The Roentgen Treatment of Morbus Basedowii

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Nearly 20 years have elapsed since the American, WILLIAMS (in 1902), published the promising experiments which he had been the first to make in treating the Mb. Basedowii with Roentgen rays applied on the glandula thyreoidea. These experiments have since been carried on by an increasing number of physicians and gradually this method has become more and more general and is at the present moment supported by an extensive literature. The opposition which the Roentgen treatment has at times met with, has not been able to stop its progress, which especially of late years has become rapid, and the operative treatment of goitre must undoubtedly have felt the Roentgen treatment to be a very formidable rival.

In the year 1916, I communicated (*Ugeskrift for Læger*, N:o 41) the results of Roentgen treatment on 94 patients suffering from Mb. Basedowii, at the same time emphasizing the fact that considerable obscurity and uncertainty still prevailed in this branch of the Roentgen treatment, which, at that time, according to my opinion, was not used to the extent it certainly deserved. Part of the uncertainty has, it is true, been withdrawn since the appearance of the above-mentioned communication, but many questions still require to be examined and elucidated, particularly regarding the extent and duration of the results achieved, the indications of the treatment, and possibly arising complications, as well as the technique and the dosing to be considered most expedient.

Of the earlier literature I gave a detailed account in my above-mentioned communication.

Among the treatises of later date, I have — regarding Scandinavia — to mention several papers by NORDENTOFT (*Ugeskrift for Læger*, 1918,

No. 34 & 35, 1919, No. 29, and *Hospitalstidende*, 1916, No. 30); further a work by NORDENTOFT and BLUME, comprising 100 cases of Mb. Bas. treated with Roentgen rays (*Strahlentherapie XI*, 2).

From French and English sources the importance of the Roentgen treatment has been pointed out at an earlier date particularly by French authors, whereas it has been received with considerable reserve by the Germans, though the treatment has its advocates also among them. And one has the impression that this method is gaining ground in Germany. Thus, STEPP & WIRTH (*Th. d. G.* 1918) mention good results attained: out of 12 cases of Mb. Bas. 6 showed a distinct improvement, 3 a slighter improvement, whereas 3 proved uninfluenced by the treatment. Also LOREY reports a good result. (*Aerzt. Verein in Hamburg*, 20 Nov. 1917). WETTERER (*Handbuch d. Röntgen- und Radiumtherapi* 1920) also mentions the Roentgen treatment very favourably. He personally has but 14 cases at his disposal; but of these 8 felt quite well after the treatment, and the other 6 had improved considerably.

The 94 patients who, in 1916, formed the basis of my personal experiences regarding the influence of Roentgen treatment on Mb. Bas. all belonged to my private clinic, and thus my material had a somewhat partial character, which is not without significance, as I will show later on. Although I was attached to the two biggest municipal hospitals in Copenhagen, I had only in one single case had the opportunity of carrying out the Roentgen treatment of a goiter patient in the hospital, owing to the fact that, at this period, the head surgeons in question still preferred other methods of treatment. This has at present essentially changed, in so far as 165 patients with Mb. Basedowii have been treated in the hospital clinics (*Kommunehospitalet* and *Bispebjergs Hospital*) in recent years, 104 at the *Kommunehospitalet*, and 61 at the *Bispebjerg Hospital*.

During the same period I have privately treated 231 goiter patients, so that the total number under my treatment amounts to 396, and if to these are added the first 94, it makes a grand total of 490.

The decision, whether or not one really is confronted with a Mb. Basedowii sometimes affords considerable difficulty, and the number of patients here stated therefore requires some commentary.

Regarding the hospital patients, the diagnosis given at the hospital section has, of course, been acted upon, and, on the whole, it has been the severe cases that have been sent to be Roentgen-treated. As to the patients in my private clinic, all those have been weeded out, where the diagnosis was struma simplex, merely enlargement of the gland and no traceable disturbance of its function. Still, even among these patients there are several where the clinical picture has been of a nature to make it doubtful whether or not to include them. Not a

few can be described as »Basedowoid», or »formes frustes», patients with doubtful struma, but with distinct nervous symptoms and moderately increased activity of the heart.

The Roentgen treatment of these patients generally gives a very satisfactory result, and what seems to me to speak strongly for the fact that in these cases one has to deal with either disturbances of the gl. thyr. or the thymus, or both, is the duration of the improvement attained. I have for years followed these patients and have been able to ascertain the thorough change for the better in their state of health. And from their own people I have, over and over again, had confirmed the wonderful improvement of their mental as well as their physical condition. I have therefore considered that, in view of the here-mentioned change for the better being closely in accordance with that which may appear in undoubted Mb. Basedowii cases, I am entitled to bring them under the same group of diseases. Among the 231 patients in my private practice, these — with regard to the diagnosis — somewhat doubtful cases represent about one third; another third comprises patients undoubtedly suffering from Mb. Basedowii, though in a lesser degree; and the remaining third consists of the moderately severe and the severest cases.

It has not been in my power to draw a reliable line of division between a thyreogenic and a thymogenic form; it appears, on the whole, difficult to distinguish between the *vagical* and *sympathetic* goiter symptoms, and, after all, it is doubtful whether we ever see a case of purely the one or the other form. If a goiter, based solely on secretion anomalies in the thymus, exists, I should, from the experiences I have made, feel inclined to look for it chiefly in men; and in two such I have observed a form of disease closely approaching the complex of symptoms mentioned by EPPINGER and HESS.

How difficult the diagnosis of Mb. Basedowii may in reality prove, especially in its earliest phase, the following case seems to me to yield a good example.

Julius M., aged 35, was taken in at the Bispebjerg Hospital, department C (Head Physician: Dr. BING) in August, 1917 under the diagnosis diabetes mellitus. In his family there was found no disposition for diabetes. He had been a healthy child, but he was rejected at the military medical examination on account of varicose veins. During the last months before coming to the hospital, he had suffered a good deal from nervousness, owing, as he thinks, to overwork. In the course of a fortnight he lost 9 pounds in weight. His chief complaint was that of nervous restlessness, want of appetite and thirst. Once whilst he was at home, sugar had been found in his urine.

He was slender of frame, below middle height, with a pronounced neurasthenic tendency. Some tremor of tongue and hands. No exophthalmia, no struma. Pulse 84, regular. Slight extension of the 1st cardiac sound of the apex. The urine contained no sugar.

The opinion at the hospital section was that the case was one of *hyper-*

thyroidism and 8 days after his arrival he underwent cautious Roentgen treatment (3 H. under 3 mm. Al. filter in four fields). A fortnight after he had come to the hospital, unquestionable exophthalmia of the right eye was observed.

