Chapter 17
Assessment and Management Plan for Graves' Orbitopathy

Peter J. Dolman

Introduction

Graves' Orbitopathy (GO), or Thyroid Eye Disease (TED), is an autoimmune disorder affecting orbital fat, extraocular muscles, and lacrimal gland, causing inflammation, tissue expansion, and fibrosis [1, 2].

It is the most common orbital disease worldwide, with an annual incidence in females of approximately 15 per 100,000 and approximately one-fifth that for males. It occurs in all races and is most common between the second and sixth decades [3]. Although TED is self-limited, it may cause permanent cosmetic and visual morbidity, impacting quality of life more than diabetes mellitus or chronic pulmonary disease [4].

The most frequent clinical presentation results from orbital fat expansion with proptosis, upper lid retraction, and resultant ocular exposure (Fig. 17.1a, b). Approximately one-third of patients with TED develop a more severe presentation from significant extraocular muscle involvement, with periocular soft tissue redness and swelling, restricted ocular motility and double vision, and occasionally vision loss from compressive dysthyroid optic neuropathy (DON) (Fig. 17.2a, b) [5]. This spectrum of clinical changes is graded as "*disease severity*".

TED follows a biphasic course, with a progressive or active phase lasting up to 18 months, followed by a stable or inactive phase. Rundle first described this

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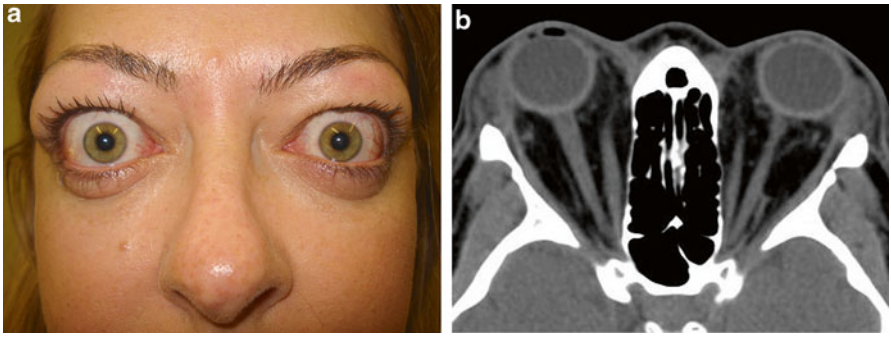

Fig. 17.1 (**a**) A 32-year-old female with insidious onset of progressive bilateral proptosis and upper lid retraction and right lower lid retraction. (**b**) Axial CT Scan demonstrates proptotic globes with fat expansion and prolapse of enlarged lacrimal glands but no significant extraocular muscle involvement

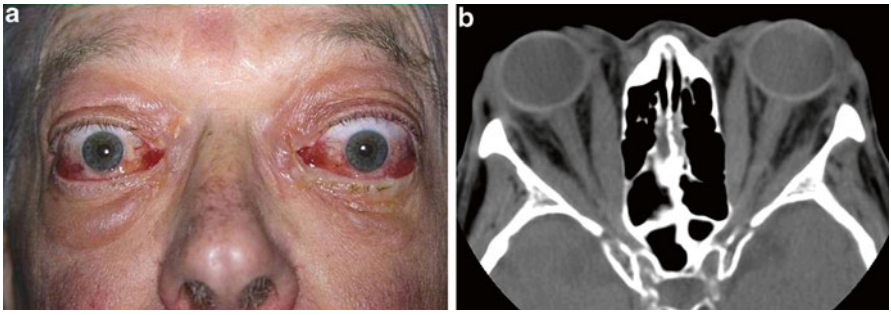

Fig. 17.2 (**a**) A 73-year-old male with progressive, rapid onset of severe inflammatory features with restricted ocular movements. (**b**) Axial CT Scan demonstrates enlargement of horizontal recti muscles bilaterally, corresponding with areas of redness and swelling on the bulbar conjunctiva. There is probable crowding of the optic nerve at the apex

progression using a graph of orbital disease severity against time (Fig. 17.3) [6, 7]. A steeper slope in the active phase reflects a more precipitous onset with the likelihood of more serious sequelae [8]. During the early progressive phase, immunomodulators and radiotherapy may limit the destructive consequences of the immune cascade [9, 10]. Once the disease has stabilized, surgery may be considered to improve orbital cosmesis, comfort, and function. Occasionally surgery is required urgently during the active phase to prevent visual loss from DON or severe corneal exposure. The course and phases of the disease are graded as "*clinical activity*."

This chapter reviews methods for evaluating and grading both the severity and activity of TED, and describe the use of the VISA classification to predict the disease course, plan management, and assess response to therapy.

