Review

Clinical and biological assessment in systemic necrotizing vasculitides

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Abbreviations:

ANCA	– antineutrophil cytoplasmic antibody
PR3	– proteinase 3
MPO	– myeloperoxidase
GCA	– giant cell arteritis
WG	– Wegener's granulomatosis
PAN	– polyarteritis nodosa
TAK	– Takayasu's arteritis
CSS	– Churg Strauss Syndrome
GBM	– glomerlular basement membrane
CRP	– C reactive protein
ESR	– erythrocyte sedimentation rate
VWF	– Von Willebrand factor
CT	– computed tomography
MRI	– magnetic resonance imaging
BVAS	– Birmingham Vasculitis Activity Score
DEI	– disease extent index
VDI	– vasculitis damage index
SF36	– medical outcomes study - short form 36 questionnaire

ABSTRACT

The systemic vasculitides are multi-system disorders with significant mortality and morbidity and frequent relapses. Treatment is usually effective but fraught with potentially serious effects. Disease Assessment is important to ensure that patients receive the appropriate treatment. Disease Assessment should comprise measurement of disease activity, chronic irreversible damage and impairment of function. Serological markers can be helpful in assessing disease activity but lack sufficient sensitivity and specificity to be used on their own. Radiological techniques such as Magnetic Resonance Imaging, Ultrasound and Positron Emission Tomography show promise in the large vessel vasculitides but require validation in large studies. Clinical Assessment tools are the current gold standard for the assessment of disease activity, damage and function.

Introduction

The systemic necrotising vasculitides are a group of uncommon life-threatening conditions, which share common pathophysiological as well as clinical features. Inflammation of blood vessels leading to their occlusion and subsequent tissue necrosis of the tissue supplied is a hallmark of these conditions. The underlying mechanisms resulting in vessel inflammation vary and are not fully understood in all conditions. Mechanisms include the formation of immune complexes, which lodge in small blood vessels inflammation (typically in mixed essential cryoglobulinaemic vasculitis); in a goup of small vessel vasculitides it is likely that autoantibodies to neutrophil proteins (ANCA) are likely to lead to neutrophil activation and vessel inflammation. By contrast, in patients with giant cell arteritis (GCA) the vessel wall inflammation is mediated by T cells and macrophages which gain access to the vessel by means of the vasa vasorum (1, 2). Before the introduction of chemotherapy in the 1970s, the overall outcome from vasculitis was poor with a 1 year mortality of over 80% in patients with Wegener's granulomatosis (WG) (3). Since then the prognosis has been transformed with almost 80% survival after 5 years (4). However, survival is often characterised by exacerbations of the disease, low-grade grumbling manifestations of active vasculitis, and accumulating damage either as a result of the vasculitis itself or due to drug toxicity. For all these reasons, patients with vasculitis have long-term ongoing morbidity. In this context it is important to differentiate the manifestations of active disease which would justify active intervention with more immunosuppression, from manifestations which are a consequence of the disease or its treatment but not necessarily responsive to immunosuppression. In this review we describe the development and use of the most commonly used clinical assessments of systemic vasculitis.

The role of disease assessment

Disease assessment in systemic vasculitis is complicated by the multi-system nature of vasculitis and the fact that disease activity in different organ systems can vary at any given timepoint. Careful, clinical evaluation offers the most accurate description of disease status. The development and use of structured clinical tools provides a qualitative and quantitative assessment of systemic vasculitis. This is an important step towards standardising therapies for patients with vasculitis. This ensures optimal treatment with adequate control of vasculitis without unnecessary exposure to potentially harmful therapies. The currently available disease assessment tools were developed to facilitate clinical trials, but they can also be used to help decision making in individual patients. Disease assessment

includes the determination of disease activity, damage due to irreversible scarring; and patient function. Other uses of disease assessment tools are summarised in Table I.

Biological assessment of necrotising vasculitis

The gold standard for assessing disease activity is the presence of active vasculitis on biopsy. Repeated biopsies are however impractical for the regular evaluation of patients and the sensitivity of biopsies from different organ sites can vary considerably. For example a nasal biopsy in proven WG shows vasculitis in only 60% of cases whereas a renal biopsy almost always shows typical features when renal vasculitis is suspected on clinical grounds (5-7).

Serological markers lack sufficient sensitivity and specificity to provide reliable assessment of disease activity in most forms of vasculitis. These markers cannot be used without careful clinical evaluation to assess disease activity; treatment decisions should therefore not be based solely on the basis of changes in serological markers (8).

