RESULTS OF RADIATION THERAPY IN LEUKEMIA AND LYMPHOGRANULOMA

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The etiologic agents in leukemia and Hodgkin’s granuloma are at present unknown. These diseases have been considered together on account of their tendency to involve the lymphatic system and their close resemblance to tumor processes. In fact, the former by some authorities is regarded as a tumor process of the hematopoietic system, while the latter is looked upon as a tumor of the lymph-nodes (1).

LEUKEMIAS

In this series, there were twenty-five cases of leukemia. Sixteen fell into the lymphatic and nine into the myelogenous groups. Males predominated in a ratio of 4 to 1. The youngest case was ten years, and the oldest case sixty-eight years. The average duration of the disease was one year and seven months in the lymphatic type and two years and three months in the myelogenous type. There seemed to be no predilection to race. From the above it will be noted that the duration is longer in the myelogenous type than in the lymphatic, and that the former is apparently more amenable to treatment.

The clinical symptoms were those usually given in the description of this disease. The most prominent were enlargements of the spleen, adenopathies, loss of weight, anaemia, malaise, nausea, vertigo, vomiting, diarrhoea, constipation, epistaxis, etc. In two cases of the lymphatic type herpes zoster was noted.

The diagnosis was easily made from the blood picture. In two cases during the disease the blood picture on two isolated examinations was that of a grave anaemia, thus demonstrating the so-called aleukemic phases of the disease.

Many cases complained of respiratory difficulty during the
course of the disease. Two cases coming to autopsy presented massive enlargements of the trachea-bronchial glands, which during life had given typical signs of mediastinal involvement, i.e., D'Espine's sign, para-vertebral dullness, bronchial voice and breath sounds below the first dorsal vertebra.

Lymphatic Leukemia

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Case No. 7827
Admitted 3/26/23
Died 4/21/23.
Only few palpable nodes in groins. Spleen markedly enlarged.
Radium Pack 2/37/33
15000 m.c. hr. over spleen.
4/20/33 Note. Condition progressively worse. Patient weaker.
4/21/33. Died.

Graph 1

Basal metabolism was performed on two cases of the series. One showed an increase of 23 per cent and the other 20 per cent plus (2).

Graph I represents a rapidly fatal type of lymphatic leukemia. The radium pack was applied with a dose of 15,000 m.c.h. over
the spleen. There was marked reduction in the size of spleen but the patient grew progressively worse, and died four weeks after the onset of the disease.

Graph II depicts a more chronic type of lymphatic leukemia lasting over a year and five months. Transfusion was done twice with marked improvement. This was especially noticeable after the first transfusion. In the interval high-power X-ray was employed consisting of the following dosage factors, i.e., 30 cm. skin target distance 10 x 15 cm. fields, 0.5 mm. copper filter, 198 K.V. (crest voltage) skin dose 23 to 30 per cent. This treatment was given over thighs, legs, sternum and spleen. For a time the treatment seemed very successful but the patient died a month and a half later. It might be argued that, had the patient come under treatment earlier, the apparently hopeful results of treatment might have been prolonged.

Graph III depicts the more chronic and apparently more hopeful course of myelogenous leukemia. The patient had had previous treatment by radiation in another city, with the usual results. A scar from a skin burn was in evidence over the left hypochondriac region. In this case, the radium pack was applied over the spleen for 9363 M.C.H. with apparent symptomatic improvement but only slight diminution of the immense spleen.

Graph IV shows a response of the encouraging type. This patient secured great symptomatic relief after treatment, and has been able to perform her usual household duties. High voltage X-ray treatment over the spleen was given at intervals, dependent on the blood count.

There were two cases of acute lymphatic type. In both these the small lymphocyte predominated. Radiation was used in one case on a purely empirical basis (3) in spite of the usual contra-indication for this type of disease. The immediate response was remarkable, the patient being transformed from a moribund state to a condition of apparent well being in nineteen days. This patient, however, soon suffered a relapse. A week later, the spleen enlarged, the leucocyte count increased, severe epistaxis supervened and the patient died.
RADIATION IN LEUKEMIA AND LYMPHOGRANULOMA

Case A678 dm tted 1/24/83 %id 3/6/83

Enlarged nodes in each side of neck and left axilla. Greatly enlarged tonsils were removed. Examination of nodes from neck showed "lymphosarcoma" which disappeared entirely under copper filtered x-ray.

