closed we have done likewise, and found that he was quite right.

Increased operative dexterity comes with practice, and after an experience of between 400 and 500 cases we naturally have learnt many little technical "tips," difficult to put into words but apparent enough in practice. The net result is lighter handling of the tissues, less damage to adjacent structures, less bleeding, and greater quickness. All but the very difficult operations are finished under an hour, and some under three-quarters of an hour, and this year I did one exceptionally easy case in thirty minutes.

The Future of the Operation.

Until some means of treating operable carcinoma of the cervix is found which will cure more than 35 per cent. of the patients, surgical extirpation will remain the proper treatment for operable cases.

Radium has not fulfilled the high hopes founded on it. It appears to cure occasional cases, but so would a red-hot poker vigorously applied. In certain quarters an improved appliance for x-ray radiation has been boomed; so were mesothorium and radium some years ago. Those of us who have had the handling and the seeing of the actual conditions that obtain in carcinoma of the cervix must be pardoned if at present these alternative methods of treatment leave us cold.

A review on the basis of five years' freedom from recurrence of not less than 100 cases treated in this country must be to hand before the results of any new method of treatment can be critically compared with the results of surgery, and the obtaining of such will require about seven years; until then, at all events, Wertheim's operation will hold the field.

Its successful results which this paper records are not its utmost achievement; improved technique and experience will better them. It is probable, however, that the advance will be more in the direction of lowered operative mortality, and prolongation of life rather than absolute cure, for it must be remembered that most of the deaths due to the operation occur in the cases of advanced growth or border-line operability, so that the "cure-expectation" rate of the lives gained by reducing the operative death rate from, say, 20 to 6 per cent. will not be great. At a hazard I should say that 4 survivals at the end of five years out of the 14 cases would be all one could expect. That the scope of the operation can be extended to growths more advanced than those now dealt with I do not believe. It has reached its limit in this direction.

THE MODERN OPERATION FOR CANCER OF THE BREAST.*

BY

RUSSELL COOMBE, M.A., F.R.C.S.,

EXETER.

WHEN one turns one's thoughts back to the form of operation that was performed for cancer of the breast in my student days and contrasts it with any of the operations which are now undertaken for this condition, the immensity of the change is very striking. In the days of my house-surgeencies an elliptical incision, made chiefly with the view of securing an easy coaptation of flaps, sufficed. These incisions were enlarged around the tumour until the pectoral fascia was reached and then the breast was removed; many operators advised tearing it from the underlying tissues since this method led to less hæmorrhage. There was never any idea of removing any axillary glands, still less of a formal dissection of the axilla. These were almost pre-antiseptic days, and the usual result was that shortly after the operation the wound had become a big abscess which slowly healed up.

Mitchell Banks of Liverpool was an early advocate of an extended operation, and it was he who pointed out how much better flaps might be obtained by "lateralizing" the scalpel used. It was Halstead, however, who first advocated and practised an operation which included removal of the greater part of the pectoral muscles and a complete clearance of the axilla; this operation, he stated,

he could complete in favourable cases in an hour and three-quarters, the time being longer in more difficult cases. Harold Stiles of Edinburgh did much to develop and improve Halstead's technique. It is taken for granted nowadays that no surgeon has done his best by a case of cancer of the breast who has not removed the greater part of the pectoralis major, the pectoralis minor and the axillary contents. The discussion of how best to carry out these objects is what I wish to lay before you this afternoon.

Certain fundamentals must be at once laid down: (1) No longer time than is essential should be spent; the shock of an operation of such magnitude is necessarily severe, and should not be increased by using any but the quickest method compatible with effectual removal of the disease. (2) Outside the question of time every other means should be taken to obviate shock. (3) Every possible precaution should be taken to prevent any risk of infecting divided tissues during the course of the operation. (4) A complete removal must be carried out of the disease itself with a wide margin of surrounding tissues liable to infection, of the proximal lymphatic area, and of the corresponding lymph glands.