A major advance in the diagnosis and understanding of the immunopathogenesis of small vessel vasculitis has been the discovery of ANCAs. They are of great value in supporting the diagnosis of vasculitis in patients for whom there is a clinical suspicion of small vessel vasculitis. ANCAs were first discovered by an indirect immunofluorescence technique (9, 10). This technique shows two typical staining patterns, in one there is diffuse staining of the cytoplasm termed cANCA in the other form there is perinuclear staining termed pANCA. The associated antigens have been identified as proteinase 3 (PR3) and myeloperoxidase (MPO) (11, 12). Both of these are present in the primary granules of neutrophils and are present on the surface membrane of activated neutrophils. Antibodies against these antigens can be detected using an ELISA technique. Patients with antibodies against PR3 usually show a cANCA immunofluorescence pattern whereas patients with MPO antibodies have a pANCA pattern. Not all patients however are positive for both techniques and recent recommendations for the use of ANCA testing therefore strongly recommend that both Immunofluorescence and ELISA should routinely be employed for clinical testing (13).

More than 95% of patients with systemic WG are ANCA positive and the specificity is in over 75% cANCA/PR3 antibodies. A strongly positive test for cANCA/PR3 is highly specific for WG. In patients with MPA pANCA-/MPO are more common than cANCA-/PR3 (14). About 50% of CSS are positive for ANCA and the specificity is mostly for pANCA/MPO. CSS patients with a positive ANCA are more likely to show the vasculitic manifestations of this disease than patients who are ANCA negative (15, 16). Although there is considerable overlap between the clinical manifestations cANCAs and pANCAs are associated with distinctive clinical patterns. Patients with MPO antibodies have renal involvement in over 90% of cases whereas only about 70% of patients with PR3 antibodies have renal involvement at diagnosis. Ear, nose and throat (ENT) involvement is more strongly associated with the presence of PR3 than MPO antibodies (17, 18). A positive pANCA is less specific for vasculitis than cANCA and is often detected in other conditions such as autoimmune hepatitis and ulcerative colitis. The specificity is improved by a strongly positive MPO titre (19). There are conflicting reports about the value of ANCA testing in

Table I. The use of disease assessment tools in vasculitis.

Uses	Comment
Disease activity	• BVAS is now routinely used to quantify disease activity in systemic vasculitis
Disease related damage	• VDI is used to measure the disease related damage which is important to assess the long term outcome of the vasculitis.
Clinical decisions	• To differentiate between active disease, treatment related problems, concurrent pathology, and inactive disease
	• Flares of disease can be treated variably depending upon the amount of rise of an activity score, eg – increasing dose of corticosteroids vs pulsed cyclophosphamide
Prognosis	• The Five Factor Score and the BVAS at diagnosis are predictors of prognosis.
Clinical Trials	• Defining entry criteria according to disease activity scores to select a similar cohort of patients
	• Defining flares and remission
	• Comparison of treatment arms of the trials
	• Comparing and pooling results from various trials
Outcome measures	• Provide a tangible outcome measure
Teaching tool	• Training manuals developed along with the validation exercise for the BVAS tool allow the inexperienced clinican to train in the disease assessment of vasculitis.
Validation of serological markers	• As new serological test become available, validated disease activity scores could be used as the yard stick.

BVAS: Birmingham vasculitis activity score.
VDI: vasculitis damage index.

monitoring disease activity. Although a clinical relapse is often associated with a rise in ANCA titre, 38% of patients with a transient rise in their ANCA titre do not experience a clinical relapse (20). However, persistent ANCA positivity is associated with a strongly increased risk of relapse on tapering immunosuppressive therapy (21-23).

There is increasing clinical and experimental evidence that ANCA directed against these two specific antigens are implicated in the pathogenesis of vasculitis (24, 25). The vasculitides in which ANCAs commonly occur share a range of pathological and clinical features and are therefore referred to as ANCA-associated systemic vasculitides (AASV). The absence of ANCA in patients with features of vasculitis does not exclude the diagnosis, since for example 30% of patients with localised WG (ie confined to the upper respiratory tract) are negative for ANCAs (26).

Goodpastures syndrome and anti glomerular basement membrane (GBM) disease are in most cases associated with circulating anti-GBM antibodies. The measurement of the anti-GBM titre is used to determine the length of therapy and suitability for renal transplants in patients with anti GBM disease (27).