After a 3 weeks' stay in the hospital, he was discharged, according to his own wish, as he felt all right. At this period there was no increase of the cardiac activity, and no sugar showed in the urine.

Shortly after his return home, his state again grew worse, with a very rapid pulse (140—150). A month after the last treatment, he got a new irradiation as out-patient (5 H. 3 Mm. Al. filter in four fields). A few days after a pretty strong swelling of gl. thyroidea was noted, as also the above-mentioned exophthalmia of the right eye became more prominent, and a very considerable tremor set in. For several days sugar showed in the urine.

His state of health kept fairly unchanged during the following month. Pulse-frequency constantly about 150. He was very restless, tired and worried by tremor. Weight 116 pounds.

In the month of December, he again got Roentgen irradiation (10 H. 3 Mm. Al. filter in four fields) and again for some days sugar showed in the urine. Afterwards his state somewhat improved, but again grew worse during spring, after an attack of gastric and intestinal disease with fever which kept him in bed for some time.

In the course of the year 1918 he again got Roentgen irradiation, two exposures with 10 H. 3 Mm. Al. filter in four fields, and one with 15 H. 4 Mm. Aluminium filter in 3 fields. He grew gradually better, the pulse-frequency being towards the end of the year 90—100. The nervousness and tremor disappeared, the swelling of gl. thyroidea and the exophthalmia diminished.

In the course of the year 1919 he became still better. His weight increased to 140 pounds. He resumed his profession, felt quite well, and he can do his daily work without inconvenience.

The history of this case seems to me interesting, as the patient, when he came under observation in the hospital, did not show the symptoms characteristic of Mb. Basedowii but these developed gradually and in the end gave even a very characteristic picture of the disease. When, nevertheless, the diagnosis was given at so early a date, the reason was that the case was at once looked upon as *hyperthyroidism*, and not as a general nervousness owing to overwork. It seems to me not unlikely that, to begin with, we were confronted by an affection of a thymogenic nature, the complex of symptoms being quite in accordance with this. Later struma sets in, and the clinical picture gradually assumes the character generally met with, where we are not able to distinguish between the thymogenic and thyreogetic origin.

The case is, moreover, of interest, because it shows in a very fine manner the heating power of the Roentgen treatment. When the Roentgen rays, at the beginning, were applied with such great caution, the reason was that the patient's state was so unbalanced, and it was feared that a reaction might possibly set in after the treatment.

In how predominant a degree goiter is found in women, is shown

by the fact that among the 369 patients only 9 were men; of the 94 mentioned in 1916, merely 2 were men, the rest women.

The vast majority of patients have been between the ages of 30—45; the oldest patient was 63, the youngest 24 years. The duration of the disease has for the majority of the patients been $\frac{1}{2}$ to 5 years, only a very few have stated that they have had the disease for a greater number of years. On 8 patients strumectomy has at some earlier period been performed.

The patients may, as already mentioned, be divided into two chief groups: one larger one that have been treated as out-patients in my private clinic, and one smaller one, comprising those patients treated at the hospitals. This latter group is again divided into two parts, some of the hospital patients — 33 — having only been treated as out-patients without having been admitted to the hospital, whilst the remaining 132 have not been treated till after having been taken in at the hospital. These latter have always been kept in bed during the beginning of the treatment and among them we meet, as a matter of course, the severest cases.

When the result of the Roentgen treatment is to be estimated the two groups of patients, those belonging to the hospitals, and those proceeding from the private clinic, must be kept apart as they are in a very different social position, which is of no small importance.

As a rule, the vast majority of the Mb. Basedowii patients laid up at the hospitals belong to the class of people who earn their subsistence by physical labour, whereas this is rarely the case with those who go to the private clinic. That this circumstance essentially influences the final result that may be attained by Roentgen treatment, is evident, considering the fact that physical work or rather overwork, highly increases the risk of Mb. Basedowii.

Those patients, whom their doctor sends for private out-patient Roentgen treatment, have generally, at a very early stage of their illness, been enjoined to keep perfectly quiet and to avoid all bodily exertion. They have often been confined to bed, and they have, as a rule, without difficulty been able to follow the instructions given. And only when this sedative treatment has proved ineffectual, Roentgen treatment is resorted to. During the first period of this treatment, they are advised to obey doctor's orders without lying in bed, however, except for a couple of hours' rest every day, if their condition makes it necessary. Later on short walks are arranged, also partaking of the house-work or other work to which they are accustomed, yet with orders to cease the moment they feel tired or are in any other way inconvenienced by it. Gradually their range of activity is enlarged, and after 3—4 months, if the treatment is successful, they are able to do their daily work to the same extent as formerly.

The hospital patients who, as already mentioned, are chiefly recruited from the hardworking classes, are often mothers with several children, needlewomen, charwomen, factory girls, or women with similar occupations. As long as they are in the hospital, they get, in a large measure, the necessary rest, together with good and nourishing food. But as soon as they are discharged, they encounter the numerous claims of everyday life, and these hinder the convalescence from being carried out in the right way with gradual augmentation in their work and without mental and physical injury.

When in this way I draw so marked a line of demarcation between these two groups, it is owing to my experience that recurrences are much more frequent in the hospital group, in contradistinction to the private practice one, and nearly always the cause of the recurrence proves to be overwork, or domestic trouble. There is then a social momentum, which must be considered, when one has to make the prognosis of one's goiter patients, and this social momentum should not be undervalued. It has lately been pointed out by SOPHUS BANG at a Medical Congress in Aarhus (5th May, 1921). The recurrences will, as a rule, be overcome through a renewed Roentgen treatment and if possible a stay in the country, or by in other ways creating conditions likely to support the treatment.

Taken as a whole, the outcome of the Roentgen treatment is, as I have earlier found, that fully $\frac{4}{5}$ of the patients treated have attained a positive result. As for the last fifth part, where the treatment cannot be said to have been successful, it has, on the other hand, caused no change for the worse — one single case of death in connection with the treatment will be mentioned later on.

As a rule, one may say that the patients who suffer from but a slight struma, and whose nervous symptoms are not particularly marked, but where in the picture of the disease the tachycardia predominates, are those on whom the Roentgen treatment is most likely to fail.

By »positive» result of the treatment we here understand either the complete disappearance of all symptoms or a quite unmistakable improvement which stretches over a longer period.

A representation of the numerous medical histories is not possible, but the following brief details about 14 patients will be added, as the improvement that has set in is made manifest through photographs taken before and after the treatment. The number of patients photographed is but small, photographs having only occasionally been taken; and these schematic reports have the stamp of casuality, comprising promiscuously both slighter and severer cases. The photographs elucidate, better than many words, what has been attained through the treatment.