The Question of Time.

The observance of certain points will save time.

(a) Free and complete access to the axilla, so that no time may be lost in the thorough clearing of its lymphatic glands and tissues. Lockwood pointed out that it is impossible to clear the glands surrounding the axillary vein unless the pectoral muscles are divided. The time spent over this can be vastly shortened by completely turning back the tissues constituting the anterior axillary wall before the dissection is commenced.

(b) The provision of instruments calculated to help in performing the axillary dissection as rapidly and cleanly as possible. Kelly's comb greatly shortens this process.

(c) Avoidance of having repeatedly to arrest bleeding from the same vessels owing to re-dividing them; that is to say, the vessels supplying the organ should at once be divided as near their sources as the incisions allow.

(d) Lower flaps should be made first so as to avoid delay due to blood from higher flaps and incisions having to be frequently wiped away.

(e) An ample supply of pressure forceps should be available so that none should have to be tied and twisted off simply because they are wanted again; four dozen is by no means an excessive number to provide.

Shock other than that Due to Time.

This raises again the point just referred to of rapid hæmostasis, but beyond this there is much to be done to minimize the shock due to so large a mutilation.

(a) Every effort must be made to keep the patient warm. In the first place a suitably cut mackintosh is wanted which will prevent loss of body heat, except at the part actually exposed for operation. The corresponding arm should be warmly wrapped up.

(b) If it can be shown that some part of the operation is necessarily slower than another, and especially if it only involves a comparatively small part of the total operation, that part should be performed first so as to avoid a prolonged exposure of the larger portion of the wound. Further, should it be shown that such a proceeding is possible, the rest of the exposed area should be carefully kept warm until the latest moment.

(c) I submit that the dissection of the axilla and the amputation of the breast practically constitute two separate operations. It is, of course, assumed that all the ordinary methods of protecting patients from shock during operation will be carried out.

Infection of Divided Tissues.

There are three chief means by which this may be reduced to the minimum:

(a) Planning incisions and flaps so as to leave a wide margin round the original growth.

(b) Avoiding any incisions or dissections which invade the line of tissue-bearing lymphatics running from the growth to the axilla, and so open lymphatic vessels which may contain malignant cells.

(c) Avoiding manipulations which may tend to push on towards the axilla any malignant cells which may already have entered lymphatic vessels.

* A paper read before the Exeter Division of the British Medical Association on November 18th, 1921.

Of course, when in cases of doubt a preliminary incision is made, it should be the rule, if a malignant growth is found, to close the incision properly—a swab inside with sharp catch forceps on the skin is the quickest method—to discard the knife and all other instruments used and thoroughly to wash one's gloves.

Complete Removal.

The aim must be removal of the disease with a safe margin, not the reservation of flaps which will come together artistically. The operator must do his best to put the patient's life out of danger and consider the covering in of the wound afterwards. I do not propose to spend time in discussing the many forms of flaps—some of them quite fantastic—which have been suggested.

Methods of Operation.

Broadly speaking, two main schemes for breast operations present themselves to us, (a) the old method of operating from below upwards, and (b) the more modern method of operating from above downwards. Personally I must at once proclaim myself as a strong advocate of the second method; yet, as I find that at, at any rate, one London hospital which is a teaching school, and also in some provincial hospitals, the former method is taught and practised, it occurred to me that the matter was one justifying some discussion of the relative merits of the two methods.

Reviewing the older method, I think we shall find the following considerations with regard to our fundamentals:

1. It is the slower method. Halstead talked of 1 hour 45 minutes. I have frequently done even unfavourable cases in less than an hour, operating by the second method. The axillary dissection is needlessly delayed and complicated by the fact that the tissues to be removed are attached and hanging on to the heavy mass of the breast tumour; the moving of this, and the fact that the axillary mass itself tends to obscure the apex, can only make for difficulty and delay. In regard to the arrest of haemorrhage, a very large part of the arterial supply of the breast comes from above; in operating from below, such vessels are continually being re-divided at a higher point than before, and much time is thus lost.

