ORIGINAL ARTICLE

Resuscitation complications encountered in forensic autopsy cases performed in Muğla province

Halil Beydilli, M.D.,[1] Yasemin Balcı, M.D.,[2] Şahin Işık, M.D.,[2] Melike Erbaş, M.D.,[3] Ethem Acar, M.D.,[1] Bülent Savran, M.D.[3]

[1]Department of Emergency Medicine, Muğla Sıtkı Koçman University Faculty of Medicine, Muğla
[2]Department of Forensic Medicine, Muğla Sıtkı Koçman University Faculty of Medicine, Muğla
[3]Ministry of Justice, The Forensic Branch Manager of Forensic Medicine Institute of Muğla, Muğla

ABSTRACT

BACKGROUND: The purpose of this study was to determine complications of resuscitation seen during autopsies and evaluate the effectiveness of basic life support training.

METHODS: Autopsy case reports conducted in The Forensic Branch Manager of Muğla were retrospectively examined. Demographic data of the patients with resuscitation complications such as age, gender, manner of death, and kinds and features of the complications were recorded.

RESULTS: In total, seventy-fourof the 100 cases with resuscitation complications were males. The autopsies in most of these cases were performed during the summer season. Among the patients, 68% died for non-traumatic reasons. Rib fractures were detected in seventy-one patients and sternum fractures in thirty-two patients. Moreover, damage to the pericardium (2%) and lung parenchymal (4%), heart lesions (4%), and liver lacerations (2%) were detected. Regarding rib fractures, fractures were found between the first and eighth ribs on both sides, with the highest numbers occurring in the fourth rib.

CONCLUSION: Resuscitation complications are important since they can be presumed to have carried out for traumatic reasons. Resuscitation complications seen in autopsy cases with non-traumatic causes can be perceived as traumatic events. They can be assumed incorrectly as trauma symptoms. These complications can be reduced with a good resuscitation training of the health personnel.

Key words: Autopsy; basic life support; closed-chest compression; resuscitation; resuscitation complications.

INTRODUCTION

Today, many people worldwide have taken courses in first aid and basic life support (BLS) or have undergone diverse training in this area. In Turkey, BLS training is provided as part of first aid courses. Such first aid and BLS training is widely available to anyone and provided by expert associations within regulations from the Ministry of Health or at certain centres approved by the ministry.[1] In this regard, the Ministry of Health has accelerated the training of medical personnel over the last 10 years. The training mentioned above, in-service training, and certification courses have been provided especially to personnel working in emergency services, intensive care, and 112 units. In order to maintain the required quality standards in hospitals, in-service training is provided every 6 months in the form of BLS or cardiopulmonary resuscitation courses. These training sessions are also monitored by the education and quality units of the hospitals.[2,3]

Airway patency establishment and closed-chest compression techniques are taught in first aid and BLS training courses. Training is provided according to the current guidelines published by the American Heart Association (AHA) and the European Resuscitation Council (ERC). Much of the information about closed-chest compression, chest compression physiology, the effects of various compression rates, ventilation/compression ratios, compression and relaxation times have been obtained from animal studies. This information has also been updated and strengthened by human studies. Finally, clear information about chest compressions was provided in the 2010 AHA and ERC guidelines.[4,5]

Address for correspondence: Halil Beydilli, M.D.
Muğla Sıtkı Koçman Üniversitesi Tıp Fakültesi, Acil Tıp Anabilim Dalı, Muğla, Turkey
Tel: +90 252 - 211 48 35 E-mail: hbeydilli@hotmail.com

Qucik Response Code

Ulus Travma Acil Cerrahi Derg
2015;21(6):463–468
doi: 10.5505/tjtes.2015.66169

Copyright 2015
TJTES

Effective chest compression is an early procedure during BLS used to provide blood flow. Chest compressions should be strong and effective. At least 100 compressions should be performed per minute, and their depth should be at least 5 cm for adults. After each compression, the chest should be allowed to pull back, and compression and decompression times should be approximately equal. There should not be any interruption between chest compressions.[4,5] Application of closed-chest compression itself is traumatic. Unwanted complications caused by chest compressions, particularly rib and sternum fractures, can be encountered. Additionally, injuries to internal organs, such as the heart, lungs, liver, or stomach, may occur.[6–10] Complication rate can vary depending on the individual performing the chest compression (medical personnel vs. lay people), the surface on which it is performed (soft vs. hard surface), the location where it is performed (in or outside a hospital), and the quality of the education and ability of the individual applying it.[6–10]

