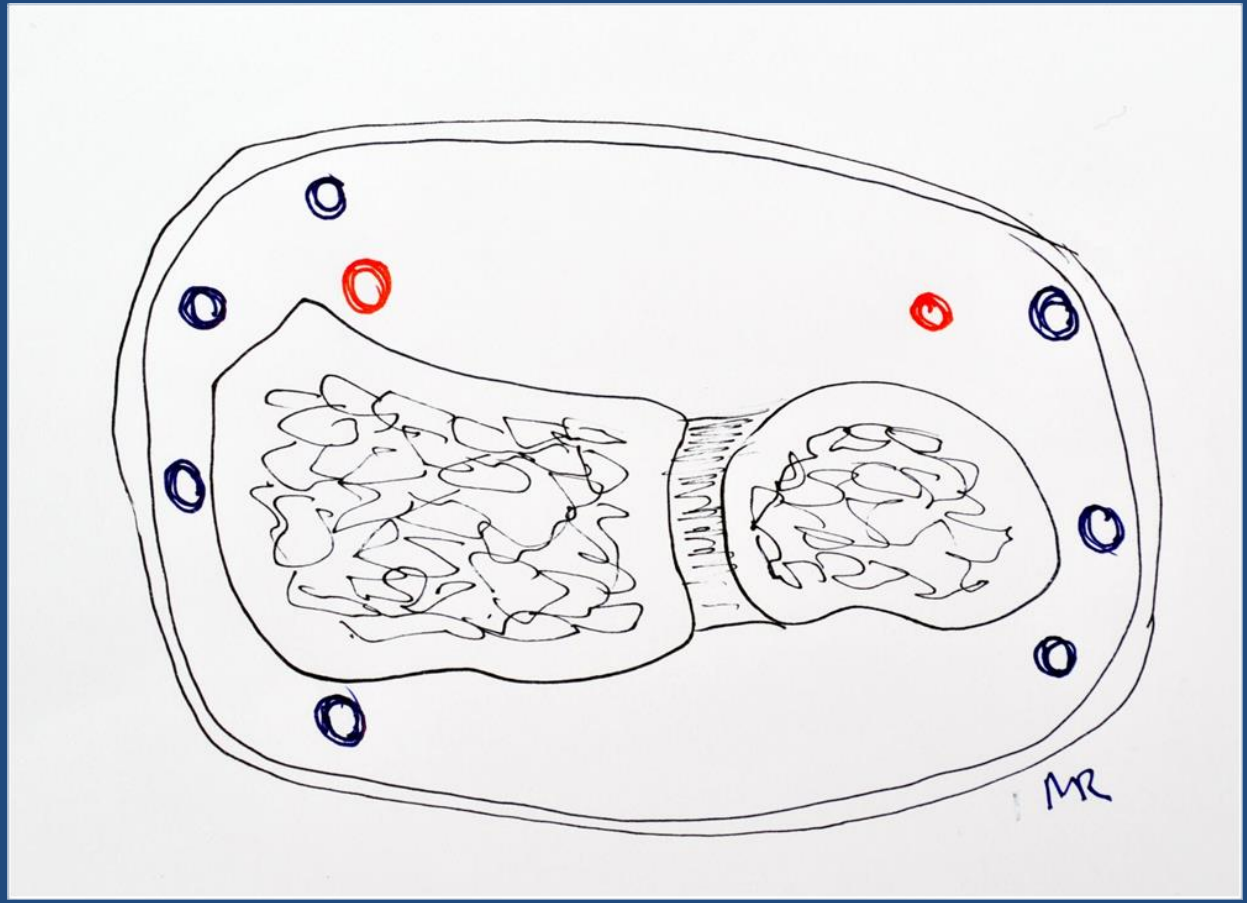
Is this really true?

