ORIGINAL ARTICLE

Late complications due to thoracic traumas

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ABSTRACT

BACKGROUND: A total of 412 patients who applied to our clinic after a thoracic trauma between March 2010 and December 2019 were examined retrospectively In this study, late complications that developed as a result of blunt and penetrating thoracic traumas were evaluated and it was aimed to present a prediction for the management of these complications to physicians who are dealing with trauma.

METHODS: Among the 412 thoracic trauma cases, 62 cases (15.04%) who developed late-term complications which constituted the main theme of this study were evaluated in terms of age, gender, the type of trauma, the cause of trauma, thorax, and concomitant organ pathologies that developed when the trauma first occurred, the late-term complications, and the treatment methods for them while considering mortality.

RESULTS: Of 62 patients with late complications due to thoracic trauma, 47 (75.80%) were male, 15 (24.20%) were female, and the average age was 56.98±21.22. When the trauma type of the patients who developed posttraumatic late-term complications was evaluated, blunt traumas were seen in 90.33% (n=56) of the cases, whereas penetrating traumas were seen in 9.47% (n=6). Traffic accidents were the most common cause in blunt trauma cases (66.07%), whereas pointed and sharp-edged weapon injuries were the most common in penetrating traumas (83.33%). The most common thorax pathology is pulmonary contusion (75%) in blunt traumas and hemopneumothorax in penetrating traumas (66.66%). When the groups were analyzed separately, the most common late-term complication for penetrating traumas was retained hemothorax (66.66%), while pneumonia was the most common (41.07%) in blunt trauma cases. Video-assisted thoracoscopic surgery was performed in seventeen patients with retained post-traumatic hemothorax and thoracotomy was performed in eight cases. Seven patients with post-traumatic empyema underwent thoracoscopy, and four patients underwent decortication with thoracotomy. Six of the patients who developed late-term complications died. The mortality rate is 9.67%. Pneumonia was detected as a late complication type in 83.33% of cases with mortality.

CONCLUSION: It will be appropriate for the physicians who are interested in trauma to determine the treatment modalities of the patients by considering many factors such as the age of the patient and the trauma type in terms of the late complications that they will not be able to detect at first glance.

Keywords: Late complication; thorax; trauma.

INTRODUCTION

Considering the recent developments in the approach to thoracic traumas, very important progress has been made regarding the approach to respiratory failure, ventilator support strategies, pneumonia, and empyema treatments, diagnosis and treatment of the aorta or other major vascular injuries, and imaging and surgical techniques. Thus, there has been a significant decrease in complications related to thoracic traumas as a result of the early diagnosis and intervention opportunities.[1]

Approximately 30% of the deaths due to thoracic traumas occur due to the complications arising from the delays in the diagnosis and/or intervention. Most of the patients who are exposed to thoracic traumas can be detected at the time of

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the admission and can recover without sequelae with the appropriate treatment methods. However, especially in 10–30% of the patients with blunt trauma, overlooked, poorly treated or trauma-dependent complications related to the natural process of trauma can occur days or years later, causing serious morbidity or even mortality.

Most of the complications depend on the type and the mechanism of the injury, and the applied treatment methods. Besides, the timing related to tube thoracostomy as a technique, position or function errors, the presence of a large volume hemothorax, incomplete reexpansion of the damaged lung, incomplete obliteration between the pleural surfaces, the delay in the recognition of the diaphragm damage, the presence of pulmonary parenchymal contusion, extrathoracic hematoma, unstable thoracic wall injury with multiple costal fractures are some of the complication-related factors in the post-traumatic period.[1,2] Chronic pain, depression, and loss of functional status are also common components seen when during the healing of the trauma.[3]

In this study, late complications that developed as a result of blunt and penetrating thoracic traumas were evaluated and it was aimed to present a prediction for the management of these complications to physicians who are dealing with trauma.

