Destroyed perinatal care after Fukushima nuclear power plant disaster and its present recovering under several supports

(Jun Murotsuki, March 30, 2014)



1. Introduction

On 11 March 2011, powerful earthquakes struck hit north-east Japan. The resulting tsunami killed almost 20,000 people, and led to a meltdown at the Fukushima Daiichi nuclear plant. The residents of Fukushima Prefecture have the concern and anxiety about a radiation hazard and the possible health risks.

Minami-Soma City General Hospital (MCGH) is a foundation hospital in the area of the east cost of Fukushima Prefecture, located 23 kilometers north from the site of the Fukushima Daiichi Nuclear Plant. As the nearest hospital from the nuclear plant, they have made a great effort to provide the health care for the residents with pain and difficulty. Destroyed perinatal care due to the nuclear disaster and its present recovering in this area is reported, with focus on the activity of MCGH, in this paper.

2. Damage situation in Fukushima and Minami-Soma

East Japan suffered terrible injury form the 2011 disaster. The National Police Agency (1) has confirmed 15,883 deaths, 6,144 injured,] and 2,676 people missing across twenty prefectures, but mainly three prefectures including Iwate, Miyagi, and Fukushima. Not only the damages of the earthquake still remain in Fukushima, but also a formidable radiation stands in the way of our recovery.

Minami-soma City (71,449 population before the earthquake) is located in the area which is 20-30 kilometers from the plant. The government issued its first evacuation directive, covering residents within a 20-km radius of the Fukushima power plant, soon after the tsunami disasters wrecked its reactors. The people, however, were practicing voluntary evacuation, and city administration was providing the support of this move. The populations dropped by as much as 10,000.

Minami-Soma City is located in the area with a relatively low radiation level in Fukushima Prefecture (Fig. 1). Although by March 2013, seventy percent of residents retuned to Minami-Soma city after revision of the evacuation preparation area, people under 40 years old account for 65 percent of the decrease, as many young families have fled the Tohoku area due to radiation fears, a lack of jobs and destroyed infrastructure. The ratio of the population 65 years of age or above is 32.1%, as "super-aged society". Unfortunately the disaster is accelerating this aged-social trend.



Figure 1

MCGH was originally emergency preparedness and response site in this area. After the disaster, the hospital continued to medical care in order to care for residents of 10,000 people who did not evacuate. After nuclear meltdowns and releases of radioactive materials at the power plant on March 13, the authority warned citizens in Minami-Soma to stay indoors and then called the emergency evacuation. There was no admitted patient in the Hospital on March 20.In May of that year, MCGH started again the hospital care for the local citizens.

Twenty-one doctors (12 full-time and 9 part-time) worked at the hospital before the disaster. Although the number of doctors decreased to four just after the disaster, it recovered to 17 (10 full-time and 7 part-time). This area is, however, a state of the medical collapse as a lot of doctors and nurses lose employment and left.

MCGH had two obstetricians originally. The obstetric medical treatment became the stop after a nuclear plant accident temporarily, but they reopened medical treatment from January, 2012, and performed again the deliveries from May. The number of deliveries in the Minami-Soma district gradually recovered.

The parturient handling was reopened in Minami-Soma City General Hospital at the 23 kilometers spot by Fukushima first Nuclear Power Plant, which gives the message for children and pregnant women for peace

of mind in everyday living.

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3. Living environment of pregnant women in Minami-soma

Currently air dose rate of the regions around the hospital is 0.2-0.3 uAv/h. Simple multiplication produces 1.8-2.6 mSv/year. The low-dose exposure is defined as an exposure for longer than one year, and as which does not accumulate to more than 100 mSv in total. Scientists do not agree on the extent to which low-dose exposure affects our health. Even if the effect of the low-dose radiation is small, it is ideal to minimize the exposure. On the other hand, it is also no doubt that the reconstruction of the affected areas is important. Whether you like it or not, we have no choice but to co-exist with radioactivity for a while now.

Radiation dose rate and quantity of radioactive substances can be categorized as either internal exposure or external exposures. In fact, the internal exposure is more important than the external one when we consider the current radiation level in the air. However, the crops harvested now in Fukushima Prefecture are reported to closed to zero in radioactive contamination, except for something as mushrooms or wild vegetables. Never to eat the vegetables in the prefecture produced, to fear less risk of internal exposure to it. Given the seriousness of the accident itself, this fact is very surprising.