After Kouwenhoven and Baringer provided two separate descriptions of closed-chest massage, which was the basis of cardiopulmonary resuscitation in hospitals in the 1960s, studies aimed at reducing complications, morbidity, and mortality gained more attention. In 1976, Enarson and colleagues published the first studies on resuscitation complications.[9,10] The recognition of various complications caused by resuscitation attempts in a series of autopsies gained great importance from a forensic viewpoint as well. Additionally, the development of cardiopulmonary resuscitation created a need for multidisciplinary post-mortem studies to help prevent complications. Little research has been done in this field in our country. In our study, we analysed post-mortem autopsy findings in patients to whom BLS was provided by medical personnel in or outside the hospital.

The aim of this study was to analyse in detail the findings of autopsy reports from patients who received BLS from medical personnel to determine the frequency of complications, evaluate the effectiveness of the training provided, and investigate the subjects in the relevant literature.

MATERIALS AND METHODS

In this study, autopsy reports from cases who received BLS performed between 2011 and 2013 in the Forensic Branch Manager of Muğla were analysed retrospectively. Complications related to closed-chest compressions were recorded in the cases who underwent BLS. Moreover, they were analysed in terms of socio-demographic characteristics, cause of death and the location where BLS was performed. Patients with thorax trauma were excluded from the study.

Complications related to closed-chest compressions performed during resuscitation attempts, rib fractures, sternum fractures, chest wall ecchymosis, haemothorax, cardiac contusion, pulmonary contusion, liver laceration, pericardial injuries, and soft tissue damage, such as marks left on the skin by defibrillator pads were included in the evaluation.

For statistical analyses, the SPSS software was used. Percent-

Table 1. Complications related to chest compressions

	Complication	All patients	Male	Female	p
Skin	Defibrillator pads skin marks or burn marks	16	13	3	0.471
	Ecchymosis and bleeding in skin/subcutaneous tissue	9	5	4	0.034
Upper airway	Endotracheal ecchymosis	1	1	–	–
Thorax	Rib fracture	71	52	19	0.786
	Haematoma around rib fractures	8	7	1	0.364
	Ecchymosis around rib fractures	17	14	3	0.799
	Sternal fracture	32	24	8	0.876
	Ecchymosis around sternal fractures	4	2	2	0.264
	Haematoma around sternal fractures	4	3	1	0.963
	Anterior mediastinal hemorrhage	1	1	–	–
	Pneumothorax	1	1	–	–
Lung	Lung contusion	4	3	1	0.963
	Pleural rupture	2	1	1	0.464
Heart	Pericardial injury/haematoma	2	1	1	0.464
	Endomyocardial hemorrhage	1	1	–	–
	Atrioventricular hemorrhage	1	1	–	–
Abdomen	Liver laceration	2	1	1	0.769

ages for the classified variables and averages for the continuous variables were calculated routinely. We used χ^2 and Fisher's exact test for comparisons. P values <0.05 were considered to indicate statistical significance.

RESULTS

Among the cases who underwent BLS and whose autopsy was performed in the Forensic Branch Manager of Muğla between 2011 and 2013, resuscitation complications were detected in one hundred (Table 1) patients. Of these one hundred patients, there were 74 males and 26 females. In Table 2, the distribution of rib fractures according to gender is shown. The average age of the patients was 54.57 (range, 0–93) years. Autopsies were performed in sixty-eight cases for non-traumatic reasons. The resuscitation process was performed on seventy-four patients in the hospital and twenty-six patients at the scene of an accident by 112 service ambulance personnel. There was no statistically significant difference in terms of resuscitation complications according to the scene of the event or practitioner (p>0.05).

