

Nailfold capillaroscopy (NVC) in Rheumatology

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Overview

- Indications
- Normal NC
- Abnormal NC
- Scleroderma patterns
- Scoring

Clinical indication



- Raynaud's Phenomenon
 - Primary VS secondary

When to Perform NVC

- NVC – safest, fastest method to detect morphology changes in the microcirculations
- Morphology pattern of Nailfold capillaries is remarkable constant in an individual
- Primary Raynaud's disease
- Secondary Raynaud's phenomenon

Role in classification of Raynaud's Phenomenon

Primary RP:

Not related to any condition

Normal:

NVC pattern, ESR,
ANA neg

Secondary RP:

Related to another condition

- Vibrations, drugs, hypothyroidism, haematological disorder etc
- In the majority of cases: manifestation of underlying CTD
ie: SSc, MCTD, SLE, DM



- Primary Raynaud's:

- Functional (Vasospastic)
- Does not progress to irreversible tissue damage

- Secondary Raynaud's phenomenon:

- Vascular abnormality: Structural, Functional (impaired endothelial dependent dilatation, mismatch between endothelial derived vasoconstrictor (endothelin- 1/vasodilators (NO, prostacyclin))
- Neural abnormalities ($\uparrow V_c$ by + α_2 -adrenoceptors)
- Intravascular abnormalities (platelet activation and oxidative stress)
- Can progress to tissue damage

PRIMARY RAYNAUD'S

- Expansion of sympathetic and cold-induced vasoconstriction due to hypersensitivity to cold
- Vasospasm of digital arteries
- Slight disruption in nutritional arteries

SECONDARY RAYNAUD'S

- Internal lesions in the arteries and arterioles
- Disruption of the nutritional capillaries
- Profound disruption in upstream arterial system
- Disruption in nutritional flow ischaemia



Primary Raynaud's

- NVC: normal
- Wide variation of "Normal"

Secondary Raynaud's Phenomenon

Connective Tissue Diseases:

- Systemic Sclerosis: 95%
- Mixed CTD: 85%
- Lupus 30%
- Inflammatory myopathies: 30%
- Sjogren's Syndrome : 20%

Progression of Raynaud's Phenomenon

- Meta-analysis of 10 Studies:
 - 639 patients with RP with no apparent secondary disease
 - 10% developed CTD
 - 2/3→SSC
 - 1/3→MCTD, SLE, RA, Sjogren's, vasculitis, myositis
 - Best predictor of transition: abnormal NVC (Positive predictive value 47%)

Progression of Raynaud's Phenomenon

Predictor of progression to SSc:

- In 586 patients with RP followed for 3197 person years, abnormal capillaroscopy and SSc-specific antibodies were independent predictors of SSc

- SSc developed in

- 1.8% with neither
- 25.8% with abnormal cap pattern
- 35.4% with a specific autoantibody
- 79.5% with both

Progression of Raynaud's Disease

At 5, 10, 15 years progression to SSc had occurred:

- 47%, 69% and 79% of early Systemic sclerosis (Positive Scleroderma specific antibodies or Scleroderma pattern NC)
- 4%, 5% and 11 % of pre CTD (Clinical signs, Normal NC, negative Scleroderma specific antibodies)
- None of primary Raynaud's Disease

How to perform NVC

- 20 mins in 22-24 °C
- Abstain from smoking and caffeinated drinks : 4 hours before procedure
- Avoid manicure (1 month), occupation
- 8 fingers evaluated, both hands

Important Points and Considerations to Note in a Capillaroscopy Procedure

- ◆ Use Only vegetable oils (neutral oils) that are skin-friendly, such as walnut oil, cedar wood oil, olive oil, and peanut oil
- ◆ common immersion oils used in microscopy may cause skin and mucous membrane irritation
- ◆ Physically injured fingers are excluded
- ◆ fourth and fifth fingers of both hands have the highest skin transparency, the most precise morphologic evaluations can be obtained from these fingers
- ◆ For a better imaging resolution, adding more oil could be beneficial. However, both too few or much oil could decrease resolution and should be avoided
- ◆ It is quite common to have little or no capillary flow when the examination room is cool or the subject is nervous
- ◆ For each subject, the procedure takes about 15–30 minutes