Tsubokura et al (2) reported on internal exposure to cesium radiation after Fukushima Daiichi nuclear plant incident. In this report, exposure levels were low in most residents of Minami-Soma and committed effective doses were less than 1 mSv in all but one resident (1.07 mSv). The current ambient dose rate in Minami-Soma is about 3 mSv/yr from external sources. It is concluded that the most residents of Minami-Soma receive a dose below 5 mSv/yr (External dose and the slight internal dose).

Increase of hereditary diseases caused by radiation exposure has not been confirmed in humans. In epidemiological studies of second-generation of atomic bomb survivors group that whole-body exposure of average around 200 mSv, there is no evidence that genetic disease is increasing in offspring by radiation exposure. Exposure levels by the Fukushima Daiichi nuclear power plant accident is considered 20 mSv/year at most, it is not at a level that genetic effects on the offspring will occur.

During the period of 4-16 weeks gestation, instantaneous exposure at doses of several thousand millisievert may increase risk of malformations. Fetal exposure in excess of 100 mSv instantaneously in 8 -25 weeks of gestation may cause the developmental disorders of central nervous system. Instantaneous fetal exposure of more than 10 mSv may increase the risk of childhood leukemia or cancer. As current exposure in Minami-Soma is less than 5 mSv/yr at most, it is hard to think of these impacts.

In March-May 2011 just after the Fukushima nuclear power plant accident, radioactive iodine contamination of breast milk has been detected in some areas. But the level was low and was not at a level to worry about the health effects of the infant. Radioactive contamination of breast milk has not been detected in later.

The most important care for pregnant women living in Fukushima is to give enough rest for them. They should refrain from being exposed to radiation as much as possible. However, at the same time, they should not bend your life style too much by extreme measures. Basically although they live in Fukushima, they move to relatively clean area, such as their parents ' home, during the only critical early pregnancy period. So that this is possible, local government and TEPCO have to make maximum efforts.

4. Radiation health counseling

It is important for the reconstruction of Minami-Soma that a lot of residents, in particular, youth and children of the next generation will come back. Along with the reduction of radiation exposure due to decontamination, the enhancement of health and welfare system for residents is necessary. Living in Minami-Soma, residents may be worried about the future chances of getting cancer or low-dose radiation effect on fetus and children. Therefore, counseling on this subject will be required at some point in time following the disaster.

MCGH introduced "radiation exposure counseling program" and started outpatient consultation on April 2011, in order to answer questions and concerns about radiation exposure of residents. The goal of "radiation exposure counseling program" is to help a resident and its family to reduce even a little anxiety about the health. Individual counseling is performed as part of the medical counseling by health care workers.

Residents in the region around the Fukushima Daiichi nuclear power plant tend not to trust what government or professionals say. Government has emphasized the safety while still underestimate the fact, and media does not try to take any responsibility for the content coverage while expressing all kinds of extreme viewpoints. Since the experts express their opinions opposite each, residents with no expertise

can not be used to determine which is correct. In order to answer questions and concerns about radioactivity general, experts claimed the safety in the lecture meeting, or distributed books or brochures to residents. But residents did not trust such a description of the expert, but repel it rather often.

In the "radiation exposure counseling program", health care workers as a counselor do counseling for individuals in order to reduce the anxiety about the health of clients. We've been doing volunteer radiation counseling so far in Minami-Soma area. From that experience, residents were found not to trust the government or professionals, but they still have confidence in the medical staffs.

The counselor is necessarily not an expert on radiation, but assists the client as an expert in health care. For health promotion of the client, not just the problem of radiation exposure, counselors pick up not only radiation exposure but also comprehensive health problems by endogenous and lifestyle. The important thing here is not to push the safety of low-dose exposure, or not to force displaced residents return home. Counselor must stand in a position of neutrality in policy of the country and particularly in the nuclear issue, and it must be consistent attitude of non-directive to the client. These are common to counseling generally.

The counseling team including obstetricians, a radiologist, a clinical geneticist, an oncologist from around the country started up this "radiation exposure counseling program" on April 2012 and exited it on March 2013. During this one year, more than 100 clients came to the outpatient room and received counseling.

5. Policies of radiation health counseling

Counseling could be done after we estimate the radiation dose to the fetus requiring consideration of all sources external and internal to the maternal body and compare radiogenic risk with the other risk of pregnancy. Estimating the dose from sources internal to the maternal body is more complex, but whole body counter (WBC) can accurately monitor people for internal contamination of radionuclides. Current WBC monitoring prioritizes the examination of children and pregnant women in Fukushima prefecture.