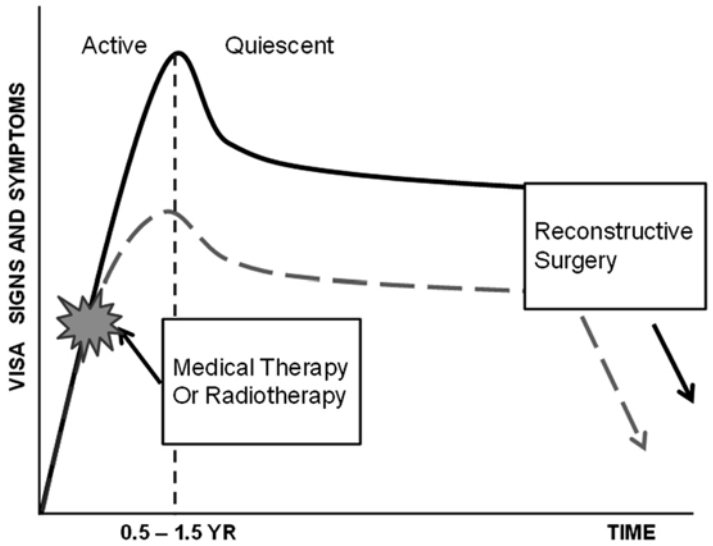

Fig. 17.3 Rundle's curve shows the biphasic course of myopathic Thyroid Eye Disease with a progressive (active) phase followed by a quiescent (inactive) phase. Medical therapy and radiotherapy are offered during the early progressive phase to prevent more serious complications of disease such as ocular motility restriction and optic neuropathy. Rehabilitative surgery is delayed until the quiescent phase. Occasionally surgery is required emergently during the active phase for vision threatening conditions such as compressive optic neuropathy or corneal ulceration

Diagnosis

Early diagnosis of TED allows appropriate evaluation and treatment that might prevent more serious complications. The primary physician may recognize early ocular clinical features, identify those at risk for developing serious disease, and arrange prompt referral to a dedicated center for appropriate intervention. This disease is best managed by a collaborative effort of experienced specialists, including ophthalmologists, endocrinologists, rheumatologists, and radiation oncologists.

The diagnosis is usually made clinically based on presenting ocular symptoms and signs described in the next section.

Abnormalities in thyroid function tests (T3, free T4, and TSH) and/or the presence of thyroid specific autoantibodies (anti-TSH receptor, anti-thyroid peroxidase) help support the diagnosis, although they may be negative.

Orbital imaging may be indicated if the clinical features alone are not diagnostic, or for monitoring progression or planning surgical intervention. Magnetic resonance imaging (MRI) may show increased edema in the muscles during the active phase [11] but is less helpful in surgical planning since it does not show bone structure. CT Scan is the most useful modality, allowing volume measurements of orbital fat and individual extraocular muscles [12], as well as identifying orbital apical crowding in optic neuropathy and the structure of the surrounding bone and sinuses for possible surgical decompression (Fig. 17.2b).

Clinical Features and Grading Severity

Appearance and Exposure

Over 80 % of patients with TED develop upper eyelid retraction, often with an insidious onset that is first recognized by others [13]. The "thyroid stare" has a characteristic lateral flare (Fig. 17.4a) that is accentuated with emotion or fixation giving the patient an angry look. It is associated with lid lag on down-gaze and incomplete lid closure while asleep (lagophthalmos). A careful review of CT images at our center has identified a strong correlation between enlarged levator muscle and upper eyelid retraction, suggesting that this muscle is the most common orbital muscle targeted by autoantibodies (Fig. 17.4b, c).

The lower lid typically rests at or slightly above the inferior corneal limbus. Lower lid retraction is present when sclera is visible inferiorly, and is associated with increasing proptosis (Fig. 17.1a).

Proptosis is the second most common finding in TED, resulting from expansion of the orbital fat and/or muscles. It may be less apparent in East Asians with tight eyelids limiting forward protrusion. Complete subluxation of the globe beyond the lids is a rare but troubling complication that may lead to visual loss if repositioning of the eye is delayed [14]. Proptosis is measured with the exophthalmometer and documented with photographs and orbital imaging (Figs. 17.1a and 17.2a).

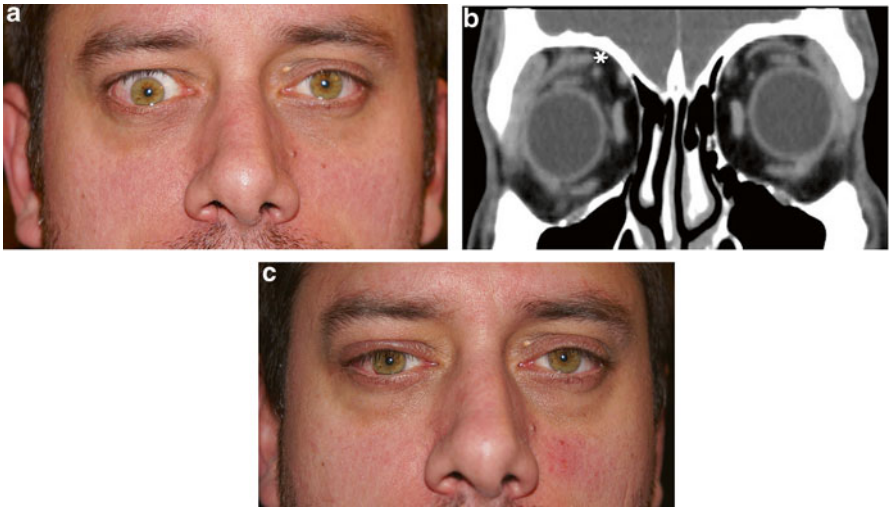

Fig. 17.4 (**a**) Isolated right upper lid retraction, the most common sign in thyroid eye disease. The patient was bothered by his altered appearance as well as dryness and photosensitivity. (**b**) Coronal CT Scan demonstrates the thickened levator muscle aponeurosis near its insertion point into the lid. The other extraocular muscles are not enlarged and this patient has a low risk of developing more serious complications of TED. (**c**) Right upper lid symmetry immediately following a surgical disinsertion of the levator muscle from a posterior lid approach

