

## LENS EXTRACTION IN DIABETIC PATIENTS\*†

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*The operative and post-operative course of diabetics is no worse than that of normal persons, if they are without hyperglycaemia and acetonuria*

THIS is a quotation from a recent and excellent textbook on ocular surgery. It is a view with which I felt I could not agree, and I therefore decided to review a series of cases of patients suffering from diabetes and undergoing operation for cataract. Undoubtedly the use of insulin has improved the prognosis in these cases, but, in my opinion, the eye of a diabetic patient should not be considered a normal eye when it comes to operation—there is more likelihood of a stormy convalescence and less chance of a good result than in a patient not suffering from diabetes.

The discovery of insulin has been one of the most important advances in medicine during the last 50 years. It has completely altered the prognosis in diabetes. The young diabetic is growing up and leading a normal life. I have one young patient whose diabetes was discovered when he was 3 years old; to-day at the age of 20 he is well on the way to qualifying as a solicitor. Another patient—a stockbroker 32 years old—has suffered from diabetes since childhood and thanks to insulin has not only conducted his business affairs with considerable success, but has also played active games until recently, when he was obliged to curtail his activities on account of failing sight. These patients both have diabetic cataract and will require operation fairly soon. I mention them because in the pre-insulin days they would have died long ago, and there would have been no problem with regard to operation. Older patients too are surviving for many years, and undoubtedly more patients suffering from diabetes come to operation on the eyes than in the days before 1921.

### Prognosis in Pre-Insulin Period

The outlook as regards operation on the eyes of diabetic patients before that date is interesting. As one would expect, the incidence of diabetes among cases operated on for cataract was relatively small; e.g. there were only 87 cataract extractions (5.2 per cent.) in diabetics out of a total of 1,660 cases collected by Gray Clegg (1920) and of these only eight shewed definite signs of diabetes—loss of flesh, polyuria, and polydipsia. This method of assessing the case is rather a contrast to the years following 1920 when blood sugar estimations and so on became the criteria of true diabetes as opposed to renal glycosuria.

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The prognosis in cases of diabetes operated on for cataract was by no means a happy one; of Gray Clegg's 87 extractions, 28 developed hyphaema which remained for anything up to 27 days, iritis occurred in 26 cases in eleven of which it was severe, hypopyon was noted in two, and there were two deaths in coma after operation.

The only pre-operative precaution taken was restriction of carbohydrate intake. The outlook was distinctly gloomy and doubtless in those days ophthalmic surgeons were very cautious in advising operation on patients suffering from diabetes.

Even so, in the course of the same discussion James (1920) reported four cases in relatively young people all suffering from true diabetes (ages 22, 37, 36, 35) where satisfactory results were obtained in four out of 5 eyes. James made a special point of admitting the patients to hospital and having them treated by a physician until a marked fall in the sugar output had taken place; he was then ready to operate if the patient desired him to do so.

### Prognosis at the Present Time

The position to-day presents a marked contrast. Reviewing the cases of diabetes operated upon in the Ophthalmic Department of the Sheffield Royal Infirmary during the last 5 years, I had in mind four problems:

- (1) Wound healing.
- (2) Incidence of infection.
- (3) Incidence of bleeding.
- (4) Incidence of iridocyclitis.

For purposes of comparison, I took fifty consecutive cases of lens extraction on "normal" patients and compiled the Table (opposite) in an attempt to shew the incidence of post-operative complications in each series.

In making the survey I was impressed by two things; first, the small number of patients suffering from diabetes admitted for operation during the period under review (30), and secondly the high proportion of cases, some of them with a known retinopathy and others with severe hypertension, who survived operation with a minimum of post-operative convalescence and with good visual results. These good results must be attributed partly to careful stabilization of the diabetes before operation and partly to advances in operative technique.

**Wound Healing.**—This is not a major problem to-day and one finds it difficult to believe that it ever was so, but France (1858), in a discussion on cataract in association with diabetes wrote that "his experience would lead him strenuously to deprecate any operative interference so long as a useful degree of vision is preserved", and he based his opinion chiefly on the indisposition of the cornea in such cases to heal even the minutest wound inflicted by a needle, and this applied more so in regard to a linear extraction: the operation which he favoured was keratonyxis, which from its derivation *κέρας* (cornea) *νύσσειν* (to puncture) was the equivalent of the modern procedure of needling or discission.

