OCULAR SURFACE SQUAMOUS NEOPLASIA (A SURGICAL CHALLENGE)

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INTRODUCTION

Ocular surface squamous neoplasia or OSSN includes precancerous and cancerous epithelial lesions of the conjunctiva and cornea. It consists of dysplasia, carcinoma in situ and squamous cell carcinoma. They generally occur in the interpalpebral fissure, usually at the limbus, although they may be found elsewhere. The limbal transition zone theory of OSSN proposed by Lee and Hirst is based on the long-living and high proliferation rate of the limbal stem cells. Any alteration here may lead to abnormal epithelial maturation which may result in metaplasia. Chronic exposure keratopathy secondary to long standing facial nerve palsy may be associated with OSSN.It may also be associated with exposure to sunlight, fair skin, pale iris, HPV, HIV etc. It is more aggressive and occurs at a younger age in patients with HIV.

CLINICAL DIAGNOSIS

The diagnosis of OSSN is mainly clinical. It may be difficult to distinguish between intraepithelial and invasive squamous neoplasia. Patients may present with a growth, redness and irritation. Visual acuity is decreased once the visual axis is affected. OSSN may grow within weeks to years; in most cases, the history is of several months.

OSSN lesions may be gelatinous with superficial vessels; papilliform with a papillary appearance; or leukoplakic with a white keratin plaque covering the lesion. It may also be nodular in case of invasive squamous cell carcinoma, or may present as a diffuse lesion mimicking a chronic conjunctivitis. The lesion is usually non-pigmented though pigmented OSSN may also occur. OSSN may sometimes mimic a pterygium or a pinguecula. It has also been known to occur in a pre-existing pinguecula or pterygium.

Staining with fluorescein sodium or Rose Bengal helps in the diagnosis by showing up the papillary or granular nature of the lesion and by delineating its extent. Anterior segment OCT may be done to find out the extent of deep involvement as well as intra-ocular and angle invasion.

TREATMENT

OSSN (Fig 1) without intra-ocular or orbital invasion requires a non-touch specialized technique of excision to prevent recurrence. Prior to surgery, the limits of the lesion should be determined and any additional foci should be carefully looked for. En toto surgical excision for OSSN is planned.

Absolute alcohol soaked on an applicator is gently applied to the entire corneal component. This causes epithelial cellular devitalization and allows easier release of the tumor cells from Bowman's layer. 2mm outside the corneal component, a blunt blade is used to microscopically outline the malignancy within the corneal epithelium. The blade is then used to sweep the affected corneal epithelium gently towards the limbus, into a scroll that rests at the limbus. (Fig 2)

A pentagonal or circular conjunctival incision based at the limbus is then made 4–6 mm outside the tumor margins. The incision is carried through the underlying Tenon's fascia until the sclera is exposed so that full thickness conjuctiva and Tenon's fascia is incorporated into the excisional biopsy. Cautery is applied to control bleeding. A superficial scleral incision approximately 0.2 mm in depth and 2.0 mm outside the base of the overlying adherent conjunctival mass is made and continued anteriorly to the limbus. Lamellar dissection of this entire extent of sclera is done with a crescent knife. During the entire surgery, a dry field without BSS irrigation is maintained to prevent tumor cell seeding. The lamellar sclera is dissected in an attempt to remove

en toto superficial lamella of sclera, overlying Tenon's fascia and conjunctiva with tumor, and the scrolled corneal epithelium. The entire surgery should be done without touching the tumor itself, ie., with a no touch technique. The removed specimen is placed flatly on a paper, labeled according to topography and submitted for histopathologic studies. This prevents the specimen from folding and allows identification of margins histopathologically. All used instruments are then replaced with fresh instruments for subsequent steps, to avoid contamination of healthy tissue with possible tumor cells. Cryotherapy is applied to the margins of the remaining bulbar conjunctiva by freezing the surrounding bulbar conjunctiva as it is lifted away from the sclera using the cryoprobe.(Fig3)

When the ice ball reaches a size of 4–5 mm, it is allowed to thaw and the cycle repeated once more. The entire conjunctival margins are treated by this double freeze thaw technique. It is not necessary to treat the corneal margins with cryoapplication. The tumor bed is treated with absolute alchohol wash on cotton tip applicator and bipolar cautery, avoiding cryotherapy directly to the sclera. Using clean instruments, the conjunctiva is undermined and either directly closed or closed with an amniotic membrane graft.

OSSN may spread circumferentially around the limbus in which case extensive surgical excision of the growth may be required. For lesions more than 4 clock hours in extent, an incisional biopsy may be done prior to surgery to confirm the diagnosis. No-touch, alcohol assisted epitheliectomy, conjunctivo-tenonectomy and superficial lamellar sclerectomy is done. The same procedure as described earlier is done. If the deep cornea is involved, deep lamellar keratectomy is also done. Double freeze thaw cryotherapy to conjunctival edges is then applied followed by an amniotic membrane graft. Reconstruction may also be done using a conjunctival limbal autograft.

Chemotherapy in the form of topical mitomicin, 5-FU or interferon alpha 2-b has also been used for OSSN either post-surgery or as primary treatment. Corneal or scleral melt may develop if these are used prior to conjunctival healing or if used excessively.

Eyes with intra-ocular invasion often require a modified enucleation and those with orbital invasion may require exenteration. Distant metastases are rare and may involve lymph nodes, lungs or bones and may contribute to the mortality.

SUMMARY

Ocular surface squamous neoplasias are a surgical challenge requiring specialized no-touch techniques of surgery. OSSN is difficult to handle, both in the physical sense and the metaphorical sense and it is important that the surgeon use a minimal manipulation technique for tumor resection to avoid transfer and implantation of tumor cells into previously uninvolved areas.

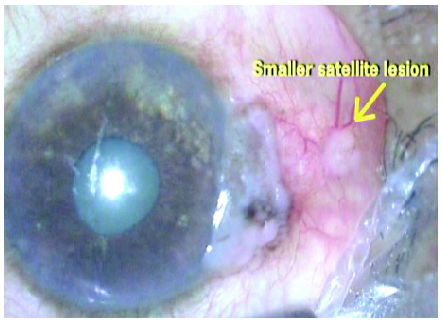

Fig 1- Ocular surface squamous Neoplasia. Note the lesion on the limbus. Also see the smaller satellite lesion

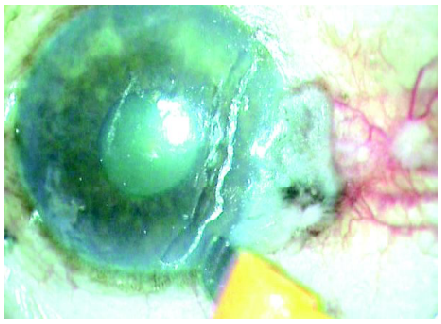

Fig 2- A blunt blade is used to microscopically outline the malignancy within the corneal epithelium.

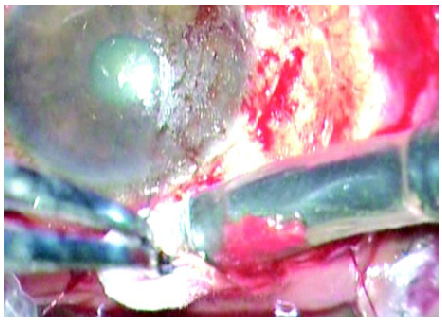

Fig 3- Cryotherapy after tumor resection

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