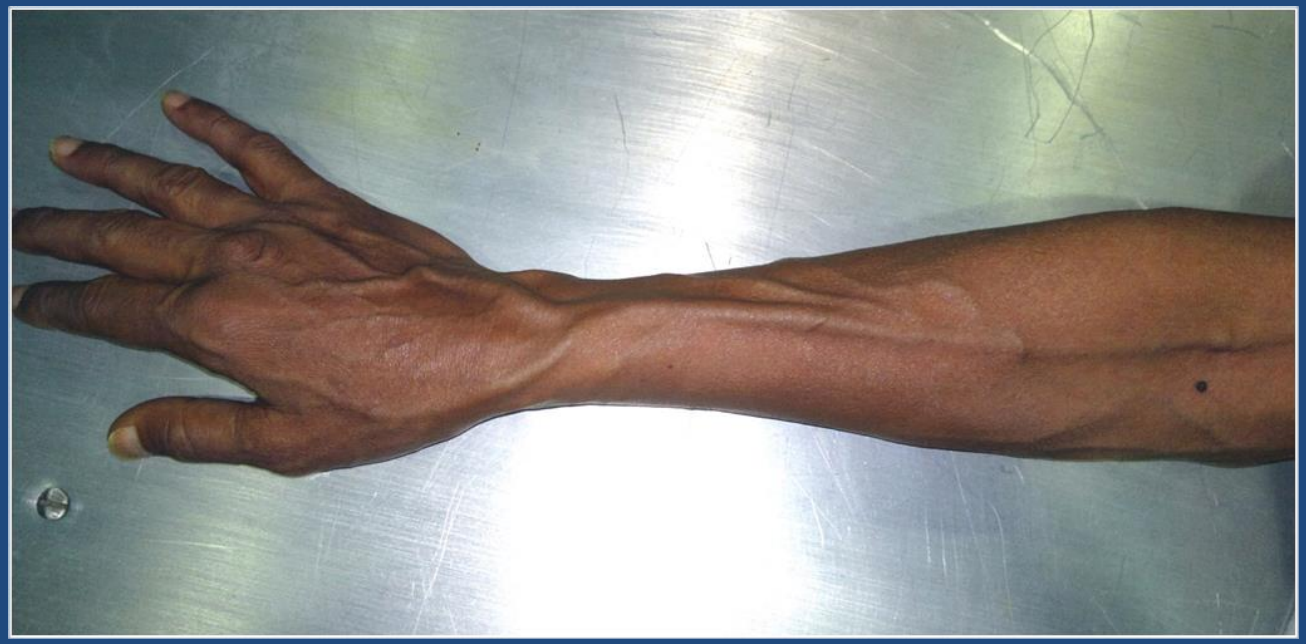
The shape of the transverse section of the wrist resembles an ellipse.



In this diagram we can see the location of the radial artery.

The location of the cephalic vein varies. It can be found at the front, at the side or even on the posterior face of the wrist.





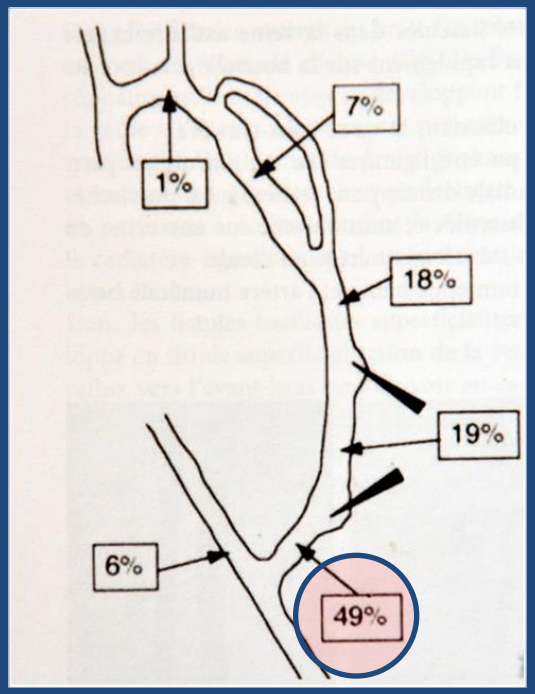
According to Konner, post- anastomotic venous stenosis is the most frequent cause of AVF failure.

The segment of the vein is subjected to multiple surgical traumas:

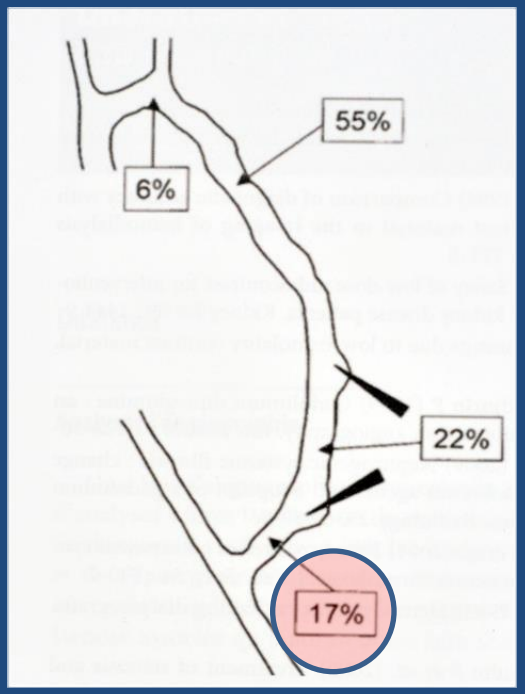
- dissection,
- mobilization,
- compression,
- twisting.

