

Original Article

Advocacy of imaging diagnosis before autopsy (Autopsy imaging, AI)

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Background: A reason of a decrease of autopsies was by a progress of an imaging examination. The word of a pre-autopsy imaging diagnosis, i.e. autopsy imaging (AI), has been re-emphasized for these several years. The advantage of AI was as follows: 1. it was easy to get a consent, 2. there was no gap between imaging views and dissection findings. In a conventional analysis without any AI, autopsy findings could not compared with previous images strictly because of changes of foci after imaging examination. The pre-autopsy images gave the definite current clinical findings and made the closely comparative study between imaging and autopsy possible.

Case: A sudden death case of a death on arrival (DOA) due to cardiac tamponade by aortic dissection was reported. It was the typical case that an AI image well corresponded to that of autopsy.

Conclusion: We expect an active utilization of AI.

Key Words: autopsy imaging, CT, MRI

Background

Autopsy Imaging (AI) was an postmortem imaging diagnosis performed after a complete arrest of both a blood flow due to cardiac arrest and respiratory arrest, which required to consider a postmortem changes. By the introduction of AI, the time lag and spatial difference between the previous imaging taken while alive and the autopsy findings could be avoided. AI before autopsy was valuable to point out the dissection part that had to search emphatically. But it was natural that AI searching was powerless in cases without any macroscopic findings to recognize. Also, the loss of image views modified by active blood circulation should be paid attention in reading AI films. AI will be valuable in itself to supplement a decline of autopsy rate (Fig. 1) and, furthermore, improve the accuracy of autopsy.

We had an experience of a case of sudden death (death at arrival, DOA) and the diagnosis from AI agreed with autopsy findings. We examined AI films about its prospect in this study.

Case (Man, 77 years old, farmer, registered in Pathol-

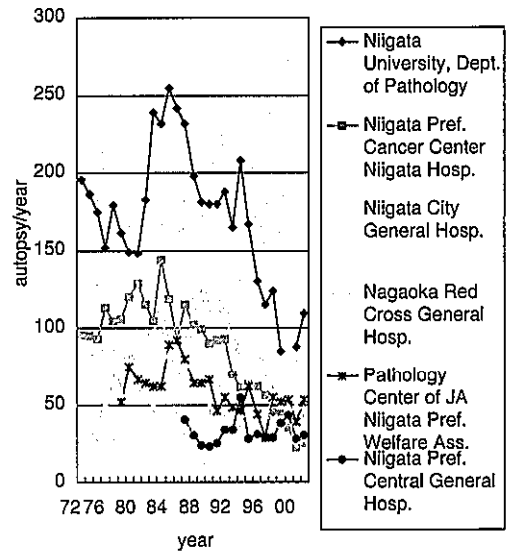


Fig.1 Changes of autopsy cases a year in Niigata Pref.

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Clinical diagnosis (duration of sickness):

1. carcinoma of stomach, OIc, early cancer, post-gastrectomy state, no recurrence (18 years).
2. sudden death (on 0th),
3. multiple cerebral infarction with symptomatic epilepsy with medication (14 years)
4. hypertension (19 years)

Present illness:

He was well until the next morning after a violent fall for a while and found sit on chair at 9:30 a.m. He was delivered to an emergency room as a death on arrival (DOA). Because there was no definite death cause, AI and an additional autopsy were performed after an adequate informed consent.

Family history: not contributory

AI: Plain supine X-ray film showed convergency of the right first arch, suggesting distended ascending aorta (Fig. 2). Plain CT's were obtained under the condition of Window Level 40 and Window Width 350. The ascending aorta distended and contained a duplex structure, where the out-lateral

high density area was suggested to be a pseudolumen occupied with coagula of 1.5cm in thickness (Fig. 4). The thick waving ribbon structure in pseudolumen suggested dissecting flap though uneven consistency of coagula could not be neglected. There was no significance in descending aorta on the basis of normal calcification in aortic wall. There was a pericardiac fluid of thick consistency around heart (Fig. 5). These findings suggested aortic dissection and cardiac tamponade.