Case 1. Anna J., aged 46, married. Bispebjerg Hosp. Section. C. 21. VIII, 1917. Ill for 4 years. Treated in hosp. with medicine, 4 months in bed. Quick decline on returning home. Struma steadily increased in size. Strong periodical palpitations, difficulty in breathing, frequent vomiting. On the whole very exhausted. Strong exophthalmia. Diffuse soft swelling of gl. thyreoidea. Systolic sounds, tremor man. Pulse 130. Weight 47 kgr. 21. VIII—31. VIII, 1917. 10 irradiations à 3 H. under 2 Mm. Al., during September and November. 8 irradiations. 3. XI. Less tired. 6. II, 1918. Struma diminished, tremor abating. P. 132. 14. II—15. II. 2 irradiations 10 H. 3 Mm. Al. 4. VI—8. VI. 4 irradiations. 23. X. Can look after her work at home. P. 120. 22. I, 1919. Is much better than before. P. 120. 10. III, 1920. Looks after her house, but gets tired quickly. P. 106. 23. II, 1921. Feels pretty well. P. 96. Weight 48 kgr.

Case 1. Jan., 1918.

Sept., 1920.

Case 2. Christine C., aged 49, widow. Bispebjerg Hosp. Section B. 3. I, 1918. Duration of illness $\frac{1}{2}$ year. Great restlessness and shiverings, profuse perspiration. Palpitation. Is very weak and tired. Loss of hair. Some exophthalmia. Pronounced shivering and tremor man. Swelling of gl. thyr., especially of the right lobe. P. 100. Weight 61 kgr. — 3. I—14. I, 1918. 1st series of irradiation. 23. I, 1919. Subjective change for the better. 28. I—30. I. 2 irradiations. 20. II. Swelling of gl. thyreoidea diminished considerably. 13. III—15. III. 3 irradiations. 13. VI—18. VI. 3 irradiations. 25. XI—2. XII. 4 irradiations. 26. II, 1920. Feeling much better, does a little housework. P. 100. 28. VIII. Feeling well. No struma, no exophthalmia. P. 84. 20. X. Doing without difficulty her work as charwoman in an office. 23. VI, 1921. State of health continues good. Pulse 72. Weight 62 kgr.

Case 3. Anna G., aged 39, married to agent. Bispebjerg Hosp. Sect. C. 13. III, 1918. For a year nervousness, palpitation, restlessness, profuse per-

Case 2. Jan., 1918.

Aug., 1919.

Case 3. Febr., 1918.

March, 1919.

spiration. During the last month diarrhoea occasionally. Emaciation. Uniform swelling of gl. thyroidea, each half the size of a hen's egg. Slight exophthalmia. Tremor man. & linguæ. P. 96. Weight 46.5 kgr. Sahli 108. Circumference of neck 30.5. 13. III—19 III. 1st series of *irradiation*. 3. IV. Felt better. P. 64. Weight 45.5 kgr. 12. IV—18. IV. 2nd series of *irradiation*. 15. V. Considerable improvement. 19. VI. Skin on neck pigmented. P. 62. Weight 51 klgr. 6. VIII. Appearance perfectly natural. No exophthalmia Weight 57 kgr. Struma disappeared 22. I, 1919. Feels well P. 80. Weight 57 kgr. 1921. Quite well.

Case 4. March, 1918.

Case 4. May, 1919.

Case 4. A. D., aged 27, lieutenant in the Russian army. Kommune Hospitalet. Section III. 21. III, 1918. Taken prisoner $\frac{20}{8}$ 14. Spent 3 months in casemate. III $2\frac{1}{2}$ years. Headache. Buzzing in the head. Fatigue. Difficulty in breathing, palpitation. Strong perspiration and diarrhoea. Considerable loss of weight. Gl. thyreoidea much enlarged. Some exophthalmia. Tremor. Some dilatation of the heart. P. 140. Pronounced systolic sounds. Circumference of neck 42 ctm. Weight 67 kgr.

Apparently the *first irradiations* did not agree with him, as dyspnoea, palpitation and restlessness highly increased. It was found, though, that the chief cause of this was that he had too suddenly ceased taking bromine.

25—29. IV, 1918. 2nd series of *irradiation*, which he stood quite well. P. constantly very quick. 29. V—1. VI. 3rd series of *irradiation*. Discharged 13. VII. Feeling well. Exophthalmia less. P. 112—120. 30. IX—2. X. Again in the hospital for Roentgen treatment. Improving steadily, but suffers now and then from palpitation, and has still to take bromine. 1919. Three times admitted to the hospital, each time *treated with Roentgen rays*. In May, 1919 his state of health is as follows: Exophthalmia gone, as also the struma. He can without difficulty cycle and play tennis, and he walks upstairs without getting palpitation. The heart-sounds are normal and the action strong, regular and without systolic sounds. P. 74. According to later information, he has again taken part in the war in the south of Russia and has without fatigue sustained the exertions involved.

Case 5. June, 1918.

Dec., 1919.

Case 5. Margrethe K., aged 46, married to a bricklayer. Bispebjerg Hosp., Section C. 8, VI, 1918. Has for some years had struma. Has in the last year, and especially the last 3 months, been very nervous. Gets, with an interval of a few days, »fits of shivering all over the body», strong palpitation. Has difficulty in breathing. Emaciation.

Distinct, almost uniform enlargement of gl. thyreoidea of about the size of a hen's egg on each side. Tremor man. et linguae. Slight exophthalmia. P. 120. Weight 52.5 kgr.

8. VI—14. VI. 1st series of irradiation. 3. VII. Symptoms much abated. August & Sept. 2nd & 3rd series of irradiation. 24. IX. Has not for a long time felt so well. P. 114. Weight 59 klgr. Dec., 1918. Renewed irradiation. Has had the »Spanish influenza». 24. VII, 1919. Feels perfectly well, can without difficulty attend to her house-work. No exophthalmia. P. 108. Weight 57.5 kgr. 16. VI, 1920. Quite well. P. 108. Weight 64 kgr. May, 1921. Perfectly well. Weight 66 kgr.

Case 6. Oct., 1918.

Case 6. Sept., 1919.

Case 6. Henry C. aged 26, typographer. Bispebjerg Hospital, Section C. 10. X, 1918. The affection began $\frac{1}{2}$ year ago with very severe nervousness and difficulty in breathing. Has had to cease work. Considerable diffuse swelling of gl. thyroidea. Consistency soft. Moderately strong exophthalmia. Strong tremor manuum. Cardiac movements agitated. Cor. enlarged to the left. P. 120. Weight 55 kgr. Circumference of neck 39 ctm. 10. X—14. X, 1918. 1st series of irradiations.