Konner K, Nonnast-Daniel B, Ritz E., *The arteriovenous fistula.* J AmSoc Nephr 2003; 14: 1669-1680

The mobilization of the vein and its displacement towards the the artery can easily cause twisting - and this twisting is likely the cause of the high incidence of post- anastomotic stenosis at the wrist.



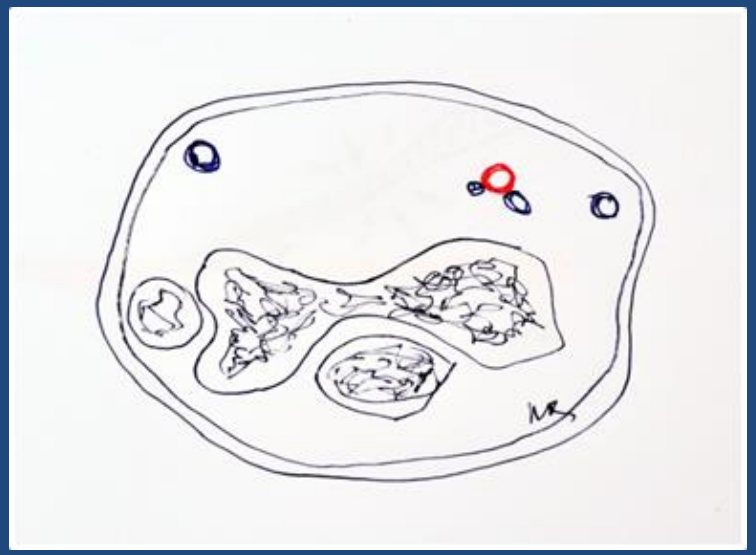
Wrist



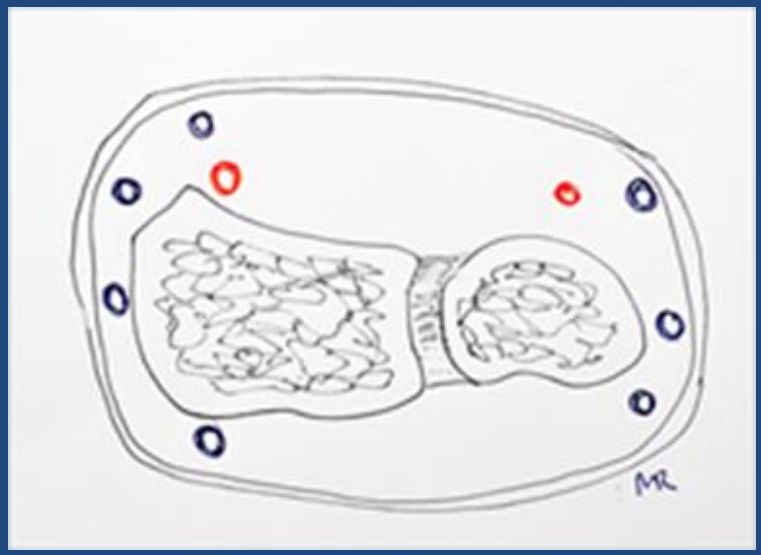
Elbow

Luc Turmel, *Radiologie diagnostique et interventionnelle des accès artério-veineux pour hémodialyse*, Springer 2012

