by exploring the ureter with the finger." Mr. Rowlands recommended "a long para-median extraperitoneal valvular incision displacing the rectus and peritoneum inwards, but did not like any form of intraperitoneal operation for the removal of a stone from the ureter."

During the period of the war, three adults (one female) came under my charge for the relief of symptoms due to the impaction of a urinary calculus in the pelvic portion of the ureter. By means of the *x* rays the position, shape and size of the stones were clearly shown. They were similar in size and appearance, being under half an inch in length and somewhat like date-stones in shape.

It was evident in the first patient that the stone would be difficult to find through an incision in the extra-peritoneal tissues only, and that it would not be easy to incise the ureter with confidence over the stone, because of its rounded and somewhat narrow presentation and distance from the surface.

Deliberate Opening of the Peritoneum as part of the Operation.

It was considered that the operation would be done with greater confidence and precision, therefore more rapidly, if a peritoneal opening was made at an early stage, and the fingers of the left hand introduced into the cavity of the peritoneum to locate the stone and steady it whilst the other hand was working in the subperitoneal tissue to the point which had been located where the incision through the wall of the ureter was required.

Experience of the Combined Method.

The result of the operation was so satisfactory in the first case that when the others presented themselves with a similar condition it was repeated for them. In none of these three patients could the oat-shaped stone be worked away from its original position in the ureter, even with the combined manipulation of the two forefingers, but, with the ureter, it was lifted upwards to an appreciable extent towards the external wound, and this rendered it more easy to make the liberating cut. The precaution of placing a strip of gauze beyond this point was taken in each, but only a small amount of healthy urine escaped.

At the depth these stones are from the surface it is almost impossible to insert any useful sutures to close the ureteral incision, and as in the absence of any stricture of the ureter there is very little tendency for urine to escape by this opening, it is unnecessary to prolong the operation by the attempt. The edges of the cut ureter fall nicely together and heal quickly, for when the ureter is steadied as described there is a clean longitudinal incision which soon closes. It is advisable to place a tube down to the bottom of the extraperitoneal wound, or a gauze drain, for a small quantity of urine usually escapes during the next day or two, and provision must be made for its easy evacuation.

Steps of the Operation.

This method may be briefly described as follows: An oblique incision is made from midway between the anterior superior spine and the umbilicus in the direction of the pubic spine. The sheath of the rectus is opened for the whole length of the incision, the muscle separated from its sheath, and strongly retracted inwards. The deep epigastric vessels are found and divided between ligatures. The posterior sheath and peritoneum are incised in the centre of the upper part of the wound to an extent permitting easy passage of the fingers of the left hand, which are carried to the place in the ureter where the stone has been shown to lie by the *x* rays. Before the final stage of the operation the abdominal contents are protected and pushed out of the way with a strip of gauze.

When the stone is located the forefinger of the other hand is worked extraperitoneally directly to the spot, separating the peritoneum to a sufficient extent down to and a little beyond the stone. An attempt may be made to bring the stone higher up in the ureter if this is thought desirable; it does not always succeed, but it can be lifted upwards and forwards with the ureter to a useful extent. In my cases the lining of the ureter at the point of impaction was rough, and this appeared to be the reason why the stones could not be moved before the incision of release was made. As the stone was so definitely localized and the part of the ureter where the incision had to be made so clearly defined, it was possible to cut cleanly along the

middle of the prominence felt, without varying from the straight line. In addition, the fixation of the stone by the fingers of the left hand made it easier to avoid any accompanying artery, and enabled the incision of the ureter to be made firmly and accurately. The importance of this will be evident to anyone who has had to deal with a case of small stone in the pelvic portion of the ureter in a fat patient, when the stone is not steadied in the manner suggested.

There is another advantage of this fixation—the incision being quite under control, one is less likely to break up the stone when making the opening for its extraction.

No Risk of Peritonitis with Ordinary Care.

It must be apparent that there is no danger of causing a peritonitis by the added manipulation within the peritoneum which this method of operating demands. The opening of the ureter is still placed extraperitoneally, but some distance away, and when the incision of the peritoneum has been closed with a continuous suture and the muscle is sutured over it, it is not exposed to further risk. Any discharge which may appear during the after-progress is carried away through the lower part of the wound, which is left open for the passage of the drainage tube or gauze drain.

Use of Landmarks.