MATERIALS AND METHODS

A total of 412 patients who applied to our clinic after a thoracic trauma between March 2010 and December 2019 were examined retrospectively (Patients who were younger than 18 years of age were not included in these 412 cases, because they were followed up by the Pediatric Surgery Clinic). There were 293 (71.11%) male and 119 (28.89%) female patients, and the mean age was 52.34±17.57. There were 333 (80.82%) patients who were detected as having a blunt trauma, whereas 79 (19.18%) had penetrating trauma.

Among the 412 thoracic trauma cases, 62 cases (15.04%) who developed late-term complications which constituted the main theme of this study were evaluated in terms of age, gender, the type of trauma, the cause of trauma, thorax, and concomitant organ pathologies that developed when the trauma first occurred, the late-term complications, and the treatment methods for them while considering mortality.

Statistical Analysis

Statistical analysis was performed using IBM SPSS (Armonk, NY, USA). Consistent factors were exhibited as mean + standard deviation or median (interquartile range), and analyzed utilizing Mann-Whitney U test as suitable. All out factors were displayed as recurrence (percentage) and thought about utilizing the Chi-square test or Fisher's correct test as proper. Logistic regression analysis was used to determine independent predictors of achievement with forward logistic regression were used to model-independent predictors. Covariates with $p<0.05$ from univariate analysis were included in multivariate analysis. All statistical tests were two-sided and a $p<0.05$ was considered as statistically significant.

RESULTS

Of 62 patients with late complications due to thoracic trauma, 47 (75.80%) were male, 15 (24.20%) were female, and the average age was 56.98±21.22. The cases were divided into four groups according to their age ranges ([Ages 18–20, n=4, 6.47%], [Ages 21–40, n=11, 17.74%], [Ages 41–60, n=17, 27.41%], [Ages ≥61, n=30, 48.38%]). Accordingly, it is observed that the majority of the patients (48.38%) who developed complications in the late stage after thoracic trauma were cases older than 60 years.

When the trauma type of the patients who developed post-traumatic late-term complications was evaluated, blunt traumas were seen in 90.33% (n=56) of the cases, whereas penetrating traumas were seen in 9.47% (n=6). Traffic accidents were the most common cause in blunt trauma cases (66.07%),

Table 1. The pathologies that developed during the first period of trauma in the patients with posttraumatic late-term complications

	Blunt trauma (n=56)		Penetrating trauma (n=6)	
	n	%	n	%
Trauma causes				
Car crash	37	66.07	–	–
Fall	17	30.35	–	–
Assault	1	1.79	–	–
Trapping under the rubble	1	1.79	–	–
Stabbing injury	–	–	5	83.33
Gunshot injury	–	–	1	16.67
Thorax pathologies				
Pneumothorax	22	39.28	1	16.67
Hemothorax	9	16.07		
Hemopneumothorax	11	19.64	4	66.66
Pulmonary contusion	42	75	1	16.67
Rib fracture (1–3 numbers)	31	55.35	1	16.67
Rib fracture (<3)	14	25	–	–
Sternum fracture	3	5.35	–	–
Scapula fracture	1	1.79	–	–
Concomitant injuries				
Head injury	1	1.79	–	–
Extremity fracture	17	30.35	–	–
Abdominal injury	6	10.71	1	16.67

whereas pointed and sharp-edged weapon injuries were the most common in penetrating traumas (83.33%) (Table 1).

Thorax and concomitant organ pathologies of the cases with late-term complications, which developed when the trauma first occurred, are presented in Table 1. According to this, the most common thorax pathology is pulmonary contusion (75%) in blunt traumas and hemopneumothorax in penetrating traumas (66.66%). While limb fractures were the most common (30.35%) concomitant injuries in blunt traumas, abdominal injury accompanied only one case with penetrating trauma.

When 62 patients who developed late-term complications were brought to the hospital during the first period that they were exposed to trauma, tube thoracostomy was applied for thorax pathologies as an invasive procedure in addition to medical treatment, and none of them required Video-Assisted Thoracoscopic Surgery (VATS) or thoracotomy. Only one patient with abdominal injury (splenic rupture) underwent laparotomy.