Post-anastomotic stenosis

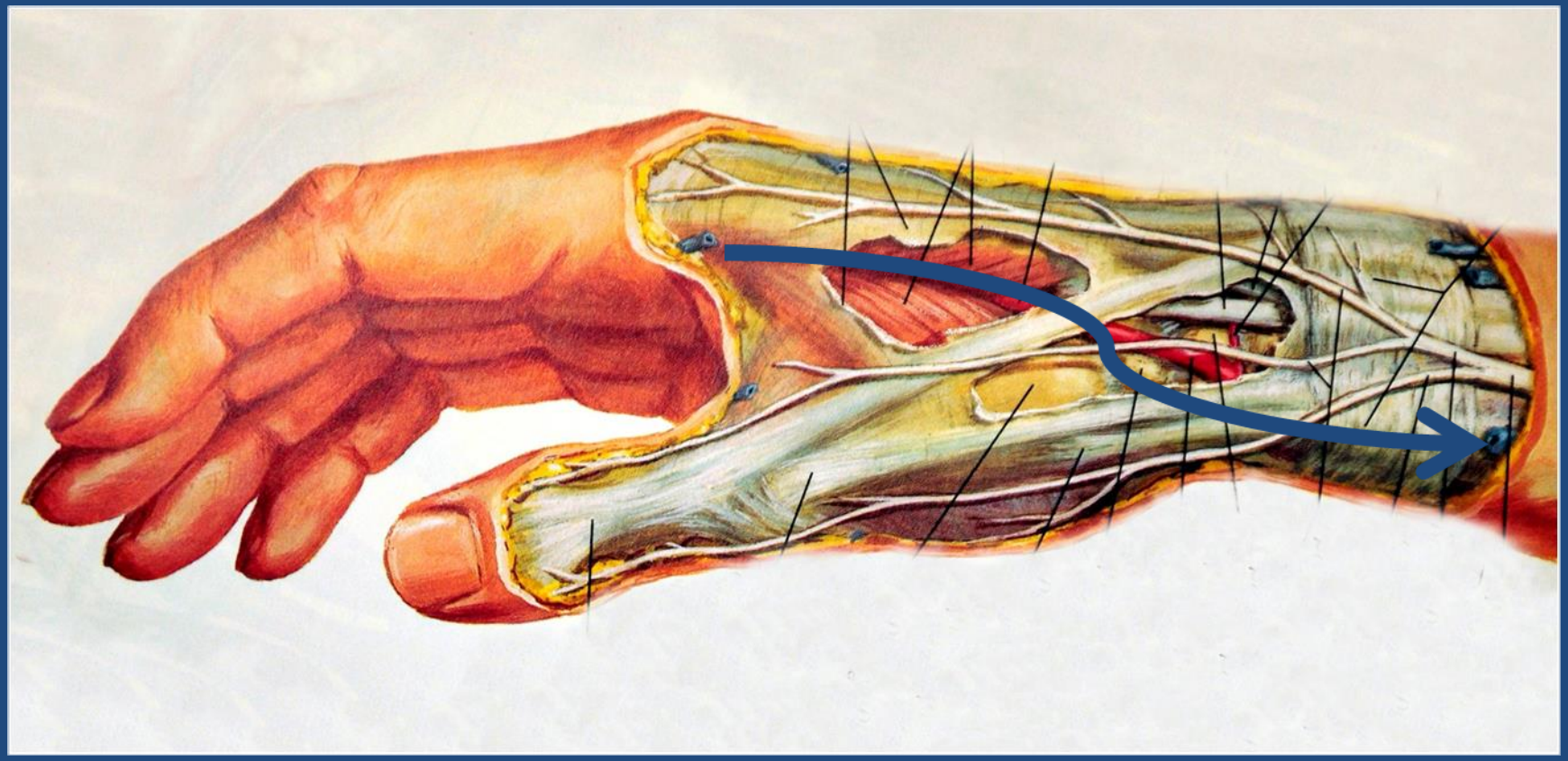


Elbow = 19%



Wrist = 63%

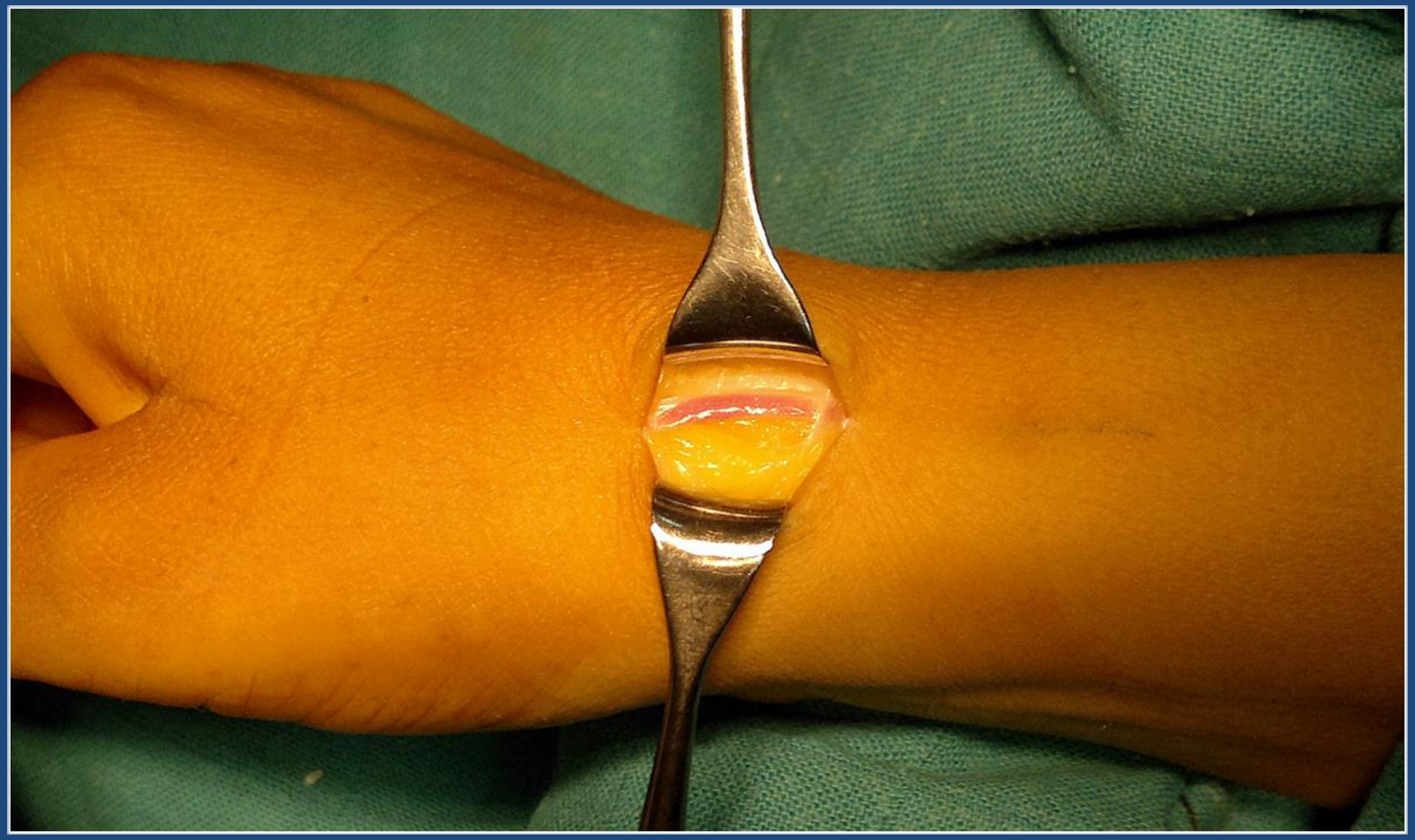
Olurotimi J et Coll., *Frequency of Swing-Segment Stenosis in Referred Dialysis Patients With Angiographically documented Lessions,* American Journal of Kidney Diseases, Vol 51, Issue 1, 93-98, January 2008

