Cryosurgery in treatment of trichiasis

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SUMMARY Ten patients with trichiasis were treated with cryosurgery by the standard retinal probe with nitrous oxide. A double freeze-thaw method was used. Nine of the patients had trichomatous trichiasis and one had conjunctival scarring. In only the latter case were the lashes destroyed, and these grew again after 2 months. Trichomatous trichiasis is frequently associated with entropion. The tarsal plate in such cases is often thickened and distorted, with extensive conjunctival scarring. The success of cryosurgical treatment of trichiasis depends not only on the type of probe used but perhaps also on the aetiology of the disease. To our knowledge no similar trial of this form of treatment of trichiasis has been carried out in eye centres in Africa south of the Sahara. Cryosurgery is simple to perform and of great potential use, particularly in areas where there is a shortage of skilled surgeons to perform the delicate eyelid operations often required in trichiasis.

The varied aetiology of trichiasis had been widely discussed.¹ In Nigeria trachoma is the commonest cause of trichiasis, and the latter, often associated with entropion, presents a major clinical problem which often results in blindness. Various treatments include epilation, electrolysis,² surgery,³ and radiation.⁴ Epilation is a temporary measure. Electrolysis destroys one lash root at a time² and has a recurrence rate of about 30% to 50%.⁵ The treatment of trichiasis with surgical procedures is effective, but recurrence varies from 5% to 15%.³

Cryosurgery was tried after it was noticed that eyelashes were permanently destroyed in areas where cutaneous malignancy was treated with liquid nitrogen.⁶ Subsequent to this observation in 1974 cryosurgery has been generally employed in some centres in the treatment of trichiasis. Sullivan *et al.*⁷ and Hecht⁵ in the USA using a tissue thermocouple reported 80 to 100% success rate with cryosurgery in the treatment of trichiasis. A specially designed probe and a standard retinal probe were used respectively. Collin *et al.*⁸ working in the UK with cryosurgery and using standard retinal probe reported a 50% success rate in their series of 41 patients. Fifteen patients in the latter series had trachoma. Cryosurgery is simple to carry out, and depending on the size of the probe few or several adjacent follicles can be destroyed at the same time. But properly designed equipment capable of cooling the eyelash to -20°C to -30°C is required.

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This paper reports on 10 patients with trichiasis treated with cryosurgery at the Lagos University Teaching Hospital. The patients were followed up for 6 to 9 months.

Patients and methods

Ten adult patients, 2 males and 8 females, were treated by us at the Eye Clinic of the Lagos University Teaching Hospital. In all cases epilation of the eyelashes had been performed on several occasions by the patients themselves. Nine cases had trachoma and one other had conjunctival scarring (Table 1). In the trachoma patients the trichiasis was bilateral and involved the length of the upper lid margin, but it was localised and unilaterally involved the upper lid in the patient with conjunctival scarring. One eyelid was done at a time. The upper lid was infiltrated with 2% lignocaine (Xylocaine) with 1:100 000 adrenaline and 1% amethocaine eye drops instilled into the conjunctival sac. With the Alcon retinal probe and nitrous oxide gas at pressure 560–800 pounds per square inch ($39\text{--}56\text{ kg/cm}^2$), the tip of the probe was placed on the conjunctival surface 2 mm from the lid margin. The

Table 1 Causes of trichiasis in 10 patients

Diagnosis	No. of cases		
	M	F	Total
Trachoma	1	8	9
Conjunctival scarring	1	0	1
Total	2	8	10

probe was applied for 30 seconds, after which the lid was allowed to thaw. Repeated applications were made along the length of the lid margin at intervals of 2 mm. The procedure was repeated to give a double freeze-thaw method. The whole operative procedure lasted about 20 minutes in each eyelid. Chloramphenicol or gentamicin eye ointment was applied post-operatively and the eye padded and bandaged for 24 hours.

Results

Moderate to massive oedema of the eyelid with chemosis was present at the first dressing in all cases. It gradually subsided over 5–7 days. Pain was mild in all cases and usually relieved with paracetamol tablets. There was no infection, hypopigmentation, or lid necrosis. Alopecia was noticed after one week in the patient with conjunctival scarring, but the eyelashes grew again after 2 months. The eyelashes were not destroyed in any of the nine patients with trachoma.

Discussion

The effect of cold on tissues was first reported in 1665,⁹ but its application to surgery (cryosurgery) was introduced in 1911 by Hall-Edwards.¹⁰ Since then cryosurgery has been used effectively in cataract extraction and in the treatment of malignant tumours of the eyelid.^{6 11–13}

The effect of low temperatures on tissues is well documented.^{14–16} Various tissues react to freezing differently.^{14 17} Melanocytes are noted to be more sensitive to cold than hair follicles.^{5 8}

The pathophysiology of cryogenic cell necrosis has been reviewed extensively.^{8 16} Rapid freezing is more destructive because of intracellular ice crystallisation. In slow freezing the cells are damaged by ice crystals formed extracellularly; they compress the cells and lead to an increase in electrolyte concentration.¹⁶ Thawing exposes the cells to the toxic effects of electrolyte imbalance and osmotic pressure changes.

Permanent depigmentation will complicate cryosurgical treatment of trichiasis. This is a cosmetic problem in heavily pigmented races such as Nigerians. However, such patients are often unconcerned with this cosmetic problem. Hecht⁵ observed alopecia postoperatively when the eyelid was frozen to -20°C . Sullivan *et al.*⁷ reported that eyelids cooled to -30°C retained their general appearance and function but developed alopecia in the treated region. Both authors monitored the temperature of the eyelid with a subcutaneous thermocouple during surgery.

The failure rate in our series was high compared with others.^{7 18 19} We attributed these to 3 factors.

First, we used the standard retinal cryoprobe. Discouraging results have been reported with the standard retinal probe with nitrous oxide or carbon dioxide.^{6 8} The main disadvantage of this probe is the small diameter of its freezing surface and the lower volume of gas flow. This also limits its usefulness in the large segment of eyelid that is often involved in trichomatous trichiasis. Good results have been reported in patients treated with specially designed nitrous oxide, gas-cooled probes.¹⁸ Similar results have also been reported with liquid nitrogen spray.¹⁹ But liquid nitrogen evaporates rapidly, and storage is difficult in a hot climate such as Nigeria has. Additional care is needed with liquid nitrogen to avoid damage to adjacent tissues.

The second factor accounting for the high failure rate was that the eyelid temperature was not monitored. It is possible therefore that the tissue temperature in our patients was far above -15°C to -20°C , the degree of cold said to be required to effect hypopigmentation or alopecia. Thirdly, 9 of our cases had trichomatous trichiasis. The latter is often associated with extensive conjunctival and tarsal scarring. A high proportion of patients in the series with successful results had aberrant trichiasis.^{5 7} In a reported series with 50% success⁸ most of the failures occurred in patients with trachoma.

The result of the treatment of trichiasis with cryosurgery should improve with the use of properly designed probes, monitoring of the tissue temperature with a thermocouple, and better selection of cases. Cryosurgery is simple to perform. In developing countries where trachoma is common and trained ophthalmologists are scarce, it is easier to train staff to carry out this technique than the surgical procedures at present available for the treatment of trichiasis.

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