the treatment of retinal detachment scleral resection must be advocated.

Comment
I cannot agree with these conclusions in the light of my own experience and that of other writers quoted. It will be appreciated that Dellaporta's fascinating work has been carried out on the healthy eyes of dogs. There had been no pre-existing pathological detachment of the retina and consequent changes in choroid, retina and vitreous, and in his performance of the lamellar folding operation no inflammatory reaction was excited by diathermy surface coagulation or penetration, or by the application of KOH solution. In fact Dellaporta states that such procedures are not advisable.

In the pathological cases operated upon in human eyes I have found the scleral lamellar operation far safer to perform than the full-thickness scleral excision. When performed by the technique described in this paper, with the use of a mild but adequate diathermy reaction and a KOH chemical reaction to cause an aseptic chorio-retinitis, the clinical results have been very satisfactory. A few cases have shown that the surplus folds in the retina may remain for many months, being contained from spreading by a line of healed chorio-retinitis. They will possibly remain for the duration of life, and their presence in the periphery does not interfere with useful vision.

RESULTS
A series of approximately 30 cases that can be traced have been operated upon in 2½ years. A number of hospital cases have been lost sight of, so that their present visual acuity is unknown. Of the 32 eyes which have been operated upon, 21 have been surgically successful and 12 have 6/18 or better vision. All the other successful cases have at least 6/60.

Illustrations of Dellaporta's experimental operations and diagrams of illustrative cases were shown. A small series of the author's cases were described, with fundus diagrams.

SUMMARY
1. A short history and description of the scleral lamellar resection operation as performed by a few overseas authorities is given.
2. It is suggested that the operation should be performed more often as a primary operation.
3. Indications for operation are given and pre-operative, operative and post-operative details and routines are described.
4. Dellaporta's experimental work on the fate of the scleral gutter is quoted in some detail.

REFERENCES

EXPERIENCES WITH A MOBILE BURIED IMPLANT AFTER ENUCLEATION*

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Artificial eyes were used in statues and embalmed bodies several thousands of years ago. An eye painted on ivory was found in a statue excavated near the Oracle at Delphi. Numerous examples occur of artificial eyes fitted to ancient Egyptian mummy-cases.

The earliest reference to an artificial eye being used on human beings is in the Babylonian version of the Talmud, Nedarim, pages 66a and 66b, which was compiled over 1,600 years ago. The text suggests that a golden eye was used in a person's orbit.

In the 5th century B.C. an eye was painted on pottery stuck on a piece of cloth, which was then fastened over the socket of the patient.


In the 16th century the great French surgeon, Ambroise Paré, described artificial eyes made of silver or gold and enamelled to look like an eye. These were used in patients' sockets. In the 17th century glass was used for the first time in the manufacture of artificial eyes. In 1934 plastic material was used and several years later alloys, usually in conjunction with plastic material, were employed.

The surgical removal of an eye, or enucleation, has been practised as a surgical manoeuvre probably for hundreds of years. Until 1841 the operation was very crude. A stout thread was put through the eyeball, and the eyeball pulled forward. A knife was then pushed through the conjunctiva, swept around until the tissues were divided, and in this way the eye was 'delivered'. This operation left a socket that very seldom allowed an
artificial eye to be fitted. In 1841 Ferral described the anatomical relations of Tenon’s capsule to the muscles and the orbital fat, and showed how an eyeball could easily be removed by working inside Tenon’s capsule. In 1826 Cleoburey had described how he performed an enucleation by working inside Tenon’s capsule, but did not describe the anatomical relationships.

Since 1841 a tremendous number of modifications of enucleation have been described, an obvious indication of how unsatisfactory from the cosmetic and psychological point of view the ‘straightforward’ operation of enucleation has been.

Grimsdale and Brewerton, in discussing the bad cosmetic result of a simple enucleation, state that many patients prefer the frank deformity of an empty socket to the vacant staring look of a sunken prosthesis that has no movement. The main modifications of the simple enucleation were devised to provide a moving stump.

Mules (1884), dissatisfied with the cosmetic results of previous operations, performed an evisceration and removed an elliptical piece of sclera. He then inserted a glass ball into the sclera, and closed the opening with sutures. There were several modifications of this operation, some of which are in use today.