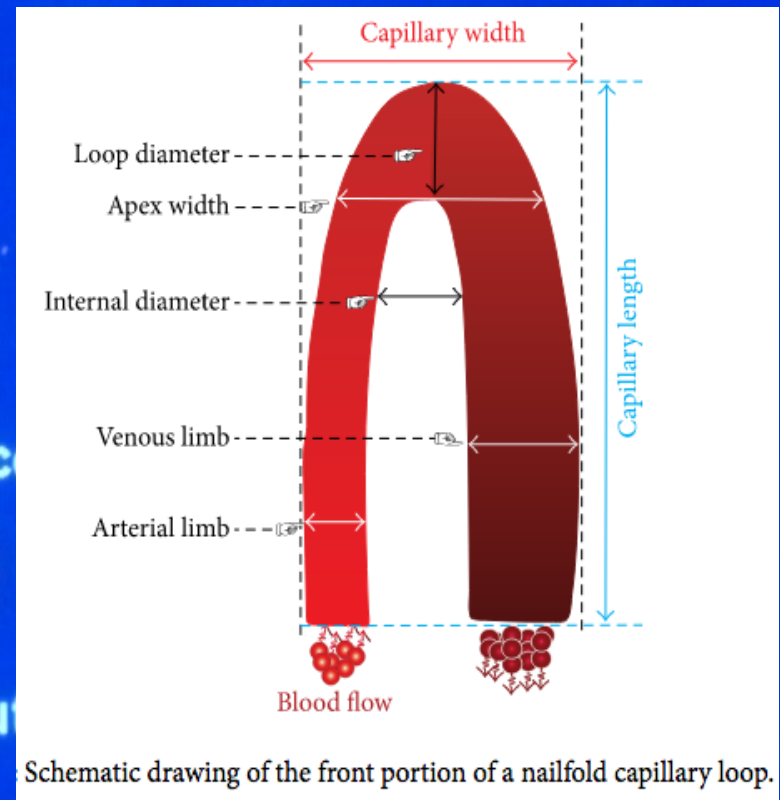
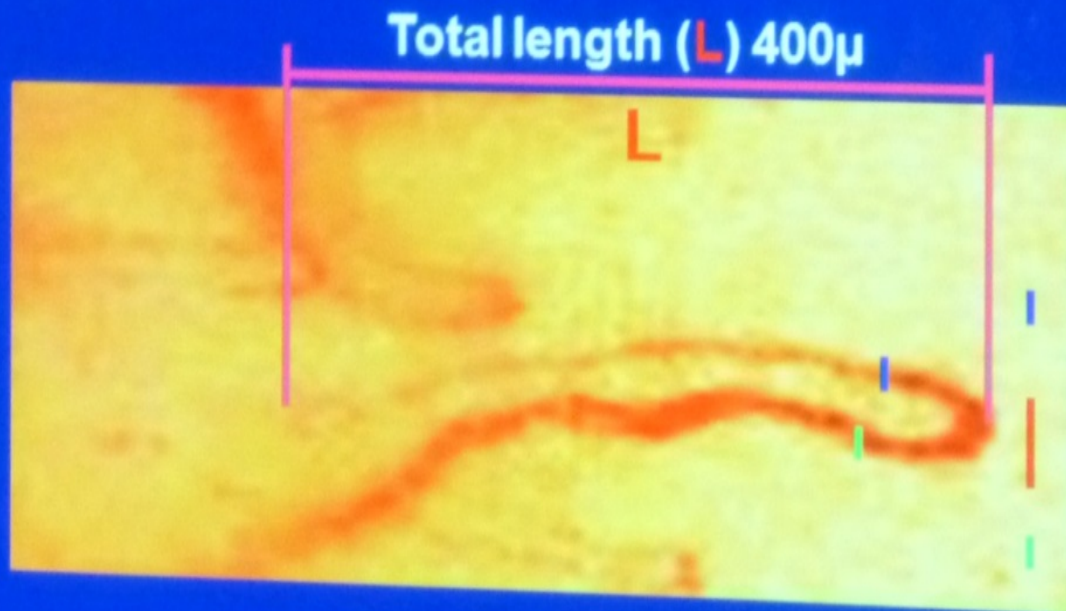
Normal capillaries

Average length of the visible part of capillary loop is about 400 μ .