Case 7. Nov., 1918.

Case 7. Sept., 1919.

6. XI. The skin on neck very red. Feels better. 4. XII.—9. XII. 2nd series of *irradiation*. 15. I, 1919. Feels well. P. 120. Weight 57 kgr. 24. I.—25. I. 2 *irradiations*, after which the skin on neck again red. 8. III.—14. III. 3 *irradiations*. 20. VIII. Has been at work two months. Feels subj. well. P. 108. Weight 58 kgr. 17. XII. Is now working 8 hours a day and feels his strength increasing constantly. P. 104. Weight 61 kgr. Circumference of neck 35.5 ctm. No exophthalmia. 1. IX. 1920. Attends to his work. Feels well. P. 100. Weight 65 kgr. marked telangiectasis on left side of neck.

Case 7. Johanne P., aged 20, unmarried, needle-woman. Bispebjerg Hosp. Sect. C. 2. IX, 1918. Noticed struma a year ago. Is nervous and restless. Very tired. Palpitation, perspiration, diarrhoea. Emaciated. Transverse, easily movable struma quite the size of a hen's egg. Tremor man. No exophthalmia. P. 132. Weight 37.5 kgr. Very much reduced in strength. 2. IX—30. IX. 4 *irradiations*. 23. X—26. X. 2nd series of *irradiations*. 27. XI. Feels much better. 3rd series of *irradiation*. 19. II, 1920. Feeling well. P. 100. Weight 56 kgr. 20. VIII. Feels tired, has worked hard. Illness at home. 29. XII—31. XII. 4th series of *irradiation*. 8. VI, 1921. Feels perfectly well. P. 72. Weight 55.5 kgr. On the neck telangiectasis.

Case 8. March, 1919.

April, 1920.

Case 8. Hans H., aged 34. Bricklayer. Bispebjerg Hospital Sect. C. 8. III, 1919. Discovered a fortnight ago a protuberance on fore part of neck, went to a doctor and was at once sent to the hospital for Mb. Bas. Complains of some palpitation, occasionally fatigue, is emaciated. Considerable diffuse enlargement of gl. thyreoidea. Fairly marked exophthalmus. Indication of GRAEFE & MOEBIUS symptoms. P. about 80. Weight about 64 kgr.

8. III—15. III, 1919. 1st series of *irradiation*. 4 fields. 9. IV. Complains of tremor man. P. 120. Weight 68 kgr. 19. V. Feels better. P. 108. Weight 65 kgr. 3. IX. Feels well. Attends to his work. P. 88. Weight 70 kgr. 14. I, 1920. Feeling well. P. 78. Weight 76 kgr. 7. IV. Complete recovery. P. 72. Weight 80 kgr. 1921. Continues feeling perfectly well.

Case 9. 5. III, 1919. Martha C., aged 35, unmarried, needlewoman. Kommune Hosp. Sect. III. Operated 1914, Dep. V. Strumectomia dext. Felt well for some time after the operation, though occasionally rather severe nervousness, on and off some palpitation. Was laid up in January in Dep. III for rheumatic fever and endocarditis, sent to undergo Roentgen treatment, because her goiter symptoms have returned: moderately marked exophthalmia, swelling of middle and left sidelobe.

Fairly pronounced tremor, slight perspiration, severe palpitation & headache. P. 136. Weight 50 kgr. 5. III—7. III, 1919. 1st *irradiation* series (3 irradiations). 29. III. Feels better, less headache. P. 136. Weight 54 kgr. 31. III—2. IV. 2nd series of *irradiation* (3 irradiations). 26. IV. Feeling anxious, but the subj. state on the whole better, does not feel tired. Weight 56 kgr. 26. V—30. V. 3rd series of *irradiation* (4 irradiations). 26. VI. Goes about her work, occasionally tired. 9. VIII. 4th series of *irradiation* (4 irradiations). 1. XI. P. 132 Is keeping well, attends to her work. No struma. No exophthalmia. 28. II, 1920. Feels well. P. 116. Weight 56.5 kgr. 21. VI. 1921. Has kept well till, 3 months ago, she again got rheumatic fever; but has quickly got over it. P. 116. Weight 53 kgr. No exophthalmia. No struma.

Case 9. March, 1919.

March, 1920.

Case 10. Sophie M. aged 30, married to a painter. Bispebjerg Hosp. Sect. B. 23. IV, 1919. In course of the last year restlessness, anxiety, fatigue, palpitation, some perspiration, loss of weight. Moderately soft swelling of gl. thyroidea. Slight exophthalmia, some tremor man. P. 120. Weight 40 kgr. Circumference of neck 32 ctm. 23. IV—28. IV, 1919. 1st series of *irradiation*. 11. VII. Has been discharged since last treatment. Has felt well. Is again admitted for treatment. Looks rather nervous; perspiration, some exophthalmia, constant blinking, Menses not shown since March. P. 120. Weight 54 kgr. 11. VII—16. VII. 2nd *irradiation*. 27. VIII. Complains of headache and fatigue. No appetite. P. 120. Weight 51 kgr. 4. XI—7. XI. 3rd series of *irradiation*. Some nausea after treatment. 14. I, 1920. Miscarriage in the latter part of Nov. Somewhat nervous and tired. 14. VII. In good health. Attends to her house. P. 120. Circumference of neck 30 ctm. No exophthalmia. 25. VIII. Feeling well. No struma. No exophthalmia. P. 108. Weight 54 kgr. May, 1921. In good health. P. about 100. Weight 54 kgr.

Case 10. Apr., 1919.

Aug., 1920.

Case 11. 2. VII, 1919. *Martha G., aged 25.* Bispebjerg Hosp. Sect. C. The last 3—4 years nervous, restless, given to weeping. Palpitation and emaciation. Considerable fatigue.

Case 11. July, 1919.

July, 1920.

Diffuse swelling of gl. thyreoidea. Pretty marked exophthalmus, some tremor manuum. P. 120. Weight 48 kgr. Circumference of neck 33 ctm. 2. VII—8. VII, 1919. 1st series of *irradiation*. 4 fields. 4. VIII. Feels much better, not nervous. exophthalmia and struma unchanged. 13. VIII—14. VIII. Irradiated in two fields.

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24. IX—29. IX. *Irradiation* in 3 fields. 26. XI. P. 84. Weight 54.5 kgr. 1. XII—5. XII. *Irradiation* in 3 fields. 18. II, 1920. Feels perfectly well. Has since the autumn had a situation as »lady-help», the work causing her no inconvenience. 3. VIII. Feeling well. Still some exophthalmia and some struma. P. normal. 8. VI, 1921. Feels well. P. normal. Weight 56.5 kgr. Slight exophthalmia and small soft struma.

