lymphatic glands. These rather dramatic symptoms may be preceded by one or two days during which the child may have a slight sore throat and stuffiness at the back of the nose, as though about to develop a severe cold in the head. The local symptoms, however, remain comparatively slight.

In one instance the adenitis was not the earliest condition, but developed in the third week of an infection of influenzal type.

A boy aged 12 was taken ill at a preparatory boarding-school with vomiting lasting for three nights and two days, and accompanied by high fever without rigors. No other boy was affected. After six days, the fever having almost abated, as term had ended, he was transferred to a nursing home in London under my care. He was found to have broncho-pneumonia at the right base, with a small effusion (confirmed by radiograph). At the end of a week, as the temperature was settling and the lung clearing, he developed an enlarged, painful submaxillary gland on one side, where a lower tooth was being cut. His temperature was again raised, his spleen became palpable, and his blood showed a white cell count of 11,500, with 70.5 per cent. polymorphonuclear cells. Further glands were rapidly involved on both sides, and about three months passed before they completely disappeared.

Course

Starting in the tonsillar lymphatic glands or in those under the sterno-mastoid muscles, the adenitis rapidly spreads, and usually both sides of the neck are involved. At first the swollen glands are painful and tender, and throughout they are very hard to the touch. In only one case did they suppurate, but they take many weeks to disappear completely. With the glandular enlargement there is a moderate leucocytosis showing a relative increase in the polymorphonuclear cells.

The most curious feature of the complaint is the frequency with which rigors occur. These were seen in more than half the cases in the series, and in many instances were repeated four or five times during the illness. In one case a rigor occurred at about 3 p.m. every day for five days, and in another a rigor occurred in the fifth week of illness after the child had been seemingly better for a fortnight. With or without rigors there is a tendency for the temperature to undergo large swinging movements. When at its lowest the child, although uncomfortable, does not appear too ill; but as the temperature runs up to 103°-105° the child is very much prostrated, with a rapid pulse and a general condition which causes a feeling of anxiety. The worst of the illness is over in five to ten days, but the complete disappearance of the fever is a matter of three or four weeks.

Diagnosis: Prognosis: Treatment

In a typical case the infection is far too fierce in type to be mistaken for anything other than a streptococcal adenitis. Milder cases would lack the mononucleosis of glandular fever.

As I have seen it this disease is more alarming than dangerous. In spite of high fever, rigors, and considerable prostration, all the cases in my series have recovered satisfactorily. As complications I have met broncho-pneumonia, otitis, and albuminuria; and Cameron has recorded nephritis.

In treatment an attempt should be made to disinfect the nose and throat by means of nasal oil, sprays, or gargles, and potassium chlorate, with sodium salicylate and sodium bicarbonate, should be given internally. Sponging will be needed for the fever. The glands in the neck are usually sufficiently painful to produce a satisfactory degree of immobilization of the affected parts. It is tempting to make use of subcutaneous injections of anti-streptococcal serum (scarlatinal), but I have not myself seen it do any real good.

Discussion

It is difficult to understand why these cases of adenitis should have made their appearance in the last two influenza seasons, but it is rather characteristic of influenza that its epidemics should show these curious variations. Pneumonia, otitis, tracheitis, jaundice, and myocarditis may be mentioned as manifestations of influenza which may show a peculiar prevalence in any particular epidemic. It is, further, difficult to appreciate in what way these cases of adenitis differ from the "haemolytic streptococcal throats" which so commonly give rise to epidemics in children's medical wards. To assume that the virulence of the haemolytic streptococcus is much exalted in the adenitis cases hardly disposes of all the difficulty.

But the most interesting point arises in connexion with the rigors seen in these cases of epidemic adenitis. In their frequency and severity the rigors are unlike anything seen in other infections in children. As has already been stated, these epidemic cases resemble most closely the rather alarming reactions that may occur immediately after the removal of septic tonsils; but in such surgical cases it is generally held that the quick swelling of the glands is of good omen, setting up a barrier to a possible fulminating infection of the blood stream. It is therefore a very interesting point that in the epidemic cases, in spite of the adenitis, rigors may occur for several days and yet no ultimate harm arise from the repeated infections of the blood stream which the rigors presumably indicate.

CORNEAL GRAFTING (KERATOPLASTY)

SOME MODIFICATIONS IN TECHNIQUE

BY

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The purpose of this short paper is to describe certain modifications in the technique of corneal grafting which I have found helpful and of some value in working on post-mortem and living material.