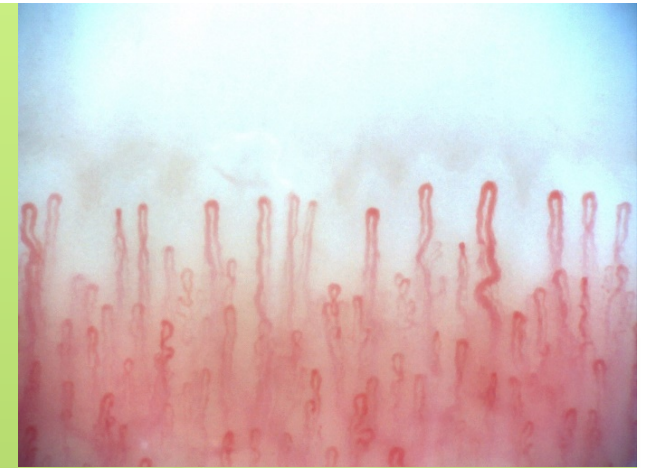
Total diameter of capillary loop is (W) is 40 - 60 μ .

The diameter of blood column at the level of the arterial part of capillary loop ranges from 5 - 16 μ .

Diameter of blood column at the level of the venular part of capillary loop ranges from 7 to 18 μ .

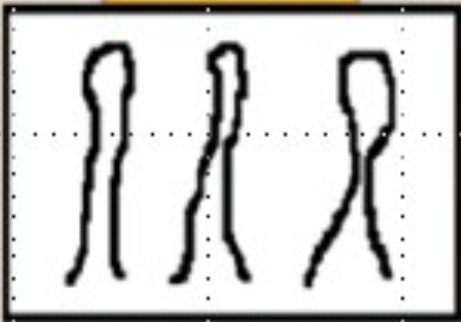


Normal capillaries



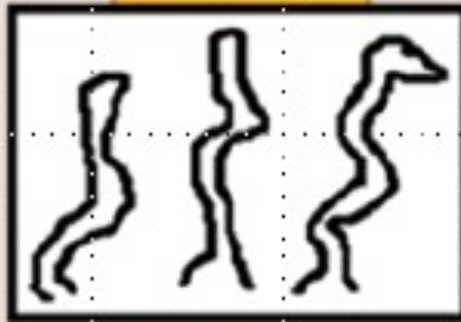
- Pattern capillaries of distal row
- Shape: hairpin or U shaped
- Size: homogenous, $<20\mu\text{m}$
- Arrangement: parallel and regular
- Number: > 9 per linear mm counted at the distal row of the nailfold