Post-traumatic late-term complications in the cases are presented in Table 2. According to this, the most common (40.34%) complication in both groups was retained hemothorax. When the groups were analyzed separately, the most common late-term complication for penetrating traumas was retained hemothorax (66.66%), while pneumonia was the most common (41.07%) in blunt trauma cases.

The applied treatment methods and mortality numbers in the cases with posttraumatic late-term complications are presented in Table 3.

According to this, it is seen that all patients who developed pneumonia as a late-term complication received medical treatment and eight patients needed mechanical ventilation (MV) due to respiratory failure that developed secondary to pneumonia.

Although tube thoracostomy was performed in four of the patients who came with an appearance of retained posttraumatic hemothorax, the hemothorax could not be discharged. While the clotted hemothorax could be discharged with VATS in 17 of the cases, it was converted to open surgery due to advanced adhesions that developed between visceral and parietal pleural leaves in eight cases.

Table 2. Posttraumatic late-sage complications in the patients

Complications	Number of patients (n=62)		Blunt (n=56)		Penetrating (n=6)	
	n	%	n	%	n	%
Pneumonia	23	37.09	23	41.07		
Retained posttraumatic hemothorax	25	40.34	21	37.5	4	66.66
Posttraumatic empyema	11	17.74	11	19.64		
Posttraumatic intrathoracic foreign body	1	1.61			1	16.67
Diaphragmatic rupture	1	1.61			1	16.67
Pulmonary pseudocyst	1	1.61	1	1.79		

Table 3. The applied treatment methods in patients with posttraumatic late-term complications and pathologies that developed during the first period of trauma

Developed complications	Conservative treatment	Mechanical ventilation therapy	Tube thoracostomy	Thoracoscopic surgery	Thoracotomy	Mortality
Pneumonia (n=23)	15	8				5
Retained posttraumatic hemothorax (n=25)			4	17	8	
Posttraumatic empyema (n=11)		2	6	7	4	1
Posttraumatic intrathoracic foreign body (n=1)				1		
Diaphragmatic rupture (n=1)					1	
Posttraumatic pulmonary pseudocyst (n=1)				1		
Total	15	10	10	26	13	6
%	24.19	16.12	16.12	41.93	20.96	9.67

Table 4. Characteristics of the variables

	Variables	p
Number of patients	412	
Average age	52.34	0.000010
Late complication developed cases and complication types, n (%)		
No	349 (84.71)	0.006500
Retained post-traumatic pemothorax	25 (6.06)	
Post-traumatic intrathoracic foreign body	1 (0.24)	
Diaphragmatic rupture	1 (0.24)	
Post-traumatic empyema	11 (2.67)	
Pneumonia	23 (5.58)	
Post-traumatic pulmonary pseudocyst	1 (0.24)	
Trauma type in all cases, n (%)		
Blunt trauma	333 (80.83)	0.025000
Penetrating trauma	79 (19.17)	
Trauma type in the cases that developed late-term complications, n (%)		
Blunt trauma	56 (90.32)	0.013078
Penetrating trauma	6 (9.68)	
Mortality, n (%)		
No	56 (90.32)	0.013078
Yes	6 (9.68)	

In six of the cases that came with posttraumatic empyema, firstly the empyema content was tried to be emptied by tube thoracostomy, but it was not successful due to loculations and pleural thickening. In seven of the cases, the empyema was in the fibrinopurulent stage, and the empyema contents were evacuated by clearing the adhesions by thoracoscopy. Decortication with thoracotomy was required in four cases.

The patient, who was injured while shooting with air rifles in the amusement park, had only a pulmonary contusion at first glance, however, the pellet was overlooked. During the follow-ups of the patient, a foreign body was detected on the lateral side of the sternum, and then it was removed by intervention with thoracoscopy.

In a patient who developed pneumothorax and was treated with tube thoracostomy as a result of a stabbing injury to the thorax, diaphragmatic rupture on the left side developed later. The diaphragm was repaired primarily by thoracoscopic intervention.

