agent which includes an antiseptic—in this case hexachlorophane—but such a substance, as well as being effectively antibacterial, must also be non-irritant. With phisohehex the problem of allergy to soap alkali does not arise. In this trial it was found soothing to the skin, caused no reactions, and was preferred by the majority of participants. On the other hand, we have evidence of hexachlorophane soap allergy in one surgeon in this hospital, and, furthermore, hexachlorophane soap is less satisfactory because of the difficulty of transferring water-insoluble hexachlorophane from soap to skin. This may be one reason why the sporadic use of hexachlorophane soaps during periods 1 and 3 of this experiment showed little or no tendency to diminish the counts. The inclusion of the water-repellent lanolin in phisohehex promotes the transfer of hexachlorophane to the skin.

The scrub time of only three minutes with phisohehex brought some criticisms from the surgical staff, but the bacteriological results show it to be far more effective than soap in the circumstances of this trial. The amount of suds produced was a little less than with soap, and this again caused some criticism.

It is claimed by the manufacturers that the effect of phisohehex is a cumulative one. It did seem that the bacterial counts at the beginning of a week were somewhat higher than at the end, but the counts generally were so low that the differences here were not significant. Although a powerful disinfectant, hexachlorophane does not degerm skin quickly, as does 70% alcohol (Price, 1951). Consequently the bactericidal effect of phisohehex can be attributed to the efficient deposition of hexachlorophane as a semi-permanent film on the skin of frequent users.

Its use might therefore be justified in the pre-operative preparation of patients undergoing elective surgery, such as, for example, certain types of orthopaedic procedure. In this instance the patient would wash frequently with the agent for two or three days before operation.

Powerful inactivation of phisohehex by tween 80 agar was demonstrated during tests on the control of the bacteriological investigation. Therefore it is highly improbable that the extremely low or negative counts obtained during the trial of phisohehex were due to the transfer of small amounts of this substance to the culture plates during sampling. This supports the theory that phisohehex, used frequently, is cumulatively bactericidal to skin flora. Furthermore, if the deeper layers of saprophytic skin flora are dependent on environmental bacterial replenishment, then the constant presence of the phisohehex film on the skin of habitual users may eventually diminish those reservoirs of bacteria which are beyond the reach of the scrubbing-brush.

The experiment was too short to gauge the effect on wound sepsis in the surgical units involved, but sepsis rates certainly did not rise during the period.

Summary

An effective and convenient technique of surgical scrubbing is described.

The assessment of the efficiency of the scrub agent—phisohehex—was determined by the fall in the number of bacterial colonies as estimated by a "streak plate" technique.

The result, which was controlled by the use of culture media inhibitory to phisohehex, showed that the new

method produced a highly significant fall in the number of colonies of skin organisms grown from the finger-pads of the surgical team at the end of operations.

The advantages and disadvantages of phisohehex and hexachlorophane soap in the surgical scrub are discussed.

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CORRECTION OF UNIOCCULAR APHAKIA BY MEANS OF ALL-ACRYLIC ANTERIOR- CHAMBER IMPLANTS

REVIEW OF 100 CASES

BY

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In 1951 Harold Ridley described his method for overcoming the visual defect in cases of aphakia by means of an acrylic lens inserted behind the iris and in front of an intact posterior lens capsule. He was thus the pioneer of intraocular implant surgery. By 1953, however, it was evident that this technique had its limitations. The artificial lens had to be inserted at the same time as an extracapsular extraction was performed, so that there was no means of checking the aphakic correction before the implant was inserted, and the patients in whom the posterior capsule had been divided or had been removed were not eligible. Perceiving the possibilities of this technique, and in an attempt to avoid some of its disadvantages, certain workers, such as Strampelli (1954), in Italy, Barraquer Moner (1954), in Spain, and Schreck (1955), in Germany, evolved an implant placed in front of the iris and behind the cornea, with feet wedged in the anterior chamber angles and carrying a central optical portion, the correction of which could be modified to suit the requirements of the individual case (Fig. 1). This type of implant can, and indeed should, be inserted after the eye has made a satisfactory recovery from cataract surgery, thus reducing the surgical trauma inflicted upon the eye at each session.

FIG. 1.—Aphakia corrected by anterior-chamber acrylic implant.

Cases of unioocular cataract or aphakia are common. While some patients accept their disability in a phlegmatic fashion, apparently satisfied to have one good eye, others suffer considerably from their three-fold disability. Their unaided vision is usually less than 3/60, and, of course, they cannot enjoy the benefits conferred by binocular vision; many of them are confused and worried by their inability to use their two eyes together and develop psychological changes for the worse, this being especially noticeable in children and young adults.