The combination of lid retraction and proptosis increases corneal exposure and may lead to symptoms of irritation, photophobia, and secondary epiphora. Signs of exposure are best assessed with the slit-lamp microscope and may range from corneal epithelial erosions to ulcerations with risk of perforation. The latter complications are most likely with significant lagophthalmos combined with absence of the normal protective Bell's phenomenon because of a tight inferior rectus muscle.

Periorbital Soft-Tissue Inflammation and Congestion

Symptoms and signs of periorbital soft-tissue inflammation include orbital ache at rest or with movement, conjunctival and caruncular injection and edema, eyelid redness and edema, and diurnal variation (worse with the head dependent after sleeping).

Assessment is subjective although reliability can be improved using precise verbal descriptors or by reference to an atlas of standardized photographs [15]. Eyelid redness may be challenging to assess in those with darkly pigmented skin, while lid edema may be hard to distinguish from orbital fat prolapse. Orbital discomfort must be distinguished from ocular surface irritation; the latter typically resolves with topical anesthetic.

Various grading schemes have been described for each of these features. The simplest binary scale (present/absent) has good reproducibility, but is insensitive at documenting change, while more sensitive scales may have poorer inter and intra rater reliability.

While these soft tissue changes may be an indicator of active inflammation, they are also seen in patients with non-progressive disease but with chronic congestion. They often reflect significant involvement of orbital muscle and should alert the physician to be vigilant for onset of more serious disease complications.

Restricted Ocular Motility and Strabismus

While the levator muscle is commonly involved in TED, the extraocular muscles become clinically involved in only a third of patients, often in an older population [16]. The onset of muscle involvement may be heralded by aching with eye movement and with conjunctival redness and edema overlying the insertion of the involved muscle. During the active inflammatory phase, progressive restriction of motility develops, initially intermittent or with gaze. Later motility restriction may be due to secondary fibrosis.

The symptoms for strabismus are best graded using the Bahn–Gorman scale: 0 = no diplopia, I = intermittent diplopia (present with fatigue), II = inconstant

diplopia (with vertical or horizontal gaze), III = constant diplopia in straight gaze, correctable with prisms, IV = constant diplopia, not correctable with prisms.

Ocular ductions can be graded from 0° to 45° in four directions using the Hirschberg principle: the patient is asked to gaze as far as possible in four directions while the observer points a bright light at the eye and studies the reflected light off the ocular surface. If the light reflex hits the edge of the pupil, the eye has rotated 15°, between the pupil edge and the limbus, 30° and at the limbus, 45°. This technique is as reliable as the "gold standard" perimetry technique with a coefficient of reliability of 12° [17].

Strabismus can be measured objectively by prism cover testing in different gaze directions and is used for planning surgical alignment.

A field of single binocular vision provides a plot of area where the patient sees single versus double because of ocular restriction.

Orbital CT Scan identifies which muscles are enlarged and with contrast may show enhancement and fat stranding around the affected inflamed muscles. In later stages, lucent zones within the enlarged muscles are thought to be hyaluronate deposition (Fig. 17.5). T2 weighted MR Scans may show enhancement of muscles thought due to edema during the active, inflammatory phase.