The autopsy results identified rib fractures in seventy-one patients; 61 of these fractures were located in the ribs of the right thorax area and another 66 in the ribs of the left thorax. In fifty-nine cases, there were rib fractures on both sides. On each side, rib fractures were detected between the first and eighth ribs. The highest number of fractures on each side occurred in the third (right: 52%, n=52, left: 56%, n=56), fourth (right: 54%, n=54, left: 64%, n=64), and fifth ribs (right: 44%, n=44, left: 57% n=57). The distribution of rib fractures according to their location is shown in Table 2.

In total, ten rib fractures were parasternal (10 males [M]). There were two axillary rib fractures (1 M/1 Famles [F]). Moreover, twenty-three rib fractures (15 M/8 F) were localized at the midclavicular line. There were haematomas around eight rib fractures (6 M/2 F). Ecchymosis was found around twelve rib fractures (7 M/5 F). Superficial skin ecchymosis/haematomas were detected in nine cases (5 M/4 F).

In thirty-two (32%) cases, sternum fractures were detected at the levels of the second, third, and fourth ribs, with the highest number at the level of the third rib (n=14) (Table 3). There were both rib fractures as well as sternum fractures in thirty-one (31%) cases (8 females and 23 males).

Apart from rib fractures, pericardium and heart injuries were detected in four cases, lung parenchymal damage in four, and rupture of the pleura in two. From the external examinations, defibrillator pad marks were found in sixteen patients, and skin and/or subcutaneous soft tissue ecchymosis and bleeding were detected in nine patients (Fig. 1).

Regarding chest injuries related to CPR, there was no statistically significant difference between the traumatic and non-traumatic groups in terms of rib or sternum fractures, age, or gender (p>0.05). Although more cases occurred during summer, no statistically significant difference by season was found (Fig. 2; p>0.05).

Table 2. Distribution of rib fractures according to location and gender

Fracture location	Men	Women	Total
Parasternal	10	10	–
Midclavicular	23	15	8
Axillar	2	1	1
Not specified	36	26	10

Table 3. Distribution of sternum fractures according to location and gender

	Fracture location	Men	Women	Total
1	Level of 2nd rib	6	6	0
2	Level of 2nd–3rd intercostal space	6	5	1
3	Level of 3rd rib	14	9	5
4	Level of 3rd–4th intercostal space	2	1	1
5	Level of 4th rib	5	4	1
Total		33*	25	8

*Had broken in two locations in a patient's sternum.

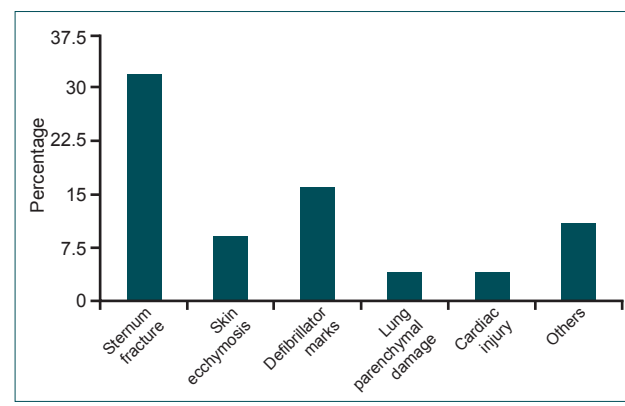

Figure 1. Rates of complications other than rib fractures.

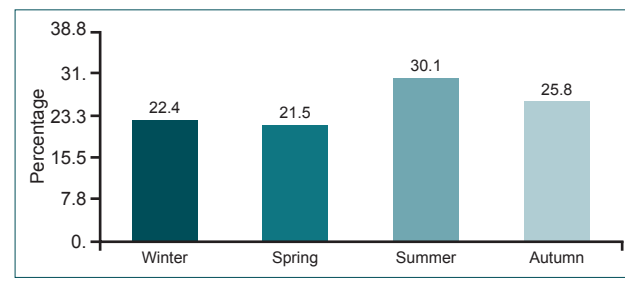

Figure 2. Seasonal distribution of the cases.