2. Owing to the early formation of the large breast wound, and the presence of this open wound during the axillary part of the operation, a severe amount of unnecessary shock is inflicted on the patient.

3. Infection of the divided tissues. We shall surely agree that manipulation of the amputated breast during the fine dissection of the axilla is very liable to help the escape of any malignant cells present in the lymphatics at the time of operation into the wound, and so lead to reinfection; also, it is less easy to keep clear of the deeper parts of the growth when lifting the mass upwards than when turning it downwards.

These, then, are distinct disadvantages of the older method, and I do not personally know of any advantages to counterbalance them. As a contrast, I propose now to describe the operation I have for some years been accustomed to perform.

A specially designed mackintosh and corresponding cloth cover up the trunk except the site of the proposed operation; the arm is well wrapped up. The upper ends of the incisions over the breast are lightly traced and continued up so as to cross the axilla and end on the inner side of the arm nearer to the anterior than to the posterior fold. A four-fold piece of sterilized flannel is then placed over the affected breast so as to keep that portion of the trunk warm during the axillary dissection.

The upper part of the incision is now deepened to divide the axillary fascia, and a posterior flap is formed to expose the latissimus dorsi (posterior wall of the axilla). The incision is made near to the anterior fold because the backward dissection does not have to go beyond the posterior fold.

An anterior flap is now dissected forward to about the middle of the clavicle, the finger is thrust up behind the anterior wall of the axilla, close to the humerus (on the outer side of the axilla) beneath the pectoralis major, which is cut through with scissors close to its insertion. This plan completely avoids the lymphatics which cross the pectoral fold further in. The pectoralis minor is now similarly divided, and the acromio-thoracic vessels on its inner side are divided between two pairs of forceps,

and any further part of the pectoralis major that requires division is severed from the clavicle. It will now be found that the whole axilla is freely exposed, and the vessels and nerves going down the inner side of the humerus are in full view.

FIG. 1.

FIG. 2.

FIG. 1.—Special mackintosh and cloth.

FIG. 2.—Remainder of flap X is pushed under the back of the thorax.

A point is selected as the lowest point from which the tissues surrounding the axillary vessels are to be removed, and these are dissected up the inner side of the arm along the outer side of the axilla to its apex. When this point is reached the dissection is reversed, and the axillary tissues are brought away from the chest wall, turned down, and left as a mass continuous with the breast and pectoral muscles. The axillary dissection is now carefully reviewed, any detail found requiring attention receiving it.

This done, all vessels are twisted and tied off before turning to the breast amputation, a large hot swab is placed in the axilla, and the upper part of the skin wound brought together over it with catch forceps, thus covering it up. This portion of the operation being finished, the breast remains to be amputated.

The external flap is cut first; then the internal flap is reflected towards the sternum. When these are completed the mass of pectoral muscles, axillary tissues, and breast are rapidly separated by the finger from the chest wall; for vessels divided in this process at least a dozen pairs of forceps should be ready.

The internal attachments of the pectoralis major are cut through with scissors, the left hand or blunt-pointed scissors separating the muscle from the chest wall and the perforating vessels being secured as they are divided. The pectoralis minor is similarly separated from the ribs, and the amputation by this and a little further separation from the chest wall is completed.

Nothing now remains but to deal with haemostasis, insert a drain in the posterior flap, and close the wound. It is well, whilst ligaturing and twisting vessels, to keep large flat hot swabs on the wound.

