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Allergic Eye Diseases,

Episcleritis

and Scleritis

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IMMEDIATE HYPERSENSITIVITY

The external eye is under constant immunological challenge from a wide variety of substances, which may lead to the development of one of many conditions that can be loosely grouped together as allergic eye disease. The chief factors which determine the outcome of such challenges are the

severity and duration of the antigenic load and the immuno-logical status of the individual. Local or systemic immune mechanisms may be involved to produce immediate hypersensitivity, complement-mediated, or delayed hypersensitivity reactions.



Fig. 5.1 Acute periorbital oedema is a common manifestation of immediate hypersensitivity. It may follow the systemic administration of antigen in a sensitized individual, such as the ingestion of foods or drugs. The reaction is frequently associated with high titres of circulating IgE antibody, being mediated by the release of histamine and other pharmacologically active substances from mast cells in the skin and mucosal tissues. It usually produces symmetrical bilateral lid oedema, which may also be accompanied by conjunctival chemosis and urticarial skin rashes. The onset is rapid but the signs usually improve within a few hours. Acute unilateral signs may result from local inoculation and histamine release in the skin, as in this example where the reaction followed an insect bite. By courtesy of Mr PA MacFaul.



Fig. 5.2 Acute conjunctival chemosis may occur in the absence of lid swelling as an immediate hypersensitivity response to local inoculation of antigenic substances (frequently pollens) directly onto the conjunctiva of a sensitized individual. The level of response depends on the degree of previous sensitization and the dose of antigen. In this patient, although both conjunctiva are chemotic and slightly hyperaemic, the signs are more pronounced in the left eye.

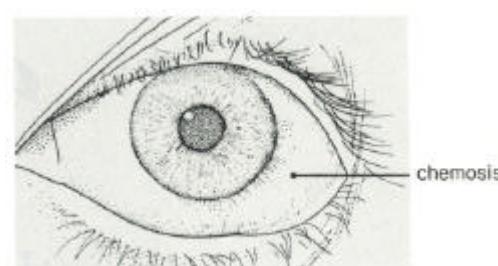


Fig. 5.3 This illustration shows the left eye of the same patient in greater detail. There is a swelling of the bulbar conjunctiva giving the typical gelatinous appearance associated with mild hyperaemia of the blood vessels. Although the symptoms may be alarming, they usually resolve spontaneously over a few hours. Systemic or topical antihistamine preparations may provide symptomatic relief.

VERNAL DISEASE

Vernal conjunctivitis is an ocular manifestation of atopy and is usually associated with elevated serum levels of IgE antibody. There is frequently a history of eczema, hayfever and asthma which characteristically starts early in life. The disease is chronic, with seasonal exacerbations and remissions, and predominates in young males. The aim of treatment during acute exacerbations is the control of symptoms by reducing conjunctival inflammation. In severe cases this is usually achieved by intensive steroid drops. Mucolytic preparations such as acetylcysteine drops may also assist by removing excess mucus. It is important to reduce topical steroids as soon as possible to avoid ocular complications, such as steroid glaucoma, and this may be facilitated by the additional use of cromoglycate drops which have a steroid sparing effect. These may be successful in controlling the disease when used alone in less severe forms of the disease.

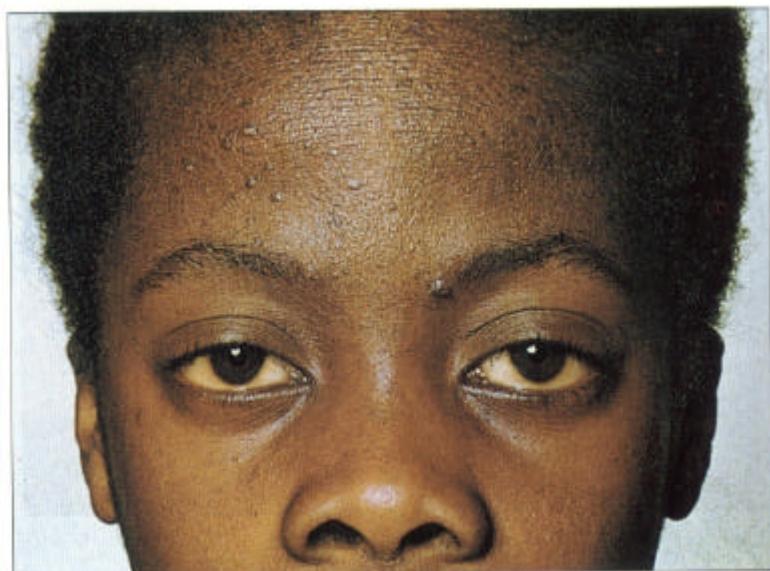


Fig. 5.4 This boy, who suffers from vernal conjunctivitis, shows a typical eczematous rash on his forehead and cheeks. There is an associated slight bilateral ptosis reflecting the chronic inflammatory upper conjunctival disease.

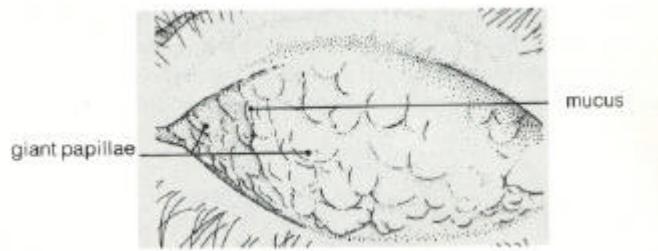
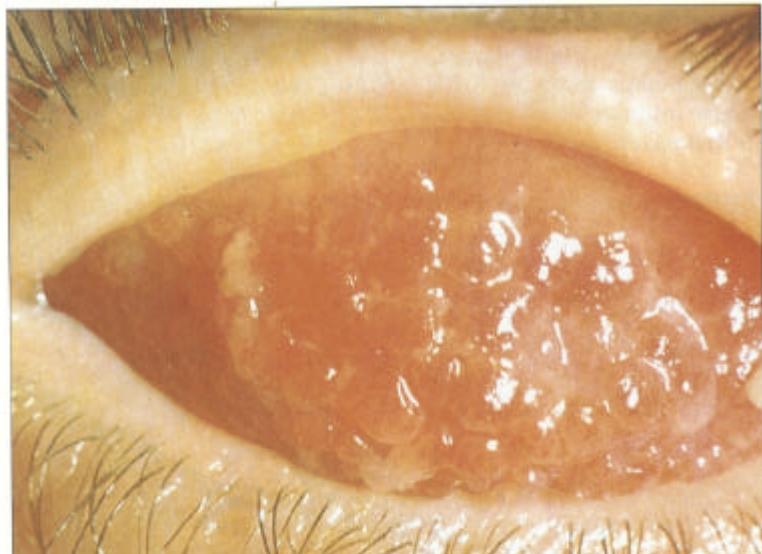


Fig. 5.5 The conjunctival changes found over the upper tarsus consist of giant papillae, typically described as having a 'cobblestone' appearance. Although these papillae persist during quiescent phases, when the disease becomes active (as in this example) they become swollen and infiltrated by oedema and inflammatory cells, with abundant abnormal mucus situated both on the surface and in the crevices between the papillae.

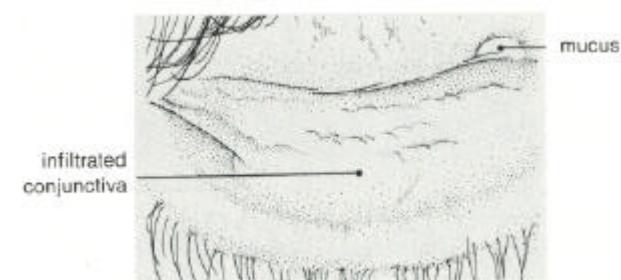


Fig. 5.6 The changes in the lower tarsal conjunctiva and fornix are less striking but equally typical. The superficial conjunctiva is heavily infiltrated by cells and oedema, thus obscuring most of the normal vascular pattern. There is also mucus accumulation in the lower fornix.

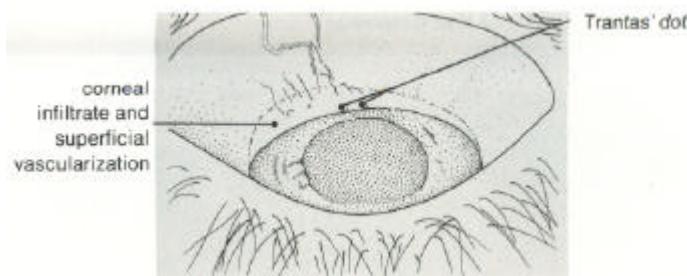
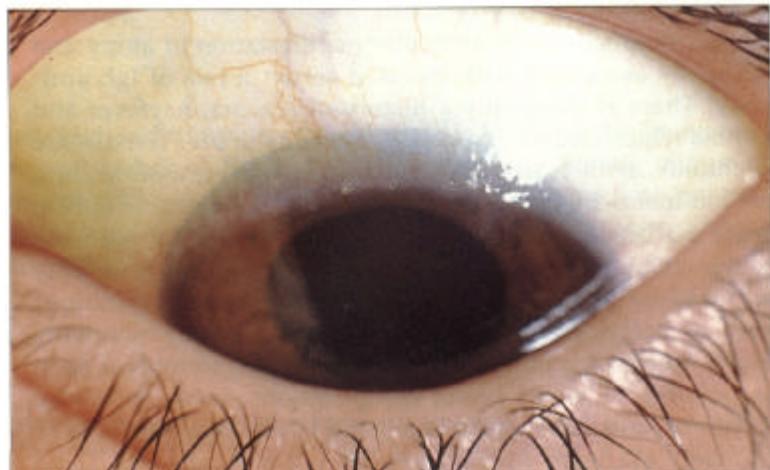
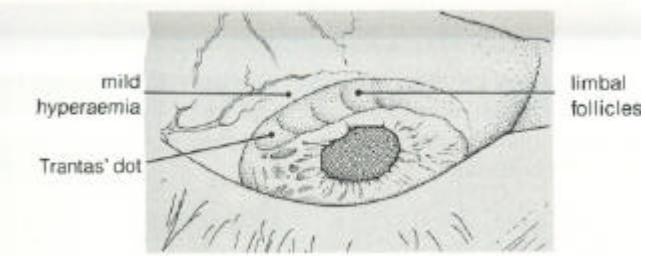
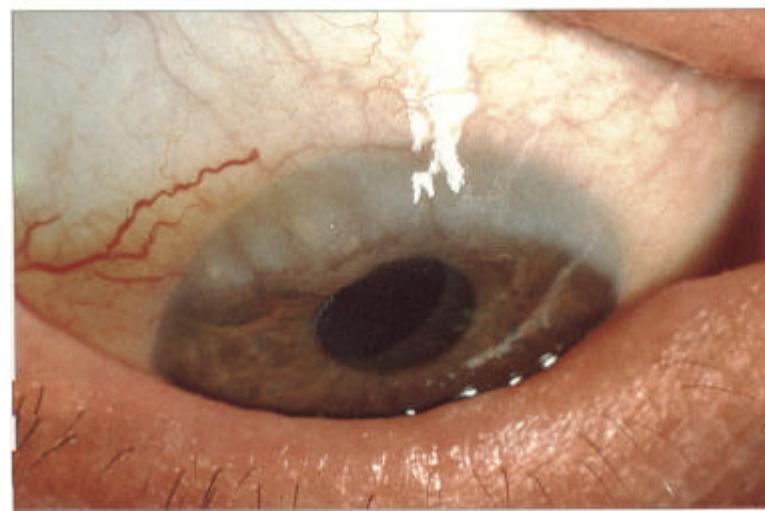


Fig. 5.7 Limbal changes may occur in vernal conjunctivitis in the absence of marked tarsal papillae. These limbal follicles are heavily infiltrated with inflammatory cells and appear as greyish, gelatinous swellings around the limbus, but especially superiorly. The blood vessels are not unduly prominent and there is no mucus visible.

Fig. 5.8 Trantas' dots are also a feature of vernal conjunctivitis. They are small white, elevated epithelial lesions seen at the upper corneal limbus. In this example, they are associated with a greyish corneal infiltrate and superficial vascularization. By courtesy of Mr RJ Buckley.

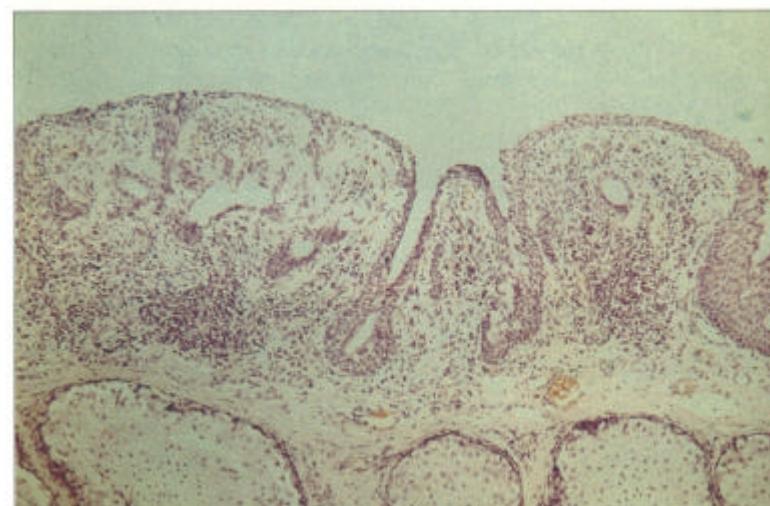
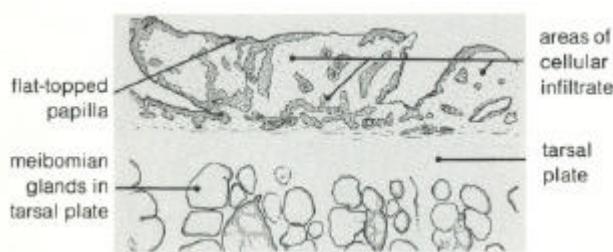
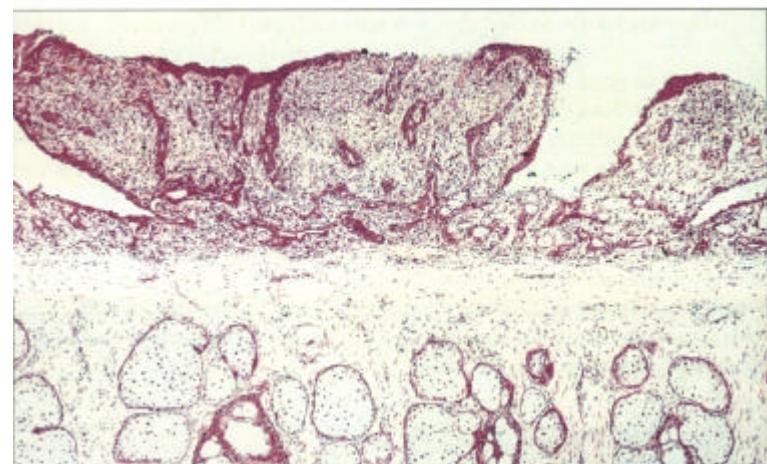


Fig. 5.9 This histological section of conjunctiva and part of the underlying eyelid from a case of vernal conjunctivitis shows the flat topped contour of the giant papillae viewed at low power. The conjunctiva is heavily infiltrated by round cells and the section also includes part of the tarsal plate and meibomian glands which are normal.

Fig. 5.10 A high powered histological section of vernal conjunctivitis shows typical papillae with epithelial downgrowth to form crypts, at the base of which lie the mucus producing goblet cells. The papillae have a loose stroma in which collections of lymphocytes and plasma cells can be seen. Eosinophils, which are present in great numbers during the active phase of the disease, are not seen in this section.

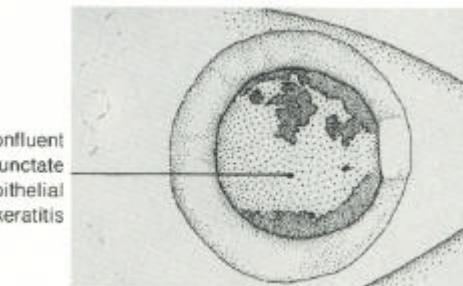


Fig. 5.11 This patient illustrates the early corneal changes seen in vernal disease. There is a fine punctate epithelial keratopathy consisting of fine grey dots which may, in more severe forms of the disease, become confluent. By courtesy of Mr RJ Buckley.

