DRUG ADMINISTRATION IN CATARACT SURGERY*

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THE problem of cataract surgery in India is immense. Great economic loss is caused by improper and inadequate surgery, and through lack of education, the cooperation of the patient is not all one would like it to be. Vitreous prolapse occurs in 7 to 9 per cent. of routinely-sedated patients, and iris prolapse in about 4 per cent., where a peripheral iridectomy has been done and a stitch applied. The visual results are often poor and ophthalmic surgeons tend to lay the blame on the patient.

With all the means at our disposal to-day, however, this is rather unfair, and we have managed to obtain better relaxation by operating under curare akinesia. We have been fortunate in not meeting many complications (Agarwal and Mathur, 1952; Agarwal, 1953), but the use of curare alone in the doses usually given is not without risk, nor does it eliminate post-operative hazards.

Chlorpromazine (Agarwal, Gupta, and Malik, 1957) has also given encouraging results when used for sedation, and both drugs lowered the intra-ocular pressure to safe limits even when it was high initially.

We have also had some success with acetazoleamide used before and after operation (Agarwal, and Malik, 1957; Agarwal, Sharma, and Malik, 1955). A further development which is discussed in the present communication has been the use of a combination of these drugs before and after operation, and the results in our latest series of cases have been excellent.

Material

The series consists of 150 intracapsular cataract operations performed at the S. N. Hospital, Agra, and at the U.H.M. and L.L.R. Hospitals, Kanpur. One hundred of these cases were straightforward, but forty were complicated by hypertension and ten by bronchial asthma.

Other series previously reported by us are also mentioned for comparison:

- (1) 100 cases in which only curare or curare-like products were used (Agarwal and Mathur, 1952; Agarwal, 1953).
- (2) 95 cases in which chlorpromazine was used (Agarwal, Gupta, and Malik, 1957).
- (3) 100 cases in which acetazoleamide was used and no peripheral iridectomy was performed (Agarwal and Malik, 1957).

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Method

The following drugs were used in a combined programme of sedation and akinesia:

(i) *Barbiturate*.—Tuinal 1·5 gr. orally on the evening before the operation, 1·5 gr. orally one hour before the operation, and 1·5 gr. on the evening after the operation.

(ii) *Chlorpromazine*.—25 mg. orally the night before the operation, 25 mg. orally on the morning of the operation, 25 mg. intramuscularly 30 min. before the operation, and 25 mg. daily for 3 days after the operation.

(iii) *Acetazoleamide*.—250 mg. in a single daily dose, starting 2 days before the operation and continuing for 4 days after it.

(iv) *Promethazine*.—One teaspoonful 30 min. before the operation.

(v) *Curare-like Products*.—Starting 15 min. before the operation, 7 I.U. curare are given in one minute and then 7 I.U. every minute until ptosis occurs. The dose is continued until paresis of the extra-ocular muscles appears.

The patients were otherwise prepared in the routine manner. 500,000 units penicillin dissolved in 0·5 ml. normal saline were given subconjunctivally before the eyes were bandaged after the operation. Routine post-operative procedures were followed. Prostigmine was kept in readiness to counteract the effect of curare if necessary and preparations were made for administering oxygen after intratracheal intubation in case of need.

Observations

(1) Blood Pressure (Table I), Respiration, and Pulse Rate.

TABLE I
BLOOD PRESSURE

Drug	No. of Cases	Blood Pressure (mm. Hg)								
		Systolic				Diastolic				
		Fall of 5 mm. or More	Mini- mum	Maxi- mum	Aver- age	Fall of 5 mm. or More	Mini- mum	Maxi- mum	Aver- age	
Curare or Curare-like Product	100	12	5	25	8·5	7	5	10	7	
Diamox	100	×	×	×	×	×	×	×	×	
Largactil	95	80	5	46	13·73	57	5	11·04	30	
Present Series {	*Without Initial Hypertension (Diastolic 90 mm. Hg or below) ..	100	95	5	25	15	60	5	14	20
	With initial Hypertension (Diastolic 90 mm. Hg or More) ..	40	40	30	60	46	40	12	35	18

* Including cases of bronchial asthma in which no curare was given.