That it is not a problem to-day is due to several factors in addition to the over-

TABLE

Cases	Visual Acuity	No. of Cases	Post-operative Complications		Remarks
			No.	Description	
Normals	6/6	14	None		None
	6/9	16	None		None
	6/12	2	None		None
	6/18	6	2	Iridocyclitis	None
	6/24	1	1	Vitreous loss at operation followed by iridocyclitis	None
	6/36	3	1	Iridocyclitis	Macular changes 2
	6/60	1	None		Macular changes 1
	C.F.	4	None		Macular changes 4
	P.L.	1	1	Iridocyclitis	None
	Eyes lost	1	1	Iridocyclitis with secondary glaucoma	Enucleated—painful eye
	Died	1			
Total	50	6			
Diabetics	6/6	5	None		None
	6/9	16	5	Iridocyclitis 3 Hyphaema 1 Delayed wound healing 1	Retinopathy 2
	6/12	1	1	Hyphaema with vitreous haemorrhage	Cleared
	6/18	1	None		Retinopathy
	6/36	1	1	Vitreous loss with mild iridocyclitis	None
	C.F.	1	None		Advanced retinopathy
	P.L.	1	1	Iridocyclitis with hyphaema	None
	Eyes lost	4	4	Intractable iridocyclitis with hyphaema	None
Total	30	12			

One case left town—probably bad result . . . . iritis.

riding principle of careful pre-operative stabilization of the patient and the use of insulin—viz. careful asepsis using the no-touch technique—the use of the antibiotics and chemotherapy when necessary, the routine administration of vitamin C (on which I have more to say later), and careful suturing of the wound. The last is of great importance in two respects: it favours rapid repair and it helps to prevent post-operative bleeding. Most surgeons I think, now suture their cataract cases: the method matters little provided that there is accurate apposition of the margins of the wound and that it is effected with a minimum of trauma to the tissues.

**Infection.**—This is now a most unusual complication, but if it should occur, the use of chemotherapy and the antibiotics is a great help, and thanks to polymyxin the dreaded *Ps. pyocyaneus* can be controlled.

**Bleeding.**—Generally speaking, diabetic patients are more likely to bleed than normal persons of the same age, but there is some difference of opinion as to the incidence of haemorrhage after lens extraction: for instance, Marshall (1895)

reported the incidence of post-operative bleeding as nil in thirty diabetic patients in a series of 1,519 extractions, and Wheeler (1916), reviewing a series of 2,123 lens extractions in which 38 of the patients were suffering from diabetes, found an incidence of 29 per cent. in the diabetic cases against 4·5 per cent. in the whole series. He very rightly came to the conclusion that diabetes especially predisposes to post-operative haemorrhage.

In my small series of cases, the incidence of hyphaema following operation was three (10 per cent.), except in association with iridocyclitis (see Table).

Pre-operative investigations on all diabetic patients included a routine report with haemorrhagic diathesis tests from the Haematological Department, and it was borne in mind that anaemia is important in that it may interfere with capillary function.

Normally, after injury, bleeding is arrested in the first place by capillary contraction. If the capillaries are not normal, contraction may not take place and bleeding will not be arrested. It would seem, therefore, to be important to know the state of the patient's capillaries before operation. With this in view two techniques are used which are perhaps not widely known and to which I would like to refer very briefly, *viz.* capillary microscopy and the reaction of capillaries to injury (Macfarlane, 1941).

*Capillary Microscopy.*—The capillaries at the base of the finger nails are observed through a binocular dissecting microscope. The finger—the index finger appears to be the finger of choice—is supported in a bed of plasticine and a drop of microoil placed on the skin at the base of the nail: oblique illumination is used and after a little practice the capillaries can be seen with the 2/3 objective. Three abnormalities are looked for:

- (1) increased tortuosity.
- (2) gross variation in calibre.
- (3) sludging of the blood, *i.e.*, it appears in a somewhat irregular stream—glomerulations of red cells being pushed through the capillaries with each heart beat.

Diabetic patients by and large have more abnormal capillaries than do normal persons of the same age.

*Reaction to Injury.*—Contractility to trauma can be demonstrated in a normal individual by touching a capillary loop with a fine needle; this causes the capillary to close down rapidly, but this does not occur if the capillaries are abnormal, as they may be in the diabetic patient.

Figs 1 (a) and 1 (b) show the capillaries of a normal person as seen under the microscope, and one capillary which has contracted down after being traumatized. Figs 2 (a) and 2 (b) show abnormal capillaries, and the absence of reaction to trauma.

This reaction to trauma is important in regard to haemostasis, the initiation of which is associated with active contraction of the capillaries, the actual clotting of the blood occurring later to maintain the haemostasis thus established. The practical point is that if in a diabetic patient capillary contractility is shown to be abnormal, haemorrhage is likely to persist (*e.g.* from a conjunctival flap or from the vessels in the iris following an iridectomy or iridotomy), so that a corneal section and a simple extraction would be preferable.

The problem is even more difficult in cases of acute congestive glaucoma requiring operation. Here the possibility of using a preparation such as special toluidine blue (BDH) comes to mind (Allen and Jacobson, 1947).

