

Early years of radiology in Singapore

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This article traces briefly the early development of Radiology in Singapore, when it became a specialty; and also to remind us of the momentous and mind-boggling advances that have taken place in Radiology, both diagnostic and therapeutic, and the equipment and machines in use today. Records are scanty and great reliance has to be placed on official documents, some of which will be quoted verbatim to make more interesting reading and to vouch for the authenticity of the information.

The Straits Settlements (Singapore, Penang and Malacca), British possessions, were governed by the East India Company after their founding, and later by the Government of India. The Straits Settlements were transferred from the India Office to the Colonial Office on April 1, 1867, and became a Crown Colony.

In 1882, a new General Hospital was opened in the Sepoy Lines locality. Earlier General Hospitals were at Pearl's Hill and the Kandang Kerbau district. Wilhelm Konrad Roentgen (1845 - 1923), a German physicist, discovered X-rays in 1895. He named the rays, X-rays, because of its unknown character then.

The first mention of X-rays was in the 1911 Annual Report of the General Hospital where it was recorded that the gas and oil used in the hospital would be replaced by electricity⁽¹⁾: (although it was recorded in the list of Subscribers to the Straits and Federated Malay States Government Medical School that the Singapore Roentgen Rays Committee donated \$177.08 when appeals were made in 1904).

"..... As in former years the gas supply was frequently not satisfactory. It is hoped, however, that electric lights and fans will be installed next year The use of an efficient Roentgen Ray Apparatus is badly needed, the existing instrument (powered by electricity from a generator) which had been in use for several years is practically useless for diagnostic purposes, while no provision

is available for photographic work. A new machine is to be obtained next year."

This shows that X-rays were in use in the General Hospital not long after its discovery, but only for screening purposes. With electricity going to be on tap, proper X-ray machines would be in use in the near future.

At the Legislative Council meeting on May 10, 1912, funds were voted for *"Electricity, lights, fans, X-ray apparatus and steriliser for the General Hospital - \$10,000.*

It is proposed to draw current from Tanjong Pagar Power House at Keppel Harbour through an overhead high tension main which will be taken over Tanjong Pagar Property. 114 lamps and 26 fans for wards of General Hospital.

The cost of the current will be half of what is now spent on gas and oil."⁽²⁾

At the end of the 1912 session of the Legislative Council, the Governor in his address said⁽³⁾:

"..... special provision has been voted this year for lighting the General Hospital with electricity and installing a steriliser and new Roentgen Ray Apparatus. The work is well in hand and should be finished by the end of the year."

By the end of the year, the Principal Civil Medical Officer reported:

"The installation of electric lights and fans for the European wards is near completion, a new X-ray Apparatus is on its way from Europe."⁽⁴⁾

In December 1913, anticipating the increased work load in the X-ray Department, the Governor requested the Secretary of State to recruit three Medical Officers, one with experience in Electrotherapy⁽⁵⁾.

The Medical Officer in charge of the General Hospital in the 1913 Annual Report stated⁽⁶⁾:

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“..... The installation of electric lights was completed in May replacing the gas which was often unsatisfactory, and the better light and the fans have effected a great improvement in the comfort of the patients.

The X-ray Apparatus was put up also in May and although a good deal of trouble was experienced from leakage of current due to damp, it has worked very satisfactorily on the whole”

This rudimentary X-ray apparatus was put to good use, even for therapy. We can consider this the start of Radiotherapy in Singapore. In 1914, it was recorded⁽⁷⁾:

“..... The X-ray Apparatus was working well during the greater part of the year, and the troubles due to moisture of the atmosphere were to great extent overcome. In addition to the radiographic work, 21 cases including Epithelioma, Ulcers, Eczema and Ringworm were under treatment by exposure to the X-rays.”

There is no record of which doctor was in charge of this embryonic X-ray Department in its early years. In 1921, however, Dr John Sutton Webster, a Medical Officer, (who in the next year, 1922, became the first Professor of Medicine in the Medical School) was in charge⁽⁸⁾.

Dr J S Webster, MB, ChB, was appointed a Medical Officer in June 1909, and arrived in Singapore on August 5, 1909. When he was appointed Professor of Medicine in March 1922, Dr Webster asked for permission to continue the practice of Radiology and Electrology, if it did not interfere with his duties as Professor of Medicine. He supported his request by stating that he had passed the Part I Examination of the Cambridge Diploma in Medical Radiology and Electrology (DMRE)⁽⁹⁾. This was approved. On his next leave in 1926, he passed the Final Examination for the DMRE (Cantab)⁽¹⁰⁾.

