should be given before midday if sleeplessness is to be avoided; on the average the effect tends to remain at a maximum for about five hours and takes an hour or more to develop fully. The psychological stimulation is not always maintained on continuous daily administration. Some patients complain that it loses its euphorizing effect after a few days, while the disagreeable features become more predominant.

The possibility of addiction needs to be guarded against, and the case of a person who had been purchasing benzedrine at chemists' shops without medical supervision has already come to our notice, though none of our own patients have so far shown a tendency to addiction. The preponderance of disquieting somatic symptoms over the feeling of euphoria when large doses are taken, and the sleeplessness, make us think that addiction will be rare. At present, however, benzedrine may be purchased at any chemist's shop without prescription, and this seems inadvisable with a drug all the properties of which have yet to be fully investigated. It must also be emphasized that the therapeutic indications for its use apart from the treatment of narcolepsy have not been exactly formulated. It is to be hoped that this drug will not be discredited by misuse.

We wish to thank Professor E. Mapother for his kind permission to use the clinical material of the Maudsley Hospital and Dr. F. Pilkington for help in the preparation of this paper.

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M. Dechaume (*Presse méd.*, March 24, 1937, p. 451) reports a case in which intense pain followed the removal of a wisdom tooth from the lower jaw on the left side. Extraction was carried out under local anaesthesia, and during the process severe pain radiating to the ear was felt, and the operation could not be completed until the nerve trunk had been injected. A small filament resembling a nerve came out of the socket, and this was cut off, slight pain being felt in the chin during the process. This was followed by intolerable pain in the left half of the face. Three days later an injection of novocain, without adrenaline, was given around the facial artery so as to paralyse the sympathetic nerves, and this relieved the pain. The following day severe pain recurred, but became less intense after a second injection. On examination the socket was found to contain pus, and as an antiseptic could not be used on account of the pain a plug of gauze soaked in novocain was applied for several seconds. During the next week symptoms subsided, with the exception of anaesthesia in the left half of the lower lip and chin. It is pointed out that, although it was unusual that a nerve should have been torn during the removal of the wisdom tooth, this could not have been foreseen. Injection of the sympathetic for relief of pain has been tried successfully in other instances. The injection causes a vasodilatation and increases the blood supply to the part, but the effect is transitory and the treatment must be repeated.

TECHNIQUE IN OPERATIONS ON THE KNEE-JOINT*

BY

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The knee-joint has been derived from the fusion of three articulations, and this makes it the most complex as well as the largest joint in the body. It is only comparatively recently that this field has been made safe for surgery, and the layman still has a fear that the removal of a semilunar cartilage may leave him with a stiff knee. Such an event is now a rare calamity, but it has occurred and still occasionally does so. Knee-joint surgery is recognized to demand the most careful technique, and I am going to describe a scrupulously careful procedure which stops short of fussiness. At the same time we shall have an opportunity of seeing that technique in these cases must include the care of a patient both before and after the operation.

The chief bogey is sepsis, and it can only arise in one of two ways—namely, by infection from without—that is, errors in aseptic technique—and by infection from within—that is, from a focus of infection elsewhere in the body. We must note that either of these events is greatly facilitated by the presence of blood in the joint. Blood is an excellent culture medium for organisms, and both a haematoma and a haemarthrosis are readily infected from without or from within. We all know that a haematoma in an operation wound prolongs convalescence for only a few days if it is at once evacuated, but becomes a much more serious trouble if it lies hidden until infection has occurred. A haemarthrosis differs from a haematoma only in its size and the character of its limiting membrane. A dry joint is probably quite able to cope with occasional organisms, which rapidly, however, become a massive infection when incubated at body temperature in a large blood-filled synovial cavity.

Preliminary Examination

Preliminary examination of all patients with cartilage injuries should include examination of the teeth. It is certainly dangerous to open a knee-joint while dental sepsis remains untreated. If any extractions or fillings are necessary it is wise to allow at least three weeks to elapse before opening the knee-joint. Equally, any other infection, such as tonsillitis, boils, or an infected antrum, demands postponement of the operation until the potential danger has been removed.

Preparatory Dressings

The skin is one of the chief dangers: the preparatory dressing is an important prelude to the operation, and a couple of days is not too long to devote to it. No procedure can make the skin completely sterile because antiseptics can only act superficially. We must do the best we can and then proceed on the assumption that we have only been partly successful. The whole limb from the toes to the groin is first shaved and then washed with soap and water. Methylated spirit compresses are applied to this area for twenty-four hours, and a solution of iodine in spirit is next painted on the skin. The whole limb is then covered with sterile towels, which are

* Based on a lecture delivered at the Hospital for Sick Children, Great Ormond Street.

bandaged firmly in position and left alone until the surgeon directs their removal at the beginning of the operation.

Operation

It is the surgeon's duty to develop a safe technique, but he is equally concerned with that of his assistants, who are probably less familiar with the requirements of the situation but are none the less capable of ruining an operation. We shall assume that there are two assistants—namely, the surgeon's immediate assistant and the theatre nurse, who is dealing with swabs, instruments, and sutures.