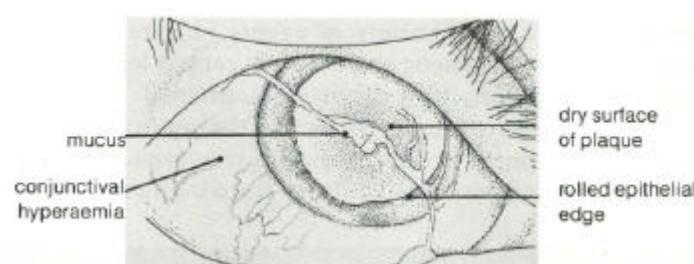
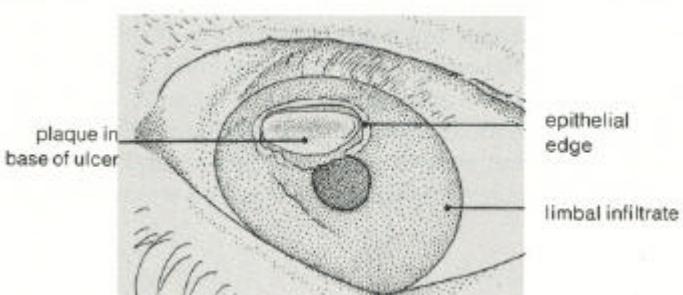
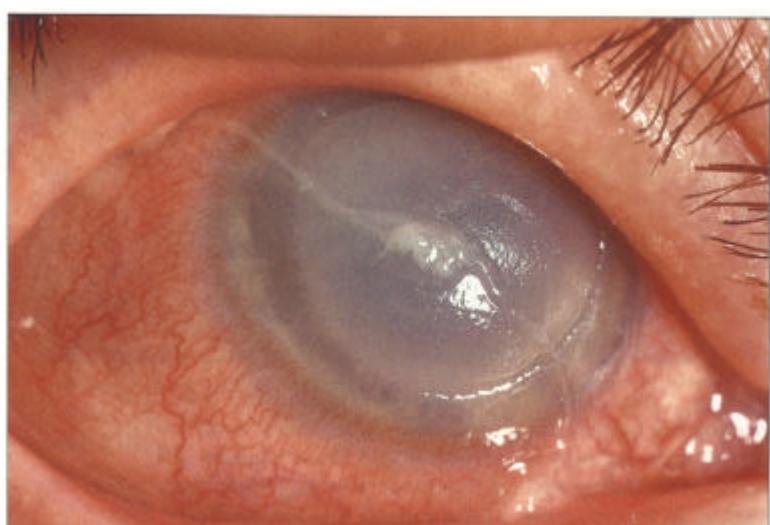
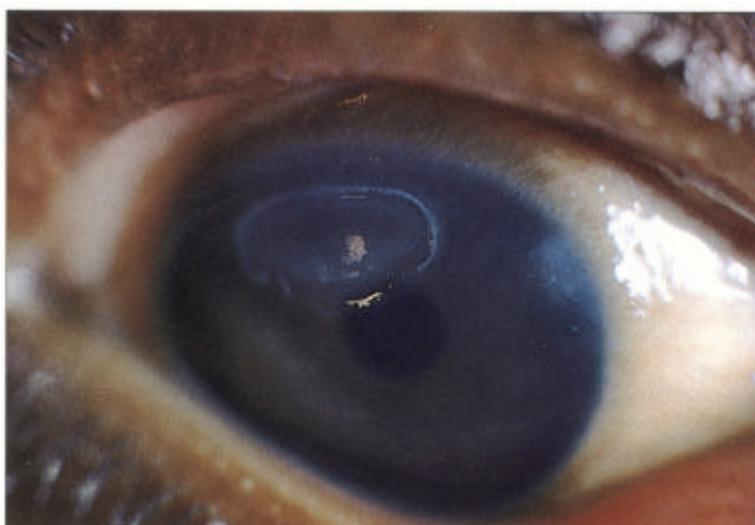


Fig. 5.12A vernal ulcer characteristically develops in the upper half of the cornea during active phases of the disease and is shown here stained with fluorescein. The edge of the ulcer is surrounded by whitish, heaped-up epithelium. The base is composed of abnormal mucus which is deposited with fibrin and other serum constituents as a grey plaque. When established, this plaque prevents healing occurring. Superficial vessels can be seen extending into the cornea from the adjacent limbal arcades. An area of superficial corneal infiltration can be seen nearer the limbus on the nasal side of the cornea. By courtesy of Mr RJ Buckley.

Fig. 5.13 This is a more severe example of a vernal ulcer showing a large area of central ulceration with established plaque formation. This example illustrates the nonwetting properties of the plaque and the raised epithelial edge, which is indicative of poor healing in the presence of plaque. Peripheral to the ulcer the cornea is relatively clear, although limbal vessels are starting to grow centrally. The conjunctiva is hyperaemic and a strand of typically 'stringy' mucus lies on the surface of the eye.

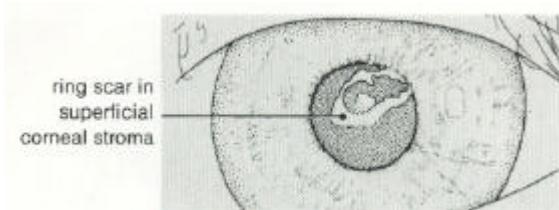
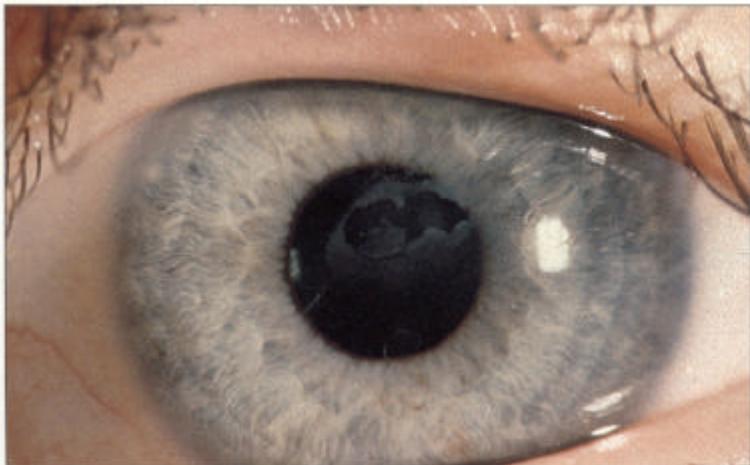


Fig. 5.14 Following treatment with intensive local steroids and acetylcysteine drops, this cornea has become re-epithelialized, leaving a typical ring scar at the site of the ulcer. In established cases, it is necessary to remove the mucus plaque by superficial keratectomy and prevent the production of additional mucus in order to allow healing to take place.

GIANT PAPILLARY CONJUNCTIVITIS

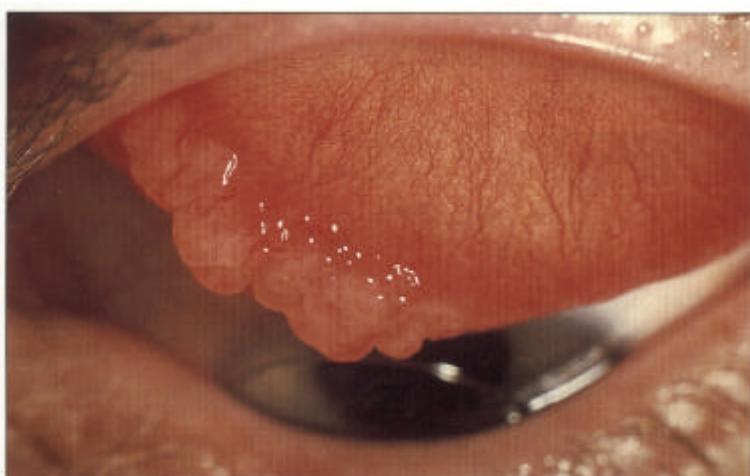
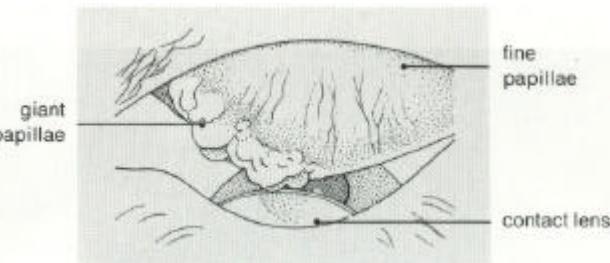


Fig. 5.15 Giant papillary conjunctivitis is a chronic condition affecting the upper tarsal conjunctiva. It has been described in patients wearing soft contact lenses and in association with protruberant suture ends at the upper limbus, following cataract removal. In this example, a hard contact lens has produced giant papillae at the medial end of the upper border of the tarsus with a



fine papillary reaction elsewhere. The presence of eosinophils and mast cells in the papillae have led some authors to suggest an allergic basis for the reaction, although the condition can be distinguished from vernal conjunctivitis by the lack of changes elsewhere in the conjunctiva, the lack of an atopic background history and the presence of an associated foreign body in the eye.

DRUG HYPERSENSITIVITY REACTIONS

Contact hypersensitivity reactions may arise in the conjunctivae or eyelids from a wide variety of agents but are commonly related to the use of cosmetic preparations, contact lens solutions or topical medications (eye drops or ointments). Substances may also be transferred to the periocular tissues from the hand through eye rubbing. The skin changes on the eyelids resemble those of a contact dermatitis whilst in the conjunctiva there is

a primarily follicular response. Symptoms include redness, irritation, discharge but especially itching of the eye. Patients may also complain that symptoms are most marked immediately following the application of the drop or ointment. The pathogenesis involves delayed (cell-mediated) hypersensitivity and the condition evolves gradually over several days or weeks unless previous sensitization has occurred when its onset may be acute.



Fig. 5.16 This patient has atypical dermatitis following three weeks of treatment to the right eye with topical neomycin drops. The right lower eyelid is erythematous and slightly swollen, while the skin of the upper eyelid and around the left eye is entirely normal. Lower down the face, the appearance of the skin of both cheeks is rosacealike and is unrelated to the hypersensitivity reaction.



Fig. 5.17 In a more severe reaction, such as in this case where the patient had received atropine ointment, the swelling and erythema are more marked, the area of involvement is more extensive, and the skin may take on a weeping eczematous appearance.

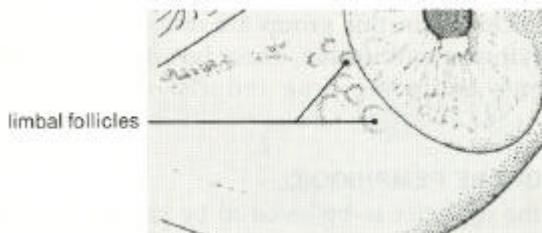
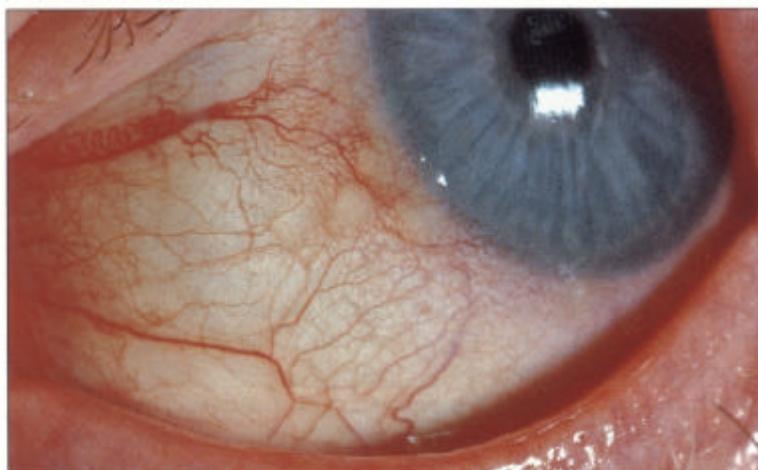


Fig. 5.18 Bulbar follicles are frequently seen in drug hypersensitivity reactions. This illustration shows a typical grouping of bulbar follicles at the limbus of a sensitized patient who has recommenced treatment with trifluorothymidine drops (once used to treat herpes simplex keratitis). The appearance is similar to that of phlyctenular conjunctivitis in which a delayed hypersensitivity response may occur in conditions such as tuberculosis. By courtesy of Dr AHS Rahi.

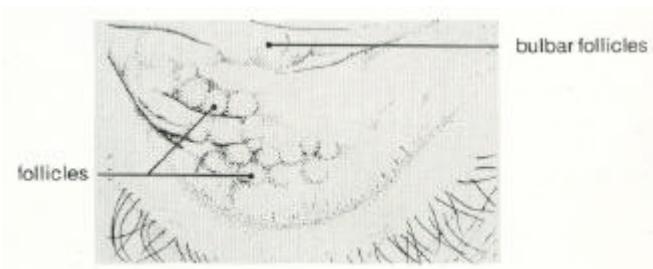
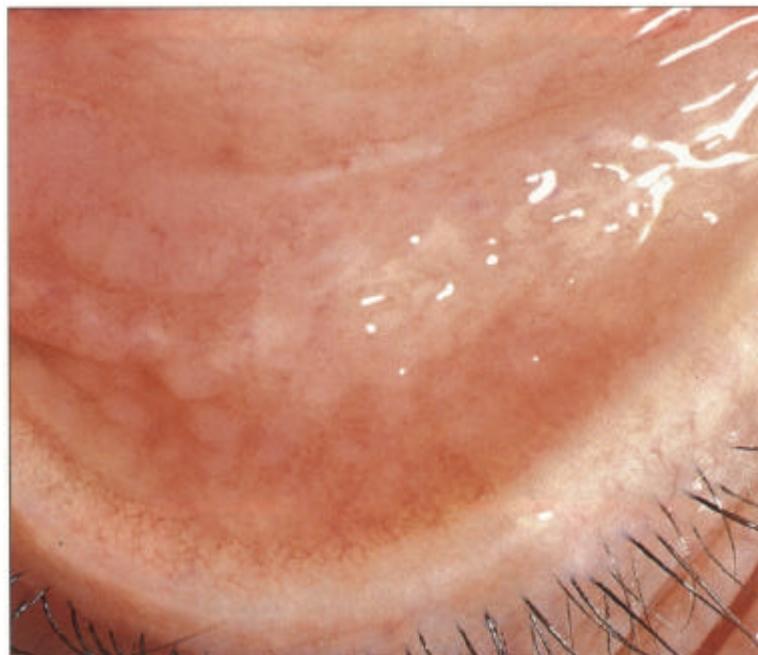


Fig. 5.19 The conjunctival changes shown in this photograph are also the result of hypersensitivity to trifluorothymidine drops, but similar changes may be seen with a variety of other drops, including pilocarpine, eserine, idoxuridine and many of the topically applied

antibiotics. The whole lower tarsus and fornix are covered by follicles which also extend on to the bulbar conjunctiva. There is also an associated conjunctival oedema and hyperaemia. By courtesy of Dr AHS Rahi.

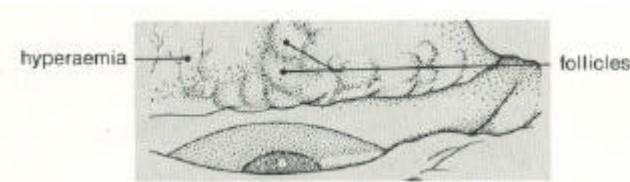


Fig. 5.20 The upper tarsus of the same patient as in Fig. 5.18 shows hyperaemic vessels and follicles extending from the medial side along the upper edge of the tarsus. By courtesy of Dr AHS Rahi.

OCULOCUTANEOUS CICATRICIAL DISORDERS

This is a heterogeneous group of conditions in which the skin, eye and mucous membranes are damaged through immune reactions giving rise to, amongst other effects, a cicatrizing conjunctivitis. Included in this group are mucous membrane pemphigoid, erythema multiforme, linear IgA disease, dermatitis herpetiformis and some drug induced disorders. The

diagnosis, which involves the cooperation of ophthalmologist and dermatologist, may depend on tissue biopsy and immunohistochemistry. Conjunctival biopsies, especially in the fornices, are better avoided as they may worsen scarring and it is often preferable to biopsy skin or other mucosal lesions in order to achieve a diagnosis.

