Kocaeli Med J 2018; 7; 2:72-75

Travmatik hemotoraks ve pnömotoraks tedavisinde küçük çaplı trokarlı göğüs tüplerinin etkinliğinin değerlendirilmesi

The Effect of Evaluation of the small diamater trochar chest tube efficacy in management of traumatic hemothorax and pneumothorax

Aykut Eliçora

Bülent Ecevit Üniversitesi Tıp Fakültesi, Göğüs Cerrahisi Ana Bilim Dalı, Zonguldak, Turkiye

ÖZ

GİRİŞ VE AMAÇ ; *Göğüs tüpleri temel olarak plevral boşlukta biriken hava veya sıvıyı drene etmek için kullanılmaktadır. Tüp torakostomi acil durumlarda hayat kurtarıcı bir prosedürdür. Göğüs tüpünün yerleştirilmesinde trokarlı ve trokarsız olmak üzere başlıca iki teknik kullanılmaktadır. Bu çalışmada toraks travması nedeniyle tüp torakostomi uygulanan hastalarda trokarlı ve trokarsız tekniğin etkinlik açısından karşılaştırılması amaçlanmıştır.*

YÖNTEM VE GEREÇLER ; *Bu çalışmada 2012-2017 yılları arasında görev yaptığım üç farklı merkezde toraks travması nedeniyle tüp torakostomi uyguladığım 145 olgu retrospektif olarak incelendi. Çalışmamızda iki grup oluşturuldu. Grup A; 20 French (F) (Bıçakcıoğlu, Türkiye trokarlı göğüs tüpü, grup B; 32F (Bıçakcıoğlu, Türkiye) trokarsız göğüs tüpü takılan hastalardan oluşmaktaydı.*

BULGULAR ; *Hastaların yaşları 19 ile 77 arasında değişmekteydi (ortalama yaş 56,8±10,6). . Gruplar arasında yaş, cinsiyet dağılımı açısından istatiksel olarak anlamlı fark saptanmadı (P= 0,410). Tüp malpozisyonu, tüp komplikasyonu, ampiyem, ek tüp gereksinimi açısından değerlendirildiğinde her iki grup arasında anlamlı fark saptanmadı (p>0,005).*

TARTIŞMA VE SONUÇ; *Trokarlı ve trokarsız teknik karşılaştırıldığında trokarlı teknik travma nedeniyle başvuran hastalarda daha hızlı müdahale imkanı sağlamaktadır.*

Anahtar kelimeler; *Göğüs tüpü, hemotoraks, pnömotoraks, travma*

ABSTRACT

INTRODUCTION ; *Chest tubes are mainly used to drain air or fluid that accumulates in the pleural space. Tube thoracostomy is a life-saving procedure in an emergency. In chest tube placement, two main techniques are used as with trocar and without trocar. In this study, it was aimed to compare the techniques with trocar and without trocar in terms of efficacy in patients who underwent tube thoracostomy due to thoracic trauma.*

METHODS ; *In this study, 145 patients to whom I applied tube thoracostomy due to thoracic trauma at three different centers where I worked between the years of 2012-2017 were examined retrospectively.. Two groups were created in our study. Group A was consisted of 20 French (F) (Bıçakcıoğlu, Turkey) chest tube with trocar, Group B was consisted of 32F (Bıçakcıoğlu, Turkey) patients with chest tube without trocar.*

RESULTS; *The ages of the patients ranged from 19 to 77 (mean age 56.8 ± 10.6).. There was no statistically significant difference between the groups in terms of age and sex distribution (P = 0.410). There was no significant difference between the two groups in terms of tube malposition, tube complication, empyema and additional tube requirement (p> 0,005).*

DISCUSSION AND CONCLUSION; *When the techniques with trocar and without trocar were compared, the technique with trocar provides faster intervention to patients who have trauma with technique with trocar.*

Keywords ; *chest tube, hemothorax, pneumothorax, trauma*

İletişim / Correspondence:

Aykut Eliçora
Bülent Ecevit Üniversitesi Tıp Fakültesi, Göğüs Cerrahisi Ana Bilim Dalı, Zonguldak, Turkiye
E-mail: aykutelicora@yahoo.com.tr
Başvuru Tarihi: 28.12.2017
Kabul Tarihi: 02.04.2018

INTRODUCTION

Thoracic injury after blunt and penetrating trauma is quite common. These injuries usually result with pneumothorax and hemothorax. Tube thoracostomy is a definite and indispensable treatment method for most cases of traumatic pneumothorax and hemothorax. Tube thoracostomy is a life-saving procedure to drain pleural air and pleural effusion or other causes that accumulates in the pleural cavity (1). Although the insertion of the chest tube is usually considered as an easy procedure; the physical condition of the patient, trauma and pleural adhesions can cause life-threatening complications and make the procedure more difficult (2).

Chest tubes differ in terms of diameter, length and attachment pattern. The diameters of the tubes vary from 12Fr (French) to 36Fr, and they also vary according to the insertion technique; trocar or non-trocar. There is no exact consensus on which indications the diameter of the chest tube should be determined in which patient (3). However, large diameter (28F, 32F, 36F) chest tube without trocar is preferred in many clinics.

