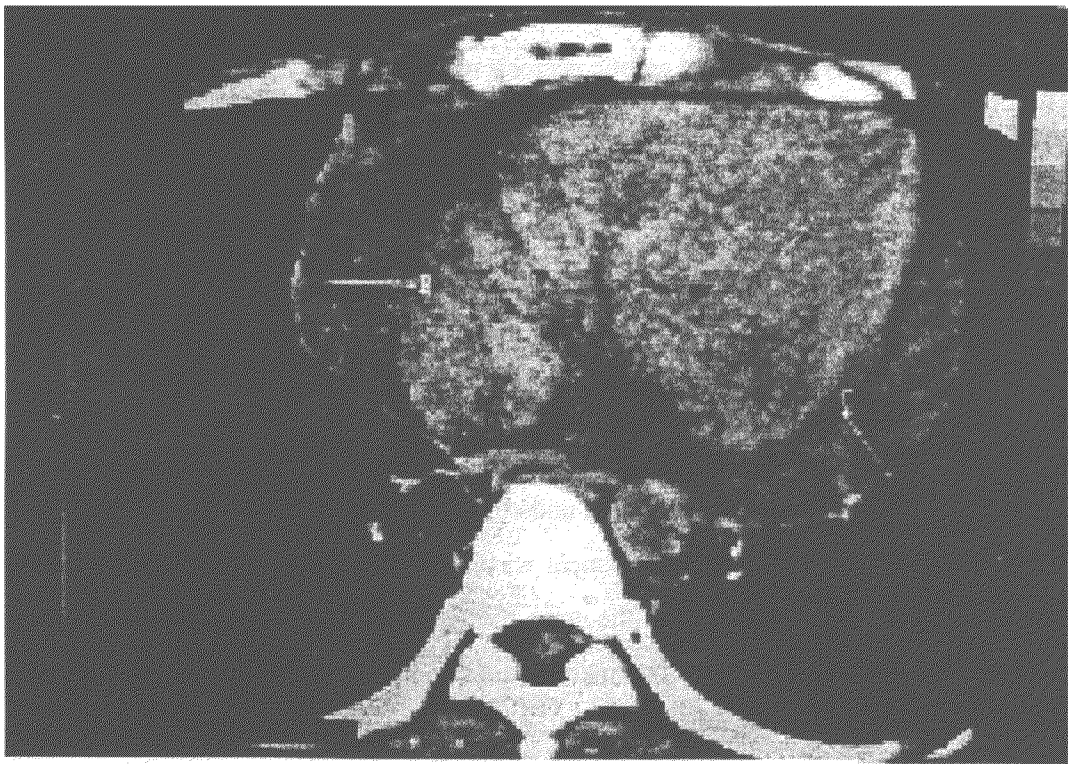

Image 12. Computed tomography X ray image of a patient showing pericardial effusion.

Patient No. 40, who had received 53 Gy in 17 fractions (3.1 Gy per fraction) to the mediastinum and developed a subsequent pericardial effusion.

Radiation can also affect major blood vessels. It causes an increase in coronary artery disease and a higher incidence of arteriosclerosis of the carotid arteries, brachial vessels, aorta and pelvic vessels. These changes typically occur between three and ten or more years after irradiation.

A number of patients examined may be expected to experience these late complications. Thirty per cent of patients who received 50 Gy of standard fractionated radiation (20–25 fractions) to the neck will develop moderate or severe lesions compared with 6% of controls. This equates to 2–2.5 Gy per fraction. Ten per cent of patients who received 26 Gy of standard fractionated radiotherapy for seminoma will develop vascular abnormalities.

Examples of patients with these characteristics were as follows:

Patient No. 39 was being treated for seminoma and had received 58 Gy in 14 fractions to the inguinal area (potential femoral artery disease and aseptic necrosis of the hip).

Patient No. 26 had received 54 Gy to the neck in 14 fractions (3.9 Gy per fraction) (potential carotid artery disease).

Patient No. 97 had received 47 Gy to the neck in 11 fractions (4.3 Gy per fraction) (potential carotid artery disease).

Patient No. 70 had received 72 Gy in 25 fractions to the left neck (potential carotid artery disease).

