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Resuscitation artefact confirmed by postmortem angiography. Case report

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Abstract: Postmortem resuscitation artefacts are often encountered in the autopsy practice. During chest compression that is an essential component of resuscitation, thorax injuries including rib and sternum fractures and anterior mediastinal bleeding are often observed. Massive bleeding that develops as a result of a hepatic rupture is a rare complication of resuscitation. A 23 year-old woman attempted suicide by taking drug overdose in a hospital toilet. During autopsy we found fractures in the 1-6th left ribs and 3rd right rib in the midclavicular line, hemoperitoneum (1300 ml) and a rupture of 0.5 cm in depth and 8 cm in length in the left posterior lobe of the liver with an a hemorrhagic area of 4x2 cm in the left lobe neighbouring the diaphragm. A postmortem angiography found intraabdominal vessels to be intact and identified the source of the bleeding as being the liver rupture. The toxicological analysis identified drugs used in resuscitation and high levels of sotalol (4090 ng/mL) and flecainide (4350 ng/mL) in the blood. The underlying cause of death was considered to be drug intoxication. Liver rupture and bleeding caused by it is rarely seen as a complication of resuscitation. We consider that regional angiography will highly contribute to autopsies in which the source of bleeding is investigated, since it is easily implemented, inexpensive and practical.

Key Words: liver rupture, postmortem angiography, resuscitation, artefacts.

Post-mortem resuscitation artefacts are often encountered in autopsy practice [1]. Due to the fact that a simple medical attempt on cases especially with murder and suicide may come to a state of importance in the judicial process, differentiation between trauma signs and artefacts should be made [2]. Cardiopulmonary resuscitation procedures including establishing vascular access, drug administration, placing endotracheal tube, performing cardiac massage and defibrillation may cause a variety of injuries [2, 3]. Massive bleeding that develops as a result of hepatic rupture, a rarely occurring complication of the resuscitation application, has been confirmed by postmortem angiography in this study.

Our aim was to provide contributory data for the clinical follow up of patients and also for postmortem evaluations in autopsies.

CASE REPORT

A 23 year-old woman attempted suicide by taking drug overdose in the toilet of the hospital where she stayed as a hospital attendant. Gastric lavage with nasogastric tube was performed to the patient who was comatose when she was found. She suffered a cardiac arrest two hours after she was found, unresponsive to cardiopulmonary resuscitation. Empty boxes of sotalol - 20 tablets and flecainide - 30 tablets were found in the toilet where she was found in coma.

External examination showed bruises due to defibrillation in the middle line of the chest and inferior of the left lower chest, peripheral vascular access catheter and an endotracheal tube in the mouth. No traumatic

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signs have been observed during the external examination except for the presence of medical derived lesions.

Hyperemia was present in the brain and cerebellum when the cranium was opened. During chest examination we found fractures in the 1-6th left ribs and 3rd right rib in the midclavicular line. A total of 80 ml of blood was evacuated from the right pleural cavity. The heart weighed 260g and did not reveal any macroscopic pathology. Right and left lung weighed 787g and 765g, respectively and both macroscopic and histopathologic edema symptoms were observed.

During opening the abdominal cavity we found 1300ml of blood. Liver examination showed a rupture 0.5 cm in depth and 8 cm in length in the left posterior lobe of the liver (Fig. 1) and a bleeding area of 4x2 cm in the left lobe neighbouring diaphragm. No pathologic features were observed in the other abdominal organs.

Once we noticed the intra-abdominal bleeding, in order to ensure that the bleeding originated from liver rupture and to confirm that there are no other bleeding sources, we performed a visual, in situ, examination of the organs, followed by an abdominal angiography. Initially the aorta was clamped just above the diaphragm. Barium sulfate as a radiopaque contrast medium was injected toward the aorta from the iliac bifurcation; abdominal aorta and the other abdominal arteries were screened under fluoroscopy (Fig. 2).

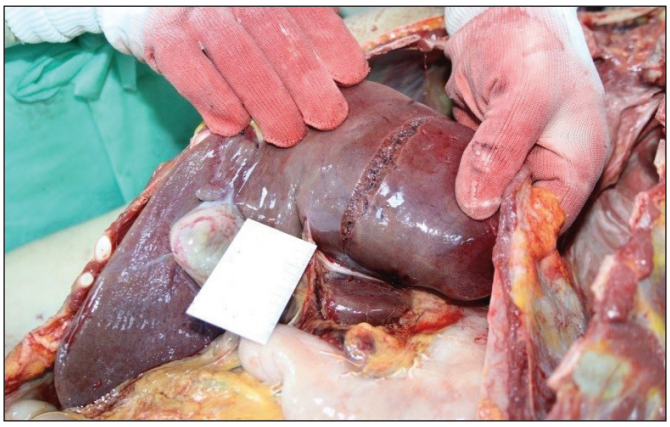

Figure 1. Rupture in left posterior lobe of the liver.