MUCOUS MEMBRANE PEMPHIGOID

This autoimmune disorder is believed to be caused by autoantibodies to mucosal basement membrane. About 70% of patients presenting with cutaneous pemphigoid have ocular changes, whereas in those presenting with ocular disease about 20% have cutaneous disease. The condition usually presents to the ophthalmologist as chronic conjunctival inflammation with a thick mucous discharge. The clinical diagnosis is suggested by the presence of one or more of the other features of the disease which include scalp lesions, oesophageal, buccal and genital ulceration. Not all features may be present nor are

they necessarily active simultaneously although it may be possible to find scarring as evidence of earlier activity. In the early stages there is symblepharon formation in the lower fornix with loss of the caruncle. With active disease, areas of conjunctival ulceration stain with fluorescein and resolve with further scarring. Progressive conjunctival scarring leads to symblepharon and entropion formation and tear film instability which in turn gives rise to corneal opacification. Treatment in the early stages of the disease includes topical and systemic steroids and immunosuppression. Dapsone or sulphapyridine may also control the disease in some patients.

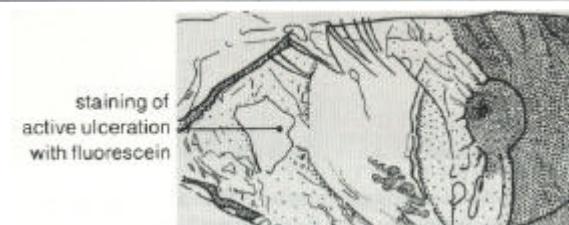
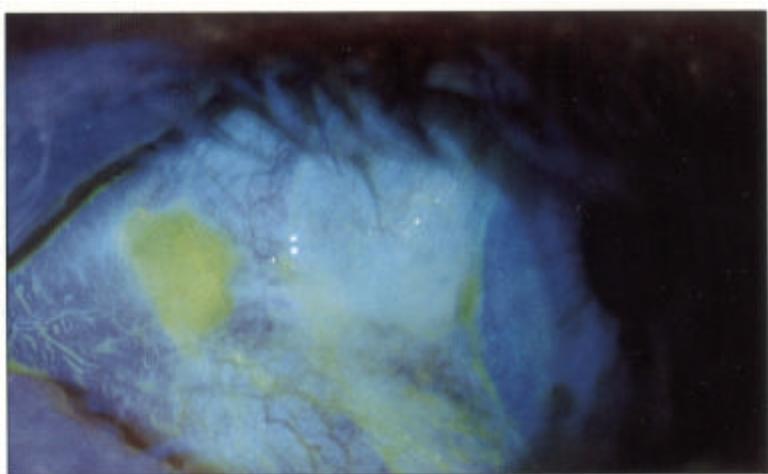
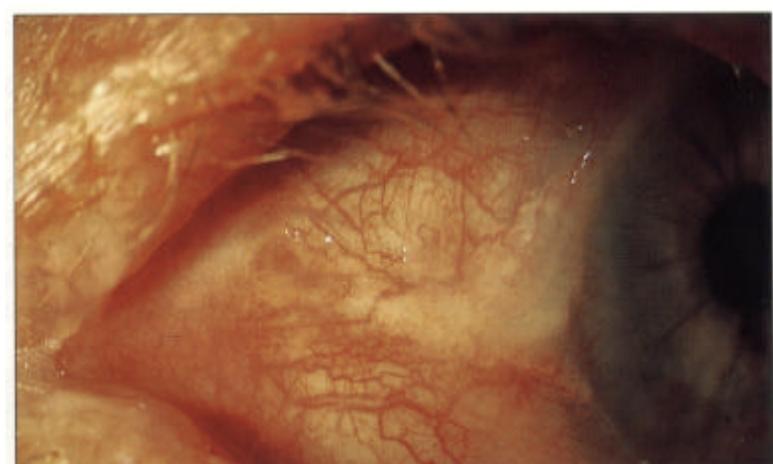


Fig. 5.21 In order to demonstrate ulceration of the conjunctiva in active mucous membrane pemphigoid, fluorescein has been instilled in this case and the ulcerated area is clearly delineated.

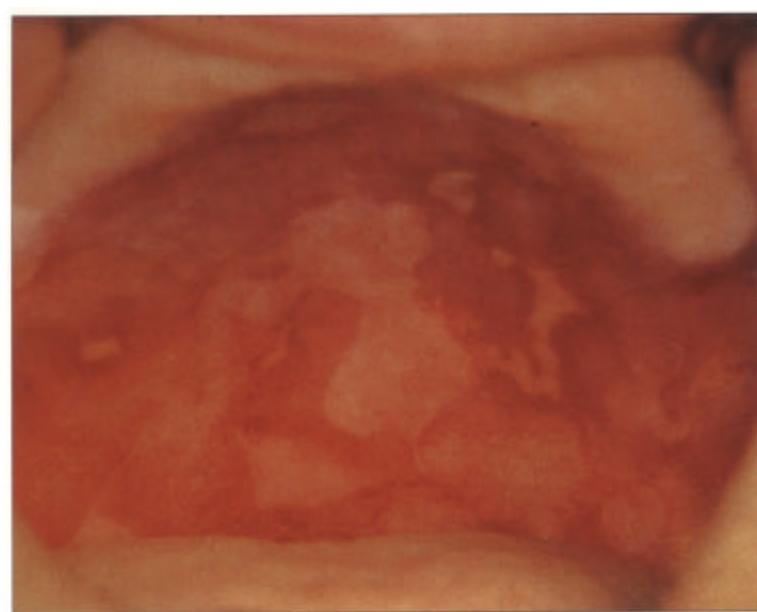


Fig. 5.22 There is extensive buccal ulceration visible on the soft and hard palate of this edentulous patient. The painful mouth ulcers had been erroneously attributed by the patient to poorly fitting dentures.

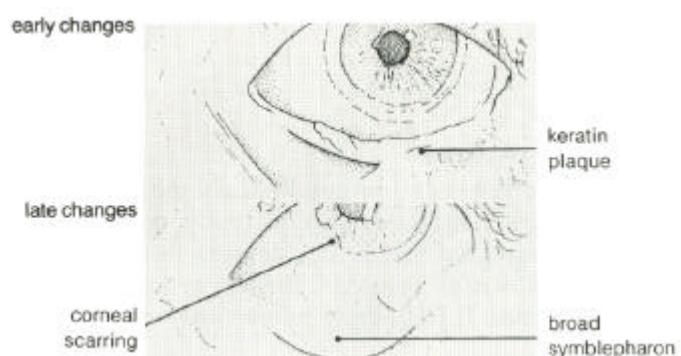
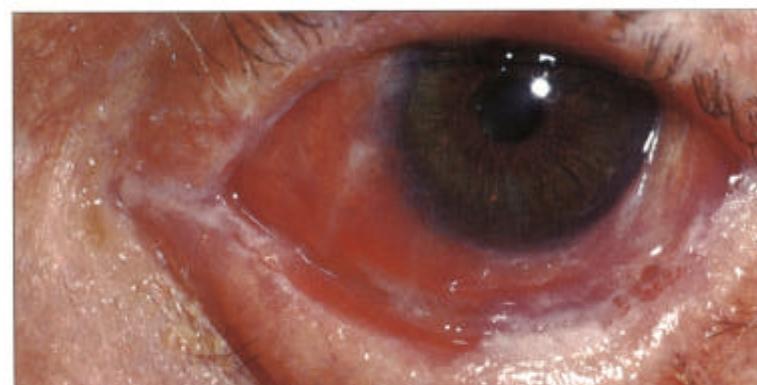


Fig. 5.23 Early disease usually obliterates the caruncle and causes progressive loss of the fornices with broad symblepharon. This example (top) shows the early changes in mucous membrane pemphigoid. There is a broad symblepharon and a foamy keratin plaque.

The slow inexorable progression of the disease is illustrated by this picture (bottom) of the same patient one year later. The inflammation diminishes as more scarring occurs, as do the conjunctival plaques. The scarring, which has progressed to involve the inferior part of the cornea, will eventually cover it completely.

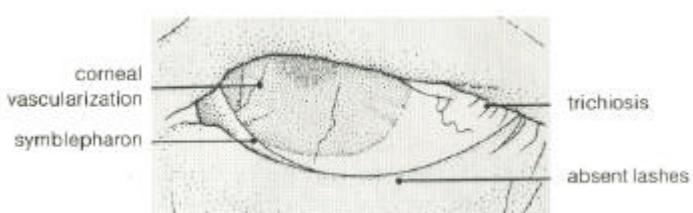
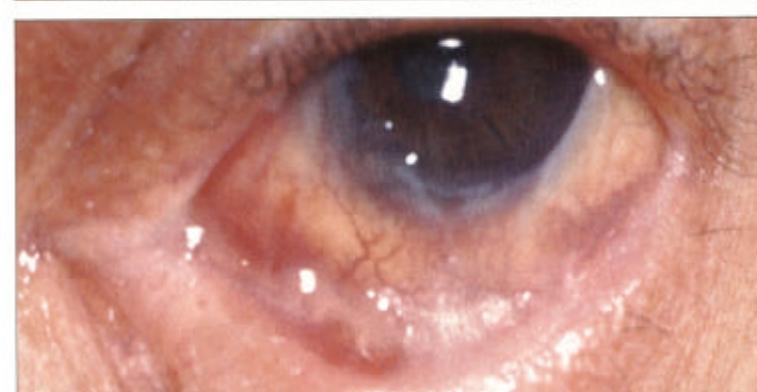
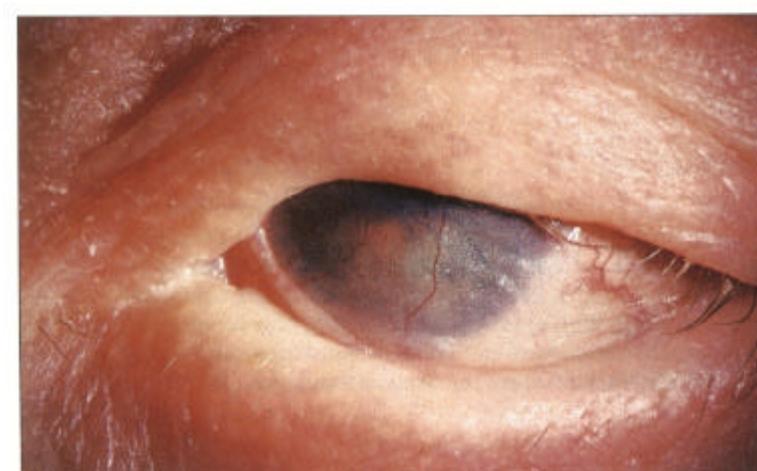


Fig. 5.24 This example illustrates a late stage of mucous membrane pemphigoid with symblepharon formation, corneal scarring, and vascularization resulting from corneal drying: this is associated with loss of mucus producing cells in the conjunctiva. The lashes have been removed during the course of the disease to prevent further corneal trauma from trichiasis and cicatricial entropion.



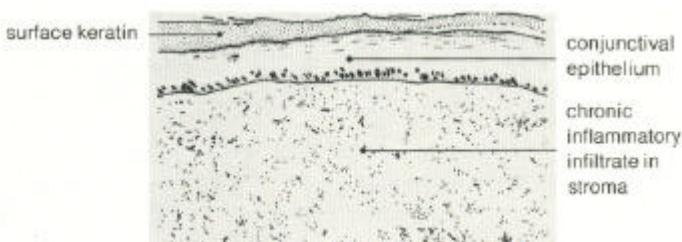
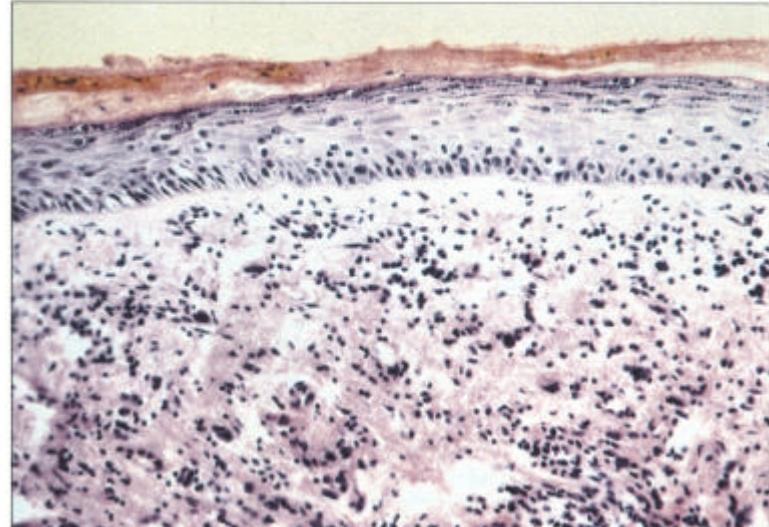


Fig. 5.25 Histology of the conjunctiva in mucous membrane pemphigoid (stained with haematoxylin and eosin) shows a thickened conjunctival epithelium with epidermalization and total absence of goblet cells. The epithelium has a 'prickle cell' layer and is covered by a thin layer of keratin. The underlying stroma shows a chronic inflammatory cellular infiltration and oedema.

ERYTHEMA MULTIFORME

Erythema multiforme is an immunologically mediated vasculitis in which circulating antigen/antibody complexes are precipitated. These give rise to focal lesions in the skin and, in its variant known as Stevens-Johnson syndrome, in the mucous membranes. It frequently follows the administration

of drugs, such as sulphonamides or phenobarbitone, bacterial infection, or viral infections such as herpes simplex. The disease is characterized by its acute onset and lasts 2-3 weeks, during which time complete resolution occurs. In some cases, serious complications, such as renal failure, may develop.



Fig. 5.26 The rash of erythema multiforme starts on the extensor surfaces of the arms and legs and spreads to involve the trunk. The skin lesions consist of an area of erythema surrounding a paler centre, which may ulcerate to give a 'target' appearance. The lesions heal without scarring.



Fig. 5.27 In its more severe form, with mucous membrane involvement, erythema multiforme is known as the Stevens-Johnson syndrome. This patient shows extensive oral ulceration involving the upper and lower lips. Patients are acutely ill, losing serum and protein through their skin, unable to eat and at grave risk of secondary infection. Systemic steroids, fluid replacement and prophylactic antibiotics are the basis of treatment.

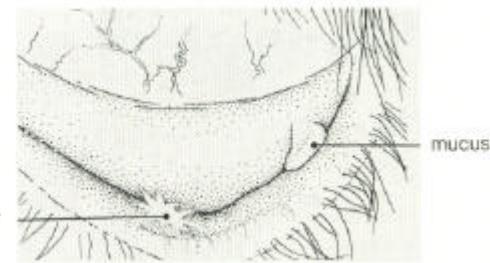
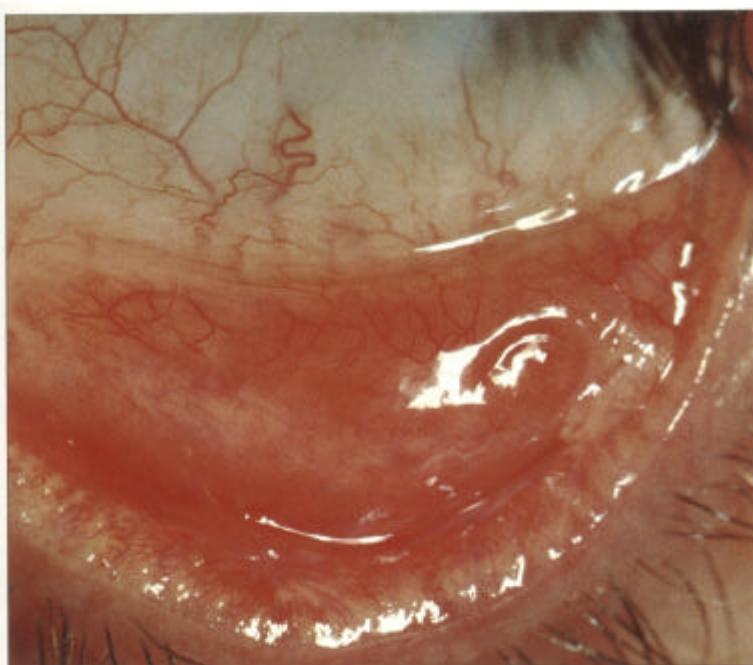


Fig. 5.28 Stevens-Johnson syndrome produces focal ulcerative changes in the conjunctiva where a severe pseudomembranous conjunctivitis may also occur in the acute stages. In the resolving phase, healing is accompanied by scar formation which is typically focal as seen here on the lower tarsus. The ocular surface is affected as a secondary phenomenon due to tear film changes and progressive corneal opacification may ensue even though the conjunctival signs remain stable.