An essential part of cutting a corneal graft is bevelling the deeper part of its substantia propria and that of its bed so that the graft will not slip from its bed into the anterior chamber. Elschmig and others have used von Hippel's mechanical trephine, an instrument difficult to control and liable to inflict severe damage. Tudor Thomas cuts the shelf in the deeper layers of the cornea with fine curved scissors. Castroviejo prepares a rectangular graft by incising half the thickness of the cornea with portions of razor blades set parallel 4 mm. apart in a clamp. A specially constructed bent keratome with a spear head but blunt sides is then passed obliquely into the anterior chamber at the upper extremities of the incisions and counter-punctures at the lower extremities. A blunt-ended thin spatula with one edge sharp is then passed into the anterior chamber between the two keratome incisions and manœuvred to cut obliquely through the deeper half of the cornea on each side to join the original incisions made by the razor blades, thereby fashioning a shelf, sloping from within outwards. Von Hippel's mechanical trephine does not make a corneal shelf, Castroviejo's manipulations are made very difficult in the case of a recipient whose cornea is so far opaque that the position of instruments passed into the anterior chamber cannot be judged visually, and Tudor Thomas's work with scissors, in spite of skilful execution, causes some crushing and mutilation of corneal tissue.

It seemed to me that a series of cuts less than 1 mm. long set side by side at a slight angle, and made by sweeping a small angular knife obliquely through the deeper half of the cornea around the circumference of the graft and its bed would cause less damage than other methods practised to date. Fig. 1 is a diagram of this knife and illustrates its simple features. The method of using it is described in the account of the operation given below. With improved methods it is probable that some better means will be devised to effect this difficult part of the operation with greater precision and the minimum of trauma.

Sutures of various kinds have been employed to retain the graft in its proper place. A mattress suture passing between the limbus at 12 o'clock and 6 o'clock, 9 o'clock and 3 o'clock, is liable to catch under the edge of the graft during convalescence and so to lift it out of place. Tudor Thomas has an ingenious method of cross-stitching, the sutures passing through opaque cornea adjacent to the site of the graft but none perforating it. Castroviejo draws conjunctival flaps together over the graft by undermining conjunctiva from the limbus backwards above and below, and leaving two strips about 3 mm. wide uncut at 9 and 3 o'clock respectively. Rycroft has employed a complete conjunctival flap drawn over the entire cornea and its graft and retained in place with a purse-string suture. This latter method I have used and found satisfactory for keeping the graft in position and protecting it for six days, during which time it is "taking." It is also possible that during this period the graft derives some nutrition from the serum and lymph from the under surface of the conjunctival flap. My colleague Mr. L. B. Somerville Large has suggested the alternative of drawing

FIG. 1.—Diagram of corneal knife. a, Magnified view of the knife blade. The cutting edge is 1.5 mm. long, and is continued half-way round the curved extremity of the knife, shown in the diagram by the bracket c. b is the shaft, which in section is a flat oval. d is rounded and smooth. e, Bakelite handle.

a large conjunctival flap from above downwards over the graft and securing it in position with two mattress sutures (Fig. 2).

On account of the roving movements which occur during operations on an eye with a densely opaque cornea I felt that some stability and security could be afforded by passing two No. 1 white silk sutures through the superficial layers of the sclera about 1.5 mm. from the limbus at 12 o'clock and 6 o'clock respectively. These sutures may be held by the assistant with the degree of tension necessary to steady the globe and to maintain it in the desired position during operation.

Pre-operative Preparation

Cultures are taken from the conjunctival sac of the donor and recipient, and operation is contraindicated if any pathogenic micro-organisms are grown during forty-eight hours' incubation. Drops of eserine 1 per cent. aqueous solution are instilled into the recipient's eye the night before and on the morning of operation.

Irrigations with lotio hydrarg. oxycyanid. 1 in 8,000 are carried out thrice daily for three or four days before operation and a salve of hydrarg. oxycyanid. 1 in 5,000 may be used at night time. On the day of the operation sterile normal saline is used for cleansing the conjunctival sac, the lashes are cut, and the skin of the eyelids and face prepared in the customary manner.

Operation

The recipient's eye is anaesthetized with two to four drops of pantocain, 1 per cent., a derivative of novocain which has no deleterious effect upon the corneal epithelium, and does not dilate the pupil or raise the intraocular pressure. Its only defect in comparison with cocaine is that capillary oozing is not so effectively checked, but this may be overcome by instilling a few drops of adrenaline.