Attempts to use a normal eye with an aphakic one by means of spectacles usually fail because of aniseikonia amounting to about 30% in most cases. A contact lens in the aphakic eye will reduce this disparity in image size to about 10%, but, even so, many patients cannot tolerate even this amount of aniseikonia. An anterior-chamber implant will reduce this figure still further to about 3%, which can be tolerated by the patient.

The type of implant which is used is clearly of the first importance. A one-piece implant, made of an inert material and of exactly the right length for the particular case, is the ideal. A modified Strampelli type implant has been used throughout (Fig. 2). These implants have an inner radius of curvature of 14 mm., which provides for a clearance between the central part of the posterior corneal surface and the anterior surface of the implant of between 1.5 and 2 mm. Therefore, if the implant has been correctly inserted it is nowhere in contact with the corneal endothelium.

The manufacturers (Rayner Ltd., 160, New Bond Street, London, W.1) supply the implants in 0.5-mm. sizes, from 10.5 to 14 mm., from which the surgeon can choose an implant of exactly the right length at the time of operation. The unused implants are then returned

to the manufacturers. This may seem an elaborate method of obtaining a correct fit, but there appears to be no satisfactory alternative. The implants are made of fully polymerized methyl methacrylate, usually known as acrylic.

The first 30 implants were sterilized in cetrimide, which was not entirely satisfactory, for some of the sterilizing agent was adsorbed by the methyl methacrylate and, leaking out subsequently into the eye, produced some reaction. This problem seems to have been answered by Frederick Ridley (1957), who evolved a simple and economic method of sterilizing these implants with caustic soda. This method has been used in the subsequent 70 cases with consequently less post-operative reaction than with the earlier cases.

Detailed accounts of the pre-operative and post-operative management of these cases and of the surgical technique involved have already been given (Choyce, 1958, 1959).

Attention to the following points is essential: (a) the eye must have made a complete recovery from antecedent cataract surgery and any complications arising therefrom; (b) the implant must be a tight fit and must not move about the anterior chamber; and (c) some form of superior iridectomy is desirable.

100 cases of unioocular aphakia have been treated with anterior-chamber implants at the Southend General Hospital. Most of these patients were unsuitable for treatment with contact lenses because they were too young or too old, or because they had been given trial fittings and had been found to be liable to diplopia, or because they had used contact lenses for a year or so and given them up as they could not tolerate them.

The following Table analyses the causes of the cataract or aphakia in these cases.

FIG. 2.—Strampelli implant for the anterior chamber. Modified by Choyce. (Diagram by Rayner Ltd.).

Causes of Cataract or Aphakia in 100 Cases

Traumatic aphakia	10 within 2 years of injury	32
	22 within 2-56 years after injury (Implants inserted from 3 months to 56 years after injury)	
Senile cataract, 50+ age group		40
Heterochromic cyclitis with cataract		10
"Senile" cataract, 20-50 age group		9
Unioocular congenital cataract, 2-4 age group		5
Complicated cataract from iritis with secondary glaucoma		4

Visual Acuity

By comparing the post-implant visual acuity with the pre-implant acuity obtained by the use of an aphakic correction in a spectacle frame, it is noted that in 90% of the patients the visual acuity is as good as or better than that which had been expected. The 10% of disappointments were due to the following causes:

Iritis leading to secondary glaucoma and necessitating removal of the implant	3
Endothelial corneal dystrophy (including two of the three above)	4
Cause uncertain, ? macular oedema	5
Sympathetic ophthalmia	0
Eyes enucleated	0

Only one case in the last 50 has been a disappointment, which suggests that as experience increases so should the incidence of complications lessen. Intra-ocular surgery is always dangerous, often difficult, and frequently disappointing, and when viewed against this background it is felt that the above list of complications is not serious.

One additional patient (aged 74) committed suicide for reasons unconnected with his eye operation six weeks after insertion of the implant. His case is not included in this series. The eye containing the implant has been examined in detail by Professor Norman Ashton, of the Institute of Ophthalmology, and a full report is in the press (Ashton and Choyce, 1959). This examination disclosed that the iris root was distorted and atrophic, and the anterior attachment of the ciliary muscle appeared attenuated and weakened so that posterior dislocation of the foot of the implant becomes a theoretical possibility. Clearly, this stretching and atrophy of the structures of the angle might be lessened if the thickness of the haptic portion of the implant could be reduced, and instructions were therefore given to the manufacturers of these implants to reduce the thickness from 0.91 to 0.50 mm.