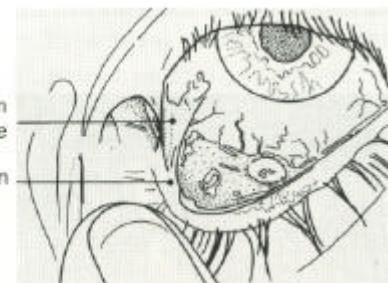


Fig. 5.29 Symblepharon formation is a frequent result of ocular involvement in erythema multiforme. In this example, a fibrous band is seen at the medial canthus stretching from the lower punctum across to the bulbar conjunctiva. These symblephara are narrow, in contrast to the broad bands of ocular pemphigoid.

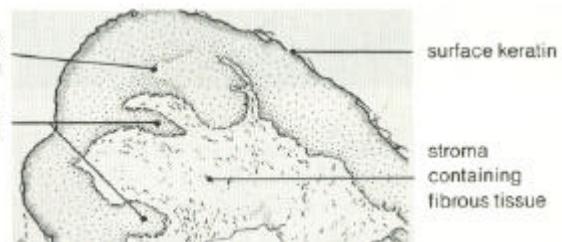
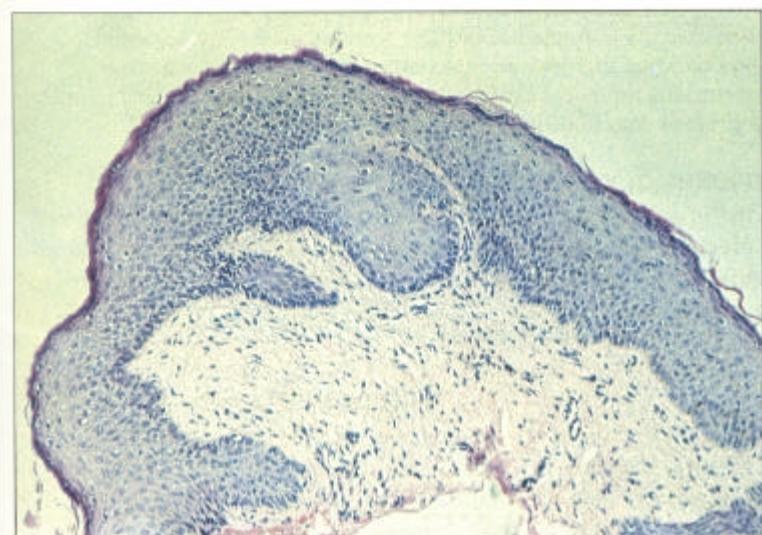


Fig. 5.30 Histological changes in end stage erythema multiforme may be similar to those seen in mucous membrane pemphigoid. Patchy epidermalization of the conjunctiva has taken place, as evidenced by rete peg formation, thickened epithelium with a prickle cell layer, and keratin formation, giving the histological appearance of skin without hair follicles or other appendages. The underlying stroma shows marked fibrous tissue formation.

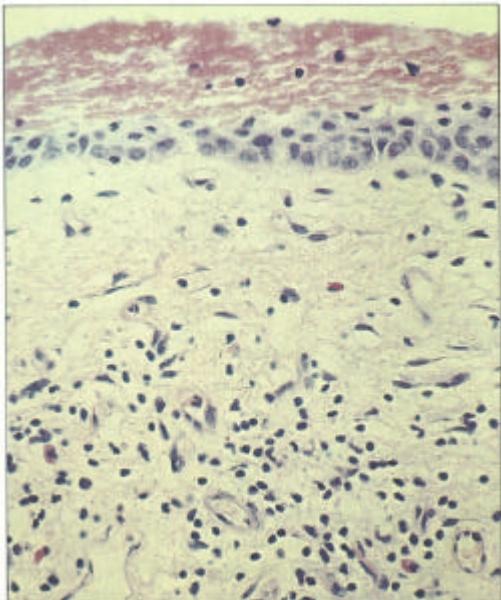


Fig. 5.31 A high-power view of a section of conjunctiva in the acute phase of Stevens-Johnson syndrome shows a thinned conjunctival epithelium with fibrinous exudate on the surface. The stroma has been heavily infiltrated by lymphocytes and eosinophils: the occasional polymorphonuclear leucocyte is also present.

GRAFT VERSUS HOST DISEASE

Chronic graft versus host (GVH) disease occurring following bone marrow transplantation for conditions such as acute myeloid leukaemia may cause lesions of various mucous

membranes including the mouth, oesophagus and conjunctiva. The symptomatology of the eye disease is that of severe dry eyes but examination usually reveals cicatrizing changes of the conjunctiva.

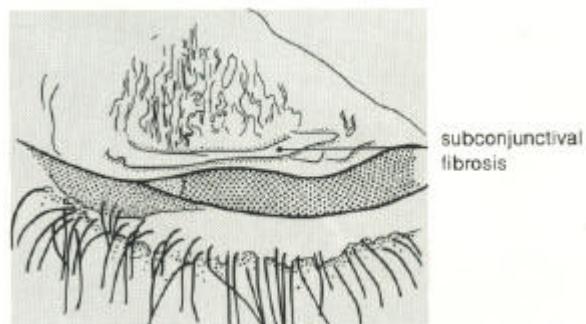


Fig. 5.32 This patient developed GVH disease which was successfully treated by immunosuppressive therapy 12 months after bone marrow transplantation. The scarring on the upper tarsus shown in this picture has persisted unchanged for 10 years but continuous intensive artificial tear supplements are required in order to prevent degradation of the corneal surface.

EPIDERMOLYSIS BULLOSA

This is a group of rare recessively inherited disorders in which defects in basement membrane of the skin and mucus membranes is associated with severe scarring in relationship to minor trauma.



Fig. 5.33 Scarring of the hands is severe in these children. They also develop oral, oesophageal and anal strictures. Great care is required during either examination or anaesthesia to prevent skin damage from minor trauma.

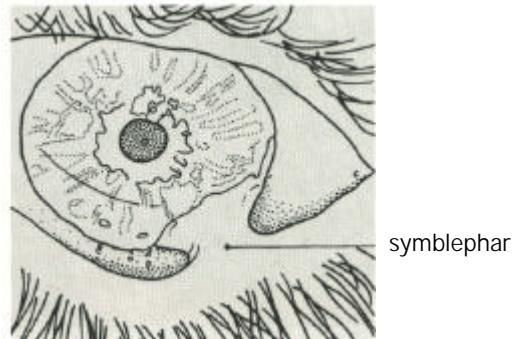
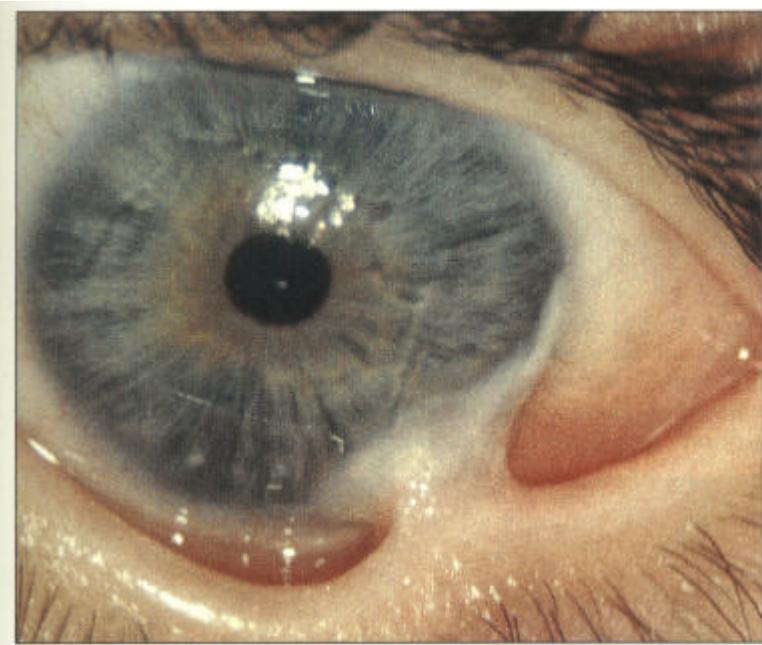


Fig. 5.34 Children develop symblepharon particularly at the medial and lateral canthi. Recurrent corneal erosions are common and are associated with a fine subepithelial scarring.

OCULAR SURFACE DISORDERS

A healthy ocular surface is an essential requirement for corneal refraction and transparency and for the protection of the globe from disease. It is maintained by the total environment provided by the eyelids, conjunctiva and adnexal secretory glands and the malfunction of any element can lead to secondary ocular surface disease. The tear film consists of mucus and watery tears secreted by the goblet cells and accessory lacrimal

glands in the conjunctiva, and an oily superficial layer secreted by the meibomian glands along the lid margin. Recent studies have shown that the mucus layer is the major constituent. It maintains even wetting of the ocular surface; the oily film retards evaporation and maintains the optical integrity. The watery tears provide oxygen and nutrition to the conjunctiva and corneal epithelium.

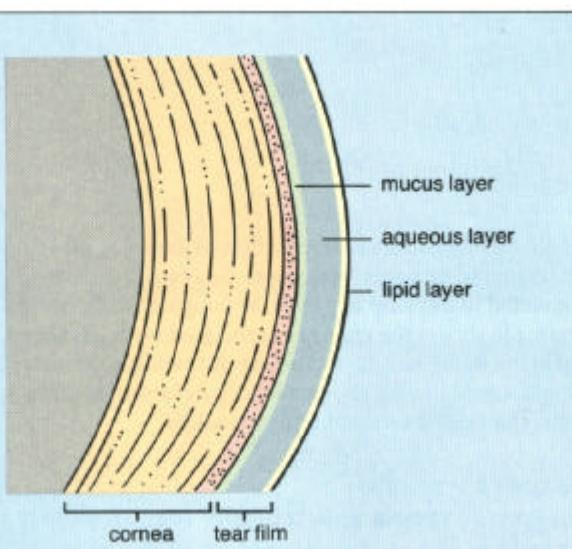


Fig. 5.35 Examination in cases of ocular surface disease includes an assessment of lid function, lagophthalmos, eyelid blinking, or abnormal lid architecture. An inspection of the whole conjunctival surface should be carried out together with the surface of the globe. The adequacy of the precorneal tear film may be judged qualitatively by the presence of excess debris or mucus and by observation of a decreased break-up time or quantitatively by looking at the marginal tear strip. Schirmer's test is not a reliable measure and the results are not always readily reproducible in an individual patient. Frothy tears indicate excessive meibomian gland secretion which may destabilize the tear film.

KERATOCONJUNCTIVITIS SICCA

Keratoconjunctivitis sicca is a common cause of chronically irritable sore eyes which usually occurs in the late middle-aged and elderly female due to a gradual reduction in lacrimal secretions. Similar symptomatology and findings may be present in other conditions where other components of the normal tear film, such as mucus and meibomian secretions, are reduced or absent. Dry eyes have a deficient or unstable

tear film, which contains mucus and debris and has a poor or absent meniscus at the lid margins. In severe cases, mucus filaments can be seen attached to the cornea and these exacerbate the symptoms. Apart from idiopathic keratoconjunctivitis sicca, similar changes are seen with rheumatoid arthritis, Sjögren's syndrome, sarcoidosis, and local conjunctival conditions caused by trauma, infection, or drugs.

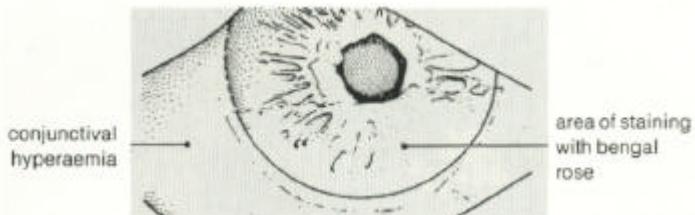
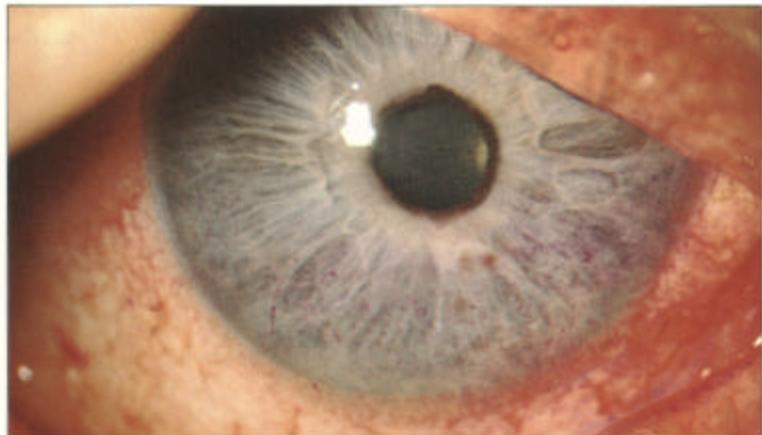


Fig. 5.36 The clinical picture of keratoconjunctivitis sicca shows diffuse punctate epithelial erosions over the lower one-third of the corneal epithelium which stain as red spots with bengal rose: the staining usually extends on to the lower bulbar conjunctiva in the exposure area. There is some associated conjunctival hyperaemia.

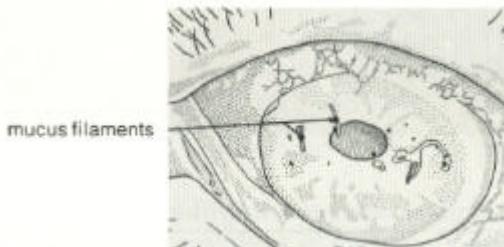
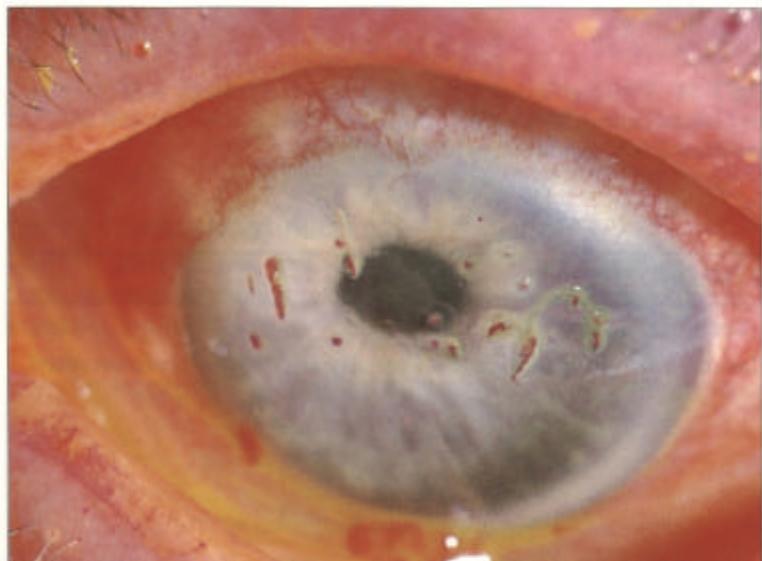


Fig. 5.37 In severe keratoconjunctivitis sicca, threads of dried mucus and epithelial cell debris become attached to particularly dry locations on the corneal epithelium. This condition is known as filamentary keratitis. Rose bengal stains mucus and devitalized cells; in this example it is seen staining the filaments more avidly than is the fluorescein which has also been instilled. Filamentary keratitis produces severe discomfort and photophobia; treatment lies in tear film augmentation and topical mucolytic agents. By courtesy of Mr RJ Buckley, Moorfields Eye Hospital, London, UK.



Fig. 5.38 A common association of keratoconjunctivitis sicca is rheumatoid arthritis. Among sufferers of the disease, 15% may be expected to develop dry eyes, although usually not severe. This example shows the changes associated with advanced rheumatoid arthritis of the hands, including the swollen metacarpal phalangeal joints, ulnar deviation, swan-neck deformities of the fingers, and the skin changes associated with vasculitis.