DISCUSSION

If closed-chest compressions are not performed properly during BLS, they can be traumatic. After examination of the patients, complications related to thorax compression such as rib and sternum fractures, were observed. Additionally, injuries to internal organs such as the heart, lung, liver, and stomach, occur frequently.[6–10] Complication rate can vary depending on the individual performing the chest compression (e.g., medical personnel vs. lay people at the scene), the surface on and location at which it is performed (in the hospital vs. outside), and the education level and capability of the individual applying it.[6–10] Thus, we believe that continuous development of BLS training strategies and high-quality training in cardiopulmonary resuscitation can reduce resuscitation-related complications.

When analysing complications caused by closed-chest compressions, methodological issues must be resolved first. Besides autopsies, computed tomography (CT) and X-ray equipment were used in this research. In this study, 86% of rib fractures detected by autopsy were not detected by AP chest X-rays.[11] CT is much more sensitive than X-ray radiography, especially for rib fracture detection. Regardless, in general, an autopsy is the best method for detecting resuscitation complications.[6,11,12] According to the above mentioned studies, detailed autopsy is still the most sensitive method.

The incidences of rib and sternum fractures, the most often encountered complications of chest compressions, were 4–97% according to autopsy and 8-32% according to X-ray. For sternum fractures, the incidences were 1–43% by autopsy and 0–26% by X-ray.[6–13] However, in a prospective CT study performed in patients who were resuscitated as a result of successful BLS, the incidence of rib fractures amounted to 31% and that of sternum fractures to 4%.[6] The third, fourth, and fifth ribs, especially on the left side of the sternum, were fractured most often. In our autopsy study, the rates of rib and sternum fractures were similar and amounted to 71% for rib fractures and 32% for sternum fractures. Fractures resulting from complications related to resuscitation were observed mostly on the left side (66%) in the third, fourth, and fifth ribs. Although the studies were heterogeneous, it is clear that complications appearing during cardiopulmonary resuscitation are still very common.

Having analysed the distribution of rib fractures according to location (Table 2), most fractures occurred at the midclavicular line. Kricher and colleagues have stated that most ribs fracture at the sterno-condral junction.[10] However, Baubin and colleagues have claimed in their study using cadavers that most ribs fractures result from chest compressions occurring at the axillary line.[14] However, according to the study of Buschmann and Tsokos and many researches performed, fractures usually occur at the midclavicular line.[6–9,11–13] In three studies conducted in Turkey in 2003, 2008, and 2010, most rib fractures were reported to occur at the midclavicular line.[7,8,15] The results of our study were consistent with the literature reports, in that most rib fractures occurred at the midclavicular line.

The localization of sternal fractures has been reported to be between the second and fourth ribs. Most fractures occur at the sternum at the level of the third intercostal space. Similar results have been reported in domestic and foreign research studies.[7,8,10–12,15,16]

Having analysed the results in terms of skin complications and internal organ damage, in the cases of distant organs (e.g., retinal haemorrhage and subarachnoid haemorrhage) and internal organ damage, their occurrence is not common. When compressing the thorax, stress created by increased thoracic pressure affects many organs. Lacerations of diverse organs related to this issue have been described.[11] In our research, injury to internal organs (lung, heart, and liver) was seen at a low rate (10%). The rates of internal organ injury have not changed much since the reports of Krischer and colleagues and Paaske and colleagues on such injuries and other life-threatening complications related to closed-chest compressions. Krischer and colleagues have reported in detail on ten complications, mentioned above, among 705 cases, while Paaske and colleagues have noticed three complications among 268 cases.[10–18] Life-threatening complications were rare in these studies.

Due to closed-chest compressions, damage to intrathoracic organs is often encountered. They usually occur in relation to rib and sternum fractures. However, this is not always the case. Organ injuries can also occur without fracture. The most important factors leading to this situation include misapplication and external chest compressions that are too strong, fast, deep, and long. Multiple injuries such as lung contusions, pleural rupture, anterior mediastinal bleeding, pericardial injury, cardiac injury, pneumothorax, haemothorax, and mediastinal emphysema have been observed. When the heart is tightened between the anterior chest wall and spine during chest compressions, epicardial petechiae and myocardial haemorrhage can occur.[6–18] In addition, in our autopsy reports, cases with pulmonary contusion, pleural rupture, pericardial injury/bleeding, and endomyocardial bleeding were observed. These findings were similar to those of the literature reports.