Autopsy findings:

main findings:

1. aortic dissection: untreated, acute phase, De-Bakey II type, opened pseudolumen type, hematoma 17x5cm in diameter, entry: just supra-aortic valve, transverse tear of 4cm in length (Fig. 7), perforated at between ascending

aorta and adventitia of atria, complicated with cardiac tamponade of 600 ml of coagula (Fig. 6),

2. myocardial infarct: untreated, left ventricle, postero-inferior wall, old and fresh infarct with hemorrhage, 2x1cm, thrombotic occlusion of posterior branch in right coronary artery,
3. carcinoma of stomach, no recurrence.

accessory findings:

1. duodenal polyp at stoma after gastrectomy,
2. intestinal congestion and hemorrhage, Gram-positive streptococci were found,
3. atherosclerosis,
4. multiple cerebral infarct,
5. lumbar puncture: negative

Death cause:



Fig.2 Autopsy imaging, plain chest XP, supine, A→P

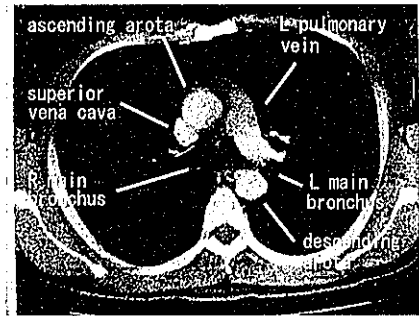


Fig.4B Autopsy imaging, CT, slice #13, control

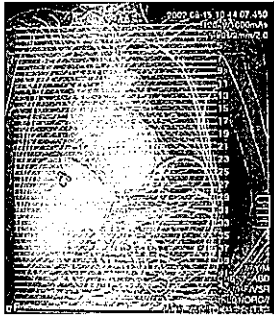


Fig.3 Autopsy imaging, CT slicing of chest

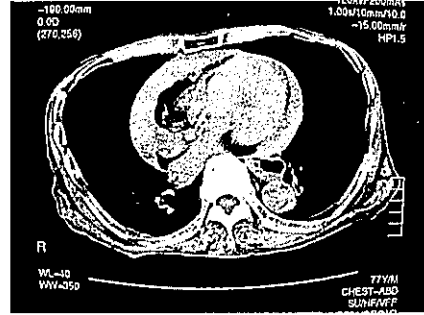


Fig.5A Autopsy imaging, CT, slice #20

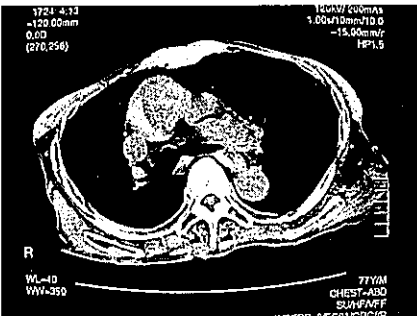


Fig.4A Autopsy imaging, CT, slice #13

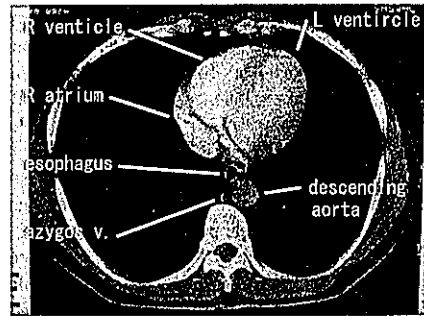


Fig.5B Autopsy imaging, CT, slice #20, control

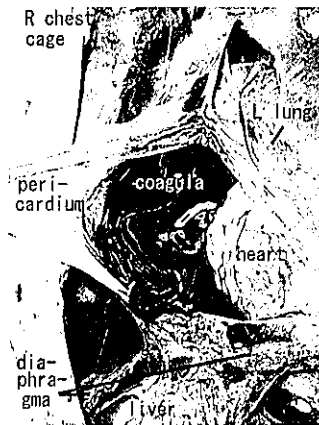


Fig.6 Cardiac tamponade

Cardiac tamponade due to aortic dissection.