Let us now review the advantages of this operation. All proceedings are so facilitated as to lead to their taking the shortest possible time. Early and complete access to the axilla is provided; the stripping up of the tissues on the outer side of the axilla from the big vessels and nerves will be found to be an almost astonishingly quick and easy procedure; everything is in full view and easy of access. Similarly the tissues on the inner side come off the surface of the serratus magnus with great rapidity and very cleanly. I should like again to draw attention to the value of Kelly's comb in the dissection of the upper part of the axilla. It was brought out by Howard Kelly of Baltimore, described in the *Annals of Surgery* in 1906, and quoted in the *Medical Annual* in 1907.

A large portion of the arterial supply to the breast is cut off quite soon by the early division of the vessels derived from the axillary artery; there is thus no waste of time due to frequent re-division of the branches of these vessels, and there is much less loss of blood from the operation as a whole. Care is taken to make the lower external flaps of the amputation first; these incisions are thus not obscured by oozing trickling down.

Shock is minimized by postponing to the end of the operation the severe mutilation involved in the actual amputation of the breast; moreover, this large area is kept quite warm during the slower dissection of the axilla by the dry thick flannel placed over it.

Manipulations are minimized and disturbance of malignant cells thus avoided; cut lymphatics are turned downwards and forwards out of the wound, and so again

the risk of infection is minimized. Especially there is no manipulation of the main tumour whilst the axilla is being dissected. An easy view is provided of the posterior aspect of the tumour, and complete knowledge obtained of the satisfactory distance of the posterior surface of the tumour from the line of cleavage.

I may add that after operation I always keep the arm at right angles to the trunk—in other words, extended in a line with the shoulder. I have known one or two cases begin doing their own hair as early as ten days after operation. I beg, therefore, to submit the contrast I have drawn between these two operations for discussion by the meeting. Personally, I have full confidence that my preference for the more modern operation will find acceptance, but I trust some of those present will be found to point out advantages of the former and defects in the latter operation which have escaped my notice, but which I presume present themselves to the minds of those who practise it. This is intended to be merely a short paper. I have therefore avoided any reference to the larger operations involving division of the clavicle or dissections down the abdomen.

GONORRHOEA TREATED BY ELECTROLYSIS:

RESULTS IN 500 CASES.

BY

CHARLES RUSS, M.B.LOND., M.R.C.S.

IN 1915 I published a description of this process and gave a brief account of the results in the earliest stages. Since then several monographs have appeared showing the improvements attained. The outstanding feature of the method, as evolved to-day is, I think, the rarity for any case to become chronic; particularly is this the case when the subject is one who has attended early and has not already had one or more attacks. Not the least satisfactory feature of the method is the facility with which one can deal with the disease in women on the same principles, but of course with a modified technique. The process as I use it is as follows:

In an acute case, in a man, the first step is to make a smear preparation of the discharge and stain it by Gram's method. The existence of gonococci will be established by this means, but if they are not seen there can be no positive diagnosis of gonorrhoea. By the microscope one also detects in this way the existence of those cases, which are quite uncommon, of a primary urethritis with a purulent discharge for which some other bacteria are responsible. These latter cases also differ clinically as to the latent period between the contact and the appearance of the discharge and in other signs.

The patient is first directed to void some but not all of the urine; he then reclines on the couch. In the acute stage a few drops of stovaine solution are injected into the anterior urethra. Having thus dulled the sensitiveness of the channel, the perforated electrolysis catheter is gently passed into the urethra as far as the compressor muscle. This will be found a painless proceeding. The flexible indifferent electrode containing metallic gauze covered by several layers of lint is wrung out with warm water and applied to the scrotum, and also around the penis. The positive electrode is connected to the stylet of the catheter, and the negative electrode is connected to the pad. The fluid used is a solution of sodium chloride, 1 per cent., containing also one-half per cent. monochloroacetic acid. This fluid fills the catheter, and also the funnel of india-rubber which is attached to its upper end. As the fluid is absorbed to some extent by the urethra, and also decomposed by the current, the excess in the funnel maintains the provision of the fluid path for the current, which is also chemically balanced as the electrolytic action progresses. I mean that the monochloroacetic acid is less decomposed by the current than the salt, and this acid is able to neutralize the alkalinity which the liberated sodium would otherwise deposit against the urethral membrane, and which would cause pain and injury to the delicate epithelium.