Sjogren's syndrome

Sjogren's syndrome is typically seen in elderly women and is characterized by a combination of dry eyes, a dry mouth and frequently rheumatoid arthritis.



Fig. 5.39 This patient illustrates the typical changes associated with Sjogren's syndrome. Patients also have a small but statistically significant risk of developing a lymphoma. Mild cases respond to treatment with wetting agents. Occlusion of the lacrimal puncta by cauterization is a useful way of alleviating symptoms in the more severe cases.

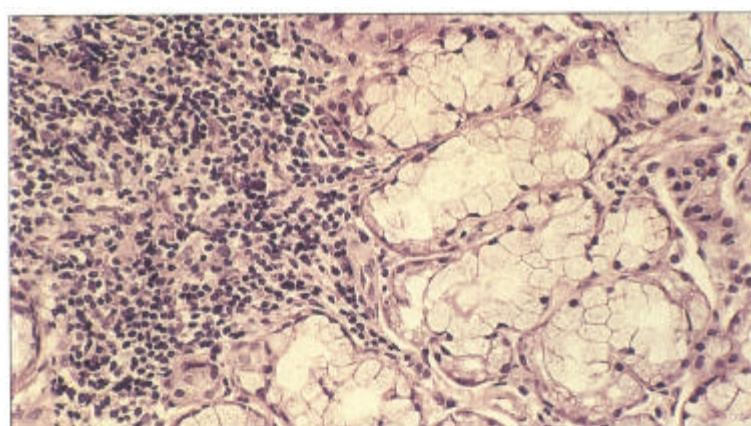


Fig. 5.40 Biopsy of the lip mucosa confirms the diagnosis of Sjogren's syndrome by demonstrating a chronic inflammatory infiltration of the labial accessory salivary glands. Patients also have a typical autoantibody profile with SS A and SS B. By courtesy of Dr PH McKee.



Mikulicz's syndrome

Fig. 5.41 Mikulicz's syndrome is usually caused by sarcoidosis. As well as keratoconjunctivitis sicca resulting from dacryoadenitis, there is bilateral parotitis. This is the same patient as shown in Fig. 5.37. There is characteristic bilateral parotid swelling from glandular infiltration.

SUPERIOR LIMBIC KERATOCONJUNCTIVITIS

Superior limbic keratoconjunctivitis is an ocular surface disorder in which the predominant changes occur in the upper limbus and tarsal conjunctiva. Most cases are associated with a history of dysthyroid eye disease although the precise pathogenesis remains uncertain. It is likely that changes in intraorbital pressure or defective blinking due to upper lid retraction produces a mechanical alteration in the normal lid-globe interaction leading to surface cell damage on contiguous conjunctiva and upper cornea. The symptoms of ocular discomfort can usually be relieved by wetting agents.

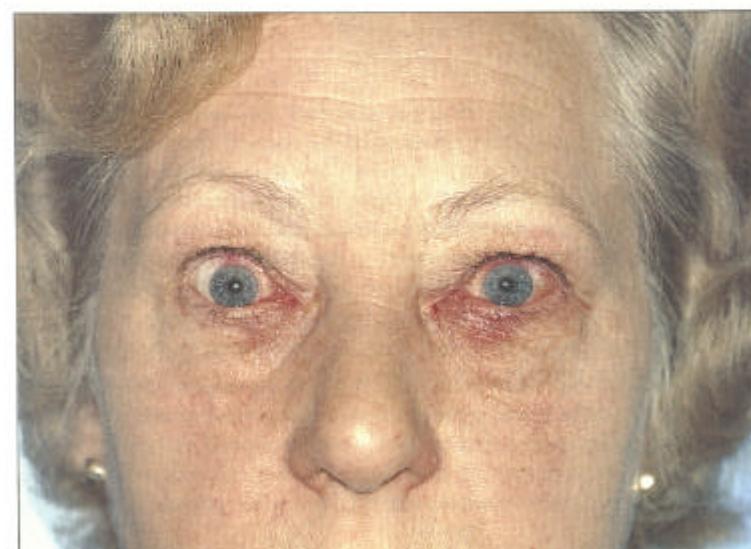


Fig. 5.42 This patient, who had previously been treated for thyrotoxicosis, presented with a history of sore eyes for many months. There is some lid oedema and lid retraction present.



Fig. 5.43 Rose bengal drops have been instilled into both eyes which demonstrated the characteristic upper limbal staining from the ten o'clock position to the two o'clock positions in each eye. Typically, there is bilateral involvement which is best seen in the position of downgaze. The changes are more marked in the left eye where a diffuse limbal infiltration extends on to the cornea and upwards on to the bulbar conjunctiva.

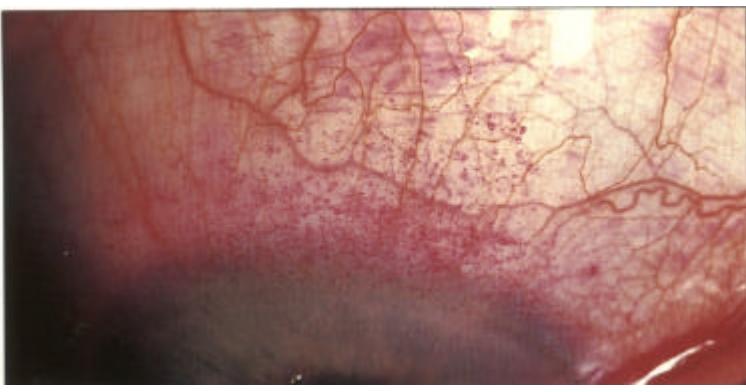


Fig. 5.44 This patient demonstrates a less severe example of superior limbic keratoconjunctivitis in which the changes are limited to scattered punctate staining of the limbus, associated with mild hyperaemia. The tarsal plate shows hyperaemia with a mild papillary reaction.

DELLEN

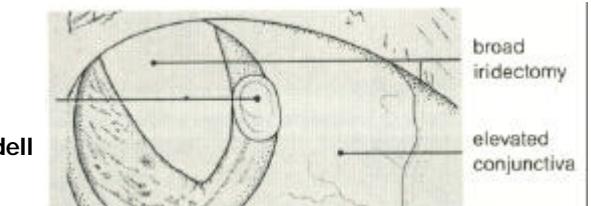
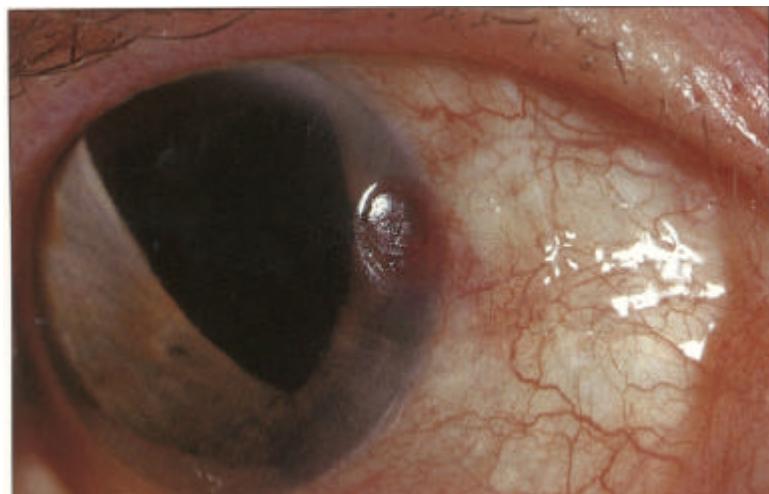


Fig. 5.45 Local drying of the corneal surface can, under certain conditions, lead to focal dehydration of the corneal stroma. A saucer-shaped excavation of the cornea, known as a dellen, can form adjacent to an elevation (usually at the limbus) which either prevents normal apposition of the lid to the corneal surface or disturbs the preocular tear film. The epithelium within the dellen may be somewhat eroded, but there is essentially no loss of tissue, and the condition responds to rehydration by padding the eye. This example, stained with rose bengal, was associated with local conjunctival elevation following squint surgery to an aphakic eye.

NEUROTROPHIC KERATITIS

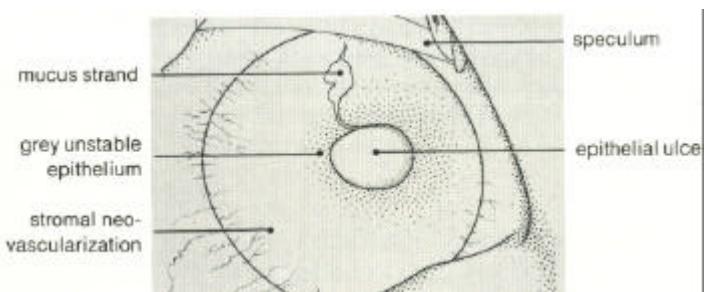
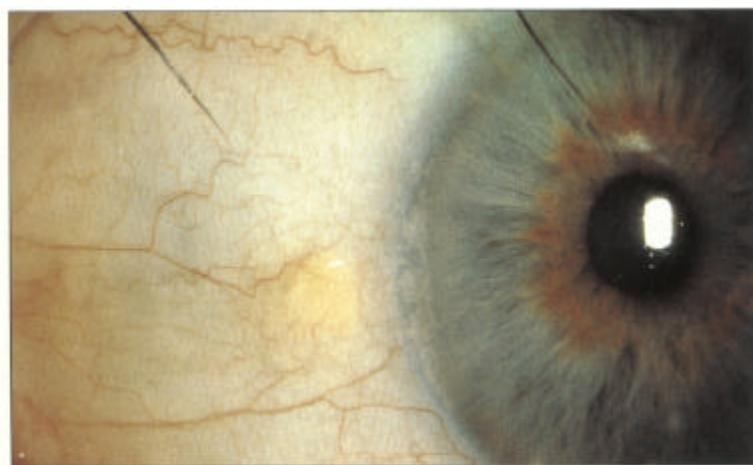


Fig. 5.46 Neurotrophic keratitis results from partial or complete corneal denervation. The extreme condition, which results from complete loss of function of the ophthalmic division of the trigeminal nerve, is known as neuroparalytic keratitis. Very soon after denervation the surface epithelial cells of cornea and conjunctiva lose their microvilli which hold the mucin layer of the tear film.

The tear film becomes unstable due to the nonwetting surface

and the eye is very vulnerable to infection and minor trauma. In the example shown, there is a shallow ulcer due to loss of epithelium, and the surrounding epithelium is grey and unstable. A permanent tarsorrhaphy may prove necessary for corneal protection.



SOLAR AND CLIMATIC EXPOSURE

Excessive exposure to outdoor conditions and especially UV radiation is associated with degenerative conjunctival changes which produce an irritable eye.



Fig. 5.47 Pinguecula may be formed in the conjunctiva adjacent to the limbus on the nasal side, or later on the temporal side. They are raised yellowish patches which gradually enlarge until they abut the cornea but do not encroach upon it. Histologically, they are formed by elastotic degeneration of collagen within the substantia propria.

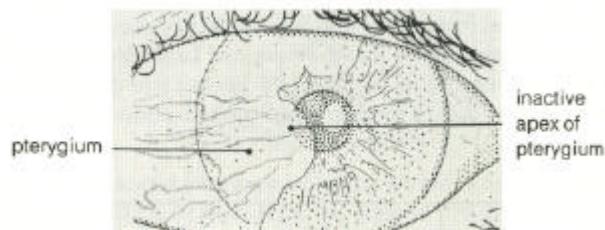
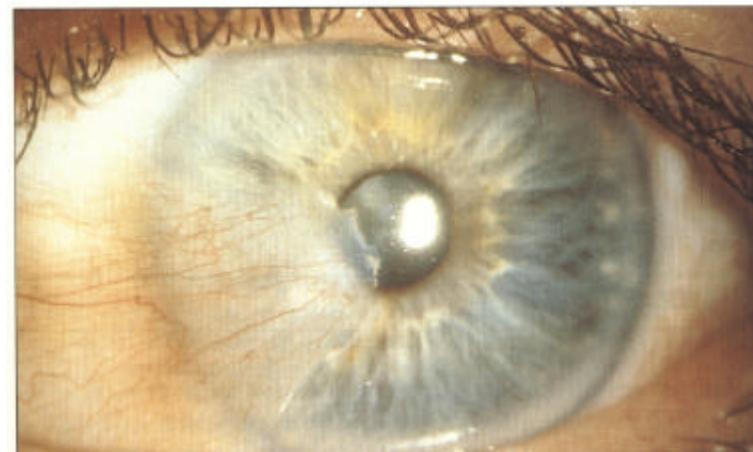


Fig. 5.45A Pterygium is a raised triangular area of bulbar conjunctiva which actively invades the cornea to produce visual symptoms if the pupillary area is involved. In temperate climates the condition progresses only very slowly and rarely causes visual symptoms, but in sunny, hot dusty regions of the world it can represent a serious threat to vision. It is usually bilateral with the nasal side of the interpalpebral area being affected most commonly. Examination of the leading edge and body of the lesion shows whether the pterygium is active by the degree of vascular dilatation in the bulk of the lesion. Surgical removal is indicated if visual impairment is threatened or if the lesion causes discomfort, but the recurrence rate is high in those countries with a high degree of solar exposure and successful removal presents a considerable surgical challenge.

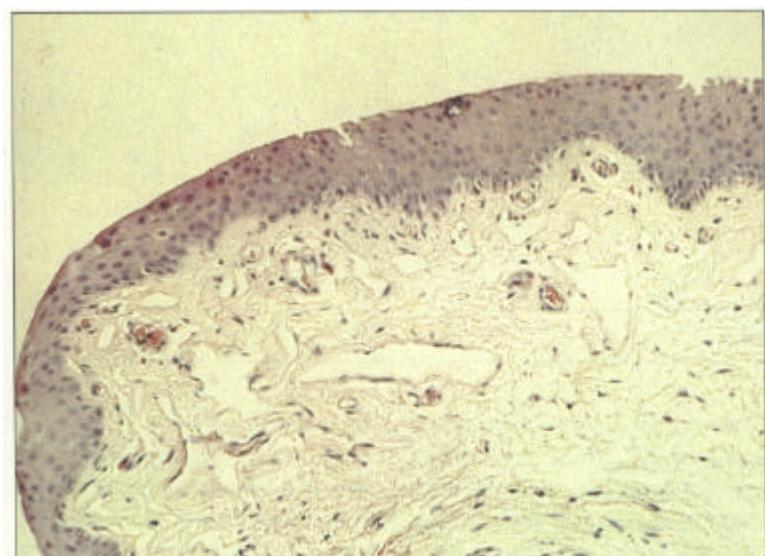


Fig. 5.49 The histology shows marked fibroblastic activity under the apex of the pterygium where Bowman's membrane has been destroyed. Elsewhere, the pterygium consists of acellular hyaline material covered by conjunctival epithelium and pseudoelastic degeneration, similar to that observed in a pinguecula (which probably represents the initial stage of the disease). This initial irregularity is thought to disturb the uniformity of the tear film causing a localized alteration in the tear meniscus and a focal area of drying (a dellen), which stimulates corneal invasion.

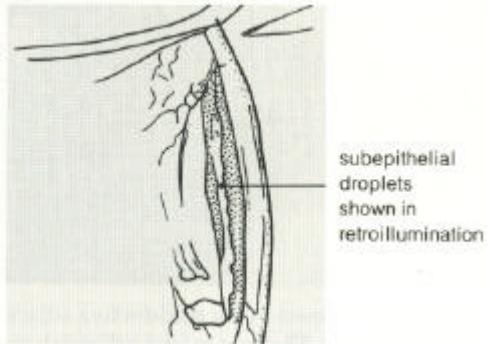


Fig. 5.50 Droplet keratopathy is another example of a condition which is associated with adverse climatic conditions. In this case it is thought to result from prolonged exposure to high levels of ultraviolet irradiation and is particularly prevalent in areas where snowy conditions reflect the sun's rays, hence its other name of Labrador keratopathy. Yellowish oily droplets are formed in the subepithelial region of the cornea and conjunctiva. In severe cases, visual impairment occurs due to the increased opacification of the cornea.