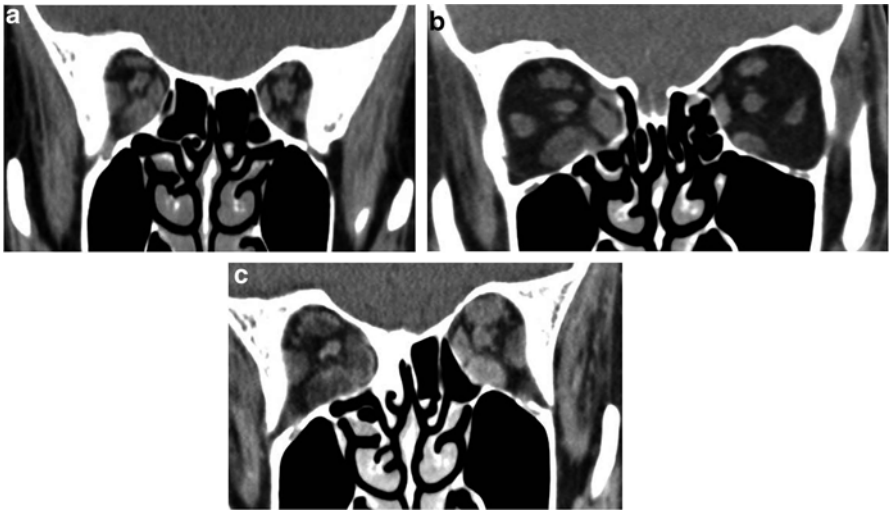

Fig. 17.5 (**a**) A 65-year-old male with progressive onset of right visual deterioration with right compressive optic neuropathy. (**b**) Immediately following decompression, his right color and central vision improved. The medial floor and wall have been expanded into the adjoining sinuses, reducing compression on the central optic nerve. (**c**) Five years later he developed a sudden onset of left congestive features with a drop in color and central vision. CT Scan shows interval enlargement of the left extraocular muscles with optic nerve crowding; the contrast enhancement suggests active inflammation in the muscle. The right muscles remain enlarged but the clear zones represent hyaluronic acid deposition and are typical in longstanding quiescent disease. He was treated successfully with left orbital decompression and adjuvant steroid/radiotherapy

Dysthyroid Optic Neuropathy (DON)

DON is a potentially reversible optic nerve dysfunction seen in 5–7 % of all cases of TED. Most cases are caused by direct compression of the nerve by swollen muscles in the narrow confines of the boney orbital apex, presumably impairing axoplasmic flow (Fig. 17.5). In rare cases with severe fat expansion, vision loss has been reported from optic nerve stretch [18].

Symptoms typically consist of desaturation of colors and blurring of central vision. This is usually confirmed on clinical examination, although a EUGOGO (European Group on Graves' Orbitopathy) survey of its members found that 20 % of patients with diagnosed DON had Snellen visual acuity better than 6/9 [19]. An afferent pupil defect is a specific sign of DON but is not detected in 50 % of patients because of symmetric loss of vision. Disc edema is also a specific sign when present, but is absent in over 40 % of patients with DON [19].

DON usually presents during the active phase of TED, since the onset of visual loss provokes the patient or clinician to investigate further. However, it may also develop insidiously, sometimes with little other clinical findings of TED.

Most cases are associated with muscle enlargement, with resultant subjective diplopia and motility restriction. Congestive and inflammatory features are typically present, but may be subtle. Likewise, proptosis is not typically a striking finding associated with DON, and some argue that this is commonly seen in patients with tight eyelids, limiting anterior decompression of the orbit.

Patients who develop DON are more likely to be male, older, and diabetic compared with their non-DON counterparts.

Coronal CT Scans demonstrate the enlarged extraocular muscles crowding the optic nerve at the orbital apex and causing effacement of the surrounding fat [20].

Ancillary tests include visual field testing, which demonstrates paracentral scotomas or generalized loss in 70 % of DON cases. Visual evoked potentials show abnormal latency in 75 % [19], but are not available in many centers.

In spite of these clinical findings and investigations, the diagnosis of DON may be uncertain in its early stages, necessitating close follow-up in high-risk groups.

Grading Severity

Several classification systems have been devised to grade severity of these clinical manifestations.

Dr. Werner's NO SPECS Classification grades TED-related symptoms and signs and assigns a global severity score (Table 17.1) [21]. The acronym reminds one of the different features of TED but the grades are loosely defined and are often based on only one variable, such as Snellen visual acuity for sight loss (ignoring other more sensitive variables such as color vision). Summary scores also tend to hide

Table 17.1 Werner's NO SPECS classification

Class	Grade
0	***N***o physical signs or symptoms
I	***O***nly signs [eyelid retraction]
II	***S***oft tissue involvement [0: absent, a: minimal, b: moderate, c: marked]
III	***P***roptosis [0: absent, a: minimal, b: moderate, c: marked]
IV	***E***xtraocular muscle signs [0: absent, a: limitation in extremes of gaze, b: evident restriction, c: fixation of globe(s)]
V	***C***orneal involvement [0: absent, a: stippling, b: ulceration c: clouding, necrosis, perforation]
VI	***S***ight loss (optic nerve compression) [0: absent, a: VA: 0.63–0.5, b: VA: 0.4–0.1, c: VA<0.1–NLP]

details about how the patient is specifically affected and make it difficult to assess disease progression or response to therapy. It does not assess clinical activity.

EUGOGO grades TED broadly in three categories from mild to very severe [22]. Mild disease is defined as minimal eyelid swelling, lid retraction or proptosis with little or no extraocular muscle dysfunction. Moderate to severe disease implies some form of active disease with or without ocular motility dysfunction with diplopia and inflammatory features interfering with ability to function. It may also include significant proptosis >25 mm. Very serious disease refers to sight threatening conditions such as DON or serious exposure resulting in corneal ulceration or scarring.

This classification separates the disease into management categories with mild disease requiring no intervention, moderate to severe disease often requiring immunomodulation, and very severe disease requiring urgent surgical intervention. A weakness of this classification is that a patient might be in the moderate class for different reasons (inflammation, motility disturbances, or severe proptosis), providing a heterogeneous group for any research trial. Also, there is an implied rank order for severity that may disagree with the patient's perception of their disease. For example, an individual with early optic neuropathy may be unaware of their mild color desaturation but would be graded as "very severe," while another individual with disabling torsional diplopia would be graded with "moderate" disease.