The manufacturers have decided to call this modification the "Choyce anterior chamber implant" to distinguish it from the thicker Strampelli implant. I have now inserted several of these thinner implants and am satisfied that the technique of insertion becomes even simpler; I am continuing to use them.

Binocular Vision

Binocular vision was restored in 75% of the cases operated upon; in the remaining 25% alternating suppression had set in, usually associated with manifest squints, either horizontal or vertical or both. Where the deviation was so marked as to be noticeable, it was corrected by means of cosmetic muscle surgery. Convergence deficiency caused some difficulty in six cases; this yielded to orthoptic exercises. Diplopia could occasionally be elicited in some of these patients, but none of them complain of diplopia.

Psychological Results

Striking improvement in the morale and psychological well-being of these patients has been observed, especially in the group of young adults with traumatic cataract or

traumatic aphakia. This point is best brought out by some typical case histories.

Case 1

A 20-year-old man, a Royal Marine commando, received a perforating wound of the right eye during exercises. He was invalided out of the Service and given a small pension for the loss of use of this eye. He was very much an open-air type, and he had set his heart on a career of this sort. He became very depressed, would not see any of his old friends, and made no attempt to get fresh employment. His family were very worried about him, and finally his twin brother took the initiative in sending him to me. He had a healed scar just below the centre of the right cornea to which a considerable strand of lens capsule was adherent. At the first operation this anterior synechia was divided, the strand of capsule removed, and a peripheral iridectomy performed. At the second operation, two months later, a 13.5-mm. anterior-chamber implant was inserted, with the result that he can now see 6/9 unaided and 6/4 with a small minus cylinder. He has full binocular vision and his mental state has improved out of all recognition. He is looking forward to a career in one of the overseas Colonial Police Forces.

Case 2

At the age of 14 a boy received a severe contusion injury to the right eye caused by an air-gun pellet. He was in hospital for many weeks and the history suggests that he had a large hyphaema with a secondary rise in intraocular tension. The sight of this eye was reduced to perception of light, and a divergent squint developed. At the age of 35 he married a woman somewhat older than himself, and although they were very fond of each other the sexual side of their married life was a disappointment to both because of the husband's diminished potency. His wife felt that this was due to his brooding over his eye and because, ever since the injury, he had had to put up with a great deal of unkind teasing, first from his schoolmates, and later on during his Army career and at work. She took the initiative in arranging for her husband to consult me. He was 38 when I first saw him. Owing to the period of secondary glaucoma following the original injury, the optic disk was deeply cupped and atrophic, and the field was small and the corrected vision was only 6/36. The intra-ocular tension was within normal limits. However, they were so anxious that everything possible should be done that I agreed to try implant surgery. A peripheral iridectomy was performed and a 12.5-mm. anterior-chamber implant inserted. At a later operation the divergent squint was reduced to about -5 degrees by muscle surgery. He was then able to see the expected 6/36 with this eye, and again the psychological benefit has been considerable. He has got himself a better job than he had had previously, and I understand that the physical side of their marriage is now satisfactory to both parties. This case shows that considerable psychological improvement can be expected even when the amount of vision which can be restored is limited by ocular damage in addition to the aphakia.

Case 3

After a blow from a piece of wood a woman developed a cataract in her left eye. This was extracted intra-capsularly at the age of 60. She was a rather nervous patient and never succeeded in overcoming the visual confusion between her normal and her aphakic eyes. She tried numerous pairs of glasses, some designed to give her the use of the aphakic eye while occluding the good one, and vice versa. After some years of this she made an attempt to commit suicide by putting her head in the gas oven. Her daughter turned off the taps just in time, and she was subsequently admitted to a mental hospital as a certified patient with a diagnosis of acute depression. When I saw her first at the mental hospital she explained that if only her two eyes could be made to work together once more she would be much better in herself and would not make any further attempts on her life. Her self-diagnosis

was supported by psychiatric opinion, and she was given an anterior-chamber implant. The visual result was good, with an acuity of 6/6 and full binocular vision. Shortly after the operation she was released from the mental hospital and is apparently leading a normal domestic life.