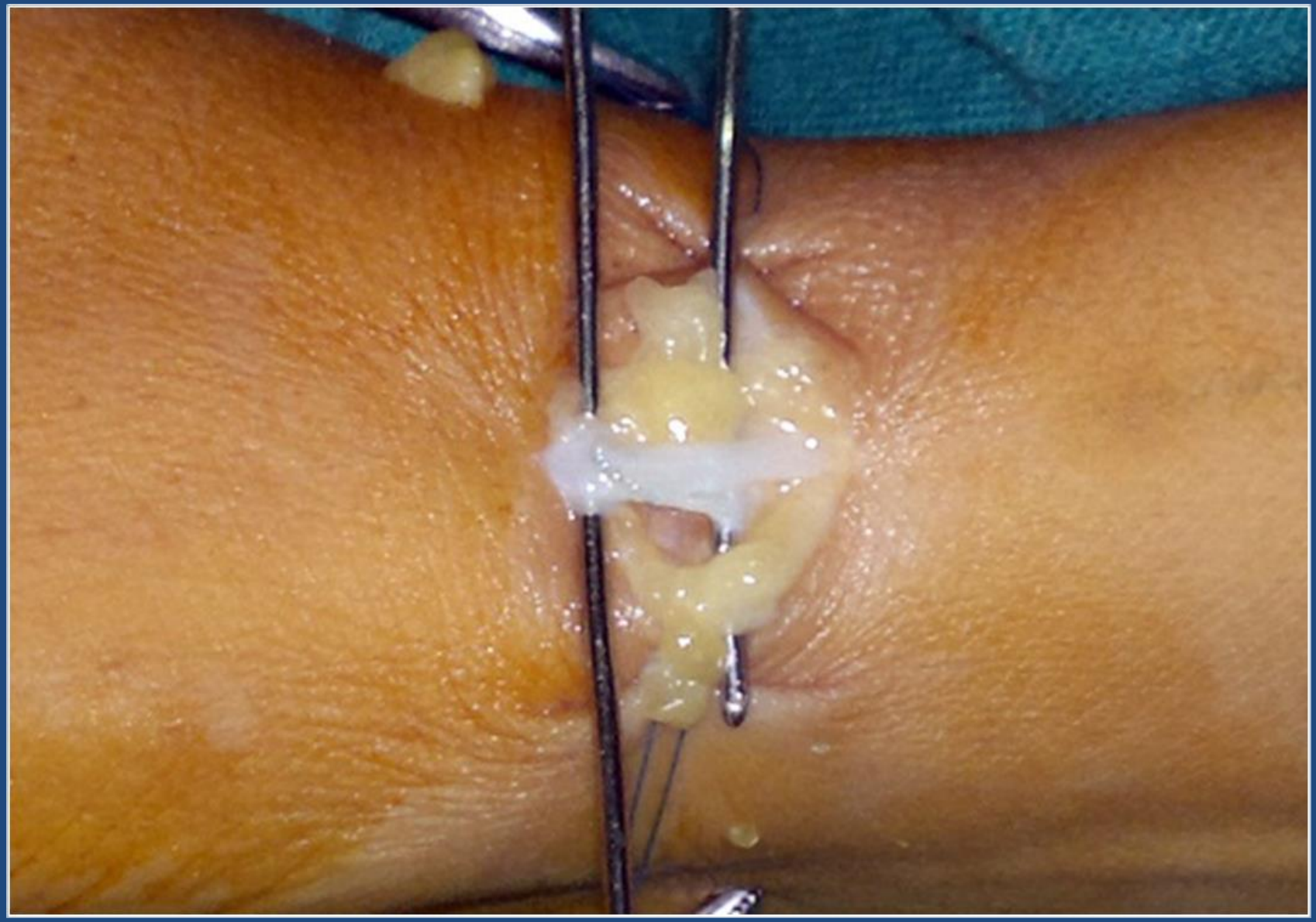


F.H.Netter, *Atlas of Human Anatomy*, MD, Novartis, 1997

At the level of the snuffbox, the cephalic vein is located above the radial artery.

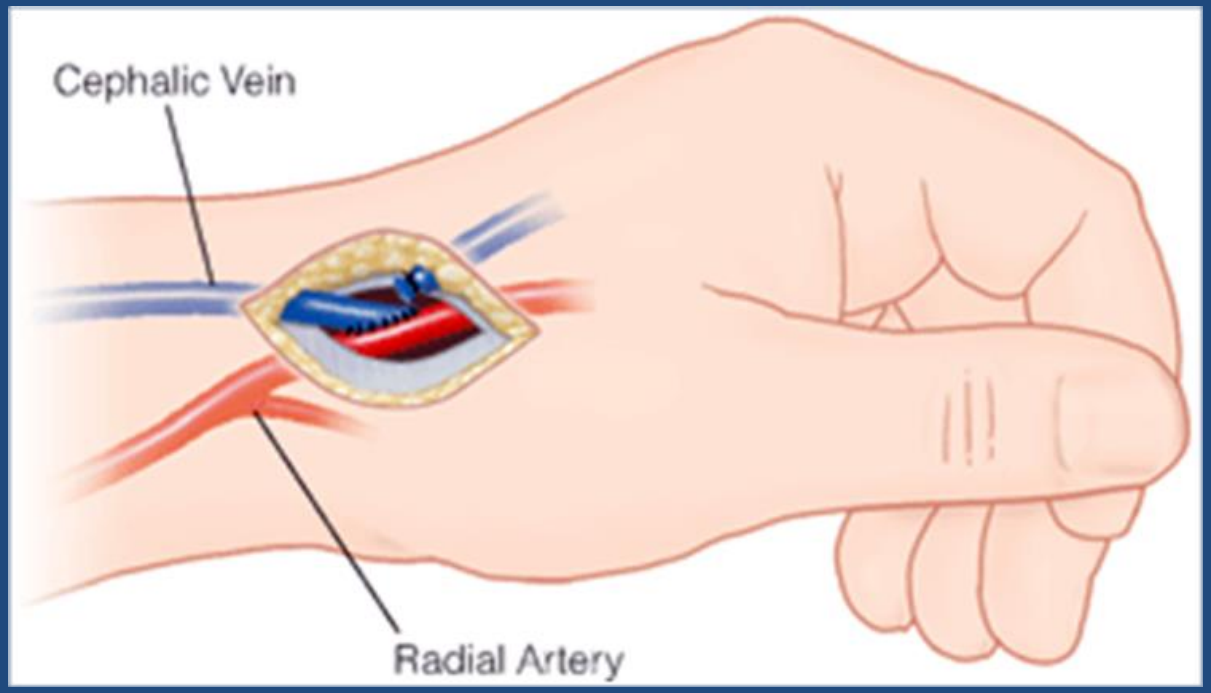
The cephalic vein is under the skin.