The various stages help in the quick performance of the operation, each being marked by some landmark.

Sometimes in doing these operations which involve a deep exploration into the pelvis there is a danger, especially in private when perhaps the *x*-ray plate has been forgotten and the lights are inadequate, that it may not be possible to find a small stone although it is known to be there and the cause of the symptoms from which the patient is suffering. It has not always been found. When it is acknowledged that the help of the fingers in the peritoneum is part of the operation, and that it should be used to find and afterwards fix the stone, a feeling of confidence is engendered which is otherwise apt to be lacking. Another advantage is the opportunity which is afforded for an examination of the kidneys or other parts (which might be affected by disease) should the symptoms suggest the possibility of complications.

There is no weakness of the abdominal wall as a result of the operation.

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¹ Thomson Walker, *Genito-urinary Diseases*, p. 335. ² *New York Medical Journal*, vol. i, 1904. ³ *Annals of Surgery*, vol. xliii, 1906, p. 743.

RESULTS OF INSTITUTIONAL TREATMENT IN SURGICAL TUBERCULOSIS.

BY

E. D. TELFORD, F.R.C.S.,

SURGEON, MANCHESTER ROYAL INFIRMARY; LECTURER IN PRACTICAL SURGERY, UNIVERSITY OF MANCHESTER; SURGEON, MANCHESTER EDUCATION COMMITTEE.

THERE have been published within the last few months a number of papers appealing for better treatment of the crippled child. These papers have made known schemes for institutional treatment excellent in their method and detail, but they have, with one or two exceptions, given little exact information as to the results likely to be obtained. Such appeals being of the nature of propaganda directed especially to the attention of local authorities and their medical advisers, it would, I think, much increase their value if some account of results were included.

The figures given in this article refer solely to the child crippled by tuberculosis, and embody the results obtained by me from work done at the Manchester Residential Schools for Crippled Children over the period 1905-18. These schools are maintained by the Manchester Education Committee, and occupying two large houses on the north side of the town, they provide in-patient accommodation for 114 cripples, of whom some 50 to 60 are cases of surgical tuberculosis of the spine and lower limb.

The fact that the schools are managed by an Education Committee involves two important consequences. The children admitted must be between the ages of 5 and 16 years, and it is, further, a *sine qua non* that they be in a sufficiently good state of health to be able to take the

ordinary school lessons. The age limit is unfortunate, since very many cases of surgical tuberculosis begin before the age of 5; in a large series of cases in which I endeavoured to determine the actual date of onset the average worked out at exactly $3\frac{1}{2}$ years of age. Hence it is to be feared that we miss not a few early cases. The second consequence is, that as the institution is primarily a school, the type of case admitted is limited to early non-complicated cases and to chronic cases which have not suffered materially in general health.

The treatment of the cases has been on strictly "conservative" lines, with very careful and exact fixation. Abscesses have been treated by aspiration, and very little open operative work has been done. As the number of beds is so much below the needs of the situation, the cases admitted have been entirely those needing recumbent treatment, and therefore the results given in this paper are of necessity restricted to cases of tuberculous disease of the spine and lower extremity.

The schools having been in existence for sixteen years are in a position to yield exact information on the result of treatment, and I find that this information may be briefly stated as follows:

A very careful investigation has been made into the after-history of 159 cases which have been traced and examined; to minimize error no recently discharged case has been included. All the children dealt with in this report were discharged from the schools not less than three years ago.

Results in 159 Cases.

	Alive and Well.	Alive but Disease still Present.	Died.
Tuberculous disease of spine ...	34	10	26
Tuberculous disease of hip... ..	38	5	9
Tuberculous disease of knee ...	28	1	2
Tuberculous disease of foot ...	6	0	0
	106	16	37

The cause of death is not known in all the 37 cases. This figure includes two instances of death by accident, and there would, of course, be a certain mortality due to causes other than tuberculosis. Deducting the two cases of accident the number of deaths is 35, and we can obtain from the figures the following definite result: Out of 100 children between the ages of 5 and 16 years, treated under good conditions for tuberculous disease of the spine and lower extremities, 68 will be cured and able to attend an ordinary school or follow a useful employment; 10 will receive no permanent benefit, and 22 will die from the disease or its sequelae.