Discussion

The Ministry of Health, Labor and Welfare had guided clinical training hospitals to satisfy autopsy cases more than 20 cases a year and 30% or more of total deaths a year, or more than 10% of beds unless the following condition could not be satisfied. The Japanese Internal Medicine Academy has decided educational hospitals in the case that the following condition is satisfied: an autopsy rate a year was more than 20%, or more than 20 cases were autopsied. The autopsy rate in the recent years has declined remarkably in the educational facilities of Japanese Internal Medicine Academy; 63.5% of the peak in 1972 and 20.9% in 1995. This trend was also similar in U.S.A. and an autopsy rate fell from 41% to 5-10% in 1961 and 1990's, respectively. Being impossible to fill the standard, the Ministry of Health and Welfare recently changed its standard from on the basis of autopsy cases to that of Clinicopathologic conference (CPC). Even hospitals in Niigata Pref, autopsy cases had decreased into 1/2 or 1/3 of those of old days in number (Fig. 1). As for the reason of the decrease of autopsy cases, a progress of imaging instruments, e.g. computed tomography (CT), most contributed. An expectation to a physician from a patient side was as follows: 1. speciality and technique, 2. sufficient explanation, 3. responsibility to performed medical treatment. On the other hand, an expectation of a physician was reported as followings: 1. sufficient explanation, 2. clinical experiences, 3. speciality and technique. The significance of an autopsy was not lost in an analysis of final diagnosis, education, and an objective death cause at medical accidents to disappear distrust impressions of patient family, even if the imaging instrumental examinations progressed.

The word called Autopsy Imaging (AI) has been re-emphasized for these several years. 1) Simple XP exam, soft-ray XP exam, supersonic waves inspections had been carried out as AI of old fashion. Though even

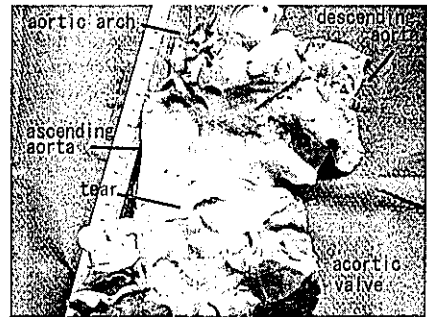


Fig.7 Aortic dissection.

CT scan has been carried out only in part, its application to routine examination of AI has become easy by the shortening in a CT enforcement time by an improvement of the devices. At present, in the case that helical (or spiral) computed tomography (helical CT) was used, the theoretically lowest need time decreased into 0.75 seconds a turn (1 sheet), and did not need more than 58 seconds to get 77 sheets in total, consisted of 45 sheets, slicing from thorax to abdomen with an interval of 1 cm, and 32 sheets, slicing head with 0.5 cm interval (e.g. Asteion, TOSHIBA Co.). Furthermore, even a magnetism resonance imaging device (MRI) could be used with 45 minutes of enforcement time for getting both T1 emphasized image and T2 one. Due to the exercise artifacts from both breathing and alimentary tract, CT was more convenient than MRI to examine chest and abdomen. But if performing time for examination was disregarded, there was an advantage in MRI that whole body searching was able to apply because of a corpse halting during an inspection. The advantage of AI was as follows: 1. patient family tended to agree an autopsy, 2. comparative examination between images and dissection was valuable for clinical attitude. The conventional analysis between previous films and autopsy findings was approximate comparison timely and spatially, but the comparative examination of AI and autopsy findings was the most exact one. AI was valuable in itself in the case that the consent of a dissection was obtained, but became more valuable with autopsy and made up each other.

References

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content) (Soft: Windows, Excel, PowerPoint (Microsoft), Photoshop (Adobe), Ichitaroh (Justsystem), and DocuWorks Desk (Fuji Xerox)).

和文抄録

症例

遺体に対して実施する剖検前画像診断 (Autopsy imaging, AI) 実施の提唱

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背景：剖検数の減少の理由は、画像検査の進歩によ

るところが大きい。数年前より、剖検前画像診断 (autopsy imaging, AI) という言葉が強調されてきた。AIの利点は、1. 患者側の了解を得やすいことと、2. その画像と解剖所見の合致である。従来の解析方法では時間的・空間的に画像と解剖所見の比較検討は近似的であったが、AIと解剖所見は時間空間的に同時に比較検討が可能で、患者治療という画像の臨床応用の面で優れているからである。

症例内容：DOA突然死症例で、大動脈剥離による心タンポナーデが死因であった。AI画像と剖検結果の一致した症例であった。

結論：今後の積極的なAIの活用を期待したい。

キーワード：剖検前画像診断、CT, MRI