The work in the X-ray Department increased by leaps and bounds. The 1924 Report reads⁽¹¹⁾:

“..... For the first time, the number of treatments (X-ray therapy) has been sufficiently large to justify recording. 220 cases were given therapeutic X-rays during the year. Amongst those treated were four cases of Fibroid Uterus and 3 cases of Exophthalmic Goitre, in all of which excellent results have been obtained. Further equipment for an electro-therapeutic department has been purchased and the work of this department commenced. There is great scope for this work in Singapore Dr J S Webster was in charge throughout the year.”

The Electrotherapeutic Department was the forerunner of today's physiotherapy section of the Department of Rehabilitative Medicine. It was then part of the Radiology Department. A Radiologist's postgraduate diploma then was in Radiology and Electrology.

A new General Hospital (to replace the one in use since 1882) was opened on March 29, 1926. One consequence of this was the greatly increased volume of work in the X-ray Department. Webster found it difficult to cope with this in addition to his professorial duties. A new specialist post of Radiologist, General Hospital, Singapore, was requested in May 1926⁽¹²⁾. It was approved, and the new post was created in July 1926⁽¹³⁾.

Because of the new General Hospital and the expansion of the X-ray Department, supporting professional staff was urgently requested. In a telegraphic despatch to the Secretary of State, the Governor stated⁽¹⁴⁾:

“Please engage two Nursing Sisters one should possess the Assistant Radiographer's Certificate and also the Certificate of Medical Electricity of either Guy's Hospital or University College, London.”

This was the start of having trained Radiographers in the X-ray Department although there was no such entity in existence then. Specially-qualified Nursing Sisters were deployed for this work.

Dr Webster was more interested in Radiology than in Medicine. He asked to be relieved of his post as Professor of Medicine and be transferred to the new specialist post of Radiologist, General Hospital. The Governor recommended his transfer from April 23, 1927⁽¹⁵⁾. (Dr Richard Brunel Hawes was appointed Professor to succeed him on the same day).

A slight digression to mention the first appointment of a X-ray Department Sister (Radiographer). Further mention will be made of her later, to demonstrate the nature of her work.

The Secretary of State replied to the Governor's telegraphic despatch⁽¹⁶⁾:

“Selected Miss M B Hornsby as a Nursing Sister. Possesses Certificate of Radiography and Medical Electricity of Guy's Hospital. Hours of work should be different from ordinary Nursing Sisters”.

The Governor informed the Secretary of State that she would be attached to the Electrical Branch (i.e. X-ray Department) of the General Hospital, Singapore⁽¹⁷⁾.

In his 1927 Annual Report, the Radiologist stated⁽¹⁸⁾:

“..... New equipment which embodies the most complete protection for the patient and the operator that the X-ray and Radium Protection Committee advise, and has been passed by the National Physical Laboratory. In addition to Cholecystography, the results of which are not ready for publication in view of the small number of cases, Pyelography has been undertaken in three cases. Also X-ray examinations after the injection of Lipiodol have also been commenced.

Therapeutic X-rays. The following diseases were treated: Uterine Fibroids, Exophthalmic Goitre, Lupus Vulgaris, Lupus Erythematosus, Sarcoma of the Bone, Tuberculous Adenitis, Acne and Tinea.

In the Electrical Branch, all the diseases usually treated in such a department have been met with here. During the year, a set of radiant heat baths was obtained and has proved useful.”

In 1928, the Surgeons in the General Hospital found X-rays useful in the diagnosis of perforated gastric ulcer⁽¹⁹⁾.

In the same year, Miss M B Hornsby, the Sister-Radiographer mentioned above, thought that she had carcinoma of the breast caused by X-rays. In his report on her written on January 30, 1929 to the Governor, the Principal Civil Medical Officer stated⁽²⁰⁾:

“The Radiologist states positively that the protection of the X-ray plant is the best that can be secured. He has worked in the department for the past 8 years without injury. The present plant, up-to-date in every detail, was installed 2 years ago.

Miss Hornsby only worked for 14 months with him, and in actual practice screened very few of the cases. The great majority were done by Dr Webster. My opinion is that Sister Hornsby's condition (chronic mastitis) is not due to X-rays and unlikely to give her any trouble if her mind can be put to rest.”

It is instructive to note that the Radiographer-Sister did screening, something not normally done by Radiographers in Diagnostic Radiology Departments today.

Until 1930, the only X-ray plant in Singapore was at the General Hospital. One was presented to Tan Tock Seng Hospital by Mr Chee Swee Cheng, JP, and installed “which will prove of very great benefit to the Hospital as well as for teaching students.” A ward at Tan Tock Seng Hospital had been converted into laboratories, lecture hall and X-ray room⁽²¹⁾.

