to demand that he who pretends to do surgery must be fitted to do surgery, and that he must be certified by and bear the approving mark of some organization of his peers rightfully constituted to so certify and so approve. I believe that this information must be got to the public through the usual channels by which information reaches the public—through the platform and through the press. The founding of the American College of Surgeons, no matter how dark you may personally regard the cloud under which it was born, no matter how deep the distrust you may personally feel for its master-men, methods and machinery, no matter how faulty you may think are some of its judgments, marks a long step in the right direction. The men who conceived and launched it were at least men of vision who did, while we dreamed. Not in this generation will its greatest good be had, but in the next and succeeding generations, when we and its founders alike shall have passed on. It is the only general certifying authority that exists for us, and I regard education of the public on that point as one of its great functions. I believe we should support it for the sake of distant generations. It should play a great part in the future reckoning of the surgeon.

THE TREATMENT OF TONSILS BY RADIATIONS FROM RADIUM SALTS INSTEAD OF OPERATION.

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THIS paper is a report of progress. The subject is of importance not only to a large number of patients, to the surgeon and the laryngologist, but also to the general practitioner, who is the first to see many of the patients, 500,000 more or less,* who are operated upon each year in this country for the removal of the tonsils.

The basis of this use of radium is the fact that lymphoid tissue, of which the tonsils and adenoids are largely composed, is especially susceptible to its radiations, and further, that the diseased tissue in the tonsil is less resistant to them than the normal. Radium should not be depended upon to get rid of fibrous tissue or pus. The presence of pharyngitis or laryngitis, so far as I have seen, does not contraindicate the employment of radium.

In carrying out this treatment it seemed to me desirable to use the radiations of radium rather than the emanations, as the radiations are uniform in output and thus permit of accurate dosage in a simple and convenient manner.

The method is based upon measurements of the radiations, made with a fluorometer, to determine the proportion of these:

First, that would reach the tonsils through different thicknesses of aluminum;

Second, that escape through the back of the container, and would reach other parts of the throat than the tonsils;

*Tonsillectomies done in 1921 in 24 of the hospitals in Boston and seven adjoining cities, population 1,180,000, were 13,325; operations done in private practice would increase this number. On the basis of these figures, the tonsillectomies done in one year in the cities of the United States of more than 10,000 inhabitants, population 46,750,000, would be 514,240 $\pm$. The towns of 10,000 inhabitants or less, population 70,000,000, are not taken into account.

Surgeons in this city tell me that more tonsillectomies are done in private practice than in hospitals; this would make the number given above at least 1,000,000 instead of 500,000.

The figures relating to population were obtained through the kindness of Professor Davis R. Dewey.

Third, that are absorbed by different thicknesses of tonsillar tissue;

Fourth, that are absorbed by the tonsillar tissue and the ramus of the jaw-bone.

These measurements showed that of the total amount of the radiations going in any other direction than the tonsil, the proportion escaping from the container used was only about 4 per cent., an amount that may be disregarded; and that of the total amount of the radiations issuing from the front of the container with a filter of aluminum 0.29 mm. thick, the proportion absorbed by 13 mm. of tonsillar tissue was a little less than 90 per cent., and that absorbed by this tissue and the ramus of the jaw was more than 90 per cent. The results of the other measurements need not be considered in detail here.

Naturally, the first thought of many practitioners would be that it is a serious matter to put radium into the throat, and to do this without carefully limiting the radiations would justify the apprehensions that were generously expressed to me by some of my colleagues when I first began to use radium for the treatment of tonsils, but these measurements show that the risk of injury to any part of the throat is negligible, if proper precautions are taken, and they have so guided my clinical use of radium that no harmful results have been noted. Among remedies of great power, I do not recall any in the use of which the action is exerted so completely where it is needed, and, at the same time, to so slight a degree where it is not desired, as is the case with radium by the method here described.

Let us now consider the clinical side. Of a group of 101 patients, the youngest was 5, the eldest 60 years of age, and in their treatment I have been guided by about twenty years' experience in the use of radium. The radium was usually applied in a silver container, about 6 mm. thick and about 16 mm. in diameter (a gold one, made for me since this was, is thinner), that has an aluminum cover 0.29 mm. thick, which acts as a filter. The container is conveniently attached to a light steel rod, that has a handle on the other end, and is covered with a new rubber cot every time it is used. Various other metal filters can be placed over the front of the container to absorb certain of the radiations. The treatments, with 50 mg. of pure radium bromide (26 mg. of radium element), were of about 20, 15, or 10 minutes' duration for each tonsil, according to the filter used, which was of aluminum 0.87, 0.58, or 0.29 mm. thick, respectively. I say "about" advisedly, because the length of treatment depends upon the patient's condition, the size and character of the tonsil, and what one has in mind to accomplish. In some patients there was reason for exceeding these doses; three among them had a moderate reaction for two or three days, but this was not enough to interfere with

their usual diet or occupation. Good results may be brought about without causing discomfort.