The procedure is relatively easy because at this location there is not much fat, even in obese patients.

Rassat described the Snuffbox AVF as early as on 1969.



Rassat JP, Moscovtchenko JF, Perrin J, Traeger J, *La fistule artério veineuse dans la tabatière anatomique*,

Journal d'urologie et de néphrologie 1969, 75(suppl 12): 482

In 2000, Wolowczyk published results based on 210 Snuffbox fistulas.

The procedure is feasible in 50% of patients for the creation of the first vascular access.

The most distal fistula achieves the longest venous segment.

The proximity of the vein to the artery at this level allows easy anastomosis without the need to free up and/or move the vein.

Immediate failure occurred in 11% of patients.

80% of AVF were useable after six weeks.

At the one-year mark, permeability was 65 %.

After 5 years, permeability was to 45%.

L.Wolowczyk, A.J.Williams, K.L. Donovan, C.P. Gibbons, *The snuffbox arteriovenous fistula for vascular Access,*

Eur J Vasc Endovasc Surg, 19, 70-76, 2000

Factors that adversely affect the establishment of AVF at the anatomical snuff box:

- diabetes,
- stroke,
- age (over 70 years),
- small diameter of lower radial artery (less than 2 mm).

Twine CP, Heidermota M, Woolgar JD, Gibbons CP, Davies CG,
A scoring system (DISTAL) for predicting failure of snuffbox arteriovenous fistula, EurJVascsurg., 2012 Jul;44(1):88-91

Since January 2011 I routinely perform Snuffbox Fistula if the good pulse is found at the anatomical snuffbox and if the diameter of the vein is at least 2.5 millimeters.

The procedure:

- plexic anaesthesia,
- tourniquet,
- magnifying glasses for dissection,
- operating microscope for anastomosis,
- polypropylene 8/0, polyamide 9/0.

The period: January 1, 2011 - December 31, 2012

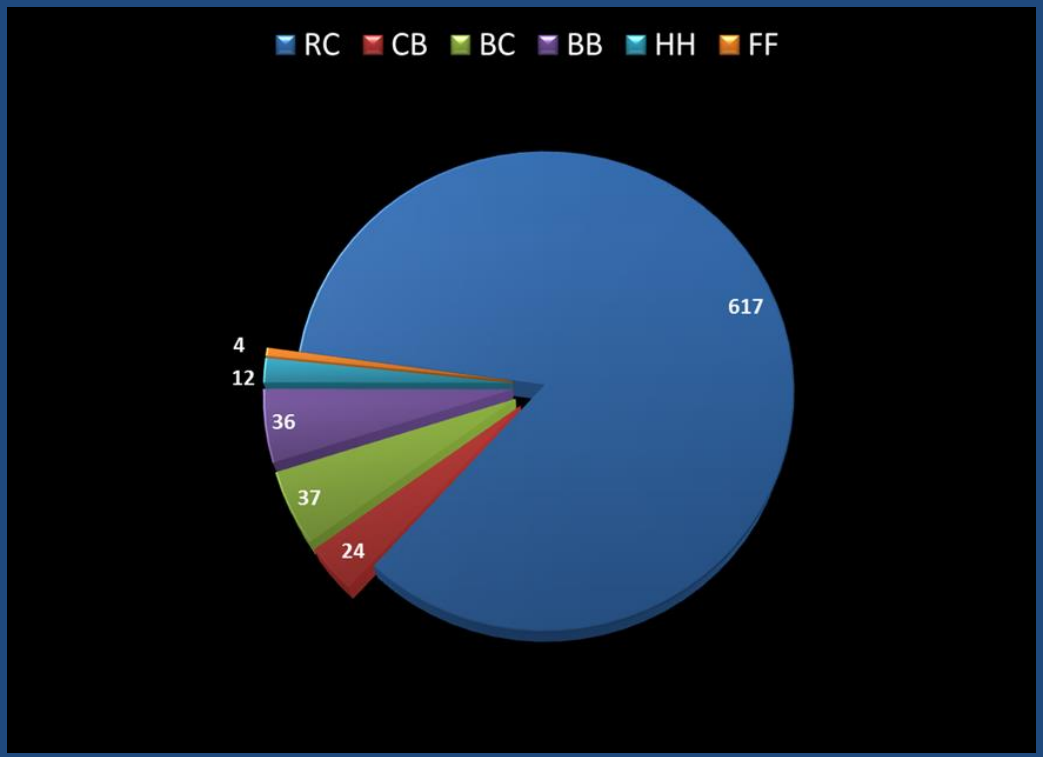
732 AVF (diabetis 32%)