Case 4

A Polish boy arrived in the United Kingdom in 1939 as a 1-year-old refugee. At the age of 12 he was hit in the right eye by a piece of wood, which produced traumatic aphakia. He developed a well-marked divergent squint, which was later considerably reduced by appropriate surgery. He became very depressed about his near-unioocular condition, and could not settle down in this country. He therefore applied to emigrate to Canada. In the meantime, at the age of 20, he obtained my opinion on the possibility of restoring useful sight to this eye with an anterior-chamber implant. I thought that this was possible, but at that moment he was told that he had been accepted by the Canadian Emigration Authorities and could leave in two months' time. I told him that it would not be possible to do this operation and see him through the convalescent period within this time, and that he had to choose between staying in this country for a year or so and having this operation done, or forgetting about it and emigrating to Canada. He decided that his eye was more important than emigration, and implant surgery was carried out. He now sees 6/6 and is very pleased. He has got a better job in this country, and is no longer so keen on emigrating.

Case 5

In 1944 two nurses were listening to the 9 o'clock news in the sitting-room of the nurses' home attached to a south coast hospital when one of the last shells fired by the Germans across the Channel scored a direct hit. One nurse was killed outright and the other received a perforating wound of the left eye. This iris prolapse was abscised and the wound healed. A traumatic cataract developed over the next year or so and eventually she was given a pension of 15s. a week by way of compensation. She subsequently married, gave up nursing, and had two children, but she found life as a one-eyed person rather trying, and her children did not hesitate to tease her, sometimes unkindly, about her disability.

When first seen 13 years later, at the age of 44, she had an inferior iris coloboma with a traumatic cataract. The cataract was extracted intracapsularly with some difficulty, because the lens capsule had become adherent to the limbal scar below. Three months later an anterior-chamber implant was inserted. The patient now sees 6/6 with a small correction, and has full binocular vision. In this case the patient was always psychologically well adjusted and no great change in her morale is yet noticeable; possibly her long contact with the medical profession has made her view the achievements of surgery with a certain scepticism, and perhaps she wonders if this happy result will last.

Discussion

The above examples suggest that it is possible to restore useful visual function to cases of unioocular aphakia many years after the original injury and at the same time to effect a notable improvement in the psychological well-being of the patients. It would clearly be better if such injuries were corrected in this way before amblyopia, squint, and psychological damage had appeared. The purpose of the operation, and the fact that it is proposed to insert a foreign body into their eyes, must, of course, be made clear to the patients, but in my experience the large majority of those with unioocular aphakia are very conscious of their disability and are not deterred by references to the experimental nature of this work. They want an improvement in their vision as soon as it can be arranged, and are not concerned at the possibility of

complications, either immediate or delayed. Two of the patients in this series were so unhappy with their almost useless eyes that they requested that these be removed should they be considered unsuitable for implant surgery.

Summary

The rationale of the treatment of unioocular aphakia by means of anterior-chamber implants is described.

The first 100 cases treated at the Southend General Hospital are reviewed; the immediate results are regarded as satisfactory.

Another 5 to 10 years must elapse before the long-term results can be accurately assessed.

In the meantime, this operation can be offered with reasonable confidence to persons with unioocular aphakia who are worried by their disability and are anxious for treatment.

This piece of clinical research has entailed extra work for a busy department, and I am grateful to my colleagues, especially Dr. R. A. Owen, ophthalmic registrar, Dr. J. Alfred Lee, senior Anaesthetist to the Group, and to Sisters Cockerill and Gugarel, for their valuable assistance. The Southend-on-Sea Hospital Management Committee has been very understanding and helpful about the additional expenditure on this work, and as a result the extra funds have been made available without our having had to apply for or to obtain a grant in aid of this research. My thanks are also due to Rayner Ltd. for their close and helpful collaboration.

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ANTE-PARTUM MECONIUM STAINING OF THE LIQUOR AMNII

BY

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The discovery of meconium staining in the liquor amnii before the onset of labour raises a problem in management, and this paper is an account of the results obtained when an expectant course is adopted in the large majority of cases.

Meconium staining of the liquor amnii in labour has long been regarded by obstetricians as an adverse sign so far as the foetus is concerned; indeed, meconium appearing in liquor which had been clear earlier in labour is perhaps the most absolute sign of foetal distress. Lister and Buchanan (1957), in an investigation of the signs of foetal distress, found that of all single factors the passage of meconium gave the worst prognosis for the foetus. In their series the babies in 50% of the cases in which meconium was passed showed some signs of asphyxia at birth. For the purposes of their investigation they regarded a baby as asphyxiated if it did not cry within one minute of birth. The findings of Lister and Buchanan are in agreement with those of FitzGerald and McFarlane (1955).