A patient who came in with complaints of rib fracture and pulmonary contusion after blunt trauma was discharged after treatment and later on, he presented with a giant pseudocyst in the lung parenchyma which was resected thoracoscopically. As seen in Table 3, 6 of the patients who developed late-term complications died. The mortality rate is 9.67%. All of these cases are patients who needed invasive respiratory support during their follow-ups. Five of the cases died from respiratory failure and sepsis secondary to pneumonia whereas in one case they developed secondary to empyema.

When the patients who developed posttraumatic complications in the late-term were evaluated statistically; as a result of comparing ages, complication types, trauma types, and mortality data, it can be seen that the groups were not statistically different from each other (A full list of patient characteristics is given in Table 4).

Logistic Regression

In our study, logistic regression analysis was performed to estimate the parameters affecting mortality. In the analysis, the dependent variable is mortality (Yes: 1, No: = 0), and independent variables are age, cases with late-term complications and types of complications, and types of trauma.

Estimation results of the installed model are given in Table 5 and logistic regression results are given in Table 6.

The established model creates a model to examine the possibilities of data to occur in the future and makes estimates according to this model. While the sensitivity of its prediction is 83.3%, its specificity is 100%. According to the independent variable data included in the model (age, cases with late complications, and types of complications and types of

Table 5. Classification table of the model

Observed		Predicted		
		Mortality		Percentage correct
		No	Yes	
Step 1				
Mortality	No	56	0	100.0
	Yes	1	5	83.3
Overall percentage				98.4

Table 6. Logistic regression model summary results

Variables	B	HR	p
Constant	-20.7230		
Age	-6.416	1.2160	0.0196
Complication types	10.126	3.1980	0.0170
Trauma types	-0.00367	0.001640	0.0612
Model fitting information			
R^2 (Nagelkerke)		0.876	
		Log Likelihood	Ratio test
Intercept only		6.4910	Sig.
Final		29.5030	0.0412

trauma), it predicted that 56 people out of 56 would not die and with a specificity value of 100%. Besides, it could not estimate only one of the six people who died. Thus, the sensitivity of the model was 83.3%, which shows that the established model was successful. The data of the model is presented in Table 6.

When the fitting information of the model established for logistic regression is examined, it is seen that the model is suitable (p=0.0412). In the study, Nagelkerke[4] r-squared values were found to be 0.876. This shows that the model has high explanatory power.

When logistic regression data are analyzed, it is seen that age and complication types affect mortality status. While the average age of the cases with late-term complications was 56.98±21.22, the average age of the cases with mortality was 74.83±12.41. This statistical result supports that the mortality rates increase with age.

The fact that pneumonia was detected as a late-term complication type in 83.33% of the cases with mortality, supports the logistic regression data that says the complication types are effective on mortality.

When the effects of trauma types (blunt or penetrating) on mortality were examined (p=0.0612), the significance level was found to be higher than the significance value of 0.005.

When we look at our Estimation Model, it can be formulated as follows:
M = −20.7230+−6.416 A+10.126 C-0.00367 T
Mortality: M; Age: A; Complication: C; Trauma type: T

Estimation results by age distribution are also shown in Figure 1. In order to examine the relationship between the patient age and the complication development, the relationship between age and the cases with complications that developed late-term complications is tested by correlation analysis; a significant relationship between age and the risk of developing late-term complications in the cases is seen. Although this significant relationship is weak, it is positive. The results show us that the probability of developing late-term complications tends to increase as the patient age increases. Although this finding is not strong, it exists. While the average age of 412 cases is 52.34±17.57, the average age of 62 cases with late-term complications is higher than this (56.98±21.22) which supports this statistical result.

Similarly, a significant relationship was found between the late-term complication types and the patient age. This relationship is positive but weak. When the data are analyzed, it is seen that this statistical result is supported. In explanation, the average age of the patients with pneumonia is 71±9.59, the average age of the patients with empyema is 71±15.92, and the average age of the patients with retained post-traumatic hemothorax is 41.4±17.03.

In Figure 2, the averages of the patient age are given according to the complication types.

