External ocular pigmentation secondary to perforating eye injury

Mark T Benson, Ian Rennie, John Talbot

Abstract
The dispersal of pigment centrifugally through the conjunctiva from the site of a repaired traumatic perforation was observed. Iris tissue had been incarcerated in the wound for three days prior to surgical repair. Conjunctival biopsies were examined by light and electron microscopy. Light microscopy revealed a normal, non-pigmented conjunctival epithelium and numerous pigment-laden cells in the substantia propria. Electron microscopy showed these cells to contain melanosomes closely resembling those found in normal iris posterior pigment epithelium. The causes of abnormal external ocular pigmentation are discussed.

Pigmentation of the conjunctiva may be melanocytic or non-melanocytic in origin.

Melanocytic lesions of the conjunctiva include benign racial pigmentation, ocular melanocytosis, ocuoldermal melanocytosis, naevi, melanoma, and acquired melanosis. In the last case this may be primary acquired melanosis or secondary to a variety of conditions, including radiation, Addison's disease, pregnancy, chemical toxicity, and chronic conjunctivitis. We report here a case of acquired pigmentation of the conjunctiva and episclera related to the migration of iris pigment epithelial cells from a traumatic perforation of the globe.

Case report
A 51-year-old white male attended the Ophthalmic Emergency Department complaining of a foreign body sensation and blurred vision in his left eye. While chopping wood three days earlier he had been struck in the left eye with a piece of wood but had not sought medical attention immediately.

On examination his visual acuity was 6/6 right and 6/36 left. The left conjunctiva was injected and chemosed, particularly in the inferonasal quadrant. The pupil was peaked inferonasally. The anterior chamber was formed and contained moderate numbers of inflammatory cells. The right eye was normal and showed no pigmentary anomaly.

The left eye was examined under anaesthesia, and a circumferential inferonasal limbal perforation was found. Incarcerated uveal tissue was noted within the wound. The conjunctiva in the immediate vicinity of the wound was deeply pigmented. The incarcerated uveal tissue was...
excised, and the wound was repaired with three
8/0 virgin silk sutures. The conjunctiva was
repaired with 8/0 Vicryl, and subconjunctival
injections of gentamicin and mydricaine were
given.
Postoperatively the patient made a satisfactory
recovery and was discharged five days later on a
combination of topical antibiotics, steroids, and
a mydriatic. He was re-examined 10 days post-
operatively, when it was noted that the con-
junctival pigmentation was no longer confined to
the immediate vicinity of the wound but was
distributed throughout the inferior conjunctiva
and fornix. Ten weeks after the injury the con-
junctival pigmentation was still apparent
(Fig 1). Several small biopsy specimens were
taken from the inferotemporal conjunctiva, and
these were studied by light and transmission
electron microscopy.

METHODS
Biopsy material for light microscopy was fixed in
10% buffered formaldehyde and processed into
paraffin wax. Sections were stained with routine
stains, with and without bleaching with
potassium permanganate, and the Fontana
method was used to test for melanin.

For electron microscopy, tissue was fixed in
3% phosphate buffered glutaraldehyde for one
hour at 4°C. The tissue was then washed in 0-2%
sucrose, postfixed in 1% osmium tetroxide for
two hours at 4°C, and dehydrated in ascending
grades of alcohols and epoxypropane. The tissue
was embedded in Araldite, and ultrathin (60 nm)
sections were cut. These were stained with
uranyl acetate and lead citrate and examined
under a Philips 400 electron microscope.

Results
Light microscopy showed a normal non-
pigmented conjunctival epithelium. Numerous
pigment-laden cells were observed in the
substantia propria (Fig 2). A scanty inflammatory
infiltrate was also noted within the substantia
propria.

Electron microscopy confirmed the presence of
pigment-laden cells within the substantia
propria (Fig 3). These cells contained numerous
stage IV (mature) melanosomes and occasional
stage III melanosomes (Figs 4 and 5). The
melanosomes were round, oval, and occasionally
extremely elongated, closely resembling those
found in the normal iris posterior pigment
epithelium (Fig 6). Occasional inflammatory
cells were noted within the substantia propria.

Discussion
Abnormal external ocular pigmentation may be
divided into two broad categories: congenital or
early acquired type, and late acquired type.1
Melanosis oculi, oculodermal melanosis, and
conjunctival naevi are examples of congenital or
early acquired abnormal external ocular
pigmentation. These lesions may be noted in
early childhood and often show increased
pigmentation at puberty or in early adult life.
External ocular pigmentation acquired in later
life may be benign, premalignant, or
malignant.2,3 Benign acquired external ocular
pigmentation may be secondary to a variety of
factors, including radiation, metabolic
disorders, chemical toxicity, and chronic
inflammatory diseases of the conjunctiva.

The patient described in this report appears to
have benign acquired external ocular
pigmentation secondary to the dispersal of iris
pigment epithelial cells following incarceration
of the iris at the site of a perforating eye injury.
Some normal pigmentation may have been
present prior to the injury, but the patient firmly
denied any prior ocular pigmentation, and the
pigmentation appeared to disperse with time
centrifugally from the perforation site.
suggesting that it was related to the injury. The shape and size of the melanosomes within the pigmented cells further support this argument. The melanosomes found in the retinal pigment epithelium and posterior pigment epithelium of the iris are in general larger than those found in skin or conjunctival epithelium. Indeed the morphology of these pigmented cells would seem to be similar to those of the posterior pigment epithelium of the iris (Figs 3–6).

We conclude that dispersion of pigment cells through a perforation represent another, albeit rare, cause of acquired external ocular pigmentation.

Figure 6: Electron micrograph of normal iris posterior pigmented epithelium. (×3900).

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