The very grave nature of tuberculous disease of the spine is well shown by the figures; of 70 patients with it no fewer than 26 are dead. The mortality is much less for disease of the hip; 9 out of 52. The knee shows only 2 out of 31. The 6 cases of disease of the ankle and foot recovered completely.

The development of abscess is always of grave omen, and it is interesting to note that of the 35 cases who died no fewer than 29 showed evidence of abscess formation on admission to the schools.

The results given above are not so favourable as others which have been published, particularly by more favoured institutions in the South of England. It would appear that the further north one goes the more virulent does surgical tuberculosis become—a state of affairs for which our adverse climate and absence of sun are no doubt mainly responsible.

A point of very real importance is the length of time needed for the treatment of these cases, since this length of time bears directly on the cost and number of beds required in any suggested scheme. The average time is certainly longer than is commonly supposed or usually indicated in the textbooks. I find that in my own cases of surgical tuberculosis of the spine and lower extremity the average duration of in-patient treatment is three years and two months.

SIGHT EFFICIENCY IN THE GENERAL POPULATION.

A CONTRIBUTION BASED ON THE EXAMINATION
OF OVER 30,000 RECRUITS.

BY

J. KIRK, M.D.,

OPHTHALMIC SURGEON, BRIDLINGTON EDUCATION COMMITTEE;
FORMERLY OPHTHALMIC SURGEON, GOVERNMENT
HOSPITALS, PENANG.

FROM the beginning of December, 1917, to the signing of the armistice in November, 1918, I acted as the ophthalmic specialist to the National Service Recruiting Boards for the Edinburgh district. I served as a whole-time officer, and every recruit was brought to me to be graded according to his sight efficiency before any further examination was made. I was in this way able to obtain a considerable amount of valuable information which I wish briefly to detail and analyse.

At the beginning I only took notes as to the causes of rejection, reasons for lower grading, and general points of interest, but from March to November, 1918, I made a brief record of the sight efficiency of every man seen. About 16,000 cases were thus detailed. The Edinburgh district from which the recruits were drawn is unique. It is a microcosm of the country, as it includes not only an ordinary city and suburban population, but a large agricultural and mining district in addition. The inhabitants of the area also have comparatively very few aliens among them as compared with other large industrial centres.

Grading Standards.

The Ministry's instructions for the grading of recruits were:

Grade I.—Right eye, 6/24, correcting to at least 6/12. Left eye, less than 6/60, but fields of vision must be good. (This standard was altered on April 7th, 1918, to a minimum of 6/60 in either eye, capable of correction to 6/12 in either eye. The other eye to have 2/60 minimum, with good fields of vision.)

Grade II.—Right eye, 6/60, correcting to 6/18. Left eye may be less than 6/60, but vision fields must be good. (The lowered standard in this grade was 3/60 at least in one eye, correcting to 6/18. The other eye may be blind or missing.)

Grade III.—6/60 with either eye with or without glasses. The other eye may be blind or missing.

Grade IV.—Included all who were not up to this very wide-meshed standard net, and therefore considered unfit for any army service. It also included those who suffered from any progressive or recurring disease.

Results of Examination.

Working on these standards the percentages of the various grades among 16,000 recruits of all classes and occupations were as follows:

93.7 per cent. were fit for Grade I. Of this number 10.3 per cent. had errors of refraction which required correcting before they attained the standard.

4.2 per cent. with glasses and without were fit for Grade II.

1.6 per cent. with glasses and without were fit for Grade III.

0.5 per cent. were totally rejected.

Thus the total average of men with defective eyesight who did not reach the very low standard of Grade I unaided was 16.6 per cent. As a further guide to the level of sight efficiency in the general population of this country, if one takes 6/12 and better in both eyes as a reasonable standard, 23.8 per cent. of the total examined had defective eyesight.

To put the figures in another way, 12,320 recruits, or 76.2 per cent., had eyesight 6/12 and better in both eyes; 3,680, or 23.8 per cent., were below this standard. Of these, in 2,937, or 18.3 per cent., the slight deficiency was due to refractive errors without any obvious disease, and in 743 cases, or 4.6 per cent., there were morbid changes in the eye structures.

Myopia and Hypermetropia.

In regard to the proportion of the various forms of refractive error, myopia and myopic astigmatism, simple and compound, formed the majority. This follows from the fact that many hypermetropes were able easily to come to the standard of Grade I without glasses, and were not further examined.