Cauterising iris scissors

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SUMMARY The cauterising iris scissors described here are a modification achieved by suitably insulating the standard De Wecker's iris scissors. This modification provides in addition to cutting an advantageous cauterising effect, which could prove useful in the surgery of eye conditions with high risk of bleeding or metastasis. It utilises the optimum electric current range of 20-40 mA.

A pair of standard DeWecker's iris scissors has been completely insulated, apart from the blades, with a dip coated PTCFE plastic, Insulast (GU Manufacturing Co. Ltd.). The blades, apart from the cutting edges and inner surfaces, have been insulated with a spray-on PVC plastic coating, Vycoat (Figs. 1 and 2). These scissors are electrically connected to the output of the Manchester Diathermy Unit through a lead which is fixed to their handle. The sharp edges of the blades act as an active electrode. They cut, coagulate the tissues, and seal the blood vessels as they cut.

With the intention of using the scissors as a cauterising and cutting instrument for surgery on the iris this study attempts to discover the safe range of the electric currents to be used that do not produce undesirable visible effects on the irides of enucleated ox eyes and irides of anaesthetised rabbits.

Fig. 1 Cauterising iris scissors

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Fig. 2 Cutting edges and inner surfaces have not been insulated

Two of the rabbits' eyes on which these scissors were used to produce broad iridectomies were observed postoperatively for 1 week. Both eyes were then enucleated and one was submitted for histological examination.

Results

ENUCLEATED OX EYES

Current root mean square values	Cutting action of scissors/visible effects on iris
5 mA	Smooth cut, no fumes, and no sticking of iris tissue to the blades
20 mA	
40 mA	
45 mA	
50 mA	
65 mA	Some fumes, very little charring
75 mA	More fumes, not cutting smoothly, iris tissue becomes rubbery
95 mA	Fumes +, not cutting smoothly, iris tissue becomes rubbery
100 mA	Fumes and noise, charring +

LIVE RABBITS' EYES

The rabbit eye, when enucleated, was placed in 10% formol saline for fixation over a 3-day period and was then paraffin processed. The eye was cut transversely through cautery marks at 5 μ m and sections were stained by haematoxylin and eosin.

Current RMS values	Cutting action of scissors/ visible effects on iris tissue (Figs. 3 and 4)	Histological findings ((Figs. 5, 6, and 7)
Zero	Bleeding + or punctate bleeding from the cut edges; no white band near the margins	Haemorrhage, vasodilatation. Stromal infiltrations with inflammatory cells
10 mA	As above	Tissue damage due to crushing effect of scissors
20 mA	Smooth cut, no bleeding, white band (cauterising effect) visible	Mild vascular reaction. A few erythrocytes. Structureless tissue near the margins over a small area
30 mA	As above	
40 mA	No bleeding, smoother and cleaner radial cut, less force required to cut. White band near the cut margins and no radial shortening of the margins	A few erythrocytes present in the area, probably derived from the first 2 cuts. Inflammatory response absent
45 mA	White band. Cut margins became round with some radial shortening	This cut was not sufficiently visible in the sections, but shows no haemorrhage or infiltration response
50 mA	White band with obvious radial shortening	

The current range between 20–40 mA is significant for the following reasons. (1) There is no visible

Fig. 3 Radial cuts made on the rabbit iris with the cauterising iris scissors using different strengths of electric currents. From right to left: 0, 10, 20, 30, 40, 45 mA

Fig. 4 High power of the radial cuts, made with 40 and 45 mA currents. Cauterising band is clearly visible (arrowed)

Fig. 5 Histological appearance of the radial cut made with cauterising iris scissors without electric current

haemorrhage from the cut edges of the iris. (2) A white band, which is due to cauterising effect, appears at the margins of the cut iris at 20 mA. This white band gets wider with higher currents. (3) Inflammatory response is absent. (4) Histologically it is impossible to recognise the damage to the iris tissue along the cut margins corresponding to the cauterising band.

RABBIT EYE ONE WEEK AFTER BROAD IRIDECTOMY

A current of 40 mA was used to perform a broad iridectomy under general anaesthesia (Fig. 8).

Cyclopentolate 1% drops and chloramphenicol drops were instilled in the rabbit's eye, each 3 times a day. A photograph of the eye 1 week after the operation shows an atrophic band along the cut margins which has replaced the cauterised band. (Fig. 9). Histological examination of this eye did not disclose any visible effect on the iris margins along the cut and adjacent tissues. There was no inflammatory response or fibrosis (Fig. 10).

Discussion

It would seem that the optimum current range that produces a clean-cut and adequate coagulation

Fig. 6 Radial cut with 20 mA current

Fig. 7 Radial cut with 40 mA current

Fig. 8 Broad iridectomy on rabbit eye using 40 mA current

Fig. 9 Rabbit eye 1 week after broad iridectomy using 40 mA. This demonstrates atrophic band along the cut margins, which has replaced the cauterised band

Fig. 10 Histological appearance of the iris one week after broad iridectomy using 40 mA current

without contraction of edges, fumes, or charring in the rabbit eye is 20–40 mA.

The DeWecker's Scissors have been further modified by soldering to the handle a socket to allow the diathermy lead to be detached and by coating the entire surface of the scissors, apart from the cutting edges and inside surfaces of the blades, with Insulast. In this way the modified scissors have been made suitable for autoclaving.

The use of this modification on DeWecker's scissors is proposed for the surgery of neovascular conditions of the iris, associated with glaucoma; neoplastic conditions of the iris, ciliary body, and anterior choroid which require excision; eyes with a high risk of bleeding in patients on anticoagulants.

We thank the Department of Medical Illustration at the University Hospital of Wales for the photographic work in this paper.