The monitoring of the complement factors 3 and 4, the total haemolytic serum complement (CH50), rheumatoid factor and cryoglobulins can be helpful in determining disease activity in immune-complex mediated vasculitis such as cryoglobulinaemia (28, 29).

Inflammatory markers, especially CRP and ESR, are non-specific markers of systemic inflammation. They are not helpful in distinguishing whether a clinical deterioration is due to infection or disease activity. This is a particular problem for patients with systemic vasculitis being treated with immunosuppression, as infections are common and infective episodes may trigger flare of disease activity. Almost all patients with untreated systemic vasculitis and some relapsing patients have elevated inflammatory parameters. In these cases serial measurements can be helpful in monitoring response to therapy. However patients with more localised but still serious disease manifestations often do not show raised inflammatory markers despite histological and clinical evidence of active disease activity. A typical example is granulomatous disease in the trachea and bronchi in patients with WG. Normal inflammatory markers do not exclude a diagnosis of active vasculitis (30-33).

The endothelium plays a central role in the pathogenesis of vasculitis. Even endothelium which is not directly the target of inflammation such as large vessels of the forearm in WG shows abnormal functional responses in active disease which normalises in response to therapy (34). Von Willebrand Factor (VWF) is released from damaged endothelium and from platelets and has been used as a marker of disease activity in vasculitis (35). Activated endothelium as well as damaged endothelium produces large amounts of circulating VWF (36). However, this is not specific to vasculitis (8) Active endothelium expresses adhesion molecules and the release of these into the circulation provides a further opportunity to measure disease activity (37). It is possible to measure circulating levels of endothelial debris (so-called endothelial dust or dots. (38), but it is important to note that elevated levels have been reported in patients with atherosclerosis and other conditions (39, 40). Atherosclerosis is probably very prevalent in patients with vasculitis, because both diseases are more common with advancing age, and patients with chronic inflammatory conditions are known to be susceptible to accelerated atherosclerosis (41). The level of circulating IL 2 receptors has been shown to reflect disease activity in some patients with WG (42).

Table II. Serolgical markers in vasculitis.

Marker	Comment
ANCA	• The presence of cANCA directed against PR3 or pANCA directed against MPO produces a diagnositic specificity of 99% for the presence of small vessel vasculitis. • PR3 specific C ANCA is 73% sensitive for WG. • MPO specific P ANCA is 67% sensitive for MPA (14).
vWF	• Levels have been noted to be higher than in controls in patients with WG with renal involvement ($p < 0.001$) and correlated with disease activity (35).
Soluble adhesion molecules	• Serum levels of sE-selectin, sICAM-1 and sVCAM-1 have been shown to be higher in AASV than in healthy controls ($P < 0.0001$, $P = 0.002$ and $P = 0.001$ respectively). These levels normalised with disease remission. (79). • sICAM-1 levels have been seen to be higher in GCA ($p < 0.001$). The levels normalised with clinical remission and corticosteroid therapy. (80). • sVCAM-1 levels have been observed to be higher in Takayasu arteritis ($P < 0.01$) compared with controls. (81).
Antiendothelial cell antibodies	• Elevated AECA titres have been seen in active WG and some patients with inactive disease. The AECA levels fluctuated predictably in remission and relapse. (82).
Thrombomodulin	• A rise in sTM levels compared with controls has been seen in a variety of systemic vasculitides. The values closely reflected relapses and therapy-induced remissions of WG. (83).

ANCA: antineutrophil cytoplasmic antibody; vWF: Von Willebrand factor; sICAM-1: soluble intercellular adhesion molecule 1; sVCAM-1: soluble vascular cell adhesion molecule 1; AECA: antiendothelial cell antibody; WG: Wegener's granulomatosis; sTM: soluble thrombomodulin.

Antiviral therapy leads to complete relapse free remission in patients with Hepatitis B associated PAN if it is successful in achieving complete viral clearance (43, 44). The measurement of viral load and serology is therefore vital in monitoring therapy in this condition. Complete viral eradication is achieved in a smaller proportion of Hepatitis C than B infections. However, successful antiviral therapy leads to clinical remission in Hepatitis C related cryoglobulinaemia. Reappearance of HCV RNA has been associated with renewed disease activity (45-47).

