a wrist. The next step was to endeavour to obtain a permanent record of the deflection so that variations in normals and abnormals could be measured and possibly standardized. The electrocardiograph galvanometer and recording camera appeared to provide the possibility of doing this, and the leads for the galvanometer were carried to a pair of Einthoven leads of a standard Cambridge instrument apparatus kindly loaned by Dr. Jenner Hoskin. The procedure was then to put the fibre at a prearranged position on the scale, with the infra-red opaque screen in place, and turn on the source of infra-red light to make

FIG. 2.—H., male, aged 50. Left wrist-joint, with centre of beam between styloid processes.

sure that no deflection occurred. The wrist or forearm was then interposed and closely applied to the infra-red filter, so that all rays emerging through the filter were bound to fall upon the skin and skin only. The screen was then withdrawn, and the string of the galvanometer at once deflected and returned to its original position on replacing the screen. Photographs of this deflection were then taken by allowing the plate to fall in the

usual way, removing the screen, and replacing it a few times as the plate fell.

The accompanying graphs from three different individuals (wrists and forearms) with the same setting of the machine were then secured. It is not possible to state at this stage that the wide variations shown by these graphs are due entirely to differences in the permeability of the structures through which the rays

FIG. 3.

FIG. 4.

FIG. 5.

FIG. 3.—M., male, aged 30. Wrist-joint, with centre of beam between styloid processes. Transverse diameter of this wrist was 3 mm. more than in Fig. 2.

FIG. 4.—M., male, aged 30. Right forearm, a few inches above wrist-joint.

FIG. 5.—H., male, aged 21. Left wrist-joint, with centre of beam between styloid processes. In this case the subject is of altogether more slender build than either of the other two cases. The deflection of the fibre is so great that the "B" position is unknown, being off the plate.

pass. It is only possible to state that repeat experiments yielded similar results. In the illustrations A indicates the position of the fibre with the screen inserted; B indicates the position with screen withdrawn.

DISCUSSION

These photographs can therefore be taken to establish the fact that infra-red rays of 7,000 to 9,000 Angström units can pass completely through the wrist and forearm. Also, as the source of energy was limited to a 100-watt lamp, and the sensitivity of the string of the galvanometer was only 3 mm. for 3 millivolts—that is, one-tenth of the sensitivity used in taking heart tracings—that, with greater incident energy and increased sensitivity of the galvanometer, thicker parts of the body than the forearm should be capable of penetration and the deflection of recording.

This preliminary communication is made in the hope that others will explore the wide field opened up by these records. Questions such as the following naturally occur:

1. Is there a "normal" for parts of a given diameter?
2. What factors influence variations from the normal other than physical thickness of the part—for example, age, sex, etc.?
3. Is there any variation in disease? For example, does an arthritis of one wrist produce a deflection different from that obtained by the wrist of the other side?
4. With increasing power and sensitivity of recording, what are the limits of thickness of the body to the passage of the infra-red ray?
5. Can anything be done to increase the speed and sensitivity of plates and films sensitive to these rays, and thereby obtain direct photographs?

Other questions also naturally suggest themselves, but I am endeavouring more particularly to obtain further information on Questions 1 and 4.

It would not be appropriate to close this communication without again extending my grateful thanks to Messrs. Ilford and their technical staff, Mr. Bloch, Dr. Harrison, and Mr. Flower; to Dr. Jenner Hoskin; and last, but not least, to Mr. Holt, whose technical knowledge and skill has materially assisted in obtaining these records.

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RADIUM BURNS

BY

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The incidence of radium burns during or following surface radiotherapy by the plaque method is not often mentioned when quoting cases, but it must, of necessity, be proportionately high where a biological unit of radium exposure has not been attained. With the object of helping the radiotherapist, therefore, the following brief account has been compiled.

No statement would be adequate unless some clinical method for calculating the dosage were stated. It has been found that the skin undergoes certain changes during irradiation, beginning with an erythema towards the third day, and passing through an oedematous stage to tissue necrosis somewhere about the sixth to tenth day. The oedematous stage should be the aim of the therapist during treatment; it occurs rapidly in the course of twenty-four hours. All treatment should then cease, as the skin has reached its limit of tolerance. When this simple rule is applied the skin rarely ulcerates.

The caustic action of the β ray is too often neglected during treatment. The β ray is not tolerated nearly so well by normal tissues, and destruction must follow when the areas are exposed to high intensities for short periods or to low intensities for long periods. The burn may be immediate or latent. If the former, it develops during treatment or at any time up to three months, and may vary in form from a simple erythema to desquamating patches and finally definite ulceration. Later these may become excavated areas with a yellowish grey slough and persistent discharge (purulent or watery). Pain is usually severe and healing obstinate. The delayed burn occurs any time after three to six months, and is manifest by an ulceration of the skin following some irritation or friction.

PREVENTION AND TREATMENT

The following details have been tabulated for clearness:

1. Radium treatment should not be given to patients suffering from cachexia, anaemia, a white cell count under 5,000 per c.mm., diabetes, nephritis, extreme obesity,

advanced myocarditis, active pulmonary tuberculosis, marked arteriosclerosis, or any general debilitating disease, general sepsis, local inflammation, or infection.