Case 12. 30. VIII, 1919. *Alma C., aged 57, widow.* Bispebjerg Hosp., Sect. C. In good health till a year ago, when she got the »Spanish influenza», after which she could not regain her strength. Nervous, restless, palpitation, perspiration,

Case 12. Sept., 1919.

June, 1920.

fatigue and loss of hair. Strong trembling. Tremor man. Is emaciated, of sickly appearance. Moderate swelling of gl. thyreoidea, essentially localized in the isthmus. Perceptible exophthalmia. P. 120, irregular. Weight 42 kgr. Circumference of neck 30 ctm. 30. VIII—3. IX, 1919. 1st series of *irradiation*. 30. IX. Tired, but quieter. During October and December 2 series of *irradiations*. 24. III, 1920. Still tired. Struma gone. P. 120. Circumference of neck 27 ctm. Weight 44.75 kgr. 30. VII. Feels well, good appetite. No exophthalmia. P. 108. Weight 49 kgr. 21. VI, 1921. Is feeling well. Attends to her work (rolling cigars). P. 116. Weight 55 kgr.

Case 13. *Hedvig A., aged 35, married to cycle-repairer.* Bispebjerg Hosp. Sect. C. 28. X, 1919. Has suffered for about 5 years from her present disease. Her condition has of late got worse. Is nervous, complains of palpitation, difficulty in breathing, feeling anxious, precordial pains. Loss of weight. Uniform swelling of side-lobes, as well as of isthmus. Some tremor, slight exophthalmia. P. 96. Weight

Case 13. Oct., 1919.

Case. 13. Nov., 1920.

48.5 kgr. 28. X—30. X, 1919. 1st series of *irradiation*. 26. XI—28. XI. 2nd series of *irradiation*. 4. II, 1920. Less nervous, feels on the whole better. P. 142. Weight 52 kgr. 9. II—11. II. 3rd series of *irradiation*. 14. III. Is feeling well, but unable to work. 16. VII. Feels well. No exophthalmia, no struma. Stands work. 10. IX. P. normal. Weight 53 kgr. May, 1921. Complete recovery.

Case 14. Anna J., aged 18, unmarried. Private institute. $28\frac{1}{2}$ 20. Ill for $\frac{1}{2}$ year. Palpitation, restlessness, fatigue, languor, frame of mind variable, perspiration, and at times diarrhoea. Struma grown continually, has often a feeling of pressure. Eats disproportionately much. Moderately pronounced exophthalmia. Diffuse swelling of gl. thyroidea. P. 112. Weight 66.5 kgr. Some tremor man. 30. I 3. II, 1920. 1st series of *irradiation*. 16. II. Condition almost unchanged. Eats much less than heretofore. 12. III—16. III. 2nd series of *irradiation*. 7. IV. P. 84. Weight 70. Is feeling well. 14. VI—17. VI. 3rd series of *irradiation*. 23. VIII. Feels well. P. 72. Weight 71. Hardly any exophthalmia. Slight struma. 26. I, 1921. Feels well. P. 78. Weight 69 kgr. 14. V. Recovery.

Case 14. Jan., 1920.

June, 1921.

If we wish to make a comparison between the results of the operative treatment, and those attained by Roentgen irradiation, it would be unjust not to take into consideration that the Roentgen irradiation is tried on all patients without exception whereas in the operative treatment all patients not considered fit for an operation are beforehand rejected; and, when the result is summed up, we start from this reduced material and in such a manner the drawing of a comparison is made extremely difficult.

Already after the first series of irradiation, an evident change for the better in the patient's state of health will, as a rule, set in, the nervous symptoms vanish, the restlessness diminishes, and many of the former complaints cease. Concomitant with the subjective improvement, an objective change takes place in the patient's symptom-picture, particularly a quieter cardiac activity and an abatement of the tremor that may possibly be present.

A careful observance of the weight of the patients is highly desirable, for in the weight we possess a good means of judging their general state of health. In almost all the patients, provided the result of the treatment be positive, we shall find an increase in weight. This does not always set in during the first stage of the treatment, however, when even a slight loss of weight may be noted, but it will often occur a month or so after the beginning of the treatment. Occasionally the increase in weight may show very early; thus 9 have at present under treatment a patient who, during the 3 weeks between the 1st and 2nd series of irradiation, had gained 5 kgr. in weight. Even such a considerable increase in weight as 10–20 kgr., is by no means rare. The increase in weight is, as a rule, proportionate to the change for the better and one does not often find an increase in weight that is not accompanied by a corresponding change in the clinical picture.

Symptoms such as perspiration and diarrhoea will disappear comparatively soon, as also does the glycosuria which has been present in about 3 p. c. of the patients. In the first case, communicated in this paper, we find, strangely enough, glycosuria after each irradiation-series but afterwards it disappeared entirely.

Tachycardia, which has been a constant symptom, has in 25 p. c. of cases disappeared, in 50 p. c. abated considerably, but has remained nearly unchanged in the the remaining 25 p. c. of the patients, and here the pulse-frequency has been 100–120. In spite of the high pulse-frequency the patients have, as a rule, felt well. A certain lability of the pulse will often be present.

Exophthalmia is, as we know, the most obstinate symptom; this holds good, whether the treatment be operative or by Roentgen irradiation. In numerous cases, though, we see it disappear completely, particularly this may be expected where the symptom is of recent date, whereas an exophthalmia that has existed a longer time is not so easily influenced.

The struma has disappeared altogether or partly in $\frac{2}{3}$ of the patients; in the last third of the patients the swelling has remained apparently unchanged, though the improvement of their health has been considerable. The soft struma will preferably be influenced whilst the hard struma will first soften, and afterwards slowly disappear.

The duration of the disappearance of symptoms, or improvement is, with regard to the private patients, quite in accordance with what I have previously observed. On inquiry, many years after the treatment has come to an end, the patients state that they continue to feel perfectly well, and for many of these the period of observation has lasted for considerably more than 10 years. The relapses have been but few, but some of the patients have in the course of time disappeared, and

nothing has been heard of them. Occasionally some of these are traced, however; thus in 1916, on undertaking a general search, I succeeded in finding part of those who had not been heard of for a length of time, and it showed that their silence denoted that they felt quite well.

Regarding the hospital patients the result has not been equally good, relapses having been more frequent. The cause, as I have stated before, is to be found in the social conditions. Moreover, the time of observation for these patients has been rather short, hardly more than 4 years. The relapses are, as a rule, combatted by means of renewed irradiations, and many hard-working women have, with intervals of a half or a whole year, undergone renewed treatment, which has resulted in their having been able to attend to their work steadily. Now and then very strong exposures have been tried on them, but without greater result.