Adams Frost (1885) suggested that a glass globe be put into Tenon’s capsule after enucleation. The cosmetic results were not as good as in Mules’s operation, but complications were fewer. Chibret (1885) implanted a rabbit’s eye into Tenon’s capsule. According to his description the eye lived for some time and even developed corneal sensitivity. After 2 weeks, however, the rabbit’s cornea dissolved in pus.

Greenwood (1914) stitched the superior to the inferior rectus and the lateral to the medial rectus and tied them over a glass ball.

Ramsay (1903) injected paraffin into Tenon’s capsule, and Spratt (1905) used lard paraffin balls.

Rollet (1904) implanted a mass of skin and subcutaneous fat, which he took from the deltoid region, into Tenon’s capsule.

Sattler (1912) suggested the use of costal cartilage in Tenon’s capsule.

In the British Army ophthalmic issue in 1940, Mules’s balls were replaced by the Duke-Elder sphere.

No new developments in the attempt to improve the cosmetic result of enucleation occurred until 1945, when Cutler described his famous ball-and-peg type of implant and prosthesis.

In 1946 J. H. Allen, discussing an article by himself, C. S. O’Brien and L. Allen, described a modification of the Cutler implant. This modification, however, was also not completely buried.

The sad history of the almost perfect mechanical implants which were not completely buried is too well known to bear reiteration. It was, however, from their modification of the Cutler implant that J. H. and L. Allen developed a buried implant which has none of the disadvantages of the Cutler type of implant, but still imparts very good movement to the prosthesis and gives enough ‘body’ to the socket to prevent the sunken appearance associated with ordinary enucleations. A full description of their implant and their technique of using it after enucleation appeared in the Archives of Ophthalmology of 5 May 1950. We should like to pay tribute to the lucidity of the text and the very fine drawings which make it easy to follow the descriptions step by step. In fact the simplicity of the drawings to some extent belies the technical difficulties presented during the operation.

**The Allen Operation**

The implant used is almost hemispherical. It is 21 mm. in diameter, the size approximating to that of the posterior half of the globe. A smaller size is used for very young children. It contains 4 tunnels; after enucleation the vertical recti are each brought through the superior and inferior tunnels and stitched together in the opening on the face of the implant, and the lateral and medial recti are brought through the lateral and medial tunnels and stitched together. The vertically and horizontally-acting muscles are stitched together, and the implant is covered with Tenon’s capsule and conjunctiva, which is stitched.

A month afterwards the prosthesis is fitted. It approximates in size to the anterior half of the globe, and has a flat, not concave, posterior surface. This lies on the flat rim of the face of the implant, and it is this contact which imparts movement to the prosthesis.

**Some Comments**

In their technique the Allens use one stitch to each edge of the muscle, making in all 8 stitches, which means there are 16 ends. In our experience, if only one double-armed suture is used for each muscle, it simplifies the operation a great deal, cuts down the time appreciably and obviates a lot of muttered imprecations while sutures are sorted out.

Perhaps the most difficult aspect of the operation is stitching the muscles together in the opening of the face of the implant, because there is very little room to work in, and the edge of the opening in the face allows of little manoeuvring. This becomes most apparent when the opposing muscles are being stitched together. It is difficult at this step to keep the muscles sufficiently taut. To overcome this we have modified the technique as follows:

Whilst the implant is held firmly with forceps by the assistant, a vertical muscle and a horizontal muscle are pulled firmly through their respective tunnels until they cross each other. They are then clamped together with an artery forceps just beyond the crossing, and stitched together at the crossing. The other pair of muscles is then treated in the same way. The two lots are finally stitched together so that the combined junction lies in the centre of the face of the implant. The muscles should, however, not be pulled too tight, because movements of the implant become limited.

A complication arising from the Allen technique is that the nasal edge of the implant may push forward so that it is very difficult to fit the prosthesis properly. In fact, in extreme cases the prosthesis will not stay behind the lids. To overcome this, after the muscles have been stitched together, the central junction of the muscles is gripped with a forceps whilst the implant is rotated with another forceps so as to tilt the temporal...
edge of the implant forwards. White silk is then stitched through the lateral rectus and around the bridge of its tunnel several times so as to anchor the implant in this position. This procedure improves the cosmetic and the functional result.