Radiological assessment of systemic necrotising vasculitis

Radiological assessment plays a particularly important role in the diagnosis and assessment of the medium and large vessel vasculitides as these vessels can be imaged directly. Conventional arteriography has been used to demonstrate aneurysms, occlusions and stenoses. This method has associated problems of invasiveness, a substantial radiation dose, administration of large quantities of iodinated contrast and technical difficulties in patients with lengthy stenotic segments. It also lacks the ability to image the vessel wall. Magnetic Resonance Imaging (MRI) and angiography (MRA) provides good quality images without the above problems. In addition, it provides qualitative information regarding the state of the vessel wall. In a trial of MRI in TAK, MR revealed vessel wall oedema in 94% of cases with unequivocally active disease and 56% of studies obtained during apparent clinical remission (48). MRA can however over estimate the degree of stenoses and therefore can produce false positive results (49) and the presence or absence of gadolinium enhancement of the vessel wall does not reliably reflect disease activity (50). Recently, high resolution MRI techniques producing sub millimetre sections (51, 52) have been used to demonstrate the distribution of vessel involvement in GCA. The advantage of using MRI for diagnosis of GCA is the ease with which images of the entire vascular tree can be obtained. This has led to a greater understanding of the involvement of vessels beyond the temporal arteries. This technique will require validation in larger studies. Ultrasonography and Positron Emission Tomography (PET) have been reported to be useful imaging modalities in the large vessel vasculitides. Ultrasonography is more helpful for superficial vessels such as the temporal artery and the common carotid artery. This technique has proven useful in the diagnosis of temporal arteritis. It demonstrates a 'halo' around the temporal artery which disappears after corticosteroid therapy (53). Colour Doppler demonstrates rheological abnormalities, which provide surrogate information regarding luminal narrowing. A meta-analysis of thirteen trials (54) reported a sensitivity of ultrasonography for the diagnosis of GCA of 95% compared to histology and 88% compared to clinical diagnosis. The investigation was very specific with a median specificity of 93% compared with histology and 97% compared with clinical diagnosis. These figures are comparable to the diagnostic yield of temporal artery biopsy as compared with clinical diagnosis (55). An advantage of ultrasonography is that it is less likely to miss a positive diagnosis due to localized disease compared to a biopsy which can fail to show changes if an unaffected segment was sampled. However, ultrasonography is very operator dependant. It also cannot differentiate between the various causes of temporal arteritis in the rare scenario where the vasculitis is not due to GCA.

PET scanning with radiolabelled 18-fluorodeoxyglucose (FDG) assesses the metabolic activity of an organ. Vascular inflammation leads to increased metabolic activity and thus lends itself to imaging. It can be used to assess vessels with a calibre of greater than 4 mm. Temporal arteries are therefore not suitable for imaging by this modality. The superficial anatomy and the superimposed intense FDG signal from the

Table III. Clinical assessment tools in vasculitis.

Assessment tool	Description	Disease profile
Assessment of disease activity		
Birmingham Vasculitis Activity Score (BVAS)	This is a clinical and laboratory assessment of nine organ systems. Features are scored if attributable to active disease.	Systemic vasculitis
Birmingham Vasculitis Activity Score for Wegener's granulomatosis (BVAS/WG)	The BVAS was modified for use in a trial of etanercept in Wegener's granulomatosis	Wegener's granulomatosis
Disease Extent Index (DEI)	Clinical and radiological assessment for active disease, in nine organ systems	Wegener's granulomatosis
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Assessment of disease severity		
Five Factor Score (FFS)	The presence/absence of cardiomyopathy, proteinuria, renal impairment, gastrointestinal involvement and central nervous system involvement at diagnosis	Polyarteritis nodosa, Churg-Strauss syndrome
Assessment of disease damage		
Vasculitis Damage Index (VDI)	Physician assessment of 11 organ systems, noting treatment related damage, vital organ damage, and spread of damage over systems.	Systemic vasculitis
Quality of life assessment		
Short Form 36 (SF-36)	It consists of 36 questions assessing physical and mental health.	All chronic diseases