The application of radium is simple for the patient. He has only to keep his mouth open while the physician holds the container against the tonsil. The container may be removed at intervals, in order to allow the patient to swallow saliva. If the throat is sensitive, a solution of cocaine may be used; in the majority of cases this has been unnecessary. As a rule, children cooperate readily.

Immediately after the treatment no especial change is noted; sometimes improvement begins promptly, and after two or three days, more or less, there is an exudation from the tonsils, which may continue for some time. Some kinds of tonsils diminish in size very strikingly within a few days, others very slowly. In a very few patients the tonsils have largely disappeared after one treatment, in others three longer applications, given at intervals of weeks, did not give as much result. Enlarged glands show improvement. In some cases the patient's general condition should guide us to the use of radium even when the appearance of the tonsils does not suggest it.

Improvement in the general condition, often marked diminution in the size of the tonsil, after only one treatment, and that not given in large amount, indicates that in a certain number of cases it may be sufficient to carry the treatment only far enough to obtain good drainage.

The earlier patients did not have as much treatment as I now use, but there has been some improvement, locally or otherwise, in nearly every one, with no interference in any case with the customary meals or occupation. The statements of patients, suffering from poisons originating in the tonsils, of improved well-being, alertness instead of lassitude, and desire instead of disinclination for work, have been the rule. It has been difficult to follow some of the patients for any length of time; they were treated, improved, were seen once or twice, and then disappeared. Of those who were treated more than a year ago there are only good results to report.

The following cases were not average ones, but show a striking response to radium treatment in adults:

Mrs. X., 60 years of age, had a succession of four severe colds during the winter; had her teeth x-rayed and as a result of this examination four of them were extracted, but she got no relief. She was below normal in her activities and well-being, and had a slightly ashen complexion.

The right tonsil was on a line with the pillars of the fauces, and the left extended 3 mm. beyond the pillars, was large and discharging, and the gland on that side was large and sensitive. I applied the radium to each tonsil for about 10 minutes, without the use of cocaine.

Within forty-eight hours after the treatment she was much improved and the gland had lost its sensitiveness. The third day after treatment the left tonsil was much reduced in size, and there was a concave instead of a convex surface in the part of the tonsil that had contained small masses of a pus-like material. The right tonsil was also reduced in size. Her improvement was evident in her voice and manner, and in the eyes and the color of her skin.

On the seventh day after treatment the gland had disappeared and both tonsils, especially the left, were greatly reduced in size. She had not had the slightest pain or even discomfort, and there was no change in the daily routine of her life except for the better. On the twenty-first day the tonsils had largely disappeared. When last heard from, six months after the first treatment, she was in excellent health and spirits. This case suggests that in some instances radium treatment, before extracting teeth or doing tonsillectomy, might render these procedures unnecessary.

Mr. Y., 48 years of age, was "crippled with rheumatism," by reason of which he had given up work for 8½ months. The tonsils were submerged and were not visibly enlarged. Both were treated with radium and a profuse exudation resulted.

Within a week he had some relief from rheumatism, in about two weeks he was much improved, and in one of the worst storms of the winter, a day on which he would not have ventured out before he had had radium treatment, he walked 1½ miles to the station and came to Boston to keep his appointment. After two weeks, he expressed himself as being in excellent physical condition, his eyes were bright and his color good. Four months after treatment, when last seen, there was still further improvement in his appearance, there had been no recurrence of the arthritis, and he said that he felt like a new man.

Mrs. E. M., 37 years old. On December 9, 1921, she gave a history of repeated attacks of tonsillitis with arthritis. The tonsils measured 1.5 cm. high by 1 cm. wide. Radium was applied to each tonsil without the use of cocaine. On the fourth day she had marked relief from the arthritis; the tonsils were smaller, and there was no irritation in the throat. On the twenty-first day she felt well, had no sore throat, and no arthritis; the tonsils were slightly smaller. Three and one-half months later, the patient was very well indeed, and the tonsils had disappeared. Six months after treatment she was still free from arthritis, and the throat was in fine condition.

The following case is in contrast to those just cited:

Miss Z. had recovered from an attack of arthritis, but had acute tonsillitis when she

received radium treatment. After one application of this remedy to the tonsils, they were reduced to a very small size and gave no further trouble, but as four weeks later there was another attack of arthritis, a severe one, tonsilleectomy was done without my being consulted, the small size of the tonsils greatly facilitating the operation, yet neither operation nor radium prevented a recurrence of arthritis; in less than three weeks after the operation she had another attack, followed in about four weeks by still another. At this time an x-ray examination showed abscesses around two teeth; since the removal of these teeth three months ago she has had no further attacks of arthritis. This case suggests that we may be able to infer, by the application of radium, whether or not certain complications have their origin in the tonsils, without resorting to tonsilleectomy.