The Theatre Nurse

Anyone who undertakes to thread needles or hand ligatures ought to be able to do this without touching the needle or suture material with the gloved hands. There is no particular difficulty about it when once the necessity is realized, and anyone can do this with a little practice. The dangerous politeness of holding an instrument by its point and passing it handle first to the surgeon is forbidden, and instruments are passed with forceps. The fingers must not touch that part of any instrument which is now or in the future going into the wound. The passing of swabs must also be done with instruments, for it is futile for the surgeon to be careful if the nurse is careless or untaught, and vice versa. The strength of the aseptic chain is that of its weakest link.

The Assistant

What has already been said about sutures and instruments applies equally to the assistant, with the added special warning that double-ended retractors are dangerous in most people's hands. All swabbing must of course be done with forceps, and no swab should be used twice. The wound must not be rubbed, but firmly dabbed and wiped from within outwards, never from without inwards. Some assistants love to swab a dry wound just to look busy and co-operative: they insult the tissues and their own intelligence. Better a lazy than an over-zealous assistant in knee-joint operations.

The Surgeon

The anaesthetized patient is laid on the operating table in the dorsal position with the line of the knee-joint half an inch below the hinge of the table's foot-piece. A nurse uncovers the big toe, which the assistant grasps with a swab. He elevates the whole limb whilst the preparatory dressing towels are removed. A large towel is slid under the limb and another is placed across the abdomen, while a third and smaller towel covers the foot and leg below the knee-joint and is secured with a sterile bandage. This method of fixation is much better than any number or any make of towel clips.

An Esmarch rubber bandage is then applied spirally from the toes to the upper third of the thigh, where it is secured with three superimposed tight turns and three looser ones. The lower part of the tourniquet is then removed, the operation area painted with iodine, and a small towel placed over the thigh immediately above the patella. The operating table is now pumped up to its full height, the foot-piece is lowered or removed, and the surgeon takes his seat on a stool of such a height that the patient's foot is resting on the operator's knee. Some surgeons operate with the knee on an adjustable wooden frame, but my own preference is for the leg hanging over the end of the operating table so that movements of rotation are easily carried out during the operation and

a direct view of the joint is obtained. In this position, however, it is particularly dangerous to cough or even talk into the wound. Probably the ordinary type of mask is unreliable, and anyone who opens a knee-joint while suffering from a cold, influenza, or sinusitis takes risks.

Operations on the knee-joint are by no means easy, and the difficulties are largely those of space and light. The latter is greatly improved by the use of a head-light, even in an undarkened theatre, and it is worth anybody's while to acquire a certain dexterity with this unorthopaedic adjunct. The surgeon must of course observe the same rules as he imposes upon his assistants in the matter of handling swabs, instruments, and sutures.

The incision is made straight down through the skin and fat until the capsule of the joint is reached. At this stage many surgeons apply skin towels to the edge of the wound, but I look upon this as a piece of self-deception. It is difficult to get them to lie close on a curved wound, and they are inevitably contaminated by subepithelial organisms which they smear into the deeper tissues. Most skin-towel clips are ineffective and only succeed in occupying some of the available space through which the surgeon gains access to the joint, so that they compel a longer incision than is really necessary. If the skin towels are waterproof some of these objections have less weight, but I still believe the operation is safer without them if the following procedure (Dunn) is adopted:

The cut edge of skin and fat is sterilized by lightly swabbing with iodine solution; the knife is then discarded or sterilized and the joint capsule incised for the same length as the skin incision.

Procedure inside the joint will be determined by what the surgeon finds, but there are two instruments which are particularly useful, though neither of them was designed for knee operations. The first is a very sharply curved Lane's cleft-palate elevator, which is better than a sharp hook or aneurysm needle for dragging forward the crescentic edge of a semilunar cartilage before severing its anterior attachment. The second is Denis Browne's gland-holding forceps, which, owing to its rat-bite grip, allows the necessary hard pull on the freed anterior portion of a cartilage during the removal of its posterior part. I use an ordinary narrow-bladed scalpel for removing the cartilage, though there are two or three specially designed patterns on the market.

The procedure to remove a damaged cartilage is as follows:

Hook forward the anterior horn and divide its attachments. Seize the part so divided, together with any split fragment such as a bucket-handled cartilage, and pull it towards the centre of the joint while you cut along the periphery of the cartilage for half its circumference. Now take a new and deeper grip on the cartilage, rotate the foot away from it, and pull quite hard on the cartilage while the point of the knife stabs and snicks the remaining peripheral attachment as far back as can be reached.

If the posterior horn is attached normally you should now cut across the cartilage and leave the posterior one-fifth behind, but if trauma has detached it you will find (as Naughton Dunn points out) that it plops forward and you can then easily remove the whole structure intact. It seems reasonably certain that a small posterior normal fragment can be left behind with impunity, but of course there will be trouble if a detached posterior horn is not removed. In my view a posterior incision is rarely necessary, and should be reserved for examples of what might be called "failed anterior approach." I have yet to meet

one in my own operated cases, which makes me think that complete transverse tears through the posterior part of the cartilage must be uncommon.