Goiter is caused by a poisoning of the organism through thyreotoxic substances secreted from diseased gl. thyreoideæ. Through operation the volume of the gland is lessened, and the quantity of poisonous matter carried to the body is diminished. The Roentgen irradiation calls forth a degenerative process in the gland tissue, from which a diminution of the gland may follow; but this is not necessary, though, for lessening the secretion, as it is quite conceivable that the function of the gland may be checked, or the compound of the secretion be altered as a result of the process of degeneration, without any simultaneous decrease of volume.

In *Ugeskrift for Læger*, 1920 N:r 17, Mrs MARIE KROGH has communicated some valuable experiments on the metabolism in goiter patients, also such as have been treated with Roentgen irradiation. The material is too small, though, to allow any conclusions regarding the influence of Roentgen rays on the standard metabolism, but a wider range of experiments is promised. The improvement in the state of nutrition and the subjective change for the better will, according to the experiments made up till now, only in very few cases be accompanied by a diminishing of the increased metabolism. It will be of importance clearly to conceive the metabolism in those patients, who have attained complete freedom from symptoms. Mrs KROGH is of opinion that an increased metabolism is an absolute condition, where a Mb. Basedowii is to be diagnosed.

If we now pass on to mention the complications which may set in through the Roentgen treatment of Mb. Basedowii, it will be natural first to examine whether the treatment can be said to entail any danger to the patient.

In my communication of 1916, I say that the risk attached to operative treatment makes it only right that scope should be given for other

and safe methods of treatment, and to these belongs the Roentgen treatment, which, carried out by a skilled hand, cannot be said to involve danger to the patient.

Shortly after this was written, there appeared in the Danish medical literature communications of 3 deaths of goiter patients after Roentgen treatment, namely 2 cases published by VERNING (*Hospitalstidende*, 1917, N:r 31) and one communicated by SECHER (*Ugeskrift for Læger*, 1918, N:r 41). These cases are rather isolated, in so far as in the home-literature only one single case can be paralleled with them, but in spite of this the question is, of course, of vital importance and requires examining.

Both VERNING and SECHER are of opinion that there is a prevailing probability for the deaths being directly connected with the Roentgen treatment. Nevertheless one may, as I have pointed out before (*Ugeskrift for Læger*, 1918, N:r 43), with a certain right maintain the opposite standpoint, that such a connection is here improbable, and I will state what, in my opinion, speaks in favour of this view.

All the three cases are of a very severe nature, and, as we know, it is by no means rare that in patients suffering from a severe Mb. Bas., a hyperthyreoidia, violent enough to cause death, may set in without a traceable cause.

I will here mention two cases, in this respect most instructive.

I. *Christian M., aged 35*, sent from the Finsen Med. Light Institute, 27. IV, 1919. Kommunehospital, Sect. VI, Ill since 5 months. Restlessness, nervousness, sleeplessness. Loss of weight c. 15 kgr. Cardiac action vigorous. Brought to the Finsen clinic 13. IV. No exophthalmia. Swelling of gl. thyr. P. 120—130. Tp. normal. Diuresis natural.

21. IV, a *Roentgen irradiation* is given 5 H. on left side of neck under 5 Mm. Al. filter. 22. IV, slept badly. Cardiac action violent. Tremor. 24. IV, confused. 27. IV, confused, restless, sleepless. Is sent to K. H. Section VI.

Strong perspiration, strong tremor. Swelling of gl. thyr. No exophthalmia, Stellwag & Graefe. Restless and confused. Steth. cordis Ictus widely spread, and strong. Action regular, very quick. Systolic sounds all over precordia. P. 136.

29. IV. State worse. P. 230. Respir. 64. Difficulty in swallowing. Death at noon, in spite of stimulants (digitalis, subcutaneous salt-water injections). P. M.: (Intoxicatio spont. Thyreoidism). Struma. Hyperplasia organ. lymph. Deg. parenchymatosa hepatis. Bronchit. pur.

II. *Johanne P., unmarried, aged 36*. Kommune Hospital, Dep. VI. Admitted to Bispebjerg Hosp. 28. IV, 1919. Transferred to K. H.

Nervous for c. 10 years. Goiter 2—3 months. Struma. Exophthalmia. Perspiration, thirst, loss of weight, tremor. Has been treated merely with bromine and valeriana. 28. IV. Is restless, weeping, ill at ease. Tp. 37.9. P. 136. Strong Exophthalmia, Moebius, neither Graefe nor Stellwag. Tremor lingue et manuum. Gl. thyr. much swollen. Steth. cordis. Ictus spread a little beyond the mammary line. No systolic sounds.

Treated with morphia and bromine. Constantly restless, ill at ease, exhausted. Tp. rising. Fits of palpitation is getting very low. Death 30. IV.

P. M.: Mb. Basedowii. Struma. Thymus persist. Bronchit. pur.

These two cases are very much alike, and we may, if we like, add the first of them to the above mentioned 3 cases with total issue in consequence of Roentgen treatment, as the patient had a slight Roentgen irradiation 6 days before his death. The other patient, who also dies under an increasing hyperthyreoidism, has, however, undergone no irradiation, and here the cause of the aggravated state that sets in is quite unknown; at all events the Roentgen rays cannot be made responsible.

It is, as I said before, by no means rare that a Mb. Basedowii ends in the above described manner, through a spontaneous hyperthyreoidism setting in, and in this respect it is most significant that, at the same time and in the same department, we find two patients who both succumb to the disease in exactly the same manner.

The thought of a casual coincidence between the Roentgen irradiation and the outbreak of the hyperthyreoidism cannot be dismissed, if only for the reason that the number of Roentgen-treated patients is so immense, and the deaths in connection with the treatment so few. Thus I have personally treated about 500 patients with Mb. Basedowii, and only observed one death that may be connected with the treatment. It must also be taken into consideration that all the cases where death has ensued have been patients with very severe forms of the disease and where consequently a fatal issue cannot be particularly surprising.

On the other hand, one cannot simply repudiate the possibility that the Roentgen irradiation, under certain circumstances, may have an unfavourable influence on a patient with Mb. Basedowii; for the Roentgen irradiation is a powerful remedy, at times even strongly influencing the patient's general condition and such a remedy is, of course, always under particular circumstances apt to have an unfavourable effect.

It is, of course, not without reason that, as far as I know, all authors, with the exception of a single one, advise great precaution when administering Roentgen irradiation to severely attacked patients. The unbalanced state, characteristic in just these patients, will always require great carefulness and attention, because every impulse, of whatever kind and however slight, may cause a much greater outcome than is expected. And here we enter on the question of dosage and the suitability of giving small or large doses.