During the past winter, the house officers at the Boston City Hospital have chosen radium treatment instead of tonsilleectomy, except one who had decided on operation before he appreciated what radium could do. He, however, chose radium for the removal of the part of the tonsil left after operation. This small group of seven have since been free from their customary attacks of tonsillitis.

Of these 101 cases,

44 had enlarged tonsils;

33 had tonsillitis; 2 acute, 31 with history of recurrent attacks;

24 had enlarged or otherwise diseased tonsils, with complications as follows:

14 arthritis

7 cardiac disease

1 cardiac disease and arthritis

2 nephritis

Of the 44 cases with enlarged tonsils, the tonsils were reduced in size in 41 cases; in 3 they were not reduced.

Of the 33 cases of tonsillitis, the tonsils were reduced in size in 31 cases; the remaining 2 cases were lost sight of.

Of the 14 cases with arthritis, in 11 the arthritis diminished or disappeared; in 1 it remained; in 1 it recurred after both radium and tonsilleectomy, but had not recurred, when last heard from, after the extraction of two teeth; 1 died of pneumonia.

Radium treatment, of course, had no effect on the old cardiac disease of the 7 cases noted.

The case of cardiac and arthritic trouble, and the 2 cases of nephritis, were lost sight of.

Radium is a powerful agent both for harm and for good. The physician should be well-informed about radium before he ventures to apply it; otherwise he may do harm to some patients, or fail to do the good that should be accomplished. Professional training and experience are required to determine the conditions under which it should be employed for treating the tonsils, and the amount and quality of the radiations which should be used.

Radium is useful for children, and especially so for adults, to whom operation may bring great discomfort and serious danger, and possibly death; as well as for those who, on account of cardiac or other disease, are not suitable subjects for operation.

The radiations from radium salts are, I believe, more suitable for the treatment of tonsils than the x-rays, because the former are uniform in output and thus permit of accurate dosage; and further, because the radiations from radium salts are applied through the mouth to the tonsil and are nearly all absorbed by the tonsil itself, whereas measurements of the x-rays, made with a fluorometer, show that these rays, being applied from the outside of the jaw to the tonsil, are absorbed to a large extent by the intervening tissues, where they are not desired, the parotid gland being especially susceptible to them, before they reach the tonsil.

I have shown chiefly thus far that the method here presented is harmless; that tonsils have been reduced in size; that recurrences of tonsillitis have been prevented, and that some patients suffering from arthritis have been relieved.

DISCUSSION OF DR. WILLIAMS'S PAPER.

DR. GEORGE W. GAY, Chestnut Hill: Dr. Williams's interesting paper, coming as it does from a pioneer in the therapeutic use of diphtheria antitoxin, the x-ray and radium, merits the thoughtful attention of the profession. In over a hundred cases of enlarged, inflamed, or otherwise diseased tonsils he has succeeded in reducing the size and the inflammation in a very large proportion by exposure to the direct radiation of radium. In 77 uncomplicated cases of enlarged and inflamed conditions of these organs a practical cure was obtained in 72 instances and two cases were lost sight of. A painless, non-operative method of treatment of these affections that proves successful in 93 per cent. of the cases is certainly worthy of consideration.

Radium not only has a distinctly beneficial effect upon the size and condition of the tonsil, but the crypts, which are the favorite resort of noxious germs, are obliterated, thus closing what is considered by many authorities a ready avenue by which the products of these bacteria enter the system. If the modern theory that certain diseases, as the so-called rheumatic affections, find entrance through the tonsils be correct, then the importance of destroying this avenue of approach becomes strikingly apparent. Should time and further experience confirm Dr. Williams' admirable results, the radium treatment of diseased tonsils must be considered a distinct advance in therapeutics. There are good reasons for anticipating this desirable result.

Another important feature in Dr. Williams' work is the fact that his scientific attainments, derived in part from his long and intimate connection with the Massachusetts Institute of Technology, of which institution he is a graduate, enable him to determine the ratio of the direct radiation of radium upon the desired area, to the indirect effect, the back kick through the container, of this agent upon the surrounding tissues. He is, thereby, able to remove certain objections that have been advanced against the use of radium in the throat. Another objection that has been made against its use in the throat is that we do not know the ultimate results of the treatment extending over three or four years. From the fact that seventeen years' experience with the agent upon the skin and a year and a half's experience in the throat