Course of Disease and Grading Activity

Rundle's Curve

While severity grades indicate the disease state on a particular visit, a plot of Rundle's curve based on subjective or objective data allows one to determine the course of disease (onset and progression) and activity.

In cases with primarily fat expansion or lid retraction, the disease onset may be gradual and distinguishing active from quiescent phases may be difficult.

These cases often present in a stable phase when surgery can be offered on a non-urgent basis.

Individuals with extraocular muscle involvement tend to have a more obvious progression through the active and inactive phases (Fig. 17.3). The acuter the onset and the rapider the deterioration, the higher the chance of serious orbital consequences and the greater the urgency for intervention. Inflammatory and congestive periocular changes are commonly noted during this progressive phase and alert one to the disease's activity.

Disease Duration and Rate of Progression

Individuals affected by TED are keenly aware of their condition and in progressive cases may remember the duration since onset and the recent disease course (deteriorating, stabilizing, or improving). They can also report on the rate of onset (the slope of Rundle's curve), helping define the urgency of intervention [8]. In general, immunosuppressive medical therapy and radiotherapy are likely to be most effective early in TED and when the disease is progressive, and careful questioning may identify such cases even on the first encounter.

Accurate documentation of ophthalmic signs on each visit allows the clinician to determine onset and progression objectively. An observed change can only be considered significant if it is greater than the known coefficient of reliability for the measurement [17]. For each measurement, a sensitive and reliable scale is needed to document change accurately.

Clinical Activity Score (CAS)

The Clinical Activity Score was introduced in 1989 by Mourits and colleagues as a global scale of soft tissue inflammation, to help identify active TED patients who are likely to respond to immunosuppressive therapy [23] (Table 17.2). This uses a binary scale with a single point for seven periocular soft tissue inflammatory symptoms and signs as surrogate markers of disease activity. On follow-up visits, additional points are given for increased proptosis (2 mm or more), decreased ocular motility (8° or more), or decreased visual acuity over the previous 3 months. The scale is relatively easy to score and a CAS score of 4 or higher has been shown to have an 80 % positive predictive value and a 64 % negative predictive value in predicting response to corticosteroid therapy.

The CAS was intended to identify active disease, but has not been shown to correlate with risk of developing significant complications such as diplopia or DON. Limitations of this binary scale are that each clinical feature carries equal weight, (development of optic neuropathy is scored equally to the onset of conjunctival redness), and that positive or negative changes are documented only when they appear or resolve.

Table 17.2 Clinical activity score

First visit (score 0–7)
• Painful feeling behind globe
• Pain on attempted gaze
• Redness of eyelids
• Redness of conjunctiva
• Chemosis
• Inflammatory eyelid swelling
• Inflammation of caruncle or plica
Follow-up visits (3 additional points: total score 0–10)
• Increase of 2 mm or more in proptosis in last 1–3 months
• Decrease in visual acuity in last 1–3 months
• Decrease in eye movements of 8° or more in last 1–3 months

While these inflammatory periocular soft tissue symptoms and signs may reflect underlying TED activity, severe disease complications such as DON can develop with low CAS scores, and patients with high CAS scores may have long-standing congestive changes that are unresponsive to any immunotherapy but that respond best to mechanical surgical decompression.

Laboratory and Imaging

Several potential serum markers for TED activity have been studied with the hope of monitoring change in activity more accurately. These include urine and serum glycosaminoglycans (GAG) [24] and thyrotropin (TSH) receptor antibodies. Imaging techniques have included assessing vascularity within and around extra-ocular muscles with contrast CT Scans, assessing edema on T2 weighted or STIR sequenced MRI scans, and monitoring inflammation using gallium or octreotide scintigraphy [25]. Facial thermography, PET Scans, and Doppler ultrasonography have also been studied, but none appear better than the clinical assessment tools.

Trial of Therapy

In some cases, determination of activity is uncertain based on an equivocal history of progression and borderline inflammatory changes. A trial of therapy using a 3-day course of oral prednisolone 50 mg can determine whether clinical features show improvement and if responsive, permit choice of more definitive therapy such as intravenous corticosteroids or radiotherapy.

VISA Classification, Planning Management, and Predicting Outcomes

Overview

The VISA classification [26] is a clinical recording form that permits grading of both clinical severity and activity based on both subjective and objective inputs and that guides overall management planning. It separates the various clinical features of TED into four discrete parameters: V (vision, DON); I (inflammation, congestion); S (strabismus, motility restriction); A (appearance, exposure).

The basic follow-up visit form (Appendix) is divided into four sections recording specific symptoms on the left and standardized signs for each eye on the right. After each section is a progress row (better, same, worse) for both the patient's and clinician's impression of the course of that parameter since the last visit. The clinician determines progress on the basis of defined interval changes (i.e., 2 mm change in proptosis, 12° change in ocular ductions) rather than on global scores.

The layout is based on the natural order of the ocular examination as well as in descending order of priority for therapy. It is designed to simplify data recording and possible later research data collation.

The end of the form lists a summary grade for the severity and progress for each of the four disease parameters. The severity grades are used as a capsule summary for the patient but not for determining progression. Rather than grading TED severity based on a rank order of the four parameters, each feature is considered and graded independently.

