CONCISE REPORTS

Differentiation between primary and secondary Raynaud’s phenomenon: a prospective study comparing nailfold capillaroscopy using an ophthalmoscope or stereomicroscope

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Abstract

Background—Nailfold capillary microscopy is a routine procedure in the investigation of patients with Raynaud’s phenomenon (RP). As a standard method, nailfold capillary morphology is inspected with a stereomicroscope to look for capillary abnormalities such as giant loops, avascular areas, and bushy capillaries, which have all been found to be associated with certain connective tissue diseases.

Aim—To investigate prospectively whether nailfold capillary inspection using an ophthalmoscope is of equivalent diagnostic value to standard nailfold capillary microscopy.

Method—All the fingers of 26 patients with RP were examined in a blinded fashion and compared with the final diagnosis one month later.

Results—All giant loops, large avascular areas, and bushy capillaries were identified by both methods. The correlation for moderate avascular areas and crossed capillaries was 0.93 and 0.955 respectively. The correlation for minor abnormalities that do not contribute to the differentiation between primary and secondary RP was 0.837 and 0.861 respectively. All patients were classified identically by the two methods.

Conclusion—For the evaluation of patients with RP, nailfold capillary morphology can reliably be assessed with an ophthalmoscope.

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surveillance.² As distinct patterns of nailfold capillaries have been described for most connective tissue diseases, nailfold capillary microscopy (NCM) has become an established procedure in the examination of patients with RP.^{3–5} However, NCM requires a bifocal stereomicroscope, a fibre-optic illuminator, and at least some space.⁶ A few reports indicate that some major nailfold capillary abnormalities such as giant loops can also be visualised with an ophthalmoscope or a modified dermatoscope.^{7–9}

We performed a prospective study to see whether, for the evaluation of patients with RP, diagnostic NCM can be simplified to a bedside (or desk side) procedure by using an ophthalmoscope instead of a stereomicroscope.

Methods

PATIENTS

Between February and April 1999, 26 consecutive caucasian patients referred to our rheumatology or angiology clinic for the evaluation of RP were included in the study. Written informed consent was obtained from all subjects.

METHODS

After the attending doctor had taken the history and carried out a physical examination, investigator 1 performed capillaroscopy with an ophthalmoscope (Beta 200; Heine, Germany). Investigator 2 then performed NCM with a bifocal stereomicroscope (×65, 475003 9903; Carl Zeiss, Germany) and lighting with a fibre-optic illuminator (KL1500; Fa Schon, Germany). Neither investigator was aware of the patient’s history or physical findings at the time of investigation nor of the findings of the other investigator. All fingers of both hands were examined for each patient after gentle washing and application of immersion oil to improve visualisation of the capillaries. The whole nailfold region including the edges was examined. Pathological findings were recorded for all fingers on a standardised data sheet.

Nailfold capillary morphology was assessed as described previously.¹⁰ In brief, dilated capillaries were classified as giant loops when the

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capillary diameter exceeded by 10-fold the diameter of the undilated surrounding capillaries. Avascular areas were classified into three degrees: first degree, less than one to three capillaries; second degree, four to six capillaries; third degree, more than six capillaries. Tortuosity was described as first degree when capillaries had less than three crossings, and second degree when three or more crossings were observed. Bushy capillaries had more than three loops (third degree tortuosity). Secondary RP was suspected if giant loops, third degree avascular areas, bushy capillaries (third degree tortuosity), or second degree avascular areas plus second degree crossings were observed.

A least one month after NCM, the patients' records were reviewed for the final diagnosis. All diagnoses had been confirmed by an experienced rheumatologist on the basis of the history, physical examination, routine laboratory variables, autoantibody screening (antinuclear autoantibodies, SCL-70, anticentromere antibodies, dsDNA antibodies), and arterial oscillography of all fingers. Further studies were performed when indicated to confirm the presumed diagnosis.

ANALYSIS

For comparison between the two methods, NCM abnormalities were registered for each finger examined. Correlations between results obtained by ophthalmoscope and NCM were determined by linear regression. NCM results were compared for both methods with the final diagnosis.