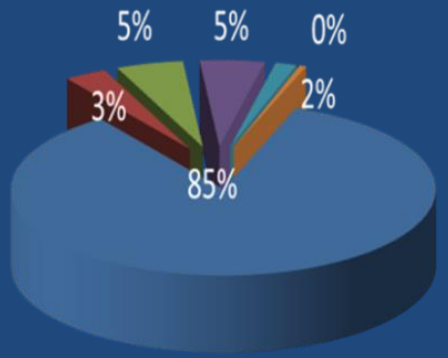
617 RC AVF

Men: 235 (38%)

Women: 382 (62%)

The Snuffbox AVS: 105 (17% of the RC AVF)





RC
CB
BC
BB
HH
FF

The Snuffbox AVS results:

Men: 64 (60%), age: 24 - 75 (51)
Women: 41 (40%), age: 28 - 77 (48)
Diabetis: 22 (21%)

- Of the 105 procedures, in one patient, the vein thrombosed at the end of the surgical intervention.
- In 8 patients, the AVF did not mature after 6 weeks and the new anastomosis was created at the wrist and then they matured.
- 96 patients (91.4%) started dialysis with the Snuffbox Fistula.
- I lost track of 11 patients.
- In 22 patients, late stenosis or thrombosis occurred and was treated with a new, more proximal anastomosis with good result in 19 patients. In 3 patients the new fistula was necessary.
- 2 patients deceased with the functional fistula.
- 1 patient was transplanted with the functional fistula.

Comments:

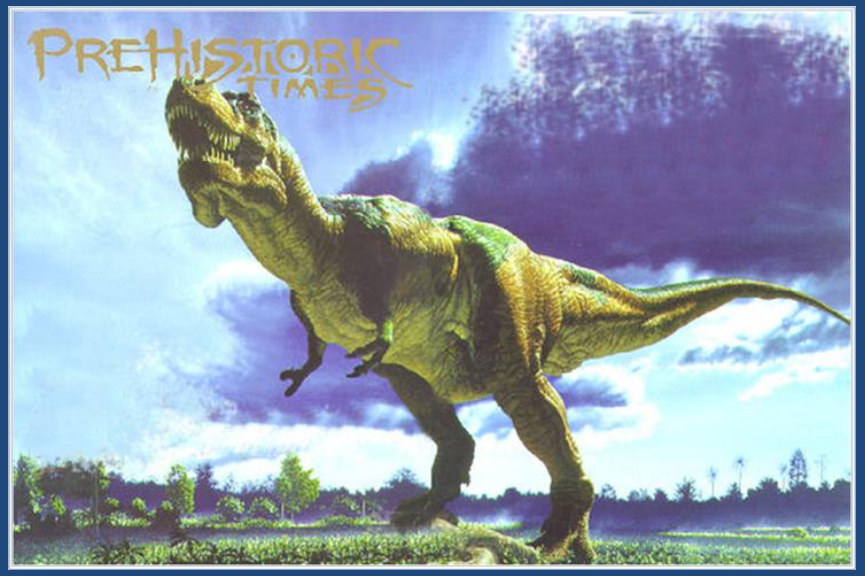
- Only one immediate failure,
- The primary patency of this group, after 24 - 48 months is 62.8%, (considering 11 missed patients as a failure).
- The secondary patency is 80.9%.
- I observed 22 stenosis or thrombosis but only 5 were post-anastomotic.

What are the advantages of this fistula ?

- The cephalic vein is very close to the radial artery.
- The dissection is very limited, about 15mm - no risque of twisting.
- The anastomosis is distal and there is therefore a lower risk of hyperflow.
- The usable segment of the arterialized vein is 50 mm longer compared to wrist AVS - more room for punctures and for possibles re-operations.
- Good immediate and long term results.
- Low incidence of post-anastomotic stenosis.

The use of an operating microscope is necessary.

But who in our time does not use microscopes to create distal AVFs?



Conclusion:

The topography of the radial artery and vein at the level of the anatomical snuffbox helps to minimize dissection and avoid twisting of the vein.

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The FAV at the anatomical snuffbox is relatively easy to perform and results in a comparatively longer segment of the vein.

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This procedure should be performed every time when the vascular status of the patient permits.