NUTRITIONAL XEROPHTHALMIA

Nutritional xerophthalmia is one of the two main clinical manifestations of vitamin A deficiency. Vitamin A is a fat soluble vitamin occurring in eggs, in the heart and liver which can be synthesized in humans from carotenoids found in yellow and green vegetables. Night blindness is the first sign of deficiency. Xerophthalmia is a major cause of world blindness, ironically frequently in areas where carotenoid containing

vegetables are plentiful but are not eaten for social or economic reasons. It usually affects children from cessation of breastfeeding to four years of age; moreover, the vitamin deficiency is compounded by protein and caloric deficiency as well as secondary systemic and ocular infection. Consequently, there is a high mortality from bowel and respiratory infections.

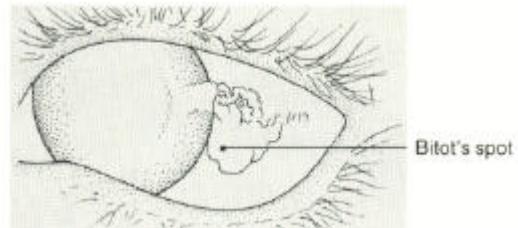
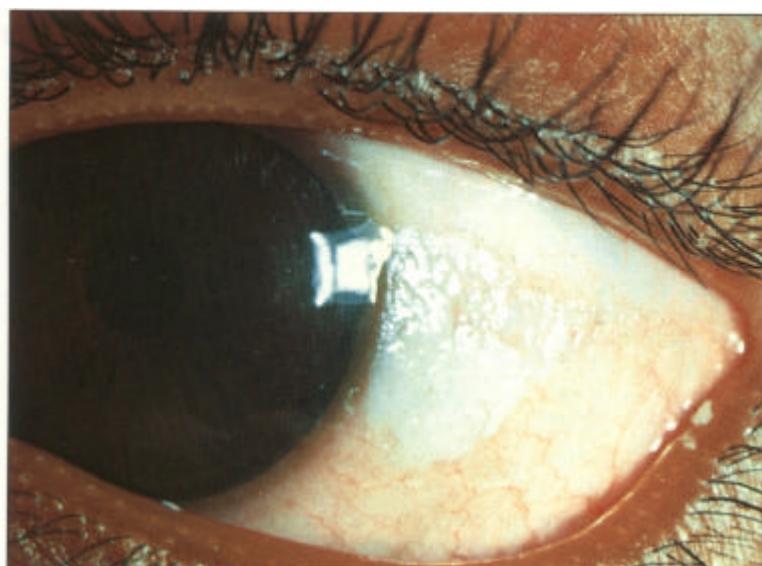


Fig. 5.51 In the vitamin A deficient eye there is a drying and wrinkling of the conjunctiva associated with the development of 'Bitot's spots'. These spots are small, white, cheese-like patches which may have a foamy appearance and do not wet easily. At this stage, a punctate keratopathy may also appear. By courtesy of Dr A Sommer.

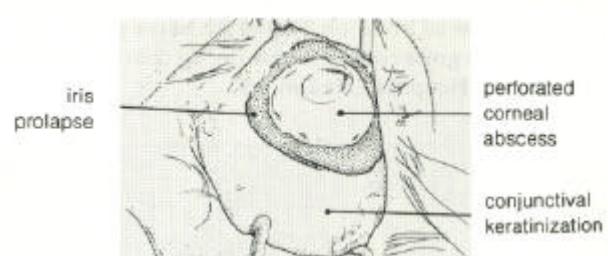
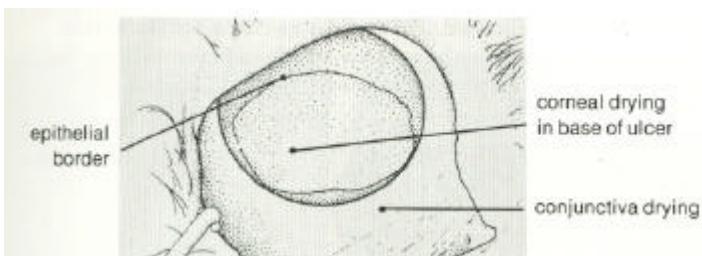
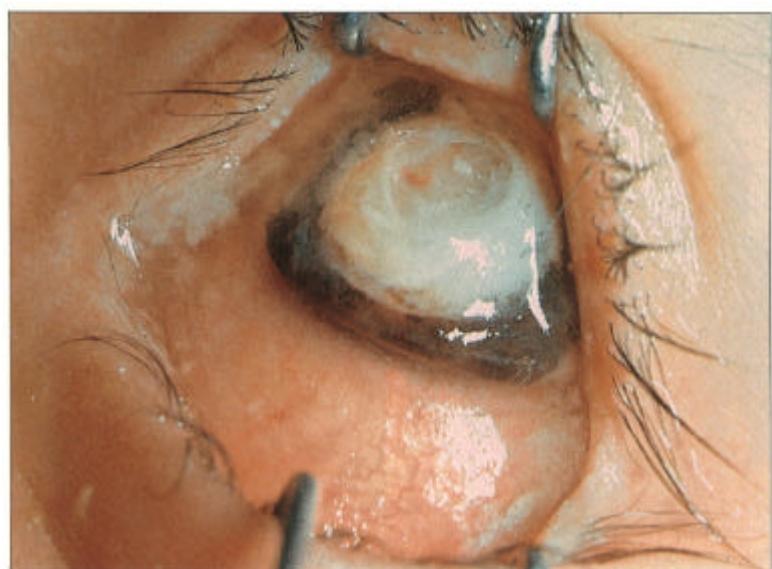
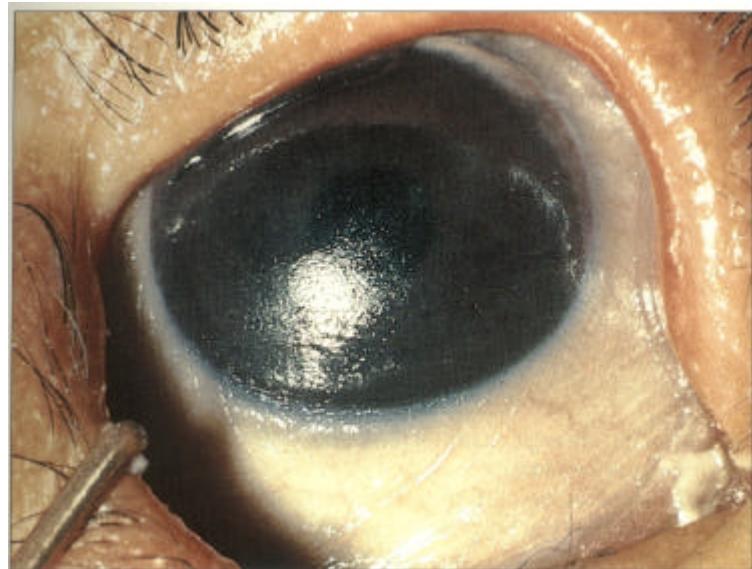


Fig. 5.52 This photograph demonstrates a late stage in the development of vitamin A deficiency in which the corneal epithelium is lost over the lower nasal part of the exposed eye. Note the dry, wrinkled conjunctiva.

Fig. 5.53 In advanced keratomalacia, the whole cornea becomes softened and opaque. At this stage, the clinical picture is often complicated by secondary infection: in this case, secondary infection has resulted in perforation of the globe and endophthalmitis. By courtesy of Dr A Sommer.

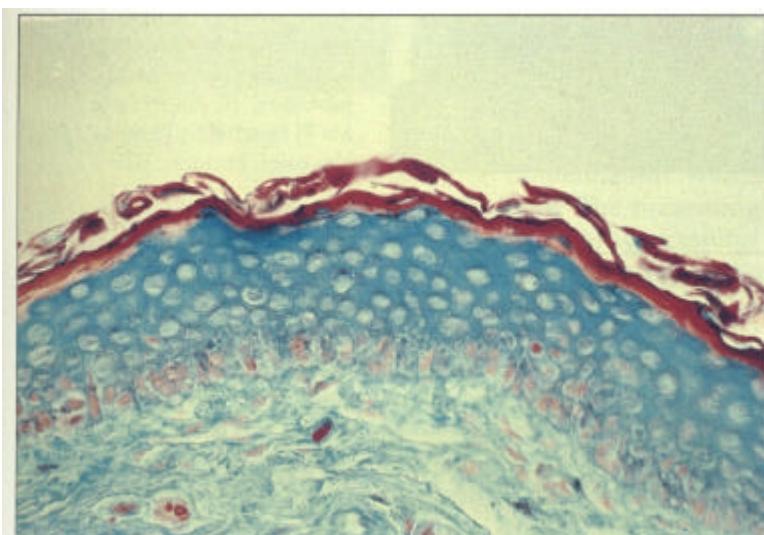


Fig. 5.54 The histological appearance of the conjunctiva in advanced keratomalacia shows a thickened epithelium with keratin formation, which stains red with a Masson stain. There is loss of goblet cells and the appearance of a prickle cell layer immediately above the basal layer. By courtesy of Dr A Sommer.

LEPROY

Leprosy is a major cause of world blindness affecting around 15 million people, of whom one million are blind. The ocular sequelae vary widely between racial groups and geographic location and are related to the predominance of lepromatous leprosy, temperate climate and health care. Damage to the eye

occurs from direct invasion of the eye by the bacilli in lepromatous leprosy or from loss of corneal sensation and defective lid closure from a 7th nerve palsy compounded by facial and hand deformities. Vision is lost from corneal exposure and infection or from chronic iritis, miosis and cataract.



Fig. 5.55 The zygomatic branch of the 7th nerve is often selectively affected because it is relatively superficial, cooler and therefore predisposed to bacterial invasion. Partial 7th nerve palsies are common, leading to gross corneal exposure. By courtesy of Mr TJ ffytche, St Thomas' Hospital, London, UK.



Fig. 5.56 The anterior chamber temperature is relatively lower than body temperature leading to direct invasion of the eye by bacilli. Corneal anaesthesia results from involvement of the corneal nerves which exacerbates the problems of exposure. A low grade chronic iritis is common which destroys iris tissue and may cause cataract. Sympathetic nerves are selectively affected in the iris as they are small and nonmyelinated. This produces characteristic severe chronic miosis which enhances the effects of lens opacities. By courtesy of Mr TJ ffytche, St Thomas' Hospital, London, UK.



Fig. 5.57 The physical deformities of leprosy with loss of the nose and fingers add to the therapeutic problems. By courtesy of Mr TJ ffytche, St Thomas' Hospital, London, UK.

DISEASES OF THE SCLERA AND EPISCLERA

Although the sclera and episclera may be affected by a wide range of diseases including degenerations and congenital anomalies, the most common and most important forms of disease in clinical practice are the inflammatory disorders. These are broadly classified as scleritis and episcleritis. The sclera is composed of collagen and elastic fibres, and is subject to the range of disease processes which affect connective tissue elsewhere in the body - hence its association with chronic inflammatory joint disease and conditions such as systemic lupus erythematosus and rheumatoid arthritis. The episclera, likewise, consists of connective tissue but, unlike the sclera, is vascularized and is responsible, in part, for the nutrition of the sclera and provides the cellular response to inflammation. Scleritis is, therefore, always accompanied by overlying episcleritis.

The sclera is the protective coat of the eye and consists of bundles of collagen and elastic tissue which are approximately 10/-15/ in width and 100,u-1501, in length, and are arranged

in a cross-cross manner. Such a structure is well adapted to the functions of the sclera which are to provide a firm protective coat for the intraocular contents and to resist distortions of the globe by the extraocular muscles. Anteriorly, the sclera is continuous with the corneal stroma, which differs in structure from the sclera both in its regular arrangement of the collagen bundles, and in its state of partial dehydration. Posteriorly, the sclera is pierced by the optic nerve and by canals which carry the posterior ciliary nerves and vessels, and the vortex veins. A knowledge of the thickness of the sclera is important in ocular surgery - it varies from 0.3mm immediately behind the insertion of the recti muscles to 1-1.35mm at the posterior pole. Anteriorly at the limbus, the thickness is 0.6mm, and at the equator it varies between 0.4 and 0.6mm.

The episclera (Tenon's capsule) acts as a synovial membrane for smooth movement of the eye. It is a fibroelastic structure covering the sclera and carries a vascular network which consists of a deep and a superficial plexus.

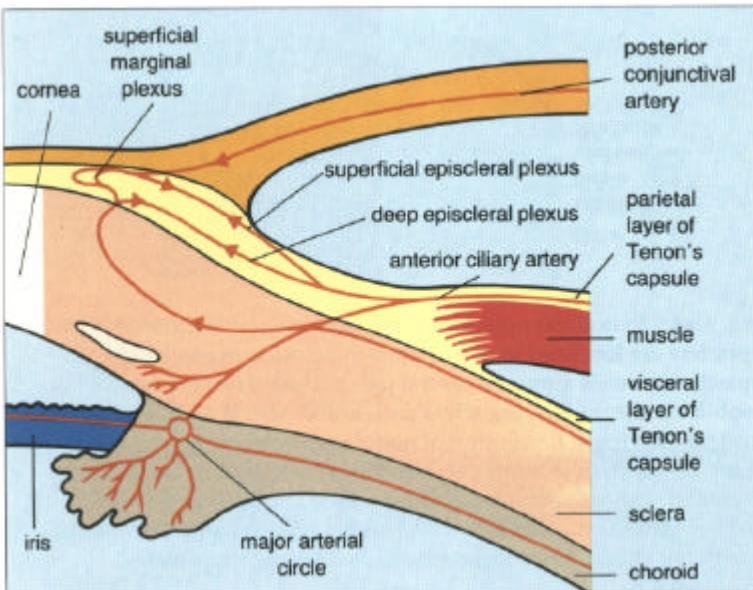


Fig. 5.58 The vascular supply of the anterior episclera and sclera are best examined using a slit lamp. The importance of understanding the vascular anatomy lies in the clues that it provides in differentiating clinical patterns of inflammation.

Three layers of vessels are visible. The conjunctival plexus is the most superficial layer and can be distinguished clinically by its ability to be moved over the underlying structures. The superficial episcleral plexus is a radially arranged series of vessels within Tenon's capsule. These superficial vessels anastomose at the limbus with the conjunctival vessels, and the underlying deep plexus. The deep episcleral plexus is closely applied to the sclera. The vessels in this layer are arranged in an irregular nonradial fashion and, unlike the conjunctival and superficial layers, will not be blanched by a drop of 1:1000 epinephrine.

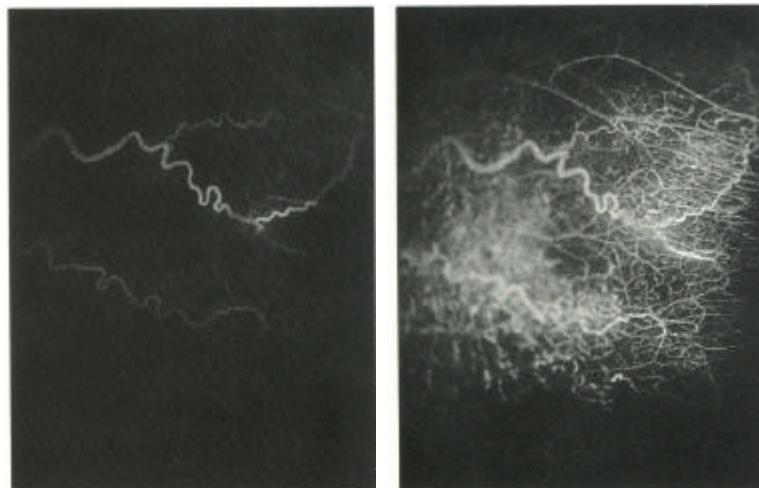


Fig. 5.59 Normal fluorescein angiogram of the anterior segment. The first vessels to fill are the perforating arterioles adjacent to the limbus. These vessels fill either from the anterior ciliary vessels whose branches surround Schlemm's canal (left) or from the long posterior ciliary arteries deep to the sclera. From these vessels, the limbal and both the deep and superficial episcleral vessels are filled (right).

Simultaneously, the posterior conjunctival vessels fill from the tarsal arcade.

EPISCLERITIS

Episcleritis is a benign self-limiting inflammation which occurs in young adults and may be bilateral. The presenting features include redness and mild discomfort with occasional watering. Severe pain and photophobia are not characteristic features and may help to differentiate the condition from a scleritis or keratitis. No associated systemic condition is found in the majority of patients, but up to 30% may have an associ-

ated general finding such as herpes zoster, collagen disease, or evidence of allergy.