The respiration in cases without respiratory complications was regular and deep, and it was also satisfactory in the ten cases with bronchial asthma.

No respiratory embarrassment was noted, and no resuscitatory measures were required.

The pulse was regular, with a good volume, and showed no increase or undue decrease in rate.

(2) *Ptosis, Ocular Motility* (Table II), and *Ocular Tension* (Table III).

The average dose of gallamine triethiodide required for production of ptosis when used alone is 26 units. In the integrated approach this dose was reduced to 14 units and the average dose required for surgery was reduced from 39 to 26 units. The untoward effects of gallamine triethiodide were thus completely eliminated.

TABLE II
OCULAR MOTILITY

Drug	No. of Cases	Type of Ocular Movements		
		Involuntary		Command
		Jerky	Rolling	
Curare	100	4	Nil	100
Diamox	100	40	60	100
Chlorpromazine	99	30	20	95
Present Series	150	4	Nil	150

TABLE III
VARIATIONS IN INTRA-OCULAR PRESSURE

Drug	No Change	Intra-Ocular Pressure (mm. Hg)							
		Fall				Rise			
		No.	Mini- mum	Maxi- mum	Aver- age	No.	Mini- mum	Maxi- mum	Aver- age
Curare	Nil	100		10	3	×	×	×	×
Diamox	Nil	100	—						
Largactil	25	70	2	48	7.5	6	5	20	11.7
Present Series	30	120	4	40	9	×	×	×	×

(3) *Cooperation* (Table IV).

The patients were mentally and physically fully relaxed and non-apprehensive. They were fully conscious and could execute movements on command. For 4 days post-operatively they lay fully relaxed and in a sleepy state.

TABLE IV
GENERAL COOPERATION OF THE PATIENT (PERCENTAGE)

Drug	No. of Cases	Percentage Response		
		Excellent	Good	Un-Cooperative
Curare	100	10	80	10
Diamox	100	0	50	50
Chlorpromazine	95	56.6	39	4.4
Present Series	150	70	30	0

(4) *Operative Complications* (Table V).

TABLE V
COMPLICATIONS DURING OR AFTER OPERATION

Treatment	No. of Cases	Complications				
		Vitreous Prolapse	Iris Prolapse	Hyph-aema	Intra-Ocular Expulsive Haemorrhage	None
No Drug { Non-hypertensive Hypertensive	100	10	4	20	1	65
	10	2	1	5	2	2
Curare	100	0	Not quoted			
Chlorpromazine	95	5	4	60	×	26
Diamox	100	6	5	20	×	69
Present Series { *Non-hypertensive Hypertensive	110	×	1	5	×	104
	40	1	1	4	×	34

* Includes ten cases of bronchial asthma in which curare was also given.

(5) *Post-Operative Flat Chamber* (Table VI, overleaf).**Results**

The patients were both physically and mentally relaxed after this integrated therapy, and the degree of relaxation was greater than when any of the drugs was used singly. Some were almost drowsy, but in spite of this degree of

TABLE VI
POST-OPERATIVE INCIDENCE OF FLAT CHAMBERS

Treatment					No. of Cases	Flat Chamber on 4th Post-operative Day
No Drug	{	Non-hypertensive	..	..	100	8
		Hypertensive	..	..	10	1
Curare		..	..	..	100	10
Chlorpromazine		..	..	..	95	8
Diamox		..	..	..	100	3
Present Series	{	Non-hypertensive	..	..	100	×
		With Bronchial Asthma	..	..	10	1
		Hypertensive	..	..	40	1

sedation could respond to questions. They were unmindful of any painful stimuli as the retrobulbar injection produced no response and no pain was felt during the insertion of the superior rectus stitch. The patients complained of dryness of mouth and had to be given plenty of water after the operation and sips of water during it. Some complained of a fainting feeling and difficulty in breathing, but these sensations were not authenticated by the pulse, blood pressure, and respiration records.

Post-operative vomiting and retention of urine were not seen except in some patients to whom curare was given alone, but even in these cases there were no serious consequences.