brain are other reasons for not accurately visualising the temporal arteries (54). The use of FDG PET has revealed that large vessel vasculitis is much more widespread than previously realised in GCA/PMR, where widespread uptake was seen including in the arteries of the legs, in patients who were asymptomatic for such involvement (56). Since inflammatory atherosclerotic plaques may exhibit FDG uptake (57) it is important not to rely solely on FDG PET findings in making a diagnosis of large vessel vasculitis particularly in the abdominal aorta and the leg vessels which are more prone to atherosclerosis. The uptake of the marker correlates with levels of inflammatory markers and responds to corticosteroid treatment in patients with GCA as well as in Takayasu's arteritis (TAK) (58, 59). PET scanning reflects the metabolic activity, so that a positive signal represents ongoing inflammation whereas the other imaging modalities such as MRI and angiography show structural changes which are not necessarily due to active inflammation (60, 61). This makes FDG PET scanning particularly appealing for monitoring the response to therapy and for detecting relapses in large vessel vasculitis. Low level FDG uptake may persist even with normalisation of inflammatory markers (50). This would be in keeping with the finding of active inflammation in over 40% of biopsies from patients in apparent remission (48). Although the presence of low level inflammation is intriguing, it is as yet not clear to what extent it is clinically significant. The sensitivity and specificity of diagnosing large vessel vasculitis (GCA and TAK) by this technique has been reported from 60% to 88.8% and 90.9% to 99.8% respectively in two reported studies (58, 59). FDG PET is still a research tool, but it may have a role in investigating pyrexia of unknown origin, due its high sensitivity and specificity for the diagnosis of large vessel vasculitis (62). A drawback of PET scanning is that it requires very expensive equipment which will limit its availability.

Conventional radiographs, CT and MRI scanning provide are very useful in assessing structural lesions and monitoring the response to therapy. This is particularly important in granulomatous conditions such as WG where most patients will have paranasal sinus or lung involvement.

Clinical assessment of systemic necrotising vasculitis

The failure of serological tests to provide reliable disease assessment has resulted in the development of clinical assessment tools. These tools also offer the opportunity to evaluate complex dimensions such as disease damage and patient function which cannot be measured by single biological tests. There are three main aspects to the clinical assessment of vasculitis: disease activity, disease damage and the functional and social consequences of having vasculitis and its treatment. These three aspects of disease are common to other inflammatory diseases such as rheumatoid arthritis and SLE. Although an experienced clinician will intuitively employ a systematic approach to disease assessment, it is necessary to use a structured and formalised system in order to be able to compare the findings over time or between different physicians.

Disease activity

The Birmingham Vasculitis Activity Score (BVAS) (63) is the current standard tool for assessment of disease activity in systemic vasculitis and has been used in all recent large randomised trials of vasuculitis (33, 64, 65).

The BVAS is designed as a list of symptoms and signs which are recognised manifestations of vasculitis. The physician has to make a judgement as to whether or not these features are due to active vasculitis requiring treatment. The disease features are grouped into 9 organ systems. Each of the disease manifestations has an arbitrary numerical value according to its perceived clinical importance. As an example, nasal crusting carries a value of 2 whereas haematuria has a value of 6. The different organ systems are also weighted according to clinical relevance by applying maximal scores for each system. The ENT system for example has a maximal score of 6 whereas the renal system has a maximum value of 12. The original BVAS has been modified on two occasions for the use in specific clinical trials. The European Vasculitis Study Group (EUVAS) made some minor changes to the clinical features list and separated scoring of new/worse disease features from features representing persistent low grade disease (66). The WG Etanercept Trial Group (WGET) adapted BVAS for use specifically in Wegener's granulomatosis and introduced a different, again arbitrary, scoring by attaching a value of 1 to disease manifestations which are usually treated with less aggressive immunosuppression and a value of 3 to items which usually would require the introduction of cyclophosphamide (67). A new version of the BVAS is currently undergoing validation. The continuous development of the BVAS to incorporate the experience gained by its use is common to all disease activity measures where there is no ultimate gold standard.

The use of the BVAS requires training, since even physicians who are very familiar with managing patients with vasculitis may not use the BVAS as originally intended, leading to wide inter-observer variation which can improve dramatically following a short training program. The areas which most commonly cause problems to the novice user are over-scoring due to the scoring of established disease damage such as stable peripheral neuropathy and the scoring of items due to infection particularly in the respiratory tract (68). In assessing disease activity it is important that a clinical finding is scored only when it is due to active vasculitis. Clinical manifestations such as haematuria for example can be caused by active vasculitis, infection or cyclophosphamide toxicity. These points are self-evident but need to be made clearly when developing assessments tools for systemic vasculitis. The number of organ systems involved in a patient with systemic vasculitis is measured by the Disease Extent Index (DEI) which also has been used widely in clinical trials. The DEI can be calculated from the BVAS and provides complementary information in that it helps distinguishing for example whether a high BVAS score is caused by a single organ system or low level

activity in several organ systems (69). Five clinical manifestations at diagnosis (abdominal, cardiac, CNS, renal involvement and proteinuria) have been found to be predictive of survival in CSS and PAN. They form the basis of a prognostic score which has been employed in clinical trials to stratify patients according to likely prognosis. This has allowed treatment to be adjusted according to disease severity. Its prognostic value in the other vasculitides needs to be formally studied (70).