Treatment with steroid drops or systemic nonsteroidal anti-inflammatory drugs will be effective in shortening the course of the condition. Episcleritis may be divided into diffuse inflammation and that associated with episcleral nodules. The inflammation is transient and not associated with long term ocular damage.

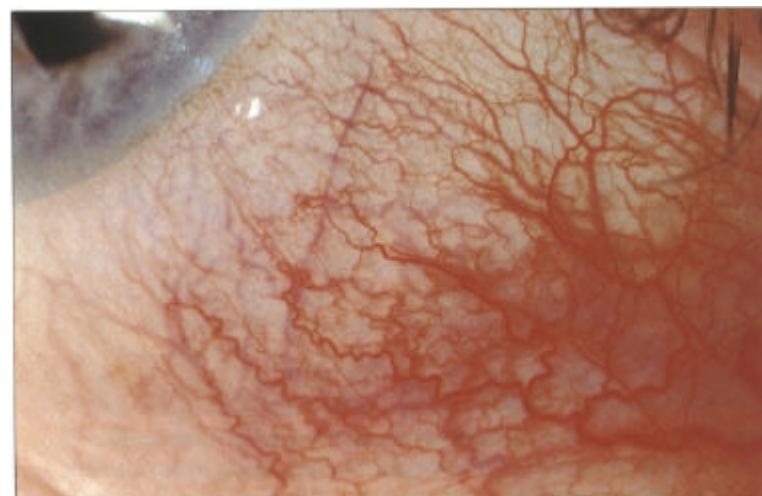


Fig. 5.60 Diffuse episcleritis may affect a sector or the whole anterior segment of the globe. In this example, the radial superficial episcleral vessels are dilated and, although there is some associated engorgement of the conjunctival and deep episcleral plexus, there is no scleral swelling. Episcleritis may recur, but no ocular damage results.

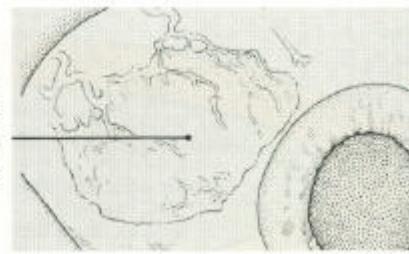


Fig. 5.61 In nodular episcleritis, the oedema and infiltration of the episclera are localized to one or more sites, with engorgement of episcleral vessels around a central pale nodule. The nodules are mobile on the underlying sclera and, unlike scleral nodules, do not undergo necrosis. Resolution of nodular episcleritis tends to occur more slowly than in simple episcleritis, and topical steroids or non-steroidal anti-inflammatory drugs applied locally, may be used. Steroid therapy may be associated with a rebound phenomenon and treatment should be reduced gradually after the signs have disappeared.

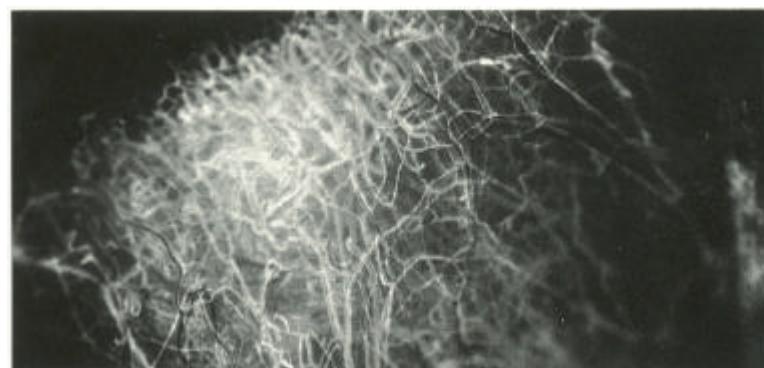


Fig. 5.62 Early and late films of anterior segment angiography from another patient with episcleritis show rapid filling of normal capillaries without distortion or obliteration of the normal vascular pattern.

SCLERITIS

Scleritis, unlike episcleritis in which resolution takes place without damage, is a destructive disease. Four clinical types of scleritis are recognized: nodular anterior, diffuse anterior, necrotizing anterior (termed scleromalacia perforans when it occurs without inflammation), and posterior scleritis. The majority of patients with necrotizing scleritis have an underlying causative systemic factor, as do a third of patients with the diffuse form of the disease. Necrotizing scleritis is caused by a vasculitis of the vessels of the anterior segment of the eye and is associated with such diseases as rheumatoid arthritis, systemic lupus erythematosus, Wegener's granuloma, polyarteritis nodosa, or Crohn's disease.

Severe pain and tenderness are the dominant features, which may be associated with photophobia and visual disturbance. The inflammation of the eye, which is also a prominent feature, has a deep red colouration, and an overlying episcleritis is invariably present as well. If the superficial episcleral vessels are blanched with 10% phenylphrine or epinephrine 1:1000, the congestion of the deeper vessels and swelling of the sclera are more readily visible. Venulitis is characteristic of this condition which leads to vaso-occlusion and later vaso-obliteration. These changes can be detected with fluorescein angiography.

Nodular and diffuse anterior scleritis will usually respond to systemic therapy with nonsteroidal anti-inflammatory

agents such as flurbiprofen if the vascular tree remains patent on fluorescein angiography, but systemic steroids may be required for severe cases. Local steroids may provide symptomatic relief but do not affect the underlying disease process. Following resolution, increased transparency of the sclera and thinning of the collagen network can be seen.

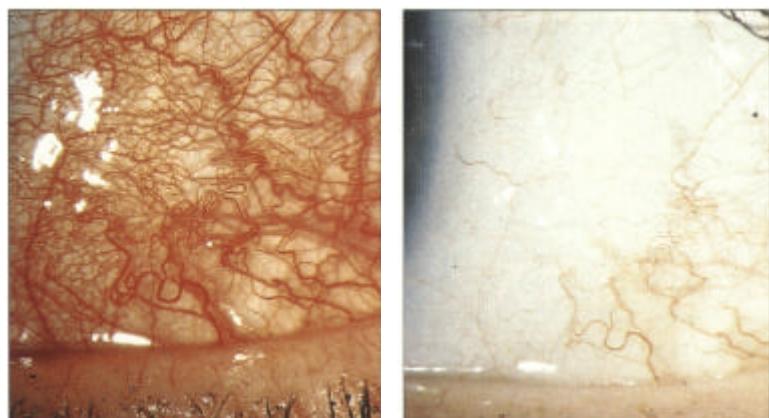


Fig. 5.63 These photographs show the blanching by epinephrine of the conjunctival and superficial episcleral vessels in a patient with diffuse anterior scleritis.

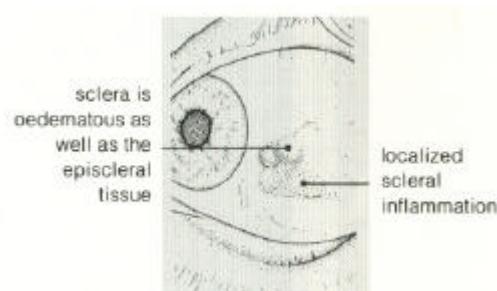


Fig. 5.64 Nodular anterior scleritis may appear similar to nodular episcleritis on superficial examination, but the nodules are tender, associated with scleral swelling, and cannot be moved over the tissues. There are inflammatory changes around the nodule, but the remaining sclera appears normal. Necrosis is a rare sequela.

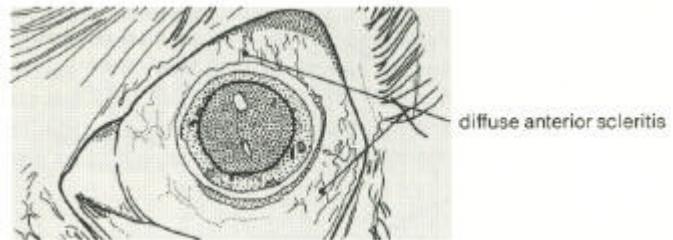


Fig. 5.65 Diffuse anterior scleritis usually shows widespread changes, although it may occasionally be confined to one quadrant. The injection is a deeper red than in simple episcleritis and all levels of blood vessels are involved.

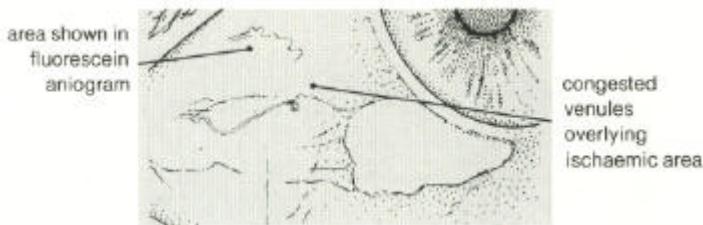
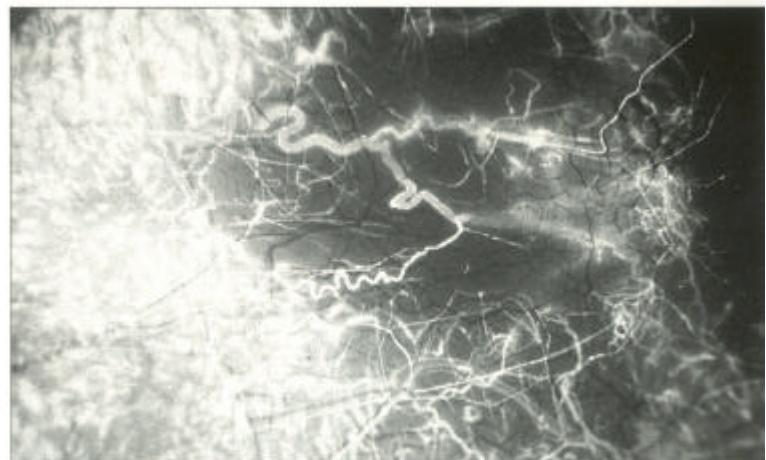


Fig. 5.66 Necrotizing anterior scleritis is the most serious of these conditions. If this is found and not treated rapidly, the condition will be progressive and may extend to involve the whole eye. The first indication of necrotizing change is vaso-occlusion or venular shutdown of areas of episcleral and scleral vessels, even though the eye still appears congested in these areas. A first attack in which there is no vascular shutdown should be treated with systemic nonsteroidal anti-inflammatory drugs in high doses, which are gradually reduced when the disease is controlled. Severe attacks or

recurrences and evidence of vaso-occlusion require large doses of systemic steroids in order to control the disease. Cyclosporin A can be effective in recalcitrant cases. Perforation of the globe is very rare. Scleral grafting is required to remove necrotic material or to support the globe.

Although there may be acute congestion of vessels in the affected area, fluorescein angiography reveals that there is nonperfusion of the venous circulation in this area.

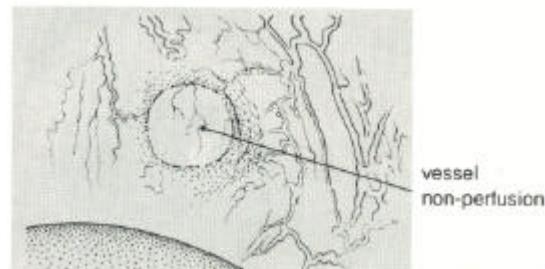
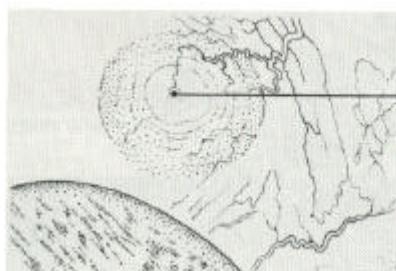
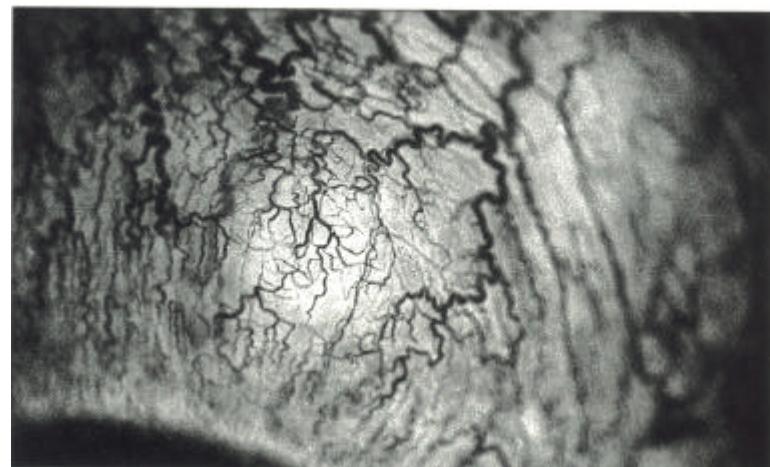
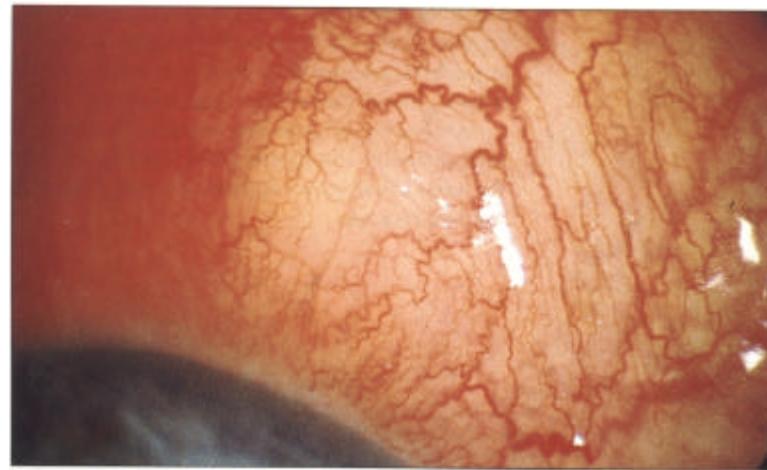


Fig. 5.67A change in colour of the underlying sclera indicates infarction of the deep tissues. In this case, there is no perfusion of the overlying vessels in spite of these being congested.

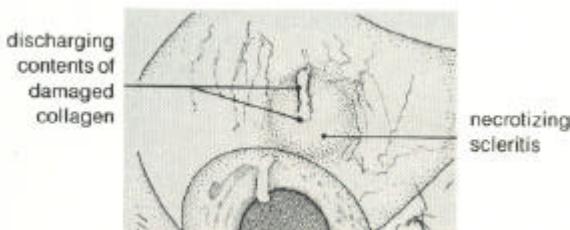
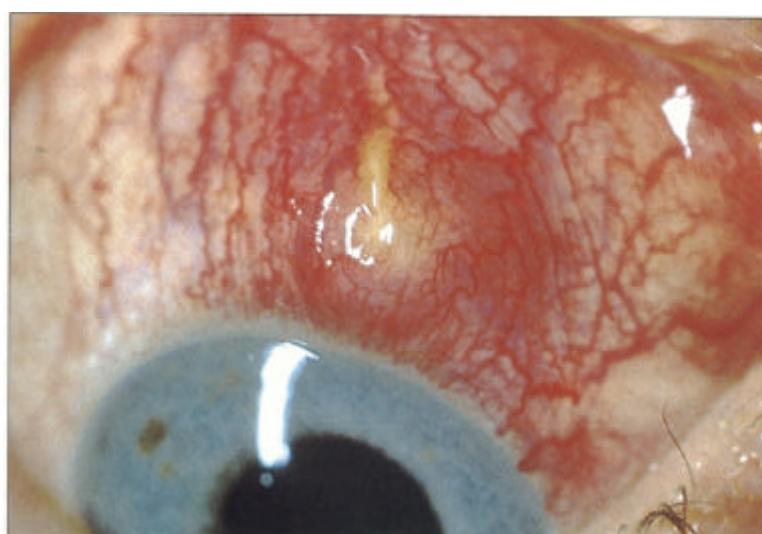


Fig. 5.68Ten days later, breakdown and ulceration of the affected area have occurred.

