Surgical management and histopathology of invasive tumours of the cornea

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SUMMARY Four cases of conjunctival squamous carcinoma invading the cornea are presented. The surgical technique of excising the tumours from the cornea by lamellar keratectomy is described. Histology of the lesions showed well differentiated squamous carcinoma invading the superficial layers of the cornea only. Large invasive squamous cell carcinomas of the cornea result because of neglect of small paralimbal tumours and can be adequately removed by lamellar keratectomy, leaving the globe intact.

The commonest tumours that involve the cornea are carcinomas arising at the limbus. Large tumours that invade the cornea tend to be well differentiated squamous cell carcinomas. These tumours grow as an exophytic mass, probably because of the protective thickness of the corneal tissue. Zimmerman (1965) has stated that he has seen a number of cases in which the eye had been enucleated because the limbal tumour seemed to have involved so much of the cornea or because it had grown so large. Zimmerman believes that the eye might well have been saved by a courageous surgeon, because often in the case of the spreading 'in situ' cancers that involve much of the corneal surface the opacification, vascularisation, and pannus formation that are so impressive clinically are found histologically to be very superficial. Zimmerman believes that an extensive superficial keratectomy would have sufficed in a number of cases that were treated by enucleation.

We wish to present our experience in treating 4 patients with invasive carcinomas of their corneas.

Patients and methods

Four Bantu-speaking South African Negroes were seen at the St. John Eye Hospital, Baragwanath. Each of the patients presented with a large limbal mass extending well on to and being fixed to the adjacent cornea.

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The first patient was a male aged 62 years. He presented with a conjunctival mass in his right eye which had invaded almost the total corneal surface. Visual acuity was perception of light, and no anterior chamber structures could be seen (Fig. 1). The second patient was a 67-year-old female. In her right eye a limbal conjunctival mass had invaded the lower third of the cornea, the upper half of the cornea being clear of the mass (Fig. 2). The third patient, a male aged 60 years, presented with a large

Fig. 1 Squamous carcinoma covering the entire cornea

Fig. 2 Limbal carcinoma invading lower half of cornea

Fig. 3 Large squamous carcinoma invading almost entire cornea

conjunctival tumour extending from the limbus on the nasal side to almost cover the entire cornea (Fig. 3). The final patient was a 50-year-old male presenting with a limbal mass which had invaded the right cornea from the nasal side.

All the above patients underwent lamellar keratectomy to remove the invading mass. An incision was made in clear cornea just beyond the furthest area of tumour invasion; it was made into the upper third of the corneal stroma. A plane between stromal lamellae found in the upper third of the cornea and the dissection was continued beneath the invading tumour until the limbus, from where the tumour was arising, was reached. At

the limbus the dissection became superficial once again, and a wide excision of conjunctiva containing the tumour mass was carried out. The sclera adjacent to the involved limbal area was left bare of conjunctiva, and bleeding was stopped by cauterisation. When the tumour was very large almost the entire perilimbal area was left free of conjunctiva (Fig. 4). All the excised tumours were sent for histological examination.

Results

The 4 corneas had similar carcinomas of their epithelial surfaces. The carcinomas as shown in the photomicrographs are of a well-differentiated superficial squamous type. Invasion is into the outer lamellae of the stroma only, and a moderate non-specific round-cell infiltrate is present beneath the carcinomas in the deeper stromal layers. In all the sections the lamellar keratectomy is seen to remove the carcinomas adequately both circumferentially and in depth (Fig. 5).

Discussion

Squamous cell carcinomas of the conjunctiva usually arise at the limbus and spread to the cornea and adjacent bulbar conjunctiva. The limbal carcinoma may invade the sclera and much more rarely the cornea (Ash, 1950). As carcinomas tend to arise at sites of epithelial transition it is consistent for the limbus to be the place of predilection. Most limbal carcinomas are removed when they are relatively small and have not invaded cornea. It is rare to see large invasive tumours of the cornea as presented in the above 4 cases, and this occurs only

Fig. 4 Post-keratectomy of carcinoma invading nasal side of cornea

Fig. 5 Irregular, thick, and keratinising corneal epithelium, covers inflamed neovascularised stroma. The epithelium is malignant, and microinvasion into stroma is present. Lamellar keratectomy has removed carcinoma completely ($\times 800$)

Fig. 6 Islands of invading squamous carcinoma are present in the corneal stroma, and invasion into adherent iris is present ($\times 800$)

as a result of neglecting the lesion when it is small and localised. The 4 cases described illustrate the well-known pathological feature of squamous carcinomas of the conjunctiva, characterised by superficial invasion of adjacent structures even if the tumour is of a large size.

Bowman's membrane offers considerable resistance to the deep invasion of the tumour, and even tumours involving the entire corneal surface may not have penetrated into stroma. This feature is important from a therapeutic aspect, as even very large tumours invading large areas of cornea may be adequately removed by superficial keratectomy, as is indicated in the 4 cases presented by us.

Ash and Wilder (1942), in discussing limbal tumours came to the conclusion that local excision

will suffice in the majority of cases and that enucleation is necessary only if recurrences are persistent. They also claimed that limbal tumours tended to invade the cornea rather than extend peripherally, and this has been our experience as well. Extension of a limbal carcinoma into the eye is an extremely rare occurrence.

We have seen 1 patient who had a phthisical eye removed and was found to have a squamous carcinoma which had penetrated the eye (Fig. 6). As the patient gave a previous history of trauma, the tumour may well have penetrated through a perforating injury.

Squamous carcinoma of the conjunctiva tends to spread to cornea rather than peripherally. The cornea is resistant to deep spread of the tumour,

which may be adequately excised by lamellar keratectomy irrespective of the size or extent of spread on to the cornea. Enucleation would appear to be rarely necessary in the management of invasive carcinomas of the cornea.

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References

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