In the relationship between thoracic trauma type (blunt or penetrating) and the risk of developing late-term complications, the relationship between the type of trauma and the risk of developing late-term complications and also the types of complications were examined with correlation (Table 6). According to the correlation results, no statistically signif-

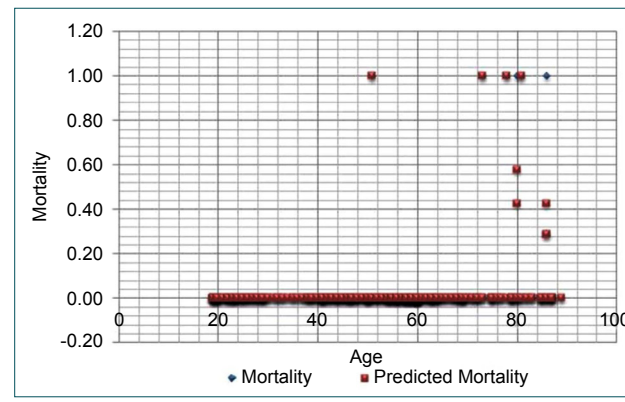

Figure 1. Mortality and predicted mortality according to age.

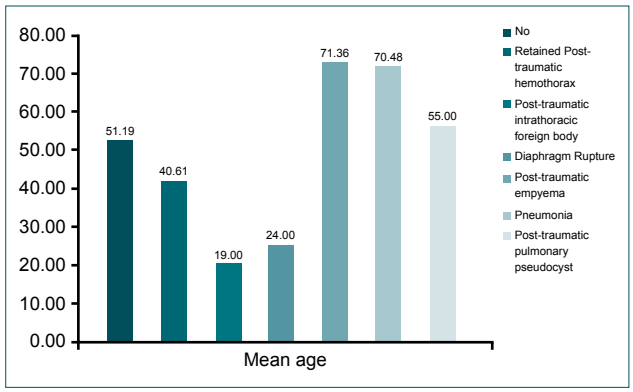

Figure 2. The average age according to the complications

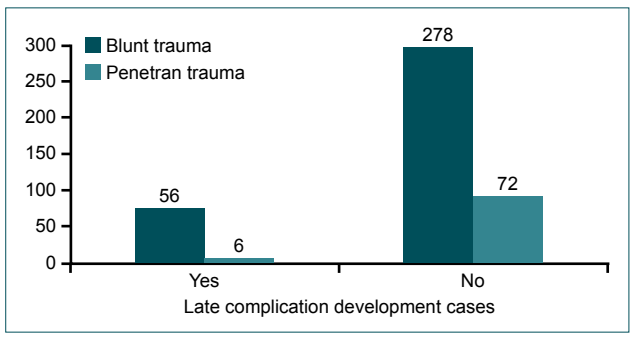

Figure 3. The relationship between thoracic trauma type (blunt or penetrating) and the development of complications.

icant relationship was found between them (p=0.0612). In Figure 3, the complication development conditions are given according to the types of trauma.

In order to examine the relationship between mortality and the patient age and the trauma type in the cases with complications, correlation analysis was performed again with the patient data of only 62 patients who developed late-term complications among 412 cases. The results of this analysis are given in Table 7.

When we summarize the results that were obtained after all these statistical evaluations; there is a significant relationship between age and the late-term complications, trauma type, and mortality.

Table 7. Correlation results

	Age	Complications types	Trauma	Mortality
Age	1.000			
Complication types	0.609**	1.000		
Trauma types	-0.349**	-0.273*	1.000	
Mortality	0.296*	0.306*	-0.107	1.000

*Correlation is significant at the 0.05 level (2-tailed). **Correlation is significant at the 0.01 level (2-tailed).

There is a significant, positive, and strong relationship between age and types of complications. There is a negative but not very strong relationship between age and trauma type. It can be said that the risk of trauma may increase as the patient age increases. Besides, it is seen that blunt trauma type is more likely to occur with increasing age. It is seen that at a young age, penetrating trauma is more likely to occur. The relationship between age and mortality is also significant, positive but weak. It can be stated that the probability of mortality increases with increasing age in patients who develop complications. Furthermore, there is a significant relationship between complication types and trauma types. This significant relationship is negative and weak. There is a significant and positive relationship between complication types and mortality. This relationship is not very strong, but it is clear that complication types affect mortality. There is no significant relationship between trauma type and mortality.