Intra-abdominal injuries are rare resuscitation complications. However, many organs may be affected. Liver and spleen laceration, gastric dilatation and gastric perforation are encountered. Moreover, intestinal trauma, intraperitoneal bleeding, and retroperitoneal haematomas have been recorded as complications. In the literature, liver damage is seen at an incidence of ~0.6 3% and is the most frequent intra-abdominal complication related to CPR.[10,19–26] Liver laceration was recorded in two of our cases and is observed more often on

the left lobe. The most important factor in this is the close anatomical relationship between the left lobe of the liver and the sword-shaped lower end of the sternum. A similar laceration was seen in our cases. Two other important factors that can increase the risk of liver laceration are hepatic ischaemia and liver distension due to venous obstruction.[10,19–26] The reason for liver laceration in our case was thought to be similar. Moreover, treatments with antiplatelet, antithrombotic, and thrombolytic agents in patients with myocardial infarction may cause such lacerations.[21,22,26]

No significant gender influence on rib fractures has been detected by the majority of studies. However, rib fractures generally occur more frequently in elderly women with high osteoporosis rates and in both genders of more advanced age.[9–13] However, according to research conducted in our country by Şam and colleagues in 2003, more complications were detected in men and younger patients (average age of 35 years).[15] In the studies of Boz and colleagues from 2008, the rate of resuscitation complications was found to be high in men and the elderly.[7] Similarly, in a study conducted in 2010 by Özer and colleagues, the rate of resuscitation complications was high (71.9%) in men and the elderly.[8] In our study, similar to others conducted in Turkey, more than half of the cases (55%) were 55 years and over, and most (75%) were male.

Hoke et al. and Black et al. have reported an incidence of rib cage fractures of less than 50% and of sternum fracture of less than 30%. In our study, we detected 71% rib cage fractures and 32% sternum fractures, higher than the average incidences reported in the literature. These results emphasise the importance of the education provided on resuscitation, and significant effort should be given to revise this to lower the complication rates.

A limitation of our study is the lack of data regarding surface type on which the chest compressions were performed, the depth of application, and the duration of application. Moreover, to obtain more detailed results on resuscitation complications, more in-depth reports on chest compressions cases should be prepared based on the following: a sufficient number of cases, homogenized study populations, exclusion of associated conditions, and stratification by age, gender, duration of application, depth of application, and soft or hard surfaces.

Our research was conducted with approval from our local ethics committee. There are no conflicts of interest to report.

Conclusion

In BLS, resuscitation is a procedure performed to bring patients back to life and to increase their chance of survival. However, at the same time, it can also cause complications that may even lead to the patient's death. Resuscitation performed in the correct manner will cause less organ injury and prevent potentially fatal complications. It should be noted that chest compressions applied with enough strength to break the ribs or sternum can harm the thorax and many organs and may decrease the patient's chance of survival.

Awareness of the complications occurring with BLS is vital in autopsy investigations. In patients in whom the major cause of death is trauma, these complications may be interpreted as additional trauma symptoms. However, in patients who died due to non-traumatic reasons, autopsy may be misinterpreted by these complication findings, suggesting that the cause of death involved trauma. Thus, detailed information about the application of BLS and its possible complications are crucial for forensic medical specialists to distinguish them from actual trauma symptoms. Moreover, it is also important for doctors, who usually perform resuscitation, and other medical personnel to be aware of these complications in terms of comprehension and a reduction in medical errors. Thus, BLS training should be repeated at appropriate intervals based on current approaches.

Note: The English in this document has been checked by at least two professional editors, both native speakers of English. For a certificate, please see:
http://www.textcheck.com/certificate/zzLYdk

Conflict of interest: None declared.