Discussion

This integrated drug administration was successful both because of the ease with which the operations were performed and because of the almost complete elimination of operative and post-operative hazards. With suitable antibiotic prophylaxis, better aseptic preparation of the patient, and greater ease in operating, it has been possible to achieve enviable results. Sedation with barbiturate and chlorpromazine makes the patient calmer, more co-operative, and more relaxed. As in our previous series (Agarwal, Gupta, and Malik, 1957) there was no autonomic disturbance or hypertension.

When we employed a combination of barbiturates and chlorpromazine alone, however, there was in a few cases, an embarrassing rise in intra-ocular pressure but when these drugs were combined with curare this rise was eliminated. The apprehension that these drugs may lower the intra-ocular pressure and so render extraction difficult is without foundation.

In North India the prevalence of trachoma makes conjunctival haemorrhage a rather frequent complication (in 20 to 30 per cent. of all operations) and sometimes leads to varying degrees of hyphaema. This risk is greater (60 out of 95 cases) when chlorpromazine is used alone (Agarwal, Gupta, and

Malik, 1957). The incidence of hyphaema in the present series was only about 6 per cent. probably because of the additional use of Promethazine, an anti-histamine with strong decongestive properties.

The incidence of vitreous prolapse is usually between 7 and 9 per cent. and we had recorded a figure as high as 13 per cent. in hospital cases (Agarwal and Mathur, 1952). When curare was used alone, this complication was completely eliminated (Agarwal and Mathur, 1952; Agarwal, 1953); when acetazoleamide was given with barbiturates the incidence was 6 per cent.; when chlorpromazine was given with barbiturates the incidence was about 5 per cent. In the present series there was only one vitreous prolapse in 150 cases. This complication is usually attributed either to an initially high intra-ocular pressure or to a sudden rise during operation, caused by the reaction of the extra-ocular muscles to painful stimuli or to a state of mental anxiety. These are well controlled by a combination of acetazoleamide, chlorpromazine, and curare.

Expulsive intra-ocular haemorrhage is a rare complication and it occurred in only one case in the series without hypertension. In hypertensive patients, however, it is more likely to occur and we had had two instances in ten such cases in our previous series. A combination of chlorpromazine, promethazine, and barbiturates, however, relieves mental anxiety and stress, and lowers the systolic pressure by 30 to 60 mm. Hg (average 46 mm.) and the diastolic by 12 to 35 mm. Hg (average 18 mm.). We did not lose even a single eye from the forty operated on in the present series.

Post-operative iris prolapse is probably due to the iris being pushed forwards by the secreted intra-ocular fluid, but a peripheral iridectomy short-circuits the route of flow of the aqueous fluid. In the series (Agarwal and Malik, 1957) where no peripheral iridectomy was done and the patient was kept on acetazoleamide, iris prolapse occurred in only 5 per cent. of cases, and it was suggested that the acetazoleamide decreased the formation of aqueous. In the present series iris prolapse occurred in only 1.66 per cent., and this in spite of the fact that in most cases peripheral iridectomy was not done.

The anterior chamber failed to re-form in two of the 150 cases, perhaps through continued administration of acetazoleamide and the complete sedation which was maintained for 4 days.

Congestion of the eyes was insignificant probably because of the diminished aqueous flow and the altered ocular metabolism due to inhibition of carbonic anhydrase.

It is evident that this combined therapy for sedation and akinesia gives remarkable results by making the patient mentally and physically relaxed, and is of special significance in patients with general hypertension. We did not have a single mishap in ten cases with bronchial asthma, but we do not recommend the use of curare except in highly expert hands if upper respiratory tract lesions are present.

Summary

(1) 150 cases of cataract extraction are reported in which a combined programme was used of pre- and post-operative sedation and akinesia with the addition of acetazoleamide.

(2) The results are compared with those obtained in previous series in which one or more of these drugs were used singly or in combination.

(3) Complications were very few, and the combined therapy was shown to be useful in cases complicated by generalized hypertension and bronchial asthma.

(4) No untoward general complications were noted, but it is not recommended that curare should be used in cases of bronchial asthma except by experts, and only when full resuscitation measures are available.

(6) The patients' cooperation was rendered unnecessary, as they were unmindful of the manipulations and were mentally and physically fully relaxed.

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