DISCUSSION

Chest traumas are responsible for 20–25% of the deaths caused by trauma in the first four decades of life.[5] Chest injuries are frequently accompanied by other system's organ injuries, and this leads to a significant increase in mortality and morbidity rates.[5] One-third of the deaths due to thoracic traumas occur within minutes at the scene of the incident, 1/3 of them occur within hours in the hospital due to vascular injury and respiratory distress due to widespread parenchymal damage, and the remaining 1/3 are due to the complications that develop and occur in days.[6]

The male/female ratio in the patients who were exposed to thoracic trauma is reported as 6.5/1 in the literature.[7] Men, especially in our country play a more active role in public life. Therefore, they face more traumas. Parallel to this, chest trauma is most commonly seen in males and the 2nd–5th decades.[7] In our study, in accordance with the literature, 71.11% of 412 cases who were exposed to trauma were male and the mean age was in the 5th decade. Of the 62 cases who developed posttraumatic late-term complications, 75.80% of them were male and the majority of the cases (48.38%) were in the 6th decade.

In many other studies, it has been reported that the frequency of blunt thoracic traumas ranged between 58.7% and 75.8%, and the frequency of penetrating thoracic traumas between 24.1% and 41.3%; the most common cause of blunt chest trauma was traffic accidents, whereas the most common cause of penetrating chest trauma was pointed and sharp-edged weapon injuries.[7–9] In our study, in accordance with the literature, in patients who developed posttraumatic late-term complications, the rate of blunt trauma was higher (90.33%) and traffic accidents constituted 66.07% of them. In penetrating traumas, the most common factor was pointed and sharp-edged weapon injuries (83.33%).

The most common pathology in thoracic trauma is rib fracture, and the most common intrathoracic pathologies are pneumothorax, hemothorax, and hemopneumothorax.[9,10] In these pathologies, effective pain control, pulmonary physiotherapy, and tube thoracostomy are mostly sufficient and thoracotomy may be required in 10–15% of cases.[9,10]

The most frequent pathology (72.58%) detected during the first follow-up visits of the patients who developed post-traumatic late-term complications in our study was pulmonary contusion (75%), followed by pneumothorax (39.28%), hemopneumothorax (19.64%), and hemothorax (16.07%) and these rates were compatible with the literature. Medical therapy and tube thoracostomy were the most common treatments in all of these cases, and none of these cases were operated.

The most common complication of thoracic trauma is pneumonia. The risk is even higher in other organ injuries accompanying thoracic trauma, especially head trauma, and also when intensive care and MV are involved.[11] The incidence of pneumonia in the patients who are intubated and require MV (even though it varies depending on the duration) is 44%, while in those who cannot be intubated it is around 6%.[12] In our study, retention hemothorax (40.34%) was the most common among the developed late-term complications, but in accordance with the literature, the most common late-term complication in blunt thoracic trauma was pneumonia (37.09%). In our study, pneumonia was detected as the late-term complication type in 83.33% of the cases that developed mortality.

Retained hemothorax problem is encountered in approximately 1–30% of patients who have been exposed to thoracic trauma.[13–15] In our study, although tube thoracostomy was performed in four of the patients who presented with retained hemothorax, hemothorax could not be discharged. While the clotted hemothorax could be discharged with VATS in 17 of the cases, it was converted to open surgery due to advanced adhesions that developed between visceral and parietal pleural leaves in eight cases.

In our study, the age of the patients who developed complications in the late-term after thoracic traumas, the types of developed complications, the types of trauma that the patients were exposed to, and the mortality rates were compared statistically.

When the development of complications in the late-term after thoracic trauma and the patient age was compared, a statistically significant relationship was observed between age and late-term complications (p=0.00001). While the average age of all the patients who were exposed to thoracic traumas was 52.34±17.57, the fact that the average age of the patients who developed late-term complications was 56.98±21.22 supports this result.