REFERENCES

1. http://www.saglik.gov.tr/TR/belge/1-552/ilkyardim-yonetmeligi.html. Access date:15.01.2014.
2. http://www.kalite.saglik.gov.tr/content/files/mevzuat/saglikta_performans_ve_kalite_yonergesi_yeni/hkskitap.pdf. Access date:15.01.2014.
3. http://www.kalite.saglik.gov.tr/content/files/mevzuat/saglikta_performans_ve_kalite_yonergesi_yeni/3_2ek4112son.pdf. Access date:15.01.2014.
4. Berg RA, Hemphill R, Abella BS, Aufderheide TP, Cave DM, Hazinski MF, et al. Part 5: adult basic life support: 2010 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. Circulation 2010;122(18 Suppl 3):685–705. CrossRef
5. Koster RW, Baubin MA, Bossaert LL, Caballero A, Cassan P, Castrén M, et al. European Resuscitation Council Guidelines for Resuscitation 2010 Section 2. Adult basic life support and use of automated external defibrillators. Resuscitation 2010;81:1277–92. CrossRef
6. Kim MJ, Park YS, Kim SW, Yoon YS, Lee KR, Lim TH, et al. Chest injury following cardiopulmonary resuscitation: a prospective computed tomography evaluation. Resuscitation 2013;84:361–4. CrossRef
7. Boz B, Erdur B, Acar K, Ergin A, Türkçüer I, Ergin N. Frequency of skeletal chest injuries associated with cardiopulmonary resuscitation: forensic autopsy. [Article in Turkish] Ulus Travma Acil Cerrahi Derg 2008;14:216–20.
8. Özer E, Şam B, Tokdemir MB, Çetin G. Complications of cardiopulmonary resuscitation. Cumhuriyet Tıp Dergisi Cumhuriyet Tıp Dergisi 2010;32:315–22.

9. Black CJ, Busuttil A, Robertson C. Chest wall injuries following cardiopulmonary resuscitation. Resuscitation 2004;63:339–43. CrossRef
10. Krischer JP, Fine EG, Davis JH, Nagel EL. Complications of cardiac resuscitation. Chest 1987;92:287–91. CrossRef
11. Lederer W, Mair D, Rabl W, Baubin M. Frequency of rib and sternum fractures associated with out-of-hospital cardiopulmonary resuscitation is underestimated by conventional chest X-ray. Resuscitation 2004;60:157–62.
12. Kim EY, Yang HJ, Sung YM, Cho SH, Kim JH, Kim HS, et al. Multidetector CT findings of skeletal chest injuries secondary to cardiopulmonary resuscitation. Resuscitation 2011;82:1285–8. CrossRef
13. Buschmann CT, Tsokos M. Frequent and rare complications of resuscitation attempts. Intensive Care Med 2009;35:397–404. CrossRef
14. Baubin M, Sumann G, Rabl W, Eibl G, Wenzel V, Mair P. Increased frequency of thorax injuries with ACD-CPR. Resuscitation 1999;41:33–8.
15. Şam B, Saka E, Süner Ç. Adli otopsilerde resusitasyon komplikasyonları. Adli Tıp Bülteni 2003;8:5–8.
16. Hoke RS, Chamberlain D. Skeletal chest injuries secondary to cardiopulmonary resuscitation. Resuscitation 2004;63:327–38. CrossRef
17. Paaske F, Hansen JP, Koudahl G, Olsen J. Complications of closed-chest cardiac massage in a forensic autopsy material. Dan Med Bull 1968;15:225–30.
18. Hellevuo H, Sainio M, Nevalainen R, Huhtala H, Olkkola KT, Tenhunen J, et al. Deeper chest compression - more complications for cardiac arrest patients? Resuscitation 2013;84:760–5. CrossRef
19. Kapłon-Cieślicka A, Kosior DA, Grabowski M, Rdzanek A, Huczek Z, Opolski G. Coronary artery dissection, traumatic liver and spleen injury after cardiopulmonary resuscitation - a case report and review of the literature. Arch Med Sci 2013;9:1158–61. CrossRef
20. Rosen J, Tuchek JM, Hartmann JR. Liver laceration in the hemodynamically unstable post-cardiac massage patient: early recognition and management-case report. J Trauma 1999;47:408–9. CrossRef
21. Adams HA, Schmitz CS, Block G, Schlichting C. Intra-abdominal bleeding after myocardial infarction with cardiopulmonary resuscitation and thrombolytic therapy. [Article in German] Anaesthesist 1995;44(8):585–9. [Abstract] CrossRef
22. Pezzi A, Pasetti G, Lombardi F, Fiorentini C, Iapichino G. Liver rupture after cardiopulmonary resuscitation (CPR) and thrombolysis. Intensive Care Med 1999;25:1032. CrossRef
23. Druwé PM, Cools FJ, De Raedt HJ, Bossaert LL. Liver rupture after cardiopulmonary resuscitation in a patient receiving thrombolytic therapy. Resuscitation 1996;32:213–6. CrossRef
24. Meron G, Kurkciyan I, Sterz F, Susani M, Domanovits H, Tobler K, et al. Cardiopulmonary resuscitation-associated major liver injury. Resuscitation 2007;75:445–53. CrossRef
25. Camden JR, Carucci LR. Liver injury diagnosed on computed tomography after use of an automated cardiopulmonary resuscitation device. Emerg Radiol 2011;18:429–31. CrossRef
26. Ziegenfuss MD, Mullany DV. Traumatic liver injury complicating cardio-pulmonary resuscitation. The value of a major intensive care facility: a report of two cases. Crit Care Resusc 2004;6:102–4.

