Editorial: Jam tomorrow

Lasers are becoming increasingly useful in many branches of surgery and are already playing an important part in the control and management of various ophthalmic disorders. An interesting article from Professor John Marshall and his coworkers in this issue of the journal deals with some of the biophysical properties of the much talked about excimer laser. For most of us laser actions have been confined to those of photocoagulation and more recently photoablation, but the possibilities of what lasers may be able to do for surgeons are likely to be much more extensive.

This particular study makes a comparison between the quality of corneal incisions produced by currently used diamond and steel knives with two versions of incisions produced by an excimer laser. Traditionally, a physical cutting blade like a diamond or steel edge produces its cutting power by applying pressure to a very sharp edge and forcing the separation of tissue to which it is applied. Diamond is capable of being much sharper than steel because of the perfect edge which can be produced by virtue of its crystalline structure. Lasers, however, cut on an entirely different physical principle, and this article supports the hypothesis that the tissue is divided by the process of photomolecular decompensation. To the surgeon it is not yet clear whether the physical difference induced in the tissues by the different methods will affect the quality of wound healing. There certainly is much less tissue damage from incisions made by excimer lasers, and it may well be inferred that such incisions may be followed by a less vigorous healing process.

The paper is also interesting for those of us who have been using diamonds routinely for corneal surgery, for the study demonstrates neatly the improved quality of the incision produced and the reduction in the amount of tissue trauma. So far there has been no indication that incisions produced by a diamond end up with weaker scars than those produced by steel blades.

The only disadvantage which this particular study

demonstrates is that deep laser made incisions in corneal stroma which do not quite perforate are associated with linear patterns of endothelial cell obliteration in the vicinity of the incision, a clearly undesirable feature. Despite this problem, which can almost certainly be modified, the excimer laser clearly has great surgical potential. Presumably it would not be difficult to engineer modes of making incisions in a variety of shapes – linear, curved, and circular – and we await the work needed to transfer what has been shown to be possible in the laboratory into instruments which can be used for clinical purposes. However, the expense will also have to be justified by significantly improved surgical results. Diamonds are not cheap, but they are certainly a great deal cheaper than the excimer laser is likely to prove.

What would be more interesting for us will be the application of an excimer laser not for the making of incisions but for the reshaping and moulding of surfaces, so that current techniques used for refractive surgery can be surpassed in terms of the speed of operation and accuracy of result. An excimer laser controlled by computer should be able to carve a corneal surface to any desired shape, eliminating in one step any undesirable refractive error except perhaps the irregular astigmatism of keratoconus, for which corneal grafting will probably continue to be the best final option. Those of us engaged in refractive surgery can therefore look forward to the arrival of such a tool with great pleasure. The obvious mechanical disadvantages for the eye, both optical and physical, resulting from radial keratotomies, keratomileusis, and epikeratophakia, will then happily be features of the past. Hopefully, so technical and unsurgical will these new refractive applications for the excimer laser be that they may be safely left in the hands of technicians, thereby freeing ophthalmic surgeons to get on with work to which they are more suited and for which their particular skills are in more demand.

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