In addition, there is a statistically significant relationship between age and the types of trauma (p=0.013). The risk of blunt trauma increases as age increases.

In our study, another statistical study related to age was performed among the patients who developed mortality and the average age of 62 patients who developed late-term complications was 56.98±21.22, while the average age of 6 patients who developed mortality was 74.83±12.41 (p=0.013). This indicates that mortality rates increase as age increases.

There is also significant data in the statistical comparison of the late-term complications developed with aging. Accordingly, pneumonia and empyema development seem to be more common with increasing age (p=0.0065).

When the relationship between thoracic trauma type (blunt or penetrating) and the risk of developing late-term complications was analyzed by correlation, it was found that the rates of posttraumatic late-term complications in blunt trauma cases (56/334; 16.76%) were higher than penetrating traumas (6/78, 7.69%). There is a negative but not very strong relationship between age and trauma type. It can be said that the risk of trauma may increase as the patient age increases. In addition, it is seen that blunt trauma is more likely to occur with increasing age. It is seen that at a young age, penetrating trauma is more likely to occur. However, when the thoracic trauma type and mortality rates were compared statistically, there was no significant relationship between trauma type and mortality development (p=0.0612).

In this study, it was detected that the increase in age increased mortality (p=0.013) and the relationship between the late-term complication type developed and mortality was statistically significant (in 83.33% of the cases with mortality was the late-term complication type was pneumonia) (p=0.0065), whereas the type of trauma (blunt or penetrating) did not affect mortality (p=0.0612).

Conclusion

As a result, it will be appropriate for the physicians who are interested in trauma to determine the treatment modalities of the patients by considering many factors such as the age of the patient and the trauma type in terms of the late complications that they will not be able to detect at first glance.

Ethics Committee Approval: This study was approved by the Van Yuzuncu Yil University Ethics Committee (Date: 14.05.2020, Decision No: 54355720-900-E).

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REFERENCES

1. Karmy-Jones R, Jurkovich GJ. Blunt chest trauma. Curr Probl Surg 2004;41:223–380. [CrossRef]
2. Yörük Y. Torasik travma komplikasyonları. TTD Toraks Cerrahisi Bül 2010;1:96–101.
3. Yeo TP. Long-term sequelae following blunt thoracic trauma. Orthop Nurs 2001;20:35–47. [CrossRef]
4. Nagelkerke NJ. A note on the general definition of the coefficient of determination. Biometrika 1991;78:691–2. [CrossRef]
5. Beshay M, Mertzlufft F, Kottkamp HW, Reymond M, Schmid RA, Branscheid D, et al. Analysis of risk factors in thoracic trauma patients with a comparison of a modern trauma centre: A mono-centre study. World J Emerg Surg 2020;15:1–10. [CrossRef]
6. Rendeki S, Molnar TF. Pulmonary contusion. J Thorac Dis 2019;11 Suppl 2:141–51. [CrossRef]
7. El-Din ML, Nashy MR, Meshhal MT. Blunt vs. penetrating chest trauma in terms of the outcome in Menoufia University Hospital. Menoufia Med J 2018;31:133.
8. Tatar C, Kocakuşak A, Özer B, Kızılkaya MC, Karşıdağ T, Arı A, et al. Analysis of 89 patients who underwent tube thoracostomy performed by general surgeons. Turk J Surg 2018;34:49–52. [CrossRef]
9. Haberal MA, Dikiş ÖŞ, Akar E. Thoracic trauma: Analysis of 440 cases. Kafkas J Med Sci 2019;9:97–102. [CrossRef]
10. Dumanlı A, Gencer A, Kaya F, Inceoğlu C, Oz G. Analysıs of patıents wıth blunt thorax trauma and rıb fracture; evaluatıon of 201 cases. Turk J Health Sci Life 2020;3:1–5.
11. Michelet P, Couret D, Brégeon F, Perrin G, D'Journo XB, Pequignot V, et al. Early onset pneumonia in severe chest trauma: A risk factor analysis. J Trauma 2010;68:395–400. [CrossRef]
12. Cavalleri M, Barbagelata E, de Teran TD, Ferraioli G, Esquinas A, Nicolini A. Noninvasive and invasive ventilation in severe pneumonia: Insights for the noninvasive ventilatory approach. J Crit Care 2018;48:479. [CrossRef]
13. Sharma OP, Hagler S, Oswanski MF. Prevalence of delayed hemothorax in blunt thoracic trauma. Am Surg 2005;71:481–6. [CrossRef]
14. Martinez RJ, Voth AH, Fernandez CM, Alarza FH, Serna IM, de Alba AM, et al. Evolution and complications of chest trauma. Arch Bronconeumol 2013;49:177–80. [CrossRef]
15. DuBose J, Inaba K, Demetriades D, Scalea TM, O'Connor J, Menaker J, et al. Management of post-traumatic retained hemothorax: A prospective, observational, multicenter AAST study. J Trauma Acute Care Surg 2012;72:11–22. [CrossRef]