A facial nerve block with 2 c.cm. of 2 per cent. novocain injected at the site where the upper branches of the seventh cranial nerve cross the neck of the condyle of the mandible, and 1 c.cm. of 2 per cent. novocain injected into Tenon's capsule are of value in securing akinesia of the orbicularis oculi and anaesthesia of the anterior segment of the eye.

No. 1 black silk sutures are passed through the skin of the upper and lower lids for 4 mm. at points 2 mm. behind the lash margin, and are used for the purpose of lid retraction by clamping the ends of the sutures with Spencer Wells forceps to the sterile towels over the head and lower part of the face respectively. (See Fig. 2, a a, a a.)

FIG. 2.—Diagram showing position of sutures. a a, Traction sutures through the lid margin. b b, Fixation sutures through the sclera near the limbus. c c, Mattress sutures to hold the conjunctival flap in position over the upper seven-eighths of the cornea after the graft is in place.

A lid speculum is used during the preparation of a conjunctival flap, but is removed when the bed for the corneal graft is being prepared, lid retraction being effected by the sutures in the lids.

With Hudson's knife the conjunctiva is incised around the entire limbus and with scissors undermined sufficiently so that it may be drawn over the cornea as a complete covering. A purse-string suture of No. 1 black silk is passed 1.5 mm. from the cut edge of the conjunctiva, and at the end of the operation, when this suture is drawn in and tied, the conjunctival flap should exert an even and uniform pressure over the cornea and its graft.

When the conjunctival flap is fashioned above mattress sutures are placed through the episcleral tissues and conjunctiva at the limbus at 5 o'clock and 7 o'clock respectively (Fig. 2) to retain it in position as a covering over the upper seven-eighths of the cornea.

If desirable at this stage the episcleral tissues at the limbus may be scraped in a band 3 mm. wide to eradicate granulation tissue and to divide newly formed vessels entering the cornea (peritomy).

Sutures of No. 1 black silk are passed through the superficial layers of the sclera at 12 o'clock and 6 o'clock 1.5 mm. behind the limbus. I have found these sutures of great help in steadying the eye when the graft bed is being prepared and also when the graft is being laid in position. The type of eye in which corneal grafting is justified has in some instances roving movements over

which the patient is quite unable to exercise conscious control. All bleeding points are stopped by pressure or touching with a hot probe, and the conjunctival sac is irrigated with normal saline at 100° F. The speculum is then removed, and the lids drawn over the eye and covered by a pad of gauze wrung out in sterile normal saline.

The donor's eye is excised at this stage. Pantocain anaesthesia is used, and an injection of novocain into Tenon's capsule and underneath the conjunctiva and around the limbus. It is needless to remark that great care is taken to prevent drying or damage to the cornea. Immediately after excision the stump of the divided optic nerve is transfixed with a thick white suture, the ends of which are passed through the hollow central core of a special stand (designed by Tudor Thomas) and retained in place by placing the weighted base of the stand over the ends of the suture as they rest on a sterile towel. The eye is thus held securely in the socket of this stand. The operator moistens the cornea with several drops of warm sterile normal saline or Ringer's solution. The

FIG. 3.—Diagram of the cornea. The continuous line (a) represents the trephine incision, the interrupted line (b) the incision in the deeper layers of the cornea. c is the corneal knife cutting obliquely through the deeper layers of the cornea. d d are fixation sutures in the sclera.

globe is surrounded by a thin gauze swab and gently grasped between the forefinger and thumb of the operator's left hand.

The site of the graft is outlined by placing the No. 1 trephine (4.5 mm.) over the centre of the cornea and making an impression sufficient to cut through the epithelium. The trephine is removed and a drop of sterile fluorescein placed on the cornea and washed off with normal saline. This outlines the site of the graft. The trephine is then replaced over this incision and a few sharp, almost complete turns are given to cut through half the thickness of the cornea. The trephine is then tilted to one side so that the cutting edge is directed obliquely through the deeper layers of the cornea. The anterior chamber is thus entered and about one-third of the circumference of the graft is completely divided, the deeper half being bevelled.

The trephine is removed and the section of the remainder of the deeper half of the cornea is completed by a series of short incisions, made with a corneal knife (see Figs. 3 and 4), sloping from within outwards and joining the line of the vertical trephine incision through the superficial half of the cornea (see Fig. 4).