The 1930 Report of the X-ray Department, General Hospital, had some interesting remarks by Dr Webster on the radiological appearance of tuberculosis of the lungs, on the results of motor-car accidents (the state of things to come) and on radiotherapy. Parts of the report are quoted as they give us a glimpse of life then⁽²¹⁾:

“During the year, 9,032 radiograms were taken. The most common radiogram is of the chest and is chiefly for the presence of tuberculosis of the lungs, which is a common condition and which is rarely seen in an early stage. Considering the advanced and extensive lesions seen, it is surprising that the cases are alive, the inhabitants must have a fair degree of resistance to this infection. It is uncommon to find less than two lobes affected. Injuries which appear to be increasing in frequency are fractures of the skull, spine and pelvis. The common history is ‘knocked down by a motorcar’. This is not surprising amongst a population which has a very poor traffic sense (as usual, never blame the driver!). The fractures of the pelvis are generally very extensive and usually multiple. Formerly, it was rare to find fractures of the scapula, but it has become more common recently. The alimentary canal often requires examination. frequency of duodenal ulcer. The oesophagus is examined usually either for a foreign body or a stricture; the former is usually a fish bone which is not visible in a plain radiogram and may need the administration of a thick paste before the obstruction is made out. The more complicated examinations – cholecystography, pyelography, lipiodol injections – are being used with increasing frequency and have proved very useful. A large number of cases where the heart, etc. were screened.

X-ray and Radium Treatment. The following cases have been treated: various skin lesions (superficial therapy), Leukaemia, Hodgkin's Disease, Carcinoma and Sarcoma, Asthma, Fibroid Uterus (metrorrhagia), Exophthalmic Goitre, Rodent Ulcer.

The superficial skin lesions reacted satisfactorily; the asthma cases showed marked improvement; the leukaemias showed improvement; the metrorrhagia was checked. The treatment of malignant conditions is not satisfactory as the cases only arrive in an advanced condition.

When the new deep therapy apparatus is installed and when the additional radium arrives, better results can be hoped for. But if the sufferers from malignant disease do not seek treatment

before large masses of secondary glands are present, it will be a hopeless task"

In 1930, the course in Radiology for medical students was revised and consisted of a series of twenty lecture-demonstrations held once a week and extending over two terms. In addition, the students were posted in pairs to the Radiology Department for whole-time work for two weeks.

Abstracts of the 1931 X-ray Department, General Hospital, Report are as follows⁽²²⁾: (It may be tedious to read through lists of procedures done and cases treated, but this is essential for posterity's sake, otherwise future generations of radiologists and others would lose sight of their humble beginnings).

"The work of the department has proceeded unabated throughout the year and shown no diminution. The total number of radiograms taken is in excess of any previous year; the number would have been greater but for the fact that the plant installed in Tan Tock Seng Hospital came into operation on April 22nd, and from that date no cases were brought to this hospital for examination. Considerable use is made of this department for the more complicated examinations, e.g. foreign bodies in the eye, pregnancy, barium meals, barium swallow. Cholecystography. The intravenous method of administration has been dropped and the oral substituted. ... Pyelography. Increasing use is being made of Uroselectan which is proving very useful especially in the demonstration of growths of the kidney. Radiography of the Mastoid and the Temporal Bone Radiotherapy. Cases are treated with either X-rays or Radium. Most cases come too late to obtain satisfactory results.

During the year, additional radium was purchased and the hospital is now equipped with the minimum quantity needed for this work, i.e. 200mg.

Cases treated (apart from malignancies) Haemorrhage from Uterine Fibroids, Exophthalmic Goitre, Lupus, Erysipelas, Cellulitis, Dermoid of the Lung, Arthritis, Tinea, Epilation of hair on scalp, Acne, Warts, Erythema Nodosum The X-ray treatment of inflammatory conditions has proved very successful and ought to be employed more often.

Electrotherapy and Actinotherapy. The following cases have been treated during the year: Septic wounds, Myalgia, Debility, Lumbago, Sinusitis, Arthritis, Fibrositis, Furunculosis, Acne, Galvanism to muscles, Singapore Ear, Ionisation

in mastoid disease, Synovitis, Writer's cramp, Flat foot, Enteroptosis."

In the new X-ray Department of Tan Tock Seng Hospital, work commenced on April 22, 1931, and up to the end of the year, a total of 1,121 radiograms had been taken: the usual range of "straight" X-rays, with a few cases of cholecystography, pyelography, bronchography, lipiodol in sinuses, barium swallows, barium meals and barium enemata⁽²²⁾. Dr Webster was in over-all charge, with Dr E J Ess as Assistant Radiologist.

