

● 大学法医学領域における CT装置活用の現状

東海大学医学部基盤診療学系法医学領域 | 大澤資樹

大学法医学領域において、Aiは必須の検査となっている。遺体専用のCT装置を用いて解剖前に撮影を行い、解剖に役立てられており、撮影は年間300件程度にのぼる。死因究明への貢献は大きいですが、Aiのみで死因の判断に至るとは限らない。今後は、器材の有効活用の観点からも、臨床医との協力をすすめ、Aiが社会に広く普及すること貢献したい。

Forensic autopsy conducted in a university facility includes the series of postmortem examinations to determine the cause of death. Radiology is now indispensable for the diagnosis. The subjects are offered from law enforcement agencies. The criteria are defined in Medical Practitioners Act #21, which includes unnatural deaths, and those from unknown causes. However, police have their own criteria such as criminal victims, suspicious ones and non-criminal ones. This dissociation of the criteria for selecting the subjects often causes a lack of mutual understanding between the medical and judicial sides

The police investigate approximately 170,000 corpses a year, which accounts for 13% of total annual deaths in Japan. Judicial autopsies are performed on those judged by the police to be criminal victims or suspicious ones. Administrative autopsies are done by the medical examiners who are designated in the 23 wards of Tokyo, Nagoya, Osaka, and Kobe cities. Consent autopsies are done in the remaining areas of the metropolitan areas. Consent ones are basically the same of administrative ones, but one of the differences is that the medical examiner has the authority to do autopsy based on his or her own discretion, regardless of whether or not the bereaved family has given the consent. In other cases, the cause of death is not only determined based on an autopsy, but also by an external observation. In these cases, computed tomography (CT) is preferentially applied for more precise diagnosis. Because the bereaved family members usually dislike the deceased to be autopsied, the demand for CT scan apparently rises in society.

In our department at Tokai University School of Medicine, the SOMATOM go (Siemens Healthcare Inc.) is used as the CT apparatus. Our responsible area is the western part of Kanagawa Prefecture, and we are also responsible for parts of Shizuoka Prefecture and the Third Regional Coast Guard Headquarters. The total annual number of CT examination accounts approximately 300 cases, including 250 of judicial and consent autopsies, and 50 of external observation accompanied by CT.

The autopsy imaging (Ai), also called postmortem imaging, is usually carried out prior to dissection. It is really advantageous for us that major findings can be anticipated in some degree, which is helpful to save time, and to concentrate focused points. In the latest days of the COVID-19 pandemic, Ai was definitely critical to check potential pneumonia among our subjects. Moreover, the agencies cover the cost of 23,000 yen for CT examination of every autopsy case. But the family bears the cost in a small part of autopsy cases and gross observation ones.

The Tokyo Metropolitan Medical Examiner's Office discloses the annual report of their postmortem examination data. For the causes of death, about two-thirds died of natural causes, and more than half of them are sudden cardiac deaths. In another word, the key to Ai practice is how to approach cardiovascular diseases. But it is really difficult to obtain definitive evidence for acute myocardial infarction only from CT, even if findings such as cardiomegaly and coronary artery calcification can be obtained. It is also difficult to reliably diagnose gastrointestinal diseases, cervical spine fractures from CT scans. If a deceased subject lacks a sufficient past history to speculate the cause of death, the CT scan does not always lead to the cause of death.

One of the most common cases in our department is drowning, in which the diseased is found in the sea or in a river. We can find the characteristic features of aspiration, such as fluid in the maxillary sinus and the airway, pulmonary edema, and exudate in the pleural cavity. This aspiration of drowning water is not only a special case, but it is also common findings observed in acute deaths in hot bath-tub. This strange death happens to elderly people during bathing in a cold winter day, which accounts to more than 10,000 a year. This phenomenon is unique to the Japanese people, who like the head-out immersion in very hot water. Autopsy is rarely performed for these cases due to no apparent association with crime. In areas where the medical examiner system does not operate, general practitioners and emergency doctors serve as police cooperating examiners. Since the cause is not elucidated clearly, they hopefully use Ai technique effectively to establish the diagnosis, and to solve the pathogenesis.

As a difficulty, university facilities are faced on the shortness of manpower. The faculty stuffs are consisted only of five to eight as a total, so that it is the limitation to conduct 100 to 200 autopsies a year in addition to main duties of education and research. Germany has a similar system for investigating the cause of death to that in Japan, but their forensic medicine facilities at universities have become a center consisting of 10 to 50 staff members. Hopefully the insufficient condition will be improved in Japan. As our current circumstances at facility, experienced radiology technicians support taking the images together, but we read CT images by ourselves with textbooks in hand. Finally, we realize to cooperate with general practitioners and emergency physicians in the domestic area. In the near future, we would like to collaborate with them to open utilization of the CT apparatus, and to contribute obtaining the define cause of death by sharing the results.