A current of three-quarters to one milliampère is all that need be given, for half an hour each day for the first five days. After that I treat the case only every other day, and on the average twelve treatments in all are enough.

Beginning this work in 1912 I have tried most of the variations of the large currents (up to five milliamperes). I have tried the effect of giving treatment several times a day and other variations, but I find the best results so far are as above mentioned. The clinical improvement is not due alone to a germicidal effect on the gonococci, though this is considerable. There is also a vasocongestion following any electrolysis, and if too strong or too frequent a current is used there may be haemorrhage following from the engorged vessels.

After six treatments of this kind there will be very little discharge, and of course no other treatment, such as lavage or irrigations, must be used. At the end of the first week the patient takes 5 minims of sandalwood oil in capsule form four times daily. This can be gradually increased to twice that amount in the twenty-four hours. A weekly dose of gonococcal vaccine is also a routine which helps the vital factor of phagocytosis. Starting with small doses of 10 million a safe increase is that of a like amount each week. Gonococcal vaccine alone is quite unable to overcome the suppurative process.

As the discharge ceases the threads are the only remaining sign of the malady; these become less purulent and are soon only wisps of mucus, in which presently no gonococci can be found. When the patient has seen no discharge for two weeks and is having no treatment by electricity, nor in the form of medicine, the tests can be undertaken. If gonococci are not found microscopically a dose of 200 million gonococcal vaccine is injected. If the infection has not been abolished there will be an angry redness of the injection site and the re-establishment of a urethral discharge of a purulent character, in which gonococci will be seen easily. Favourably there are neither of these signs. At the same time the patient can resume the use of alcohol, which has been avoided since the onset of the malady. Alcohol, being a mild urinary irritant, is sometimes able to reinforce a slight urethral discharge, which the patient may have missed, but it is, of course, unable to generate gonococci or other bacteria which were not there all the time. Electrolysis practised in this way is a painless, safe, and rapid way of overcoming acute gonorrhoea. It is, of course, a much more elaborate form of treatment than using a syringe or irrigator, and gives much more reliable results.

Complications.

I have already referred in previous monographs to the remarkable immunity from arthritis and fascial complications of patients treated in this way. In the whole series I have only encountered two cases, and in one of these a peri-urethral abscess had been incised before I saw the case. The act of incision (a correct procedure) had provided the inoculation of the gonococci into the lymph stream. In the other case the condition was reported to me after the patient had come under the care of another doctor for a sharp fever attack coincident with his gonorrhoea, but I did not have the opportunity of seeing the joint or distinguishing the condition from an influenzal or other arthritis. Without, however, labouring these cases, the percentage is too remarkably small to be accidental. It is clear that the process of electrolysis for gonorrhoea makes arthritis so unlikely an occurrence as almost to justify the assurance of immunity. When one realizes the serious disability that patients may suffer from the crippling effects of gonorrhoea this is a consideration of the first order of importance.

In this series I had no cases of ophthalmia, nor did any cases of stricture occur. The absence of stricture is not surprising, considering the rarity with which cases become chronic. For an organic stricture to form there has previously been a necrotic phase of the suppuration leading to an ulceration. The subsequent fibrosis of the ulcer leads, of course, to the constriction of the urethral lumen and its symptoms. It is probable that the use of strong and caustic chemicals, either as bougies or as instillations, in the delicate urethral lining produces the initial chemical lesion which initiates the ulcer formation. Spasmodic stricture one sees, of course, occasionally, but as this is essentially of the nature of an inflammatory spasm it needs nothing more than sedative treatment, to which it always yields.

Epididymitis is the one liability of gonorrhoea in men which I have encountered; this condition is, of course, met with in patients in whom none but expectant or