In 1932, 10,926 radiographs were taken in the General Hospital. 75 cases were treated with X-ray therapy, 52 cases with radium, and in the division of Electrotherapeutics and Actinotherapy, 88 cases received treatment⁽²³⁾. In Tan Tock Seng Hospital, 48 cases received ultraviolet therapy, viz. furunculosis, tuberculous arthritis of elbow, impetigo contagiosa, chronic ulceration, tuberculous adenitis, tuberculous caries of the spine with large ulcerations in the back, onychia.

3,660 radiographs were taken, of which 612 were of the lungs. A total of 1,133 cases were subjected to fluoroscopic examination. As in the previous year, much work was done with the students from the King Edward VII College of Medicine, who in the course of their clinical case-taking, brought their cases for fluoroscopic examination. The students were also shown how to interpret the radiographic findings, both on the screen and on the radiographs⁽²³⁾.

In the General Hospital, additional radium had been purchased in 1931 but the deep therapy plant ordered at the same time was not delivered until much later. It arrived in the early part of 1933, was installed and put into commission in May. Owing to the humidity of the atmosphere, special measures had to be devised to counteract it; consequently a dry room was erected to house the apparatus which kept the humidity constant and low (60%). The Radiologist reported in 1933⁽²⁴⁾:

"88 cases underwent treatment. With the opening of the deep therapy plant there has been an increase in the number of cases of malignant disease treated with X-rays, but it must not be overlooked that X-rays are even more successful in the treatment of other internal conditions, e.g. Leukaemia, Exophthalmic Goitre, Hodgkin's Disease, Uterine Fibroids (menorrhagia), etc., and that its use is not confined to the treatment of cancer.

The results in non-malignant conditions have been good; the results of the treatment of sarcomata

have been satisfactory but those in the case of carcinomata are somewhat disappointing probably because all patients were in an advanced condition. Eight cases of cutaneous malignancies were treated with good results.....

In the X-ray diagnostic section, 10,808 radiographs were taken. 137 patients had electrical treatments and diathermy."

Whereas in Tan Tock Seng Hospital, 4,057 radiographs were taken, including 615 of the lungs and 198 for barium meals. 74 cases had ultraviolet therapy, 43 diathermy. In December 1933, a new superpower vario frequency diathermy apparatus was purchased to start artificial fever therapy⁽²⁴⁾.

In 1934, the deep therapy apparatus which had been installed in the General Hospital the previous year was made use of in the treatment of suitable cases. 77 cases were treated by X-rays and radium: menorrhagia (uterine fibroids), Hodgkin's disease, myeloid leukaemia, sarcomata, multiple myelomata, cancers of the mouth, nasopharynx, cervix uteri and cervical glands, tuberculous glands of the neck, diseases of the skin, acute inflammatory conditions, and exophthalmic goitre.

Dr Webster, the Radiologist, commented that the value of X-rays in leukaemia, Hodgkin's disease and exophthalmic goitre was again demonstrated⁽²⁵⁾. The number of radiographs taken at the General Hospital was 11,275 and at Tan Tock Seng Hospital, 4,122. In Tan Tock Seng Hospital, there had been a marked increase in the number of cases of pulmonary tuberculosis subjected to X-rays and much of the screening was on cases treated with artificial pneumothorax⁽²⁵⁾.

Electric Therapy and Diathermy were available at both the General Hospital and Tan Tock Seng Hospital. Artificial fever therapy by diathermy was started at Tan Tock Seng Hospital and utilised in the following cases: syphilitic myelitis, spondylitis osteoarthritis, peripheral neuritis, and general muscular weakness almost amounting to paralysis. Three of the peripheral neuritis cases, who previous to treatment were unable to walk, recovered the use of their legs to an appreciable extent after two or three sittings. Of the four cases of syphilitic myelitis, only one showed well-marked improvement. The two cases of spondylitis were

relieved. Diathermy was tried in three cases of lobar pneumonia but was discontinued as the results were unfavourable⁽²⁵⁾.

After 1934, the hospitals settled down to mainly routine work. The number of radiographs taken at the General Hospital and Tan Tock Seng Hospital increased year by year. As were the patients treated by Electric therapy and Physiotherapy. In 1936, it was reported that some difficulty had been experienced in operating the deep therapy apparatus owing to the meter breaking down and having to be sent to England for repairs⁽²⁶⁾.

On May 16, 1939, the Governor, in a despatch, informed the Secretary of State for the Colonies that Dr J S Webster had left Singapore prior to retirement. He had served the Government for 30 years⁽²⁷⁾.

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