The blade of the corneal knife is introduced into the anterior chamber on the flat and is then turned so that the 1.5 mm. cutting edge is set obliquely and is aimed to reach the line of the trephine cut on completion of the incision. The back and heel of this angular knife are blunt, smooth, and rounded, so that the iris and lens are not damaged, an important precaution to observe in cutting the bed for the corneal graft in the recipient's eye. The incisions with this knife are made with a gentle

but firm sliding action. Attempts to pull the knife through the deeper layers of the cornea of course fail to make a clean incision, and are liable to distort and injure the cornea to an unnecessary extent.

A series of short (about 1 mm. or less) cuts set obliquely and making a small angle with each other are made until about the last millimetre of the circumference of the graft remains undivided. At this point the corneal disk is too mobile to cut effectively, and it is obviously undesirable to steady it by holding the edge with forceps. So the corneal knife is laid aside and the severance of the graft completed by an oblique cut with a special pair of scissors.

It was my intention to leave the divided graft *in situ* in the donor's cornea until it was required, covering it in the meantime with a fine gauze swab soaked in warm normal saline and raised up over the graft area like a tent, the base of the swab resting on the cornea and sclera surrounding the graft. However, in human eyes the lowered intraocular pressure resulting from excision and then trephining causes the cornea to collapse, and so the graft is in danger of being tilted into the anterior chamber, from which it would be difficult to extract it without damage. I believe this difficulty could be obviated by keeping the sclera compressed sufficiently to displace the lens and iris forwards so as to act as a mechanical support for the posterior surface of the cornea. The corneal graft is removed by sliding a smooth flat spatula 4 mm. broad beneath it and then placing it in a warmed watch glass filled with sterile normal saline at 100° F.

FIG. 4.—Diagrammatic section of anterior part of eye after the anterior chamber has been lost by entering it with the trephine. a a show the corneal incision at right angles to the surface of the cornea through its superficial half, and then shelving through the deeper layers. The corneal knife is drawn at the angle necessary to effect incision through the deeper half of the cornea to meet the trephine cut. The shaded area represents the excised piece of cornea.

It is obvious that it is desirable that the minimum amount of time should elapse between preparing the graft and placing it in its bed in the recipient's cornea. The recipient's eyelids are retracted by the sutures, which are clamped to the sterile towels. The bed for the graft is prepared in a similar manner to that in which the graft is cut.

The assistant holds the two sutures through the sclera at 12 o'clock and 6 o'clock respectively, so that the eye is kept still and does not rove aimlessly about.

Great care must be exercised not to damage the iris or lens when the trephine (4.63 mm. diameter) penetrates into the anterior chamber and then later when the corneal knife is manoeuvred to divide the deeper half of the remaining circumference of the graft bed.

Some assistance is afforded in making these incisions by holding the cut edge of the opaque corneal disk in straight, fine-toothed iris forceps. Fixation by this means enables the operator to complete the shelving of the graft bed without having recourse to the use of scissors in the terminal stage of severing the corneal disk. The corneal disk is now removed and the state of the lens and iris underlying the corneal bed may be examined. If an anterior synechia is present in the vicinity of the graft bed it should be divided and the iris swept clear of the posterior surface of the cornea by a bent iris repositor.

The corneal graft is floated on to the upper surface of the broad spatula, which has been dipped in warm normal saline, and is transferred to the corneal bed. With the

minimum manipulation the graft is fitted as accurately as possible into its bed. The surface of the graft should be flush with that of the surrounding cornea. The conjunctival flap is drawn firmly and gently over the site of the graft in the manner of a tent, keeping the deep surface of the conjunctiva clear of the graft until the purse-string suture has been drawn together and tied. The ends of the suture are held up and the conjunctiva allowed to drop gradually over the site of the graft. The ends of the suture are then cut, two or three drops of sterile atropine, 1 per cent., and ol. paroline are instilled into the conjunctival sac; the lid margins are smeared with sterile vaseline, and the upper lid drawn down over the eye and the lid suture strapped to the cheek.

The lower lid suture may be retained to facilitate opening the eyelids when dressing the eye, and thus to prevent any accidental pressure on the globe. A Cartella shield, covered with sterile gauze, is strapped over the eye, and the patient placed in the dorsal position with one pillow.

Pre-operative Treatment

It is as well to leave the patient in the dorsal position for three weeks, a time considered necessary for the graft to take securely. No dressing need be done for three or four days after operation, and then all that is necessary is to swab the lid margins and instil a few drops of gutt. atropin., 1 per cent., and ol. paroline. The lid margins are then smeared with sterile vaseline and closed

over the eye. After this it is seldom necessary to do more than dress the eye as described above on alternate days.