DRAWING 1



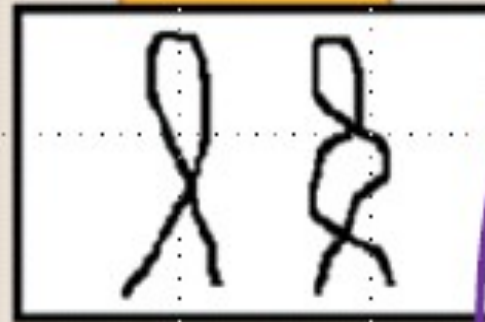
Stereotype hairpin shape

DRAWING 2

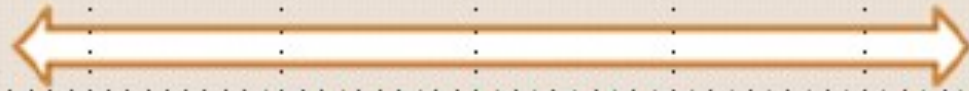


Tortuous

DRAWING 3



Crossing



Non-specific variation



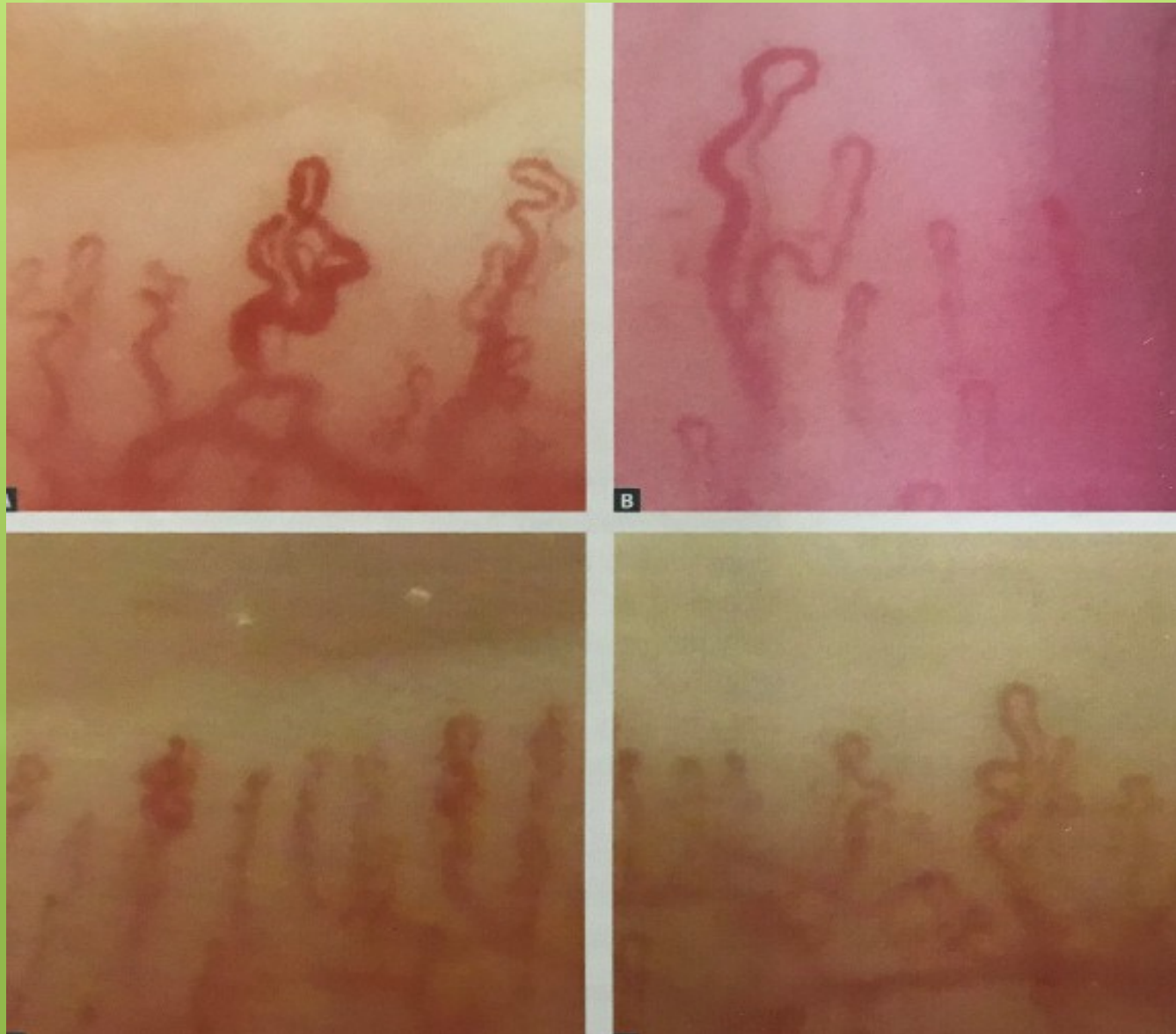
NORMAL



- Tortousity:

- Relatively common in healthy subjects
- Can occur after trauma
- Is a feature of angiogenesis

Tortuous Capillaries



Pathological capillaries

- Enlarged capillary
- Giant
- Haemorrhages
- Loss of capillaries in the nailfold
- Avascular
- Abnormal shape = neoangiogenesis
eg ramifications

Definition:

- Enlarged capillary- increase in capillary diameters (homogenous or irregular) $> 20\mu\text{m}$
- Giant capillary – homogeneously enlarged loop with a diameter $> 50\mu\text{m}$
- Microhaemorrhage- dark mass due to haemosiderin deposit