Everybody, I believe, with the exception of NORDENTOFT, advises in severe cases small doses with suitable intervals, in order to see how the patient reacts against the irradiation. And it is hardly in the first place the fear of causing a hyperthyreoidism through the intense irra-

diation that is here decisive, but more probably the dread of a Roentgen poisoning (Roentgen nausea) setting in. That such a poisoning, provided it be tolerably strong, may be dangerous to a very exhausted goiter patient is unquestionable, the more so, as the effect of the poisoning tells long before the eventual degenerative effect will develop. The Roentgen poisoning, about the causes of which we have but hypotheses to adhere to, shows very fitfully; in some patients it sets in with great violence, in others it does not appear at all, though just the same technique has been applied. NORDENTOFT himself writes that in easily influenced goitre patients one, now and then, notices a strong Roentgen poisoning setting in, with 2—3 days of vomiting, but the patients should not be exposed to such a shock, if it can be avoided.

If we go through the case-histories from VERNING and SECHER, we find nothing to justify the thought of a Roentgen poisoning likely to be conducive to the fatal issue of the disease, and I think it most probable, that here various circumstances coincide, and such a coincidence will now and then take place. The Roentgen treatment of Mb. Basedowii is in reality harmless, when given with the precaution which the state of the patient may require.

The question as to whether through Roentgen treatment of a goiter patient hyperthyreoidism may be brought on, is, of course, of the greatest interest. NORDENTOFT, who has fought in favour of the large dose, »full dose», as he calls it, says that if there is any danger at all, it must lie in the small doses, which may act as irritants. He mentions that, for instance, FORSELL (N. T. f. Terapi, Jan., 1914) states that small doses act irritatingly on gl. thyroidea and produce an increased cell-activity, whereas large doses have a degenerative effect. This, no doubt, is right, Forsell's observations do not aim directly at the gl. thyroidea, however, but are given in a general way; at all events we do not know any fixed irritative dose, for in numerous cases the affected gl. thyroidea has been irradiated with small doses, without any traceable increase of the cell-activity. That there exists an irritative dose for the carcinoma, seems on several occasions to have been proved, but, here too, we know but little of the size of this dose. SEITZ and WEINTZ fix it at 40—55 p. C. of the effective cancer-dose, which appears much too high. For if the irritative dose is really about half of the effective one, we would in numerous cases see a rapid development of the cancer, for in manifold cases this dose will surely have been applied, especially in recurrences of cancer mammæ, which has so often been insufficiently dosed. A rapid spreading of such a cancer mammæ is in reality extremely rare. If the dose necessary for the destruction of the tumor is not applied, this

will keep passive, or be somewhat checked in its development, if the dose has been tolerably strong.

The large dose (erythema dose) does not in itself carry any direct danger, but indirectly danger may arise through the large dose, if, in a very exhausted patient, it calls forth a Roentgen intoxication. Nordentoft, the only advocate of the large dose, seems himself to have felt misgivings about the large dose in all cases, for in his last paper (*Strahlentherapie XI*, 2) he writes that the two methods in so far are equal, as both lead to the goal; and he even does not deny the possibility of there being forms of Mb. Basedowii where the method with repeated small doses may eventually be preferable. But on this point we can only be taught by continued research and much greater experience.

The question of how far it is possible through Roentgen irradiation to cause an abatement of the function of gl. thyreoidea, strong enough for a myxoedema to set in, is not yet clear, though several observations point in this direction. I have myself mentioned a woman, who, having first had Roentgen irradiations for tuberculous glands in the neck, and later on for a slight struma, got myxoedema, which soon disappeared, however, with the aid of thyreoidine. Meanwhile the communications regarding the hypofunction of gl. thyreoidea accompanied by myxoedema, resulting from Roentgen irradiation, are too few to draw positive conclusions, the more so, as there are large numbers of Roentgen-treated cases, where no such a thing has taken place; and in none of my 500 patients, with the one exception mentioned above, have I observed anything of this kind.

The goiter patients' skin is very sensitive, very likely owing to the irritability of the vessel-system, wherefore we also in these patients, more often than in others, see a passing erythema arise shortly after the irradiation. Whilst this phenomenon quickly disappears and in so far is without significance, an ordinary reaction erythema may also easily set in even with moderate irradiation, where, under ordinary circumstances, one would not expect it. This urges to precaution, especially in recurring cases, where there is a question of a longer period of treatment. Lasting changes in the skin of such patients may easily arise, and often they take one by surprise, no erythema having beforehand been traceable. In about 3 p. c. of the here mentioned patients the Roentgen treatment has been accompanied by more or less pronounced telangiectasis on the skin.

In 2 patients a strong and protracted hoarseness has come after the irradiation, and with the aid of laryngoscopy it has been seen that the vocal cords were slightly red and swollen, but these symptoms have again disappeared without special treatment, though in one of the patients

only after the course of several months. In some cases a passing swelling of the lymphatic glands has been observed, and in a few cases dryness of the mouth, owing to diminished salivary secretion; these accompanying symptoms have set in where the field of irradiation has been the largest and have been located far back on the side of the neck.

The unfavourable result of the Roentgen treatment, formerly emphasized by VON EISELSBERG, viz., that fibrous tissue adhesions round gl. thyroidea were apt to make a later operation more difficult, has not only remained unconfirmed, but has been refuted from many quarters. Adhesions between the capsule and its surroundings will often be observed, and numerous communications tend to prove that these adhesions are not more frequent in Roentgen-treated cases than in such where an irradiation has not taken place.

MANNABERG'S observation (*Wiener Klinik* 1913, No. 18) that through irradiation of the ovaries on goiter patients approximately the same result may be reached as by irradiation of gl. thyroidea, has not been confirmed. STEIGER, it is true, states (*Strahlentherapie VIII*) that of 3 cases of myoma complicated with Mb. Basedowii, he has in two of the patients noticed a favourable influence on this latter disease through the setting in of amenorrhoea; but, on the other hand, VON GRAFF (*Wiener klin. Woche* 1914, 5) communicates, that he has seen a Mb. Basedowii develop in connection with an amenorrhoea, so that this point must be said to be rather obscure. I personally have had a single case of myoma, complicated with struma, but I did not notice that it was influenced by the oncoming amenorrhoea. That there is a certain connection between the functions of the ovaries and the irradiation of gl. thyroidea, seems evident from the fact that not a few of the female patients, who have otherwise had quite regular menstruations, state that during the treatment meno-pauses have set in, lasting for a couple of months.