RESULTS AND COMPLICATIONS

Twenty-five of these operations are reported in the present series. The first was performed 4½ years ago and the last in this series a year ago. More than 60% were done at least 2 years ago. Figs. 1, 2 and 3 illustrate the result in 3 cases.

Fig. 1

Fig. 2

Fig. 3

Two cases have been failures; a fistula developed in both, infection supervened, the external rectus sloughed and the implant had to be removed. It is difficult to determine whether the primary cause of the failure was imperfect closing of the conjunctiva at operation, or pressure on the conjunctiva from the implant or from the prosthesis, or infection from buried stitches, or some other cause.

One of the failures was a man whose orbit had been riddled with quartz from a blast accident. When the implant was removed, exudate was found around particles of buried quartz and he was probably an unsuitable case for the operation, but he had retained the implant and worn a prosthesis for a year. Another complication arose in his case. The lower fornix was shallow and when he looked up or sneezed, the prosthesis fell out. This was overcome by doing a fine tarsorrhaphy at the inner end of the lids, which was successful in retaining the prosthesis and was scarcely noticeable.

The other failure was a boy whose conjunctival edges did not heal despite the absence of infection. He was readmitted after a month but, despite freeing and freshening the edges of the wound, the hole would not close. After 4 months a prosthesis was fitted, which was worn without discomfort or discharge for a further 8 months. After this the socket became infected and, although this was cured with local antibiotics, the external rectus had sloughed and the implant had to be removed.

There are 2 other cases in which the conjunctiva did not heal. One is an old woman on whom 3 attempts have been made to join the edges of the hole but all have failed. She uses an antibiotic ointment daily and has worn her prosthesis for 18 months. The other patient was operated on overseas and came complaining of profuse discharge from the socket. After antibiotic therapy it was possible to resuture the conjunctival wound. The operation was successful and there has been no discharge for a year.

One complication that we have met is tilting of the implant so that the prosthesis leaves a gap on the nasal side, or even falls out when the patient looks to the side. An attempt was made to correct this in one case by carrying out a squint operation on the implant. This was partly successful and although a gap can be noted, the prosthesis no longer falls out.

Another complication, found in one case, was a lax lower lid which would not allow the retention of the prosthesis. The Dimmer modification of Kuhnt’s operation for ectropion gave a very satisfactory result.

CONCLUSIONS

The use of the Allen type of buried implant is, in the large majority of cases, a very satisfactory operation. The cosmetic results are very good.

The most important difficulty is that of securing permanent closure of the conjunctiva, for which careful suturing without tension is the best answer.

Another difficulty is the nasal tilting of the implant, which is easy to rectify either by stitching it with a temporal tilt, or by tightening the muscles to make the implant lie deeper.

The final difficulty, perhaps better called a disappointment, is the fact that the vertical movements are not as good as the lateral ones. The answer to this problem is
probably the use of magnets in the implant and the prosthesis.

SUMMARY
1. Twenty-five cases of the buried Allen implant are reported at intervals of between 1 and 4½ years after operation.
2. Two failures and other complications are described.
3. Modifications in technique are suggested.

All the implants and prostheses were made by Mr. A. Schulmeister, without whose cooperation these cases could not have been done.

REFERENCES


ETHER: A VINDICATION

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I found Dr. Samson’s short article Cyclopropane: a Vindication, 1 which appeared in our Journal of 25 February, most interesting and full of common sense. With cyclopropane anaesthesia his veiled battle cry appears to be ‘Oxygen! More oxygen!’ I fully endorse his views and here wish to repeat his battle cry of ‘Oxygen! More oxygen!’ in association with ether.

To my mind he rightly concludes that where there is a sufficiency of oxygen in the system—I prefer an excess of oxygen—there can be no symptoms of hyperventilation—no slowing of the pulse and raising of blood pressure, no ventricular fibrillation—irrespective of what anaesthetic is used, even in moderate excess.

My interest, however, is not in Dr. Samson’s cyclopropane, but in his logical reasoning, which I apply to ether; I never use cyclopropane. Except where there is an explosion hazard I always use ether and pure oxygen, with a flow of 6 litres per minute, after induction with N₂O plus O₂ plus Tritene or pentothal plus a relaxant. Where I have not used this excess I have on a few occasions had reason to regret that oversight.