Gestational age and radiation dose are important determinants of potential radiogenic risk. The following points are based on ICRP Publication 84 (3). For fetal dose below 100 mGy, radiation-induced health effects are not detectable in all stages of gestation. During the period of 8 to 25 weeks ' gestation, the brain is very sensitive to radiation and fetal doses above 100 mGy may result in decrease of intelligence quotient (IQ). During the same period, fetal dose in the range of 1000 mGy result in a high probability of severe mental retardation. A lifetime radiologic risk factor for induction of childhood cancer or leukemia at 100 mGy is about 1 in 170. Without radiation exposure, the lifetime risk of cancer is about 1 in 3. Malformations due to radiation probably do not occur at fetal doses less than 100 to 200 mGy. Therefore, there is no medical justification for termination of pregnancy because of radiation exposure for fetal dose less than 100 mGy.

Despite of attempts to avoid unnecessary radiation exposure, most women will still receive some, but very low-dose exposure in Minami-Soma area. They exposed to even low levels of radiation tends to believe that they have a much higher risk of malformations than the naturally occurring risk, but appropriate

counseling could be beneficial. One useful approach is to suggest to the client the probability of not having a child with any malformation.

Radiation exposure counseling should be based on scientific evidence because it is a type of medical counseling. However, instead of beginning to end general and constant ideas, it is important to take the stance of "I consider the problem of you." That's why we need to listen to individually as counseling, instead of commentary or lecture. Radiation exposure counseling must be performed by a medical care team, which is made up by the cooperation such as counselors, hospital staff physicians, psychologist, and public health nurses.

The most frequently asked question is whether they could deliver the baby or not in Minami-Soma area. The answer to such a question is, of course, "yes", but "you have to decide by yourself." This answer depends on how the person evaluates those health risks carrying a small likelihood of occurrences. In order for the person to decide, health experts should make their best efforts to provide information, but now I do not think this is satisfactory. However, I believe that the right of self-determination should be upheld in regard to the radiation problem.

Our recommendations and suggestions are as follows:

- (1) You should avoid being exposed to radiation as much as you can. However, at the same time you should not change your life style too much by extreme measure.
- (2) Within the bounds of common sense, you had better get food containing relatively small amount of radioactive substances.
- (3) You need to know how much total radiation accurately.
- (4) You may not care other details too much if you follow these recommendations and suggestions.

5. Pregnancy and Birth Survey in Fukushima

Fukushima prefecture launched the Fukushima Health Management Survey (4) to investigate low-dose radiation exposure by the Fukushima Daiichi Nuclear Plant accident. This is a long-term cohort study on a large scale that targets all Fukushima residents. Following this general health management survey, health examination of pregnant women is carried out as Pregnancy and Birth Survey. The purpose of this health survey is to support pregnant women who suffer from anxiety and to offer good quality perinatal care by rebuilding of ties with medical institutions.

Professor Keiya Fujimori, Department of Obstetrics and Gynecology, Fukushima Medical University, reported preliminary data from the Pregnancy and Birth Survey (5). According to that report (Table 1), number of deliveries in Fukushima prefecture after the disaster had decreased by 80%, but the numbers gradually recovered in 2012. There were no significant changes in miscarriage rate and induced abortion rate through the observation period. There is no obvious increased prevalence rate of congenital malformations during Jan 2012-Aug 2012 at the compared with the rate of Birth Defects Monitoring of Japan Association of Obstetricians and Gynecologists (JAOG).

6. Discussion

Decrease in the number of delivery due to the Fukushima Daiichi nuclear power plant accident is limiting and temporary, and then there is a recovery trend in the number of delivery. There was no obvious change in the number of induced abortions. These facts present a marked contrast to European countries in which abortion has increased dramatically after the Chernobyl nuclear accident (6). The Japanese had decided and acted rationally during and after the disaster, which means the height of the cultural standard.

In general, the risk of radiation exposure causing health effect is limited. However, the most serious problem for Minami-Soma residents is not internal exposure or external exposure, but so-called "exposure in mind". Although we can estimate the external exposure by measuring air dose and the internal exposure by using whole body counter, "exposure in mind" can never be measured. "Exposure in mind" eats away at the inner surface of mind. It gives a great stress and concerns and wraps them up in suspicion. How to tackle the "exposure in mind" has become a challenge now.

In order to respond to fear and anxiety over radiation scientific counseling process based on the latest information is necessary. Counselor has a role to provide the correct information to residents and to help to decide autonomously. Their anxiety over radiation is involved in not only their health but also pregnancy, child care and life in general. The comprehensive care of these problems can only solve their anxiety.Physicians should be trained so that they can give objective advice to residents who are concerned about the radiological effect on the fetus and can play a role as counselor on their problem.

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