The under-surface of the patella and as much as possible of the opposite semilunar cartilage should be examined as far as the incision allows before closing the joint.

The capsule is sutured with a continuous catgut stitch in two layers. Iodine is again applied to the edges of the wound, which are approximated with a continuous suture of silkworm-gut.

Dressing

This is a most important part of the treatment of these cases. The tourniquet is still in position and the joint cavity free from blood. A slack dressing will allow effusion when the tourniquet is removed, whilst a very tight bandage will obstruct the circulation and cause oedema below the knee. The best and safest dressing is the following (Bankart):

A generous amount of gauze and wool is applied to the knee-joint whilst the rest of the limb from toes to tourniquet is wrapped in cotton-wool to the thickness of an inch or more. A series of 6-inch bandages is then applied really tightly from below upwards, so that a steady elastic pressure is maintained not only on the knee-joint itself but also upon the area of the limb below and above it. The tourniquet is finally removed and a layer of wool and a firm bandage takes its place. Providing there are no constitutional disturbances this wool compress is left untouched until the stitches are removed on the eighth day, and the patient next day starts walking and begins a course of faradism to his quadriceps. I firmly believe that this simple method of treating operated knees is a most trusty safeguard against the troublesome and indeed dangerous haemarthrosis which occasionally follows other methods.

Post-operative Care

No splint is necessary and the patient moves his limb as much as he cares to do. Active contraction of the quadriceps muscle with the knee straight may be practised in bed after the second day, and walking, rowing, and cycling exercises are encouraged as soon as the stitches are removed.

Complications

1. *Haematoma* occasionally occurs between the skin and the sutured capsule. If the temperature is raised above 100° F. on the second or third day the dressing should be at once removed and the wound inspected and palpated. If its edges are bluish-red and the operation area is indurated but the joint itself normal a probe must be inserted between two stitches, the blood evacuated, and the wool compress replaced. This generally closes the incident.

2. *Haemarthrosis*.—The patient is never really comfortable after operation, and his temperature rises with his pain until it may reach 103° in a day or two. The knee-joint is so distended and painful that morphine may be required. Aspiration at once relieves the patient's pain and the surgeon's anxiety, but gradual subsidence is usual even if nothing is done, though perhaps this inactivity risks infection from the blood stream.

3. *Stitch abscess* occasionally occurs two or three weeks after the operation, but clears up rapidly on removal or discharge of a small piece of catgut. Usually it is quite superficial and does not delay convalescence.

4. *Passive effusion* into the knee-joint commonly appears when the patient begins to get up. It is generally attributed to quadriceps insufficiency, and is best treated by daily faradism to the quadriceps with a wool pressure bandage over the joint. The effusion is serous and does no harm if it is actively treated from the outset.

General Convalescence

It is often six or eight weeks before full, free, and painless movement is regained after a straightforward operation for a cartilage injury, but exercise and some forms of sport are possible a good deal earlier, and the patient can usually resume his ordinary life two or three weeks after operation.

The results of these operations are most gratifying to both patient and surgeon, but diagnosis must be exact, and anyone who undertakes knee-joint surgery ought to be able to feel that his technique is as safe as he can make it.

TREATMENT OF SOME ERRORS OF METABOLISM AT BRITISH SPAS*

BY

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After a number of years' practice at a spa one comes to definite conclusions as to the type of case which does best and which obtains the most relief from a "cure" there. My own experience leads me to believe that the most suitable are those due to some error of metabolism in which the liver is the chief offender; among these may be mentioned congestion of the liver, disease of the gall-bladder, gout, gouty glycosuria, so-called gouty eczema, some forms of obesity, and certain chronic rheumatic states.

In using the term "spa treatment" I refer to definite balneological treatment—that is, treatment with waters and baths—and not to other forms of physiotherapy, such as diathermy, ultra-violet rays, massage, etc.

During recent years the medical profession would appear to consider that spas are useful only in the treatment of chronic rheumatic diseases, and it is by no means unanimous even on this point, as at the discussion on the treatment of chronic rheumatic diseases at the Oxford meeting Dr. H. L. Tidy (1936) confessed scepticism regarding the advantages of spa treatment over hydrological treatment away from a spa. The profession seems to have forgotten that the spa is primarily and particularly useful in the treatment of disturbances of metabolism.

I had not been long in spa practice before I noticed that patients with disturbances of liver function, simple congestion, enlargement due to long residence in the Tropics or associated with gastro-intestinal catarrh, all did well; cases of plethoric gout and glycosuria associated with gout improved enormously under the administration of mineral waters and baths. Further, it was observed that patients coming for treatment for sciatica or other rheumatic conditions often gave the information that they had been under treatment at a spa a number of years previously for an attack of gall-stones, or gall-bladder disease, from which they had since been quite free; also that certain cases of rheumatism cleared up with waters

* An elaboration of part of a lecture on spa treatment read before the Ayrshire Division of the British Medical Association, December, 1936.