Some patients, about 30, have become pregnant in the course of the treatment, or at all events during the time of observation. Those concerned have suffered from a natural fear as to how events would turn out, but in no case it has been proved that pregnancy or child-birth had aggravated their condition.

Regarding the technique of the irradiation, it has somewhat varied according to the degree of development of the disease. To very severely attacked patients 3 H. have been applied (5 Holzkecht units are counted equal to one Sabouraud-Moiré unit) through 3 Mm. Al. filters with an interval of a couple of days. All in all, 4 fields of skin have been irradiated, viz., the two side-fields of the throat and the middle-field,

care having been taken to avoid crossing of the rays, and, finally, one field comprising the upper part of sternum.

If the patient has shown the slightest cause for alarm, the pause between the irradiations has been prolonged; but if they have borne the treatment well, they have after the lapse of a month received a more intense irradiation, namely 8—10 H. under the same filter in the above mentioned four fields.

The less severely attacked patients have from the beginning got a larger dose, and the out patients have as a rule got 8—10 H. through an aluminium filter 3—4 Mm. thick, one of the four fields having been irradiated every day. About a month later the same dose has been given, after which there has been a pause of 2—3 months; finally, 10—12 H. through 4—5 Al. in 3 fields, and with this the treatment has in most cases come to an end. If later on a relapse has set in, the latter dose has been repeated with an interval of several months.

At an earlier period somewhat larger doses have been given, but, on account of the skin, they have been decreased and the focal distance augmented. Taken as a whole, the doses here mentioned are not small, but larger than those mentioned by most authors. Thus HOLZKNECHT gives, according to WETTERER, 10 H. through $\frac{1}{2}$ Mm. zinc in one field, and then pauses a fortnight, after which a new field is irradiated in the same way. And LENK (*Röntgentherapeutisches Hilfsbuch, Berlin, 1921*) gives two irradiations of each 6 H., 3 Mm. Al., with an interval of 8 days, and repeats this 2—6 times. FORSELL's doses, too, are somewhat smaller. After a test-dose 3 H. (3 Mm. Al.) on the side-fields of the neck, he gives 10 H. on the same fields spread over 4 days, and 10 H. on Manubrium sterni, and this dose is further given twice with an interval of 4—6 weeks.

As to the indications one would like to give regarding the Roentgen treatment of Mb. Basedowii, the question must first of all depend on the position assigned to it, as compared to the surgical treatment. If we think, as some do, that the two methods of treatment are equally valuable, or, as does LEDOUX-LEBARD, that the Roentgen treatment is superior to the surgical one, the consequence will be that we shall not hesitate in applying this treatment to all cases. In accordance with this we also see that, for instance, LENK (*Röntgentherapeutisches Hilfsbuch, Wien 1921*), does not give any contra-indications, but declares the Roentgen treatment superior to every other treatment and insists upon its being unconditionally tried before one proceeds to an operation.

FORSELL (*Lærebog i intern Medicin, 1921*) is considerably more reserved, saying that our range of experience is still too limited, and, above all, the time of observation too short for a comparison with other

methods, or for the stating of a safe indication for the Roentgen treatment of Mb. Basedowii. Further, he says that, considering the risk which is still undoubtedly incident to the operative treatment of Mb. Basedowii, we may even now be entitled to try Roentgen treatment, together with the internal treatment, before an operation is decided upon, provided a postponement of some months cannot be supposed to involve danger to the patient. On relapses after an operation, as well as in inoperable cases, a trial with Roentgen rays will certainly be justified.

If one takes into account the experiences that are to be reaped from the material in hand, the indications regarding the Roentgen treatment are as follows:

The lighter, rudimentary, cases of Mb. Basedowii, where the usual medical treatment has proved resultless, ought decidedly to undergo Roentgen treatment. The result will, in the greater number of cases, prove a complete and lasting recovery.

In moderately severe cases the Roentgen treatment will likewise be indicated, because it must be considered safe if carried out with the necessary precaution, and because, as a rule, the result of the treatment will prove satisfactory. Should the radiotherapeutics not lead to a favourable result, operation must be resorted to; the postponement need give rise to no anxiety, the less so, as there is not the slightest proof, nor even probability of the Roentgen treatment having made the operative incision more difficult. If we meet one of those cases where the irradiation proves of no use, the time of observation should not be stretched beyond 3—4 months, there being but a slight probability of an improvement setting in later, if it has not appeared in the course of this time.

In severe chronic cases, which nevertheless show some oscillation of the condition, the Roentgen treatment should be tried, particularly if the operation, on account of the patients state of health, has to be put off. Through this treatment we may possibly render an operation superfluous, possibly improving the conditions for an operation. The stagnant chronic form of Mb. Basedowii, where there is imminent danger of a rapid degeneration of the myocardium, must be operated, if this is possible, if not, Roentgen treatment must be tried.

All inoperable cases and all relapses after operation should be Roentgen-treated.

The more recent a Mb. Basedowii is, the greater is the chance of the Roentgen treatment resulting in a complete recovery, so that all symptoms disappear. If the medical treatment does not help in the course of a reasonable time, more effective treatment should be tried, and the choice must now be made between operative incision and

Roentgen treatment. The former implies no inconsiderable risk, the latter must be said to be without danger; and thus we must feel justified in choosing the latter, if we do not see a danger in putting off the operation, this however, I am sure, will rarely be the case.

Summary

Among 490 patients treated for goiter there were 11 men, the remainder women. The material at hand is divided into 2 parts, viz: those treated at hospitals, and private out-patients, the majority of the former belong to the working-classes, and the latter for the most part to the well-to-do classes.

The prognosis varies within these two classes; it is most favourable for the well-to-do, because the working class patients are not, as a rule, able to take the care so necessary in this disease. In $\frac{4}{5}$ of the cases a positive result is attained, complete or partial cessation of symptoms. Recurrences occur principally among the poorer patients; on the whole, the duration of the results attained is satisfactory. Nervousness decreased rapidly, increase in weight is usual, in several cases the increase has been about 20 kilo. Perspiration and diarrhoea disappeared, likewise glycosuria which has been observed in 3 % of patients. In 25 % the pulse has become normal and in 50 % it has decreased considerably in frequency. Exophthalmia in several cases has disappeared, if it has not been of long duration.

Serious complications are precluded if the administration of Roentgen rays is carried out with care, so that in the case of severely attacked patients one should not run the risk of Roentgen intoxication.

The usual dose has been 10 H. with 3 Al. filters on 4 fields, the one on thymus; but a smaller dose to begin with if the patient has been seriously attacked.

One should not be too exacting with regard to the indications for Roentgen treatment. Only in cases where a postponement of an operation is likely to cause danger should this treatment not be indicated.