Activity is determined on the basis of deterioration in any one of the four parameters. An elevated VISA inflammatory score is interpreted that the extraocular muscles are likely inflamed or enlarged and alerts the clinician that the disease may follow a more serious, progressive course.

On the first visit, the date and rate of onset as well as historic progress of both the systemic and orbital symptoms is recorded, helping define characteristics of the disease activity. Additional questions also determine risk factors for more serious TED outcomes including smoking, family history, and diabetes.

A downloadable first visit form (2 pages) and follow-up form (1 page) is available through the International Thyroid Eye Disease Society (ITEDS) website: www.thyroideyedisease.org. An associated quality of life form (TED-QOL) allows patient feedback concerning the effect of the disease on their overall quality of life, satisfaction with appearance, and ability to function [27]. This is also available through the same website.

VISA Classification and Risk Factors for Serious Disease

Because TED can present with a wide spectrum of orbital manifestations and activity levels, it is important to identify those most likely to progress to more serious complications such as strabismus or DON before they develop, so that they can be followed more closely and preventive therapy offered earlier.

Risk factors for developing TED include smoking, life stressors, poorly controlled hypothyroidism following radioactive iodine, and a positive family history of orbitopathy [2].

Predictive variables for developing more serious consequences of TED, (specifically those 30 % of affected individuals with significant extraocular muscle involvement), include male gender, increasing age, smoking, and a rapid onset of orbitopathy [16, 18]. Diabetics may have a higher risk of developing DON.

Cigarette smoking has been shown by numerous studies to be correlated strongly with the development of TED and a progressively higher incidence of smoking is seen with more severe disease [28, 29].

Reactivation of disease is fairly uncommon [30], occurring in less than 5 % of individuals, and is sometimes associated with a major life stressor such as a family death, divorce, or loss of job.

Specific VISA Sections and Planning Management

V: Vision/DON and Corneal compromise: The focus of this section is to identify vision threatening processes such as DON or corneal breakdown.

DON is recognized by the combination of central and color vision loss combined with possible afferent pupil defect and/or optic nerve head changes. Ancillary tests to confirm the diagnosis include visual fields, VEP, and coronal CT Scans (Fig. 17.5).

As a summary grade, VISA lists DON as present or absent since therapy is usually offered if the condition is suspected.

Most cases are identified during the progressive phase with the patient aware of the date of onset and the rate of recent deterioration; occasionally the onset may be insidious and the findings subtle.

Initial therapy is a trial of systemic corticosteroids (oral prednisone 1.5 mg/kg/day or iv methylprednisolone 1 g for three doses). The response to this trial of therapy often helps predict whether benefit will be gained from subsequent external beam radiotherapy or surgical decompression. Complete lack of response or the presence of a pale optic nerve head signifies a poorer prognosis.

Most cases do show at least partial response to corticosteroid, but this may be incomplete or refractory to repeated doses. Some authors have found external beam radiotherapy (2000 Rads divided over 10 days by lateral port to the posterior orbits) may avoid surgery [31]. Surgical decompression near the orbital apex by removing the medial orbital wall and medial floor into adjoining sinuses may significantly

restore even severe vision loss, sometimes even months after onset of the optic neuropathy (Fig. 17.5). Adjuvant radiotherapy is often offered to prevent continued postoperative expansion of muscle and recurrence of visual loss.

Corneal exposure may occur from severe lid retraction combined with proptosis and in severe cases may result in corneal ulcers, perforations or scars. This may be recognized by an opacity or a disruption of the light reflex on the corneal surface and is often associated with ocular surface redness and edema. The patient must be referred urgently to an ophthalmologist who may protect the cornea with topical antibiotics, patching, temporary suturing of the eyelids, or even emergent decompression.

I: Inflammation/congestion: VISA records features of orbital soft tissue inflammation or congestion as a separate parameter which can be graded and followed for progression. Symptoms include orbital ache at rest or with movement and diurnal variation while signs include injection and edema of the ocular surface or eyelid. These are summed to form a VISA Inflammatory Score based on the worst score for either eye or eyelid. This differs slightly from the CAS by widening the grade for chemosis and lid edema from 0 to 2 [26].

Unlike the CAS, the VISA inflammatory score is not interpreted as proof of disease activity, but rather as a marker for extraocular muscle involvement (either acute inflammation or chronic congestion) and the chance that more serious sequelae such as diplopia or DON may develop.

Mild soft tissue inflammatory changes may be treated with cold compresses and head elevation.

Those with recent onset and worsening scores may be treated medically with oral or intravenous corticosteroids (CS), with several studies demonstrating that soft tissue inflammation is reduced in 60 % of cases with oral therapy and in 85 % of cases with intravenous (iv) therapy (Fig. 17.6) [32]. Fewer side-effects are encountered with iv CS, but cumulative dosages less than 8 g solumedrol are recommended to avoid possible hepatic complications [33]. We recently reviewed 144 patients who had received monotherapy iv CS and found that 35 % still developed strabismus and 15 % developed dysthyroid optic neuropathy in spite of adequate iv CS therapy [34].