5.5. UNDEREXPOSURE OF PATIENTS

An additional, perhaps unappreciated, problem is undertreatment owing to the fact that, following the discovery of the problem with the source, treatment was halted and not resumed. While most of the patients who were beginning treatment at the time the problem was discovered did receive the necessary additional radiotherapy, at least two patients did not, probably resulting in less than optimal therapy. In at least one instance, this was the choice of the patient, and not because additional therapy was not offered.

5.6. PSYCHOSOCIAL EFFECTS

The patients treated by radiotherapy are from a population of modest financial means, with a monthly average income of some US$160. Their level of education is low and they live principally in rural and suburban areas. The majority of patients were women (approximately 60%) who did domestic chores, whereas the greater part of the men were farmers. The average number of children per family in this population group is five. Additionally, minors were also a part of this group of irradiated patients. Minors experienced the highest death rate in the initial stages of the accident. The majority were schoolchildren in the public school system.

Psychosocial problems associated with this accident were clearly evident. These related to: (1) the issue of radiation exposure without somatic effects, (2) issues related to having been involved in an accident and (3) issues related to the direct effects of radiation on tissues.

Patients exposed accidentally to any radiation may have concerns related to the unfamiliarity of radiation. Often these issues can be resolved somewhat by information and education. Persons who are involved in an accident are often thought to have post-traumatic stress disorder (PTSD). Experience

with the population around Chernobyl in the former USSR has shown that the effects seen and the patient manifestations of PTSD are not exactly the same. PTSD occurs after an event such as an earthquake that is large, sudden and then is over. A term which has been proposed as a result of study of the psychological issues at Chernobyl is 'chronic environmental stress disorder' owing to the continued presence of, and exposure due to, environmental radioactive contamination.

In this and other radiation accidents involving serious overexposure, the patients have to live with the knowledge that the potential effects may not be over or may not even be evident for years. Many of the patients in this accident who have had cranial and spinal overexposure may have significant neurological consequences, including quadriplegia, that will require major psychosocial support. Another large group of patients that fits into the third category are those who have received large pelvic overexposures and still suffered from severe bloody diarrhoea. Having to wear diapers and to suffer this is very damaging to self-esteem and makes for a very difficult daily life. Finally, in contrast to most other radiation accidents, most of these patients had already been under tremendous stress as a result of their tumours. Many had known they would have a limited life span as a result of neoplasm but the situation had been further complicated by this accident. For a number of patients, the quality of their remaining life and their life expectancy have been significantly reduced.

It is encouraging that the patients involved in this accident have formed a self-help committee. This is a positive sign and should be encouraged. The vast majority of patients examined by the Expert Team were quite rational, but they were concerned about their future and the extra risks and effects of the radiation. The Ministry of Health is to be commended on the prompt notification of the accident to the public. In spite of this openness on the part of the authorities, a large number of the patients appeared to have lost confidence in the health care system owing to the inaction they faced relative to their complaints and problems. Additionally, some of them had partially lost confidence in certain of their physicians. This was apparently quite physician specific and can be explained by the fact that when the patients had initially complained of severe side effects during the treatments, they had felt that they had been either ignored or taken lightly.

The Expert Team was impressed by the attitudes and activities of the relatives of many of the patients. Many of them obviously were very concerned about their relatives and had spent a great deal of time and energy dealing with problems directly related to the accident. These relatives were often very

concerned and stressed by the intensive care needed by the patients. Many relatives were also in need of psychosocial and logistical support.

The Expert Team did receive reports that some patients with psychological problems prior to the accident, such as depression, saw their problems either recur or exacerbated as a result of the accident. The issue of depression is complex. Many patients who have radiation therapy or who are involved in accidents complain of fatigue. Whether this is a direct effect of radiation, a psychological manifestation of stress, or a result of associated disease is a matter of debate. At present, the symptom is felt to be multidimensional in nature and multifactorial in origin. The literature suggests that 70% of the patients who receive radiotherapy complain of fatigue, even long after the treatment has ceased. There is also evidence that psychotherapy may result in reduction of reported symptoms. As an example of the extent of psychological effects, five years after the Chernobyl accident, over 80% of persons surveyed reported fatigue even in villages with essentially no radioactive contamination.