2. There must be no ulceration of the skin immediately prior to treatment.

3. The skin must be cleaned and lightly powdered with dusting powder before applying the plaque, and this must be repeated on alternate days to ensure the absence of perspiration or fetid discharge irritating the skin.

4. The plaque should fit the area to which it is applied firmly and without possibility of friction.

5. It should be removed at once on the appearance of oedema in the skin (clinical oedema dose).

6. The part should be subsequently well powdered or calamine lotion applied. No soap should be used for two months.

7. Following radiotherapy there should be no friction, irritating apparel, etc.

8. The plaque should be removed immediately the burn appears, and the radium treatment discontinued.

9. The area should be cleansed thoroughly without soap, and a dressing of eucalyptus and paraffin (5 per cent.) applied. This should be replaced by sterile vaseline at a later stage when healing is evident.

10. The use of powders, etc., should be avoided at this stage.

11. Rest should be secured.

12. Where healing is intractable, rapidity may be aided by an erythema dose of ultra-violet light.

CASE REPORTS.

This method of treatment has been freely used in all cases of radium burns, both large and small, during the last year at this hospital with marked results, as the following three cases show.

Case 1.—The patient, aged 50, was admitted to hospital with recurrence of lymphadenoma on the opposite side of the neck; the original side had been treated with radium two years previously, and a burn had followed. The recurrence was treated, but an intractable burn followed—due to an accidental overdose—which extended from the angle of the jaw to the clavicle, on the right side. The treatment described was applied with beneficial results until an area the size of a sixpenny-piece was reached; this proved obstinate, but was overcome by the application of an erythema dose of ultra-violet light. The condition at present is completely healed, with supple scar and less pigmentation than on the site of the previous burn. The time limit from onset to complete healing was five weeks.

Case 2.—A man, aged 23, with lymphadenoma, received an adequate dose of radium, and was retained in hospital for one week following treatment, when he was discharged. He reappeared a week later with a statement that his own doctor, not satisfied with the slight redness of his neck, had ordered fomentations. The result was that the epidermis had been removed from the whole of his neck. A dressing of eucalyptus and paraffin was applied freely, to the patient's immediate relief, and the neck was completely healed and all dressings removed in fourteen days. No scar is now visible.

Case 3.—A patient, aged 15, with myelocysthaemia, was first treated in 1931 by radium application to the abdomen; no burn followed. He was again treated in December, 1932, and three or four burns appeared on the abdomen a few days after the radium treatment ceased. The epidermis had been removed, and there was a thin, watery discharge. Eucalyptus and paraffin were applied, with the result that all dressings were removed at the end of a week with the condition healed.

COMMENTARY

By the method of treatment described pain is relieved, and the oily antiseptic dressing, which does not hurt the patient when it is removed, keeps the scar supple, promotes healing, lessens discharge, and promotes epithelization without undue granulation. Where a large area is involved the scar remains supple and not contractile—for example, in the neck.

Memoranda

MEDICAL, SURGICAL, OBSTETRICAL

A SMALL IMPROVEMENT IN APPENDICECTOMY

The very small modification in technique which I am about to describe may be familiar to many of my readers, but I have never seen it mentioned in the textbooks. I feel, therefore, that it may possibly be of use, and as it tends to save time it may fairly be called an improvement. Briefly, it is a method of tying both the meso-appendix and the base of the organ after the passage of only one ligature.

Let me assume that the most difficult part of the operation is over. The caecum and appendix are isolated. Three pairs of haemostats are applied to the base of the

appendix, the last near the caecum, and including only the actual thickness of the appendix. Opposite this pair the meso-appendix is pierced by an aneurysm needle in a bloodless area; the needle is threaded and withdrawn. If now the ligature be cut at the eye of the needle there will be two lengths of catgut protruding through the meso-appendix, transfixing it. One of these can be tied round the base of the appendix, the other must of necessity include all the vessels of the meso-appendix.

It may be argued that this method is not as safe as Kocher's, but it is usual to transfix any pedicle on which a vital ligature is to be placed. I have never known one such ligature slip.

London, S.W.

A. R. C. HIGHAM, F.R.C.S.

INTERLOCKED TWINS

In view of the rarity of obstructed labour due to the interlocking of twins this case may prove of interest.

The following is the clinical history and management of labour in a case of "locked twins" delivered at the Royal Free Hospital on February 21st, 1933.

The patient, a single girl aged 19 (date of last menstrual period, mid-May, 1932; date of expected delivery, end of February, 1933), was first seen ante-natally when twenty-eight weeks pregnant. Progress throughout pregnancy was satisfactory. She also attended the venereal disease department for the treatment of syphilis. She was last seen on February 17th, 1933, at thirty-eight weeks; the presentation was diagnosed as a vertex left occipito-anterior, the head being still palpable in the abdomen. An x-ray examination was suggested to confirm the presentation, but this was not performed, as the patient went into labour.

She was admitted at 9.45 p.m. on February 20th in the first stage of labour, and on examination per vaginam by a senior student the cervix was three fingers dilated and the nature of the presenting part queried. A second vaginal examination was made by the obstetric assistant on February 21st at 8.45 a.m., after rupture of the membranes, and