Refractory cases may respond to combination therapy (including cyclosporine, azathioprine, or newer monoclonal antibody biologic agents).

External beam radiotherapy (XRT) has been used for over 50 years for active thyroid orbitopathy and retrospective studies have shown 60 % efficacy in reducing soft tissue inflammation and stabilizing strabismus, possibly by targeting lymphocytes and fibrocytes that play an important role in disease evolution. Three randomized controlled trials have demonstrated XRT to be as effective as oral CS therapy and that it has benefit in reducing strabismus and soft tissue inflammation [35–37]. A recent retrospective review at our institution of 258 patients found that there was 0 % incidence of new onset DON in those treated with XRT/CS, compared with 17 % for those treated with iv CS alone [34].

In chronic cases refractory to medical therapy with no other signs of progression, the high VISA inflammatory score may represent chronic orbital venous congestion, rather than true inflammation, from enlarged extraocular muscles; in these cases, surgical decompression should be considered (Fig. 17.7).

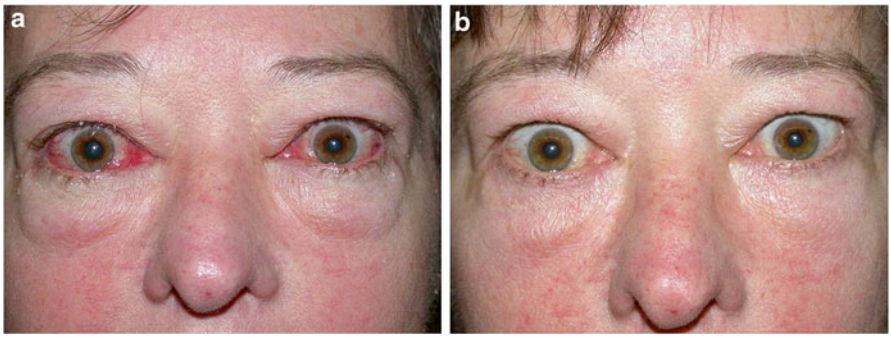

Fig. 17.6 (**a**) A 47-year-old female with relatively rapid and recent onset of inflammatory changes (CAS Score 7/10, VISA inflammatory score 9/10). The recent onset and history of progression indicate *active disease* while the congestive changes indicate extraocular muscle enlargement (and the risk for serious sequelae) based on the VISA classification criteria. (**b**) She was treated with combination corticosteroid and radiotherapy for control of the inflammatory changes and to prevent onset of motility disruption and optic neuropathy. Notice that the inflammatory soft tissue changes have resolved but the upper lids remain retracted, suggesting levator scarring has already occurred

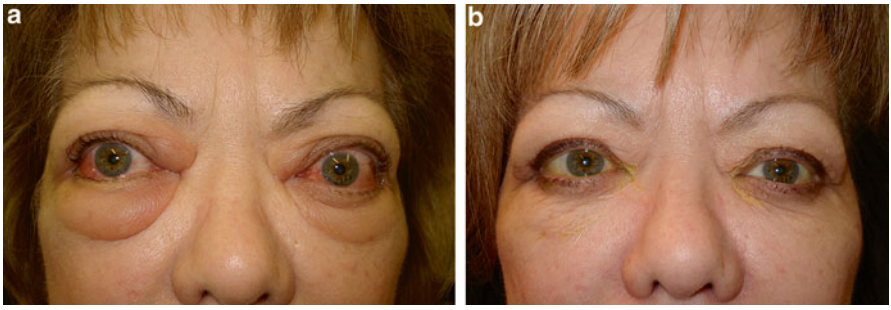

Fig. 17.7 (**a**) This lady had a high VISA inflammatory score (and high CAS Score) based on her soft tissue changes. However, she had been on combination oral corticosteroids and cyclosporine for over a year with no history of progression, and was *inactive* following the VISA Classification guideline (although her CAS score would have been interpreted as active). (**b**) One month following bilateral orbital decompression and upper lid lowering, her congestive features had resolved and her medications were tapered off. Both the VISA inflammatory score and CAS scores were reduced to zero

S: Strabismus/motility restriction: Three aspects are documented. Symptoms of diplopia are recorded using a modified Bahn-Gorman scale and can be graded from 0 to 3. Ocular ductions are measured to the nearest 5° in four directions using the corneal light reflex technique described above. Ocular restriction can be graded from 0 to 3 based on the range of ductions (0–15°, 15–30°, 30–45°, >45°). Strabismus can be measured objectively by prism cover testing in different gaze directions to plan surgical alignment.