When cyclopropane came into fashion I soon found out that there is nothing you can do with it that you cannot do equally well, or better, with ether, when once your patient is safely induced with say, Pentothal plus a relaxant or by N₂O plus O₂ plus Tritene. The optimum flow of oxygen in the semi-closed system is 6 litres to the minute. If you use more—say 10 or 12 litres—there is the possibility of too little rebreathing, resulting (theoretically) in an accumulation of CO₂ in the lung alveoli in spite of a good colour in your patient—a combined excess of oxygen and CO₂. If you use too little—say 2 litres—there is the danger of an excessive accumulation of CO₂ in the system as well as an excess of ether, neither of which gets sufficiently blown off. Your patient will, to start with, breathe too deeply but eventually the breathing centre will become exhausted and natural breathing will cease.

I was brought up in the Edinburgh school of open chloroform and ether. Subsequent advances I had to pick up in the hard way—by trial and error. I fully appreciate Dr. Samson’s suspicions that ventricular fibrillation is brought on by an insufficiency of oxygen rather than by the anaesthetic per se—even with chloroform.

DIFFICULTIES OF THE CLOSED TECHNIQUE

To my mind an unavoidable evil with cyclopropane is the necessity of the difficult closed technique, for the sake of economy—a technique which lends itself so easily to hypoxia and excess of CO₂ in the hands of the less experienced. Economy, to my mind, is the only advantage in the closed technique. A similar opinion was recently expressed by Sir Robert Macintosh when he visited us in Pretoria.

Dr. Samson states that innumerable patients of his manifested varying degrees of ‘cyclo shock’ because of his initial inexperience of the closed circuit technique. This condition he ascribes to lack of oxygen. I am sure that with ether and a 6-litre flow of oxygen such collapse would not have occurred in the semi-closed technique. I use this 6-litre flow even in infants with the Ayres tube or a completely open valve—a valve held open by a thick safety pin. In both these instances the bag is only used as an indicator with minimum rebreathing.

I am told that it is bad practice to give pure oxygen, 6 litres to the minute, with ether because there is a possibility of oxygen intoxication. Although I have given about 35,000 anaesthetics, of which well over half were with oxygen and ether, I have never yet come across this dangerous oxygen intoxication. To give pure oxygen in a closed circuit necessitating controlled respiration is a different matter. Here the oxygen pressure in the alveoli rises considerably, varying with the pressure applied to the bag or bellows. One can imagine the possibility of an excessive absorption of oxygen here. It is stated, by those who are supposed to know, that you require a continuous oxygen pressure of 3 atmospheres before such intoxication can be induced. At our altitude the atmospheric pressure is considerably less than 1 atmosphere as measured at sea level.

Again, we are told one is apt to get an excess of CO₂ in the system and alveoli. This I maintain is impossible with a 6-litre flow to the minute. With that flow you get the optimum blow-off to keep the CO₂ concentration down, yet sufficient rebreathing with normal excursions. If the excursions are subnormal there must be obstruction or other reasons.

I know of a case in which a flow of 2 litres per minute of oxygen with ether caused an anaesthetic death, following on 12 hours of artificial respiration and many stormy recoveries. With a 2-litre flow there is the very definite danger of an excessive accumulation of CO₂, as well as of ether—not enough blow-off. On the other hand with a 12-litre flow insufficient rebreathing may ensue, resulting in shallow breathing insufficient to empty the alveoli of their CO₂, which, theoretically, in spite of a good colour in the patient, may cause an excessive retention of CO₂ in the blood, sufficient to upset the nerve centres and heart. This I maintain cannot happen with an unobstructed flow of 6 litres—the happy medium between 2 and 12.

It has certainly never occurred in my 20,000 cases. I maintain that in the past we were in the habit of giving ether in far too high a concentration. Not many years ago I saw a senior anaesthetist bubbling ether with a gas supply! What a safe anaesthetic we have in ether! The more I use ether the less of it I use! I remember reading an account of the first occasion when ether was administered in South Africa. The patient had to have a leg off. After the operation he stated that he could recall much of the conversation going on during the operation, yet felt...