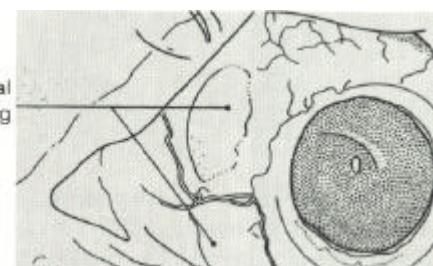
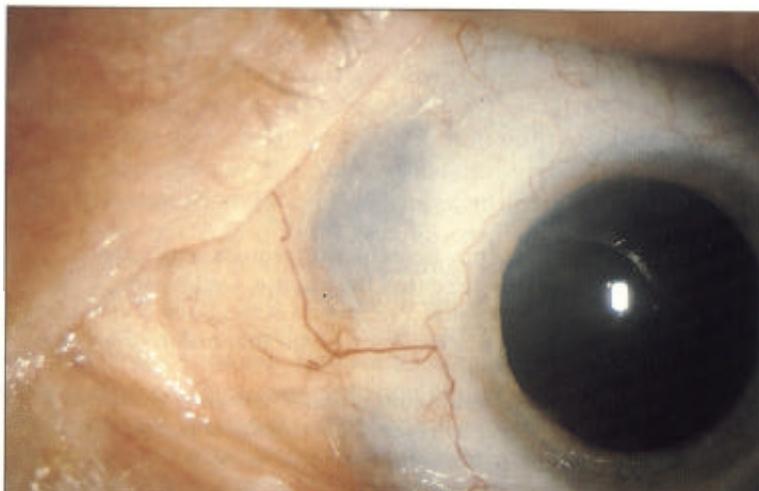


Fig. 5.69This eye shows scleral thinning following resolution of an anterior diffuse necrotizing scleritis in a patient with Wegener's granuloma.

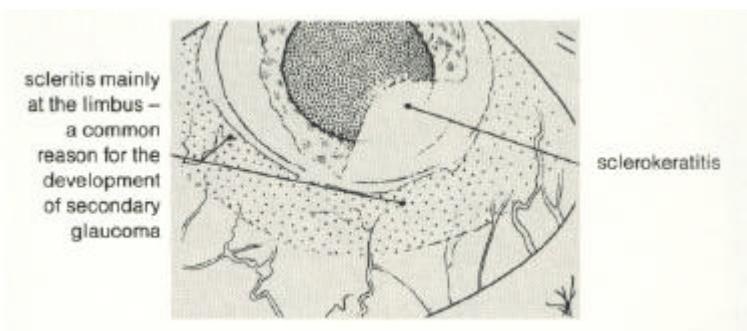
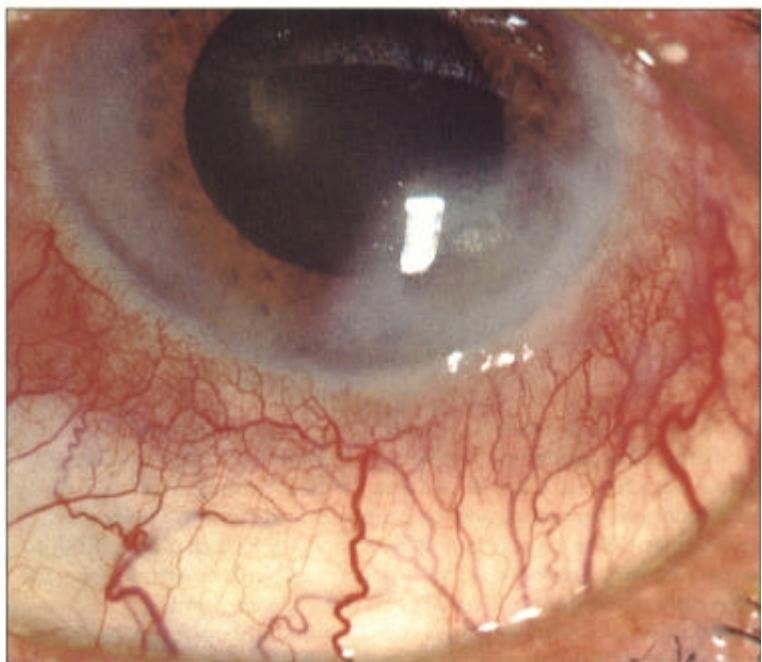


Fig. 5.70 Sclerokeratitis may complicate an anterior scleritis when a diffuse peripheral opacity may develop in the adjoining corneal stroma. In active disease, the whole thickness of the stroma adjacent to a patch of scleritis may become oedematous and may later vascularize. With resolution of activity, a dense white opacity persists and lipid deposition in the cornea is common. This type of active limbitis is often accompanied by an acute rise in intraocular pressure and KP on the adjacent corneal endothelium.

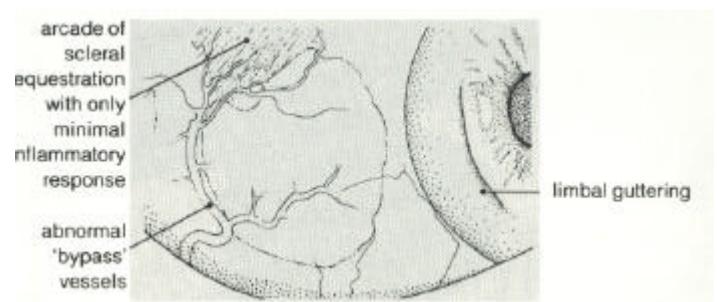
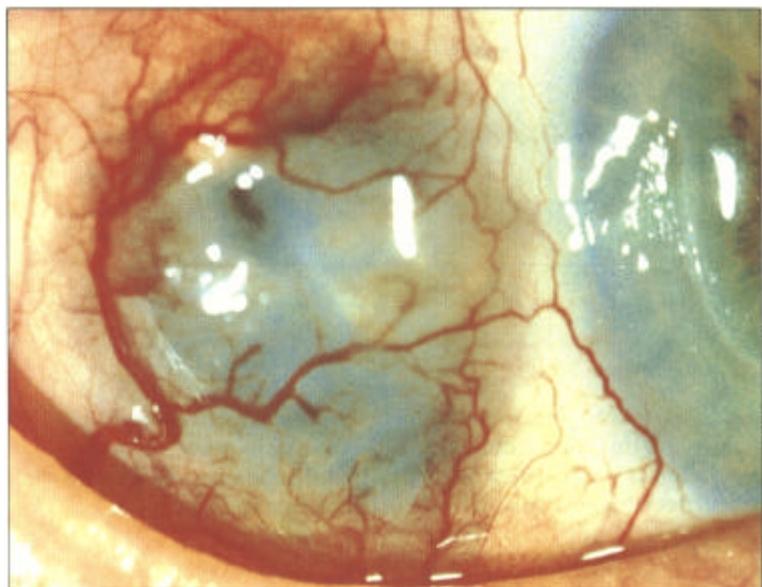


Fig. 5.71 Scleromalacia perforans is characterized by progressive thinning of the sclera in the absence of symptoms and with minimal inflammatory signs, as a result of arteriolar occlusion of the deep episcleral vascular network. Pathologically there is infarction and sequestration of the affected area. It is nearly always associated with severe longstanding seropositive rheumatoid arthritis. In this example, scleral thinning has resulted in conjunctival ulceration and guttering of the adjacent cornea. Treatment has to be started early to prevent progression of the disease.

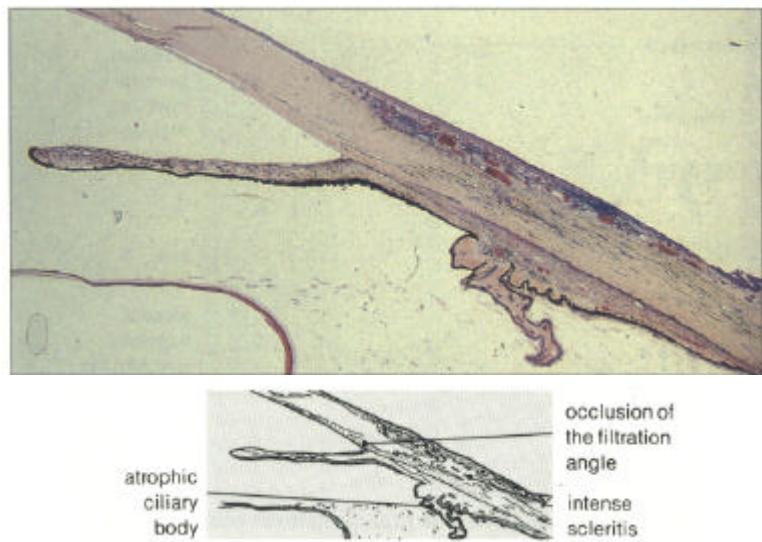


Fig. 5.72 This eye was enucleated for glaucoma secondary to sclerokeratitis.

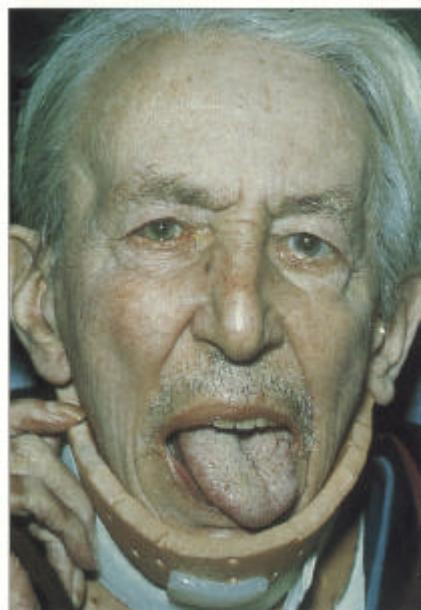


Fig. 5.73
Scleromalacia perforans is normally seen in patients with longstanding seropositive rheumatoid arthritis. Note the left 12th nerve palsy and supporting cervical collar.

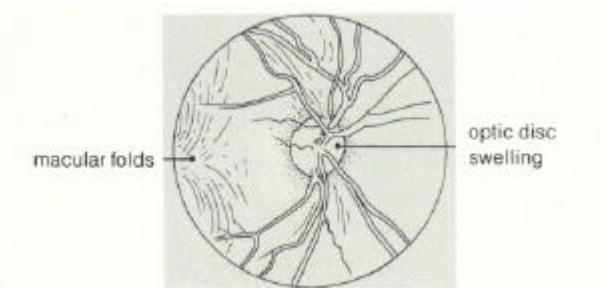
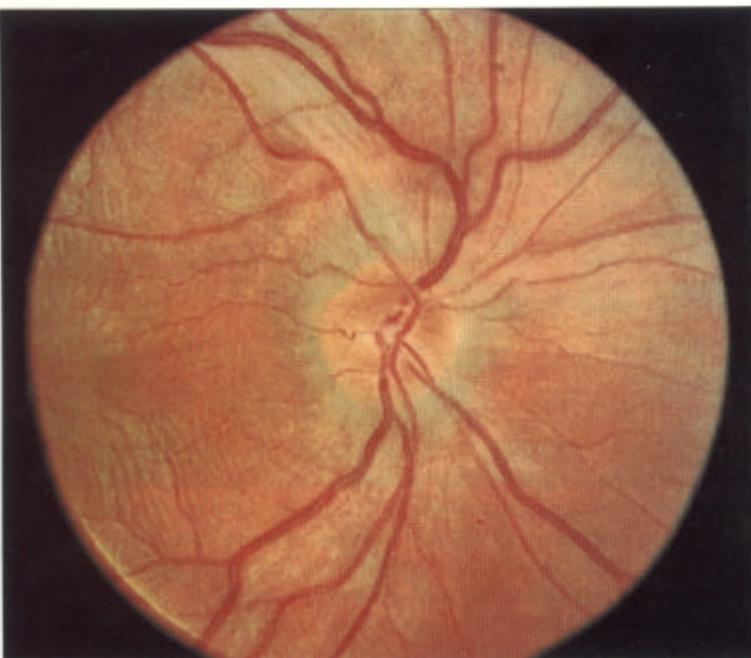


Fig. 5.74 Posterior scleritis is a seriously underdiagnosed condition. The patient may present with ocular pain and exudative retinal detachment, macular oedema, or disc swelling. With severe inflammation, there may also be proptosis and extraocular muscle involvement. The diagnosis may be easily overlooked unless careful inspection of the anterior sclera is performed; inflammatory signs are often only apparent in the more posterior aspects. Fundus examination of a relatively mild case shows slight optic disc swelling and subretinal fluid producing macular folds.

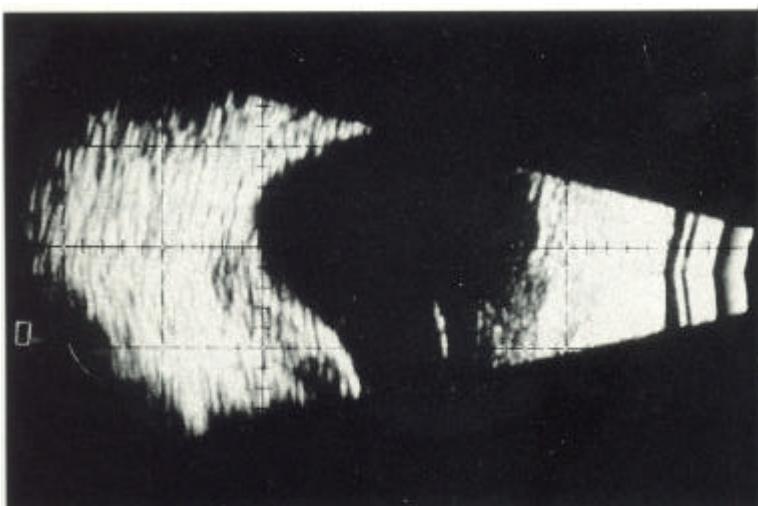


Fig. 5.75 B-scan ultrasonography is the most effective way of diagnosing this condition. There is thickening of the sclera and separation of the episclera as a result of the inflammation. Exudative retinal detachment can also be detected by this method.

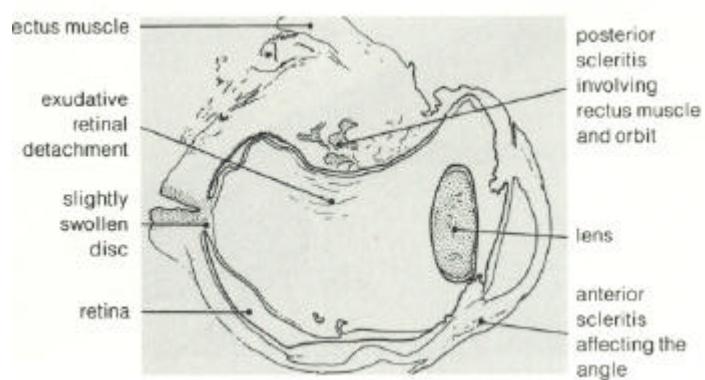
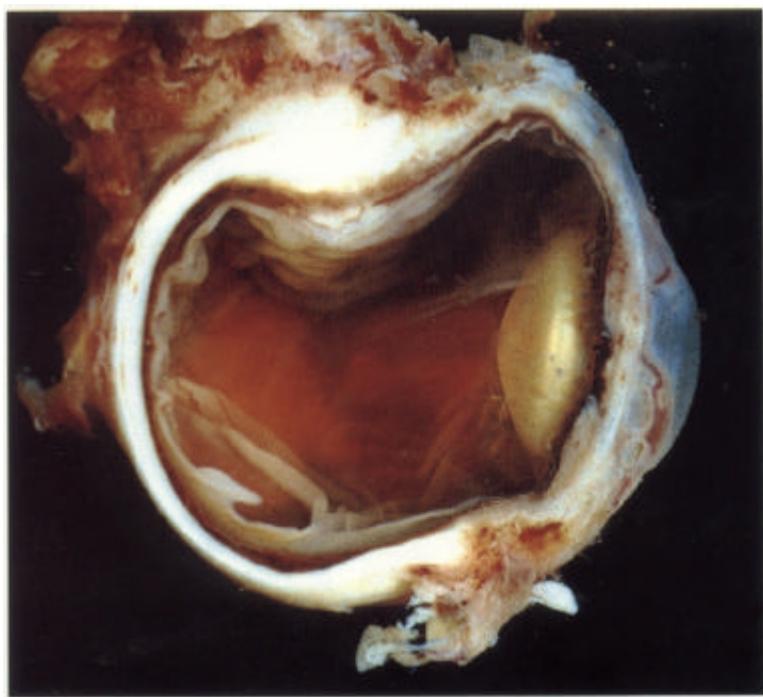


Fig. 5.76 In severe scleritis, the granulomatous process not only involves the anterior segment but extends, as here, to involve the posterior sclera and adjacent orbital tissue, giving rise to retinal detachment, disc oedema, and limitation of ocular movement.

INDIA