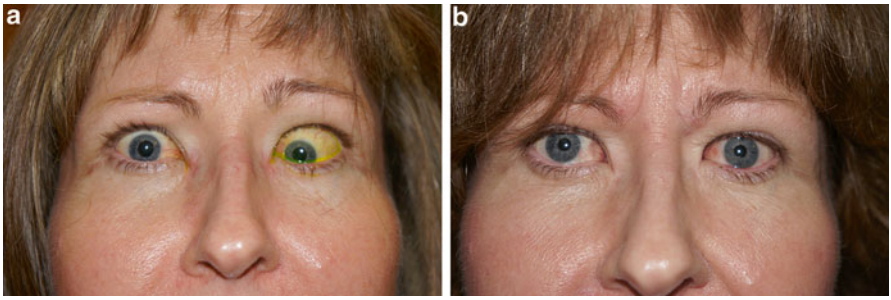

Fig. 17.8 (**a**) Progressive disease with bilateral upgaze restriction and constant diplopia. (**b**) Quiescent disease following combined iv corticosteroids and radiotherapy and subsequent ocular alignment surgery and upper lid lowering surgery

Diplopia is treated with prisms or patching during the active phase, and systemic CS and XRT are considered to limit ocular restriction. Once a stable phase is documented, alignment surgery or prisms may be offered (Fig. 17.8).

A: Appearance/exposure: This section records features relating to appearance and exposure including lid retraction, exophthalmometry, and corneal exposure changes. Photographs document appearance changes.

Exposure changes are treated with lubricant drops and patching during the active phase. Rarely a tarsorapphy or even an orbital decompression may be required for corneal breakdown or ulceration to prevent vision loss as mentioned above.

Once the disease is non-progressive, surgery may be offered to deal with proptosis, eyelid retraction, and orbital fat prolapse.

Referrals

In patients with a low-risk profile (nonsmoking, younger females with slow onset of ocular changes), with milder clinical features, and with no history of recent progression, referral to an ophthalmologist is recommended on a non-urgent basis.

Individuals undergoing radioactive iodine therapy for hyperthyroidism should be referred for ophthalmologic evaluation to help decide on prophylactic corticosteroid therapy.

Individuals in a high-risk group (older, male, diabetic, or smoker), with a recent history of progression, or with any moderate inflammatory changes, should be referred and seen by the ophthalmologist within a few weeks to consider therapy to avoid onset of diplopia or DON.

Cases with reported color or central visual loss, progressive diplopia, rapid deterioration in symptoms, or significant inflammatory scores should be seen within a few days. In all cases, a close communication between all involved physicians is essential [2].

ITEDS: VISA Follow-Up Form

Date: Visit #:

Patient Label:

Date of birth: Age:
Gender:

ORBITOPATHY
Symptoms:

THYROID
Symptoms:

GENERAL
Smoking:

Meds:

Progress: Status:

Therapy: Therapy:

QOL: ☹ - - - - - - - - - - ☺

SUBJECTIVE	OBJECTIVE	OD	OS	
VISION				**Refractions** Wearing _____ + _____ X _____ _____ + _____ X _____ Manifest _____ + _____ X _____ _____ + _____ X _____
Vision: n / abn	Central vision: sc / cc / ph	20/___	20/___	
	with manifest	20/___	20/___	
Color vis: n / abn	Color vision plates (HRR) / 14			
	Pupils (afferent defect)	y / n	y / n	
	Optic nerve: Edema	y / n	y / n	
	Pallor	y / n	y / n	
Progress: s / b / w	Macular/ lens pathology	y / n	y / n	
INFLAMM^N/ CONGESTION				**Inflammatory Index (worst eye/eylid)** Caruncular edema (0-1): Chemosis (0-2): Conj redness (0-1): Lid redness (0-1): Lid edema (0-2): Retrobulbar ache (0-2): Diurnal Variation (0-1): **Total**: (10):
Retrobulbar ache	Caruncular edema (0-1)			
At rest (0-1)	Chemosis (0-2)			
With gaze (0-1)	Conjunctival redness (0-1)			
Lid swelling: y / n	Lid redness (0-1)			
Diurnal variation: (0-1)	Lid edema Upper (0-2)			
	Lower (0-2)			
Progress: s / b / w				
STRABISMUS/ MOTILITY				Prism Measure:
Diplopia:	Ductions (degrees):			
None (0)				
With gaze (1)				
Intermittent (2)				
Constant (3)	Restriction > 45°	0	0	
Head turn/ tilt: y / n	30-45°	1	1	
	15-30°	2	2	
Progress: s / b / w	< 15°	3	3	
APPEARANCE/EXPOSURE				Fat prolapse and eyelid position:
	Upper lid position: MRD	mm	mm	
Lid stare y / n	Scleral show (upper)	mm	mm	
	(lower)	mm	mm	
	Levator function	mm	mm	
Light sensitivity y / n	Lagophthalmos	mm	mm	
Bulging eyes y / n	Exophthalmometry (Base: mm)	mm	mm	
Tearing y / n	Corneal erosions	y / n	y / n	
Ocular irritation y / n	Corneal ulcers	y / n	y / n	
	IOP -straight	mmHg	mmHg	
Progress: s / b / w	-up	mmHg	mmHg	

DISEASE GRADE			Grade	Progress / Response	DISEASE ACTIVTY
V	(optic neuropathy)	y / n	/ 1	s / b / w	
I	(inflammation/congestion)	0-10	/ 10	s / b / w	Active
S	(diplopia)	0-3	/ 3	s / b / w	
	(restriction)	0-3	/ 3	s / b / w	Quiescent
A	(appearance/exposure):	normal - severe	/ 3	s / b / w	

MANAGEMENT **FOLLOW-UP INTERVAL:**

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