ORİJİNAL ÇALIŞMA - *ÖZ*

Toraks travmalarına bağlı geç komplikasyonlar

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AMAÇ: Kliniğimize Mart 2010–Aralık 2019 tarihleri arasında toraks travması sonucu müracaat etmiş 412 olgu geriye dönük olarak incelenerek, künt ve penetran toraks travmaları sonucu gelişen geç komplikasyonlar değerlendirilmiş ve travmayla ilgilenen hekimlere bu komplikasyonların yönetimi için bir öngörü sunulması amaçlanmıştır.

GEREÇ VE YÖNTEM: Dört yüz on iki toraks travmalı olgudan bu çalışmanın ana temasını oluşturan geç dönem komplikasyon gelişmiş 62 olgu (%15.04) yaş, cinsiyet, travma tipi, travma nedeni, travmanın ilk geliştiği dönemde gelişen toraks patolojileri ve yandaş organ patolojileri, gelişen geç dönem komplikasyonları ve bunlara yönelik tedavi yöntemleri ile mortalite açısından incelendi.

BULGULAR: Toraks travmasına bağlı geç komplikasyon gelişmiş 62 olgunun 47'si (%75.80) erkek, 15'i (%24.20) kadın, yaş ortalaması 56.98±21.22 olarak tespit edildi. Posttravmatik geç dönem komplikasyon gelişen olguların travma tipi değerlendirildiğinde künt travmaların %90.33 (n=56), penetran travmaların %9.47 (n=6) oranında olduğu ve künt travma olgularında en sık nedenin trafik kazası (%66.07), penetran travmalarda ise delici-kesici alet yaralanması (%83.33) olduğu saptandı. En sık gelişen toraks patolojisi künt travmalarda pulmoner kontüzyon (%75), penetran travmalarda ise hemopnömotoraksdır (%66.66). Gruplar ayrı ayrı incelendiğinde penetran travmalar için en sık görülen geç dönem komplikasyon retansiyone hemotoraks (%66.66) iken, künt travmalı olgularda en sık (%41.07) pnömonidir. Retansiyone posttravmatik hemotoraks tablosu ile gelen hastaların 17'sinde video yardımlı torakoskopik cerrahi, sekiz olguya torakotomi uygulandı. Posttravmatik ampiyemle gelen olguların yedisine torakoskopi, dört olguya torakotomi ile dekortikasyon yapıldı. Geç komplikasyon gelişen olguların altısı hayatını kaybetdi. Mortalite oranı %9.67'dir. Mortalite gelişen olguların %83.33'ünde geç komplikasyon türü olarak pnömoni tespit edildi.

TARTIŞMA: Travma ile ilgilenen hekimlerin, ilk bakıda tespit edemeyecekleri ve daha sonra karşılarına gelebilecek geç dönem komplikasyonlar açısından, hastanın yaşı, tavma tipi başta olmak üzere birçok etken faktörü gözününde bulundurarak hastasının tedavi modalitelerini belirlemeleri uygun olacaktır.

Anahtar sözcükler: Geç komplikasyon; toraks; travma.

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