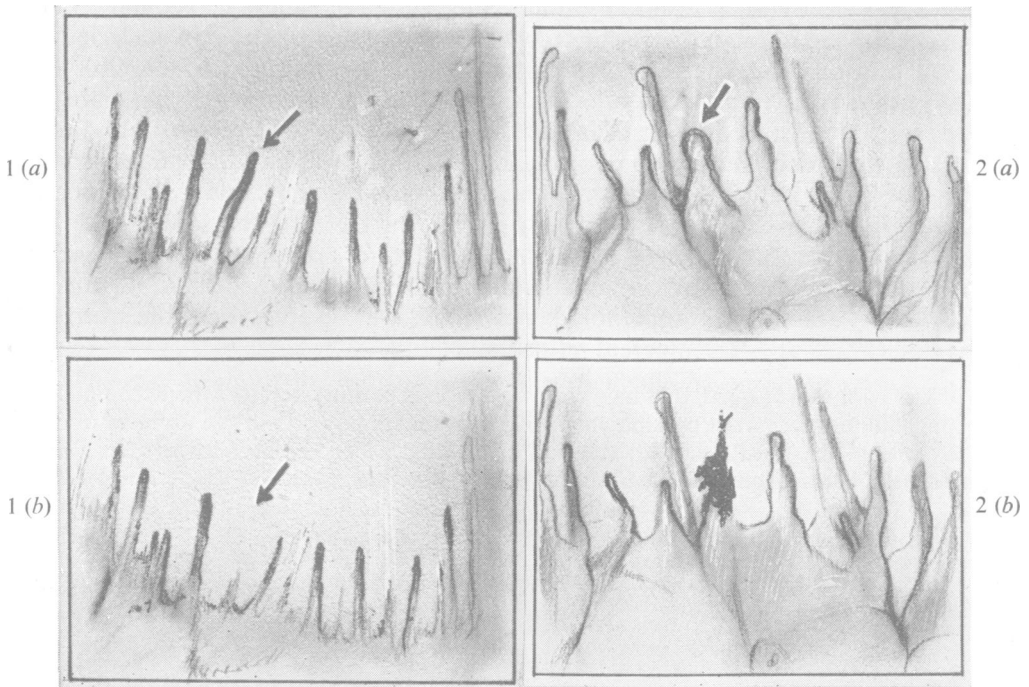


FIG. 1(a).—Normal capillary bed.  
 FIG. 1(b).—Same bed showing normal contraction of capillary (arrow) after trauma.

FIG. 2(a).—Abnormal capillaries in a case of idiopathic thrombocytopenic purpura.  
 FIG. 2(b).—Same field showing failure of capillary (arrow) to contract after trauma, associated with local haemorrhage.

**Vitamin C.**—Ascorbic acid is concerned with the synthesis and maintenance of the intercellular material which provides the frame-work for healing, and also with the formation of the intercellular substance of the capillary walls. It is not synthesized in man, nor is it stored to any great extent in the body, and many elderly patients probably have some degree of vitamin C deficiency. It is impossible to do a saturation test on every patient, and the routine, therefore, is to give a daily dosage of 150 mg. empirically to all those admitted for an intra-ocular operation. In passing, I should mention that it is not the level of ascorbic acid in the plasma which matters so much as that in the white-cell layer of the blood. I feel sure that as far as the prevention of bleeding is concerned and also the promotion of wound healing the use of ascorbic acid is valuable in normal patients, and more especially so in diabetics.

**Vitamin K.**—It seems unlikely that this is of any value in the prevention of post-operative bleeding except in special cases where there is a pathological lesion or the patient is on a deficiency diet for some reason. Provided the diet is suitable there does not appear to be any factor in diabetes to hinder normal absorption of vitamin K from the small intestine.

In the same connection it is worth noting that such preparations as Rutin and vitamin E appear to produce no sustained definite improvement in capillary fragility.

**Iridocyclitis.**—The Table shows that out of fifty “normal” cases one eye was

lost (2 per cent.) as a result of iridocyclitis with secondary glaucoma. Four (8 per cent.) had iridocyclitis during convalescence but this was only of consequence in one, and one had vitreous loss at operation with subsequent iridocyclitis but finally achieved a visual acuity of 6/24. Of the 31 patients suffering from diabetes, four eyes were lost as a result of intractable iridocyclitis (13·6 per cent.) and four had notable iridocyclitis during convalescence (13·6 per cent.). A comparison of fifty consecutive cases of lens extraction in "normal" patients with thirty-one in patients with diabetes is not statistically sound, for the series is so small that no hard and fast conclusion can be reached, but the figures are suggestive. As regards the avoidance of iridocyclitis, I am sure that the removal of the lens in its capsule is important and that incomparably better results will be achieved if the words of Crichtett (1922) are remembered:

Of this I am well assured, that he will be the most successful operator who accomplishes his purpose in the gentlest possible manner, for in operations on the eye we have to deal with some of the most delicate structures in creation. Let us never forget that Dame Nature is a woman and likes the last word, and always has it.

I wish to express my thanks to Dr. Blackburn of the Haematological Department, Sheffield Royal Infirmary, for his help, to my colleague, Mr. Ferguson, for allowing me to use some of his cases, and to Mr. Foster, Medical Artist of the United Sheffield Hospitals, who has made the diagrams relating to capillary microscopy.

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