Liver and spleen not palpable.

X-ray Treatment
2/5/23.

198 K.V. 30 cm. Distance, 8 m.a.
S.D. 23-30, D.D. 29, 0.5 copper.
Over thighs, legs, sternum and spleen.

Graph 2
Myelogenous Leukemia

**Case No. 140**

Admitted 11/4/20
Spleen immensely enlarged, reaching to mid line & crest of ileum. X-ray burn in left hypochondrium. No palpable glands.

11/20/20 Radium Treatment over spleen
9365.2 m.o.h.

12/29/20 Radium Treatment over spleen
8645 m.o.h.
12/29/20 Note. Not much change in spleen.

2/5/21 Note. Patient decided to go to Baltimore for further treatment.
Condition unimproved. Later reported dead.

Graph 3
RADIATION IN LEUKEMIA AND LYMPHOCYTOMA

Admitted 6/25/23.
Poorly nourished woman of twenty-eight years with spleen extending within two inches of symphysis and at least two inches across midline.

9/25/23. Radium Pack
Over spleen. 16500 m.c.hr.

7/25/23
Spleen much smaller.

8/15/23.
Spleen same as 7/25/23.

8/18/23 X-ray treatment
198 K.V.,0.5 Cu.8 m.a. 70 cm.
36 min. 18 x 26 cm. field ant. and post. over spleen.

8/31/23.
Spleen much reduced in size.

9/28/23.
Spleen a little large. Color markedly improved. Gaining weight

198 K.V.,0.5 Cu.8 m.a. 36 min.
70 cm. 22 x 20 field ant. and post. over spleen.

10/22/23.
Spleen much reduced.

11/5/23.
Spleen very much smaller.

Graph 4
We believe that medical treatment should be used in conjunction with radiation wherever possible. In this series, arsenicals, benzol, transfusion, radium or X-ray were used in various combinations in the hope of arresting the process. Symptomatic response was noted after all these forms of treatment, but more constantly after radiation. Splenectomy was not performed.

We consider high voltage X-ray and radium as comparable methods of treatment. The early cases were treated with 140 K.V. crest voltage, 4 mm. aluminum filter, short target distance. The long bones, spleen and adenopathies were the object of attack. Later, the radium pack giving 15,000 to 16,000 m.c.h. filtered through 2 mm. brass and 1 mm. aluminum was used (4).

In those treated with high power X-ray 198 K.V. crest voltage with 0.5 mm. copper filtration, long target distance and 8 ma. was used with equally encouraging results. We have had no experience with the active deposit of radium intravenously as recommended by Janeway.

In the early cases the dosage was not measured as at that time the apparatus was not standardized. At present, with our improved pack and high voltage X-ray, which are constantly measured by our physicist, it is possible to subject the leukemic tissue to a definite dosage. On the whole, our dosage was too low in the earlier cases and perhaps a little high in the later cases. It is hoped that a satisfactory optimum dosage will be worked out. Dreyfuss (5) recommends a dose of 30 per cent in the spleen and lymph-nodes.

While being very enthusiastic with the results of short wave therapy in securing remissions with the least discomfort to the patients, we would lay stress on the fact that the remissions have not been permanent. It is true that most cases, notwithstanding this gloomy prognosis, have extended their sphere of usefulness under radiation therapy, and many have worked and enjoyed apparent good health until shortly before death.

HODGKIN'S GRANULOMA

Of forty-six cases herein reported twenty-nine were males and seventeen females. The usual proportion of male to female
cases is given as 3 to 1, but in this short series the ratio was 1.7 to 1. The incident of the disease was greatest between the ages of 20 to 30. Oldest case in series was 73 years; youngest case 5 years. Average age 33.68 years when first seen.