A similar process was applied to the vena cava inferior and iliac veins after the arterial phase. No leakage was observed during the examination of the abdominal arteria and veins under the fluoroscopy (Fig. 3). Intra-abdominal vessels were intact suggesting that bleeding was caused by the liver rupture.

Histopathologic analysis revealed the rare presence of hypertrophic fibers in the myocardium, extensive edema in the lungs and hyperemia in the kidney, liver, brain, cerebellum and peduncles. Toxicological analysis found atropine - 14,41 ng/mL, midazolam - 89,41 ng/mL, lidocaine - 572,13 ng/mL, sotalol - 4090 ng/mL, flecainide - 4350 ng/mL were detected.

As the incident took place in the hospital, and no trauma history and no traumatic lesions observed in the autopsy except for the lesions associated with medical interventions, it was concluded that the liver rupture and the resulting massive bleeding along with the rib fractures were a result of resuscitation efforts.

Lethal concentrations of flecainide were detected in blood samples [4]. Therefore, by corroborating medical documents, autopsy findings and toxicological results the underlying cause of death was considered to be drug overdose.

DISCUSSION

During chest compression, which is an essential component of resuscitation, chest injuries such as rib

Figure 2. Abdominal aorta and its branches.

Figure 3. Abdominal artery and vein structures.

and sternum fractures and anterior mediastinal bleeding are often observed. Abdominal injuries are less frequent. Due to its larger size compared to other intra-abdominal organs, its fragile structure and its close adjacency to the midline, liver lesions are more common following blunt trauma and/or resuscitation measures. Moreover, severe complications such as hemothorax, pneumothorax, spleen rupture and myocardial contusions may co-exist [5].

Incidence of liver rupture was 0.6% in an emergency unit of a university hospital [6] and 1.4% and 2.1% of autopsy cases had these lesions [5, 7]. Liver lesions mostly occur in the form of a rupture and the reason for its more common occurrence on the left side is the fact that it corresponds to the area of focus in resuscitative chest compression and its relation to the liver anatomy [3, 6, 8]. Chest compression after rib and sternum fractures may affect the abdominal organs [9]. In our case the liver injury was observed on the left side closely neighbouring the rib fractures. However, liver rupture or hematoma may also be observed without the presence of rib or sternum fractures [5]. Excessive pressure and inappropriate positioning of the hands may also cause these ruptures. Liver rupture as a result of inappropriate chest compression by a bystander has also been reported [10]. Occurrence of a subcapsular hematoma in liver was reported in another study where an untrained person applied resuscitation [11]. However, these injuries may still occur during mild compression [6]. The risk of liver injury may be elevated in patients on thrombolytic, antithrombotic or antiplatelet treatments [6, 12].

Liver rupture occurring during resuscitation may increase the severity of the main pathology causing the death [13]. Liver rupture symptoms may be masked in unconscious patients or when the patient is in arrest, significantly complicating the diagnosis of rupture or bleeding. Although the underlying cause of death in our case was drug overdose, the massive bleeding that occurred may have been a contributing factor to her death. However, because resuscitation was only performed after the disappearance of vital symptoms, it is difficult to differentiate between the two.

Postmortem angiography is a useful screening method in elucidating vascular pathologies and is more frequently used in autopsies in recent years. Postmortem angiography can be used to determine vascular variations and aneurysms and to find the source of bleeding in trauma cases such as those with subarachnoid bleeding, blunt trauma and injuries with firearm and sharp objects [14]. In this case report, intra-abdominal vessels were examined under the fluoroscopy through the injection of barium sulfate, which confirmed that the intra-abdominal vessels was intact and the source of bleeding observed in autopsy was liver rupture.

CONCLUSION

To conclude, liver rupture and massive bleeding resulting from resuscitation may occur as a rare complication and should be considered in postmortem evaluations. Furthermore, we consider that segmental angiography is an inexpensive, readily applicable and practical method that can be used in investigating the source of bleeding in autopsy.

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