Dilatation of the pupil to a point which enables the iris to be clear of the graft and not to form an anterior synechia is desirable. An adhesion between the iris and the graft leads to its opacification and vascularization. About the sixth day the centre of the conjunctival flap opens and exposes a small area of the graft, and by the eighth day the conjunctiva has receded enough to display completely the grafted area. The conjunctival sutures are removed on the eighth day, and the conjunctiva gradually recedes to the limbus during the ensuing week or ten days. The eye may be protected from injury and from the effects of light by the use of a Kirkpatrick transparent shield, tinted to correspond approximately with Crookes's B.1 blue glasses, moulded over the appropriate area of the patient's face and held securely by tapes tied round the head.

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ASPIRIN POISONING

BY

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Severe toxic and even fatal results have been observed from the common, homely remedy known as aspirin. The ease with which aspirin, or its chemical equivalents, can be obtained renders the occurrence of poisoning therefrom a possible problem of diagnosis and treatment in the day's work of any medical practitioner. The drug may be classified among those which produce noxious action after a relatively long period of time following ingestion, and, since the progress of the symptoms and signs is somewhat gradual, it is not unusual for many hours to have elapsed before the person taking the drug comes under medical observation. Since a very large dose is necessary to produce dangerous symptoms, the patient suffering from aspirin poisoning has generally taken the drug with suicidal intentions. There is evidence to indicate, however, that some persons who are considerably debilitated through acute or chronic illness may be unsuspectingly susceptible to an amount of the drug which in a physically healthy person would cause but relatively slight disturbance. Personal idiosyncrasy is also known, and rapid allergic type symptoms may occur.

It is the purpose of this paper to make some observations on several cases of aspirin poisoning which have occurred in Birmingham.

A Case with Recovery

The patient was a female aged 52, whose previous health had been fairly good, except for periodic mental depression. On August 9th, 1935, at 4 p.m., she took about one hundred 5-grain tablets of aspirin made up in a mixture with milk. At 7.30 p.m. her husband found her looking rather ill and gave her a small drink; she vomited a little afterwards. Two hours later she was admitted to hospital in a semi-comatose state. There was profuse sweating and pallor. Respiration rate was 35 per minute and a little shallower than normal; pulse rate was 105 and poor in volume. The pupils were normal. The patient could be roused to answer some questions.

Soon after admission to the ward the stomach was washed out with several pints of weak sodium bicarbonate solution, and ten ounces of warm coffee passed into it. The urine showed a light cloud of albumin and a high content of salicylic acid. Lumbar puncture was carried out, and 30 c.cm. of clear cerebro-spinal fluid were allowed to escape slowly; the fluid was under a moderately increased pressure. The high degree of sweating continued. Soon after the lumbar puncture there was definite clinical improvement, but respiration remained quicker than normal and somewhat deeper than on admission. The mental power of the patient became clearer, and she complained of a choking sensation in the throat and some pain in the back of the head. About eighteen hours after admission the alkali reserve of the blood was 40 volumes per cent., which indicated a moderately grave compensated acidosis.

The patient had received 60 grains of sodium bicarbonate four-hourly for twelve hours and ample fluid by the mouth. Twenty-four hours after taking the aspirin her general condition was very much improved; but she had then developed considerable deafness with tinnitus, and she indicated the presence of a subjective feeling of pressure in the head and a feeling of constriction round the skull. She felt as though she was being lifted up in the air, a sensation that disappeared quickly when she sat up in bed for a few minutes. Profuse sweating continued for thirty-six hours. The blood pressure returned to 122/80. There had been no objective changes in the nervous system. A reactionary pyrexia reaching 100° F. occurred after forty-eight hours. The respiration rate and pulse rate declined to normal after three days. The urine was entirely free from salicylic acid four days after admission.

A Case from the Literature

In comparison with the above I should like, at this stage, to include certain observations of S. C. Dyke on a case of aspirin poisoning recently published in the *Lancet*,¹ inasmuch as his case reveals a series of clinical phenomena of considerable interest and importance.

In summary, Dyke's case came under medical observation a few hours after the patient, a young woman, had consumed probably 435 grains of aspirin, the symptoms and signs at that time being nausea and tinnitus, leading to deafness and mental wandering a few hours later. Restlessness and disorientation were the phenomena observed during the following night, and by the next morning stupor and signs of cerebral irritation were evident. Respiration was deep and