Graph 5

Showing greatest incident of disease between the ages of 20 to 30. Oldest case in series was 73 years; youngest case 5 years. Average age 33.68 years when first seen.
tuberculosis and neoplasia could be excluded as predisposing factors, being negative for tuberculosis in all but four, and for malignancy in all but two cases. Tuberculosis was demonstrated as a complicating disease in four cases; in two, a terminal miliary process supervened, as demonstrated at autopsy. Amoebiasis as the cause of this disease was looked for in many according to Kofoid's suggestion (6). To date no convincing data has been accumulated at this institution pointing toward amoebae as being the causative factor.

The diagnosis in these forty-six cases was verified by biopsy. We take this opportunity to impress the great value of biopsy in all cases of adenopathy where the diagnosis is not self-evident.

Among the earliest symptoms pruritis was noted as being common and in many cases very intractable. The adenopathies commenced in the cervical and supra-clavicular glands in thirty-four; the cervical and axillary glands in four; the axillary glands in four; the mediastinal in two; and the inguinal and mesenteric in one case each. From these points of initial involvement the deeper chains became affected with greater or lesser rapidity. Night sweats was also an early symptom. Clinically, the spleen was not found enlarged as frequently as would be imagined from the usual descriptions of this disease. Malaise and loss of weight was noted in most cases and later during the course of the disease a fever was prone to occur.

One of our cases was operated on in another city for cholecystitis complicating the Hodgkin's disease, on account of fever, nausea, vomiting and a mass in the region of the gall-bladder. At operation a mass of lymphogranulomatous tissue was discovered instead of a cholecystitis. Another case developed a paraplegia from pressure on the dorsal cord, due to infiltration and erosion of the vertebrae. Several cases developed secondary deposits in the lungs and many had effusion into the pleural cavity. Two cases had a typical chylous ascites. In one case of essential mediastinal involvement large nodules of the size of marbles were found in the kidneys. The typical porphyry spleen was observed in all that came to autopsy.

The usual blood findings were encountered; namely, secondary
anaemia, with increase in leucocytes varying from 10,000 to 30,000, an increase in neutrophiles, moderate eosinophilia from 5 to 10 per cent, and an increase in blood platelets over 350,000. Increase in transitionals was not observed as a common finding of diagnostic import (7).

Interesting physical findings were observed. Signs of mediastinal involvement occurred in many as demonstrated by D'Espine's sign, paravertebral dullness, etc., as in the leukemias. In both diseases these findings were verified by radiographs. Two cases developed massive edema of the breasts due to pressure of enlarged nodes. Many presented signs of pleural effusion and pressure on the bronchi. Lung involvement was more difficult of positive diagnosis, radiographs being often resorted to.

Medical treatment was instituted in conjunction with the radiation as in the leukemias, and consisted in arsenicals, as arsphenamine, thiarsol, liquor potassi arsenatis, etc. Emetin hydrochloride and emetin bismuth iodide pills were tried on the basis of amoebiasis as a possible cause but with negative results. In one case autogenous vaccine was made from a node and given subcutaneously in another, the lymph-node itself was autolysed and administered in similar fashion; no beneficial results were observed by either of these methods.

Radiation therapy was administered in the same manner as in the leukemias, the adenopathies and spleen when enlarged being the objects of attack, the technic and apparatus employed being identical with the exception of the dosage. Here the attempt should be made to deliver a large dose of radiation to the granulomatous tissue, that used being between 60 and 70 per cent of the skin erythema dose. The treatment of each part was repeated after two months if indicated.

We do not feel that this dosage is necessarily the best, but we have seen great response from the adenopathies, which seemed to disappear with fair degree of regularity under this regime. Here again the results are quite similar to those in leukemias. Remissions are occasionally observed after treatment which lasts over long periods of time, but a cure has never been achieved to our knowledge.
SUMMARY

1. The results of radiation therapy are reported in twenty-five cases of leukemia and forty-six cases of lymphogranuloma.

2. Radiation therapy is empirical, like the medical treatment of these diseases, but tends to induce remissions with least inconvenience to the patient.

3. Medical treatment should be used wherever indicated in conjunction with radiation therapy.

4. Radiation therapy was given in two acute cases with temporary improvement.

5. An optimal dosage is still desired for both diseases.

6. We have seen no cures of leukemias or Hodgkin's disease by this form of therapy, but marvelous amelioration of symptoms and remissions have resulted which, however, were not permanent.

REFERENCES