Results

A blinded investigation and the final diagnosis were available for 20 women and six men. The mean age was 48 years and the mean duration of RP was 8 years. A connective tissue disease was diagnosed as the cause of RP in 12 patients. Seven had limited or diffuse scleroderma, two had systemic lupus erythematosus, two had mixed connective tissue disease, and one suffered from polymyositis. For all other patients no further clinical or laboratory abnormalities were detected, so that the diagnosis of primary RP was confirmed.

Table 1 gives the nailfold capillary findings for all patients assessed either by using an ophthalmoscope or microscope. All major diagnostic abnormalities such as giant loops, large avascular areas, and bushy capillaries were

detected by ophthalmoscopic examination. First and second degree avascular areas were somewhat overestimated when the ophthalmoscope was used ($r=0.837$ and $r=0.93$ respectively). First and second degree capillary tortuosity was less often detected by ophthalmoscopic examination than by NCM ($r=0.861$ and $r=0.955$ respectively). However, ophthalmoscopic and microscopic examination of the nailfold capillary patterns produced the same distinction between primary and secondary RP in all patients. One patient with a normal nailfold capillary pattern determined by both methods developed polymyositis, a disorder for which giant loop formation has been observed.¹¹

Discussion

Many abnormalities of nailfold capillaries have been observed, but only giant loops, avascular areas, and capillary tortuosity have been found to be associated with connective tissue diseases as a cause of RP.³ Because previous reports indicate that at least some abnormalities can be detected with lower magnification devices, we questioned whether a simplified technique of nailfold capillary inspection using an ophthalmoscope would yield the same diagnosis in patients with RP as standard NCM.⁷⁻⁹ We found that not even one giant loop, third degree avascular area, or bushy capillary (third degree tortuosity) was missed with the ophthalmoscope. For all patients, the ophthalmoscopic nailfold inspection led to the same distinction between primary and secondary RP as standard NCM, although ophthalmoscopic overestimation of first and second degree avascular areas and underestimation of first and second degree tortuosity did occur. Minor abnormalities such as crossed capillaries or small avascular areas are a common finding in healthy people, and are therefore not relevant in distinguishing between secondary and primary RP.¹² The discrepancy indicates that ophthalmoscopic nailfold inspection may also rely on other factors, such as quality of the ophthalmoscope because of the lower magnification compared with NCM. However, the correlation of 0.93 for second degree avascular areas and 0.955 for second degree tortuosity is sufficient in a clinical situation because these abnormalities seldom appear without giant loops or third degree abnormalities.

In the group of patients studied here, the mean duration of RP was 8 ± 12 years. The sensitivity of ophthalmoscopic capillaroscopy compared with NCM may be lower early after onset of RP because capillary abnormalities may be limited initially.¹³

NCM is a convenient procedure when the appropriate equipment is available. However, from our data we conclude that, in clinical practice, ophthalmoscopic inspection of capillary nailfold morphology after application of a drop of oil, immersion gel, or alcohol spray is a simple and reliable procedure. It extends the physical examination of the vascular system in patients with RP by allowing inspection of capillary abnormalities at the nailfold to a comparable level to that of direct ophthalmoscopy in patients with diabetes or arterial hypertension. As the

Table 1 Nailfold capillary abnormalities of 260 fingers of 26 patients with Raynaud's phenomenon (RP) assessed with either an ophthalmoscope or a microscope

	Ophthalmoscope	Microscope	Correlation
Abnormalities (n)			
Giant loops	43	43	1
Avascular areas			
First degree	145	138	0.837
Second degree	48	45	0.93
Third degree	5	5	1
Tortuosity			
First degree	108	120	0.861
Second degree	32	38	0.955
Third degree	10	10	1
Final diagnosis			
Primary RP (14 patients)	15	15	1
Secondary RP (12 patients)	11	11	1

characteristic abnormalities are easily detected, nailfold capillary inspection should no longer be considered a specialist procedure but used as a part of the initial physical examination.

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