ORİJİNAL ÇALIŞMA - *ÖZET*

Muğla ilinde yapılan otopsi olgu sonuçlarında karşılaşılan resüsitasyon komplikasyonları

Dr. Halil Beydilli,[1] Dr. Yasemin Balcı,[2] Dr. Şahin Işık,[2] Dr. Melike Erbaş,[3] Dr. Ethem Acar,[1] Dr. Bülent Savran[3]

[1]Muğla Sıtkı Koçman Üniversitesi Tıp Fakültesi, Acil Tıp Anabilim Dalı, Muğla
[2]Muğla Sıtkı Koçman Üniversitesi Tıp Fakültesi, Adli Tıp Anabilim Dalı, Muğla
[3]Adalet Bakanlığı, Muğla Adli Tıp Şube Müdürlüğü, Muğla

AMAÇ: Bu çalışmanın amacı, otopsiler sırasında görülen resüsitasyon komplikasyonların belirlenmesi ve temel yaşam desteği eğitimi etkinliğini değerlendirmektir.

GEREÇ VE YÖNTEM: Muğla Adli Tıp Şube Müdürlüğü'nde gerçekleştirilen otopsi olgu raporları geriye dönük olarak incelendi. Resüsitasyon komplikasyonları olan hastaların yaş, cinsiyet, ölüm şekli ve çeşitleri gibi demografik verileri ve komplikasyonların özellikleri kaydedildi.

BULGULAR: Toplam, resüsitasyon komplikasyonlara 100 olgunun 74'ü erkektir. Bu olguların çoğunda otopsileri yaz sezonunda yapıldı. Hastalar arasında %68 travmatik olmayan nedenlerle öldü. Kaburga kırıkları 71 hastada, sternum kırıkları 32 hastada tespit edilmiştir. Ayrıca, perikart (%2) ve akciğer parankim (%4), kalp lezyonları (%4) ve karaciğer laserasyon (%2) hasarı tespit edildi. Kaburga kırıkları ile ilgili olarak, meydana gelen kırıklar en yüksek sayılarda dördüncü kaburga, her iki tarafta ilk ve sekizinci kaburga arasında bulundu.

TARTIŞMA: Resüsitasyon komplikasyonları önemli, çünkü bu komplikasyonlar otopside travmatik nedenlerle yapılmış sanılabilir. Travmatik olmayan nedenlerle yapılan otopsi durumlarında görülen resüsitasyon komplikasyonları travmatik olaylar olarak algılanabilir. Onlar, yanlış olarak travma belirtileri sanılabilir. Bu komplikasyonlar sağlık personelinin iyi resüsitasyon eğitimi ile azaltılabilir.

Anahtar sözcükler: Kapalı-göğüs sıkıştırma; otopsi; resüsitasyon; resüsitasyon komplikasyonlar; temel yaşam desteği.

Ulus Travma Acil Cerrahi Derg 2015;21(6):463–468 doi: 10.5505/tjtes.2015.66169