Damage

Damage is the development of an irreversible scar which will not respond to immunosuppressive treatment. It is a very important outcome from the patients point of view. Damage can result from (recurring) disease activity, treatment toxicity and seemingly unrelated causes. The role of damage assessment is different from that of assessing disease activity and it is important to be clear on this distinction. The Vasculitis Damage Index (VDI) (71) is the only tool which has been widely accepted for measuring damage due to the systemic vasculitides. It represents a catalogue of 64 damage items grouped into 11 organ systems which were judged by a panel of experts to be the most important in patients with systemic vasculitis. The items are not weighed, damage has to be present for at least 3 months before it is scored to avoid scoring disease activity and items are by definition irreversible so that the score can only increase or remain static over time. The VDI has been widely used in trials of vasculitis. It provides not only a catalogue of damage which occurs in vasculitis but it has also been shown to be of prognostic value (72).

Function

Systemic vasculitis leads to a significant impairment in the quality of life and carries a high socioeconomic burden (73, 74). The measures for physical and mental health at diagnosis are significantly impaired in comparison to the normal population and this impairment is sustained even after disease remission has been achieved, although function improves considerably with treatment (33, 64, 65). The standard measure of quality of life in vasculitis is currently the Medical Outcomes Study-Short Form 36 (SF36) questionnaire (75). It has been employed in several recent trials. However, because of its generic nature it might fail to capture items more specific for patients with systemic vasculitis. There is currently a dearth of data regarding the overall socioeconomic impact of the newer medical therapies of vasculitis. Although most of the newer treatments are much more expensive than the current standard therapies there is the potential of substantial savings if they prove to be more effective and safer in the long-term control of systemic vasculitis.

The use of vasculitis assessment in clinical trials

Recent clinical trials in vasculitis have employed clinical disease assessments as an important part of their protocols. Active disease as defined by a numerical BVAS was a requirement for entry in some trials (65) Remission was defined using BVAS (33, 64, 65). Major and minor relapses has been defined using BVAS (76, 77). The DEI has been used on its own or in combination with BVAS in a number of studies as a morbidity measure (33, 64, 78). These measures are becoming a recognised part in the design of clinical studies of vasculitis. In the absence of a gold standard they remain the best available measures for determining the effectiveness of current and future therapies for the management of vasculitis.

Table IV. Key messages.

Biological assessment of systemic vasculitis

- Histology is the gold standard for diagnosis but repeated biopsies are impractical.
- None of the serological markers can predict disease activity with sufficient accuracy.
- The presence of specific ANCA is useful for differential diagnosis of vasculitis.
- Persistently elevated ANCA despite immunosuppressant therapy increases risk of relapse.
- ESR and CRP are the most widely used markers of disease activity but they are very unspecific and not sensitive. Normal inflammatory markers do not exclude active vasculitis.

Radiological assessment of systemic vasculitis

- Magnetic Resonance Imaging is useful for the diagnosis of large vessel vasculitis and defining the extent of the involvement of the vascular tree. It will need validation in larger clinical trials.
- Ultrasonography is useful for defining involvement of superficial arteries.
- FDG PET imaging appears to be very sensitive to demonstrate active inflammation in large extracranial vessels. Exact role in disease monitoring needs to be validated in large studies.

Clinical assessment of systemic vasculitis

- The most effective tools to assess disease activity, monitor therapy and, reflect disease related damage and functional health status.
- They have prognostic value.
- The tools require training for appropriate use to reduce inter-observer and intra-observer variability.
- BVAS is the most widely applied tool in clinical trials for measuring disease activity in systemic vasculitis.

Conclusion

The disease assessment of systemic vasculitis has to include disease activity, damage and function. Serological and radiological tests lack the sensitivity and specificity to be employed in isolation for disease assessment. For this reason the current standard for disease assessment are clinical tools which integrate a large amount of information. They also permit to assess complex dimensions such as disease damage and function which by their nature cannot solely be assessed by biological means.

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