In this study, we aimed to compare the efficacy of pneumothorax and hemothorax caused by thoracic trauma of small-diameter (20 F) thoracic tubes with trocars and large diameter chest tube without trocar.

MATERIAL AND METHODS

In this study, 145 patients to whom I applied tube thoracostomy due to thoracic trauma at three different centers where I worked between the years of 2012-2017 were examined retrospectively. 129 of the patients were male and 19 of them were female. Two groups were formed in this study. While group A was composed of patients with 20 French (F) (Bıçakcıoğlu, Turkey) chest tube with trocar, group B was composed of patients with 32F (Bıçakcıoğlu, Turkey) chest tube without trocar.

All cases were evaluated in terms of age, gender, type of trauma (blunt, penetrant), tube cause (pneumothorax, hemothorax or pneumothorax + hemothorax), rib fracture, pulmonary contusion, other organ and extremity injuries (abdomen, head, vertebra, extremity), intubation, thoracotomy, tube malposition, tube complication, additional tube requirement, empyema, duration of hospital stay and mortality.

Statistical analysis was performed by using SPSS 19.0 (SPSS Inc., Chicago, IL, USA) program. Properness of normal distributions with numerical variables was examined by Shapiro-Wilk test. While descriptive statistics for numerical variables were expressed as the statistical arithmetic mean ± standard deviation, they were expressed as number and percentage for the data in the verbal construct. Fisher's exact Chi-square and Chi-square tests were used to compare the groups in terms of variables in verbal structure. The Mann-Whitney U test was used to compare the two groups in terms of numerical variables and $p < 0.05$ value was considered significant for all evaluations.

RESULTS

A total of 145 patients with chest tube were included in the study. The ages of the patients ranged from 19 to 77 (mean age was 56.8 ± 10.6). There were 107 patients (73%) in group A with 20 F chest tube with trocar and 38 patients (27%) in group B with 32 F chest tube without trocar. Group A consisted of 92 men (86%) and 15 women (14%) with a mean age of 57.43 ± 11.3. Group B consisted of 34 males (89.5%) and 4 females (10.5%) with a mean age of 55.34 ± 10.3. There was no statistically significant difference between the groups in terms of age and sex distribution (P = 0.410).

There was no statistically significant difference between groups in terms of rib fracture, duration of hospital stay, type of trauma (blunt, penetrant), pulmonary contusion, other injuries (abdomen, head, vertebra, extremity) (Table 1).

Tube indications were classified as pneumothorax, hemothorax, hemothorax + pneumothorax. Tube thoracostomy was performed in Group A due to pneumothorax in 22 patients (20,6%), hemothorax in 35 patients (32,7%), hemothorax + pneumothorax in 50 patients (46,7).

Table 1. Distribution of variables between groups

	Trocar tube 20F (Group A)	Non-trocar tube 32F (Group B)	Total	P value
Average age ± SD	57,43±11,3	55,34±10,3	56,8±10,6	P= 0,410
Gender Male Woman	92 (%86) 15 (%14)	34 (%89,5) 4 (%10,5)	126 (%100) 19 (%100)	P= 0,781
Trauma type Penetrating Blunt	11 (%10,3) 96 (%89,7)	4 (%10,5) 34 (%89,5)	15 (%100) 130 (%100)	P= 1.000
Average rib fracture number ± SD	2.05±2,187	1,84±2,007	1,99±2,136	P= 0,677
Pulmonary contusion	33 (%30,8)	13 (%34,2)	46 (%31,7)	P= 0.857
Time (day)(of hospital stay ± SD	7,69±2,697	7,76±2,098	7,71±2,547	P= 0.610
Abdomen injury	8 (% 7,5)	0 (%0,0)	8 (%5,5)	P= 0,111
Head trauma	6 (%5,6)	2 (%5,3)	8 (%5,5)	P= 0,111
Vertebra fracture	10 (%9,3)	3 (%7,9)	13 (%9,0)	P= 1,000
Extremite fraktürü	20 (%18,7)	4 (%10,5)	24 (%16,6)	P= 0,363
Intubation	6 (%5,6)	3 (%7,9)	9 (%6,2)	P= 0,698
Thoracotomy	3 (%2,8)	0 (%0,0)	3 (%2,1)	P= 0,567
Mortality	3 (%2,8)	2 (%5,3)	5 (%3,4)	P= 0,606

Tube thoracostomy was performed in Group B due to pneumothorax in 1 patient, hemothorax in 26 patients (68.4%) and hemothorax + pneumothorax in 11 patients (28.9%). When the groups were compared in terms of all indications, the difference between them was statistically significant (p <0.001) **(Table 2).**

Table 2. Tube thoracostomy indications

Tube thoracostomy indications	Trocar tube 20F (Group A)	Non-trocar tube 32F (Group B)	Total	P value
Pneumothorax	22 (%20,6)	1 (% 2,6)	23 (%15,9)	P<0,001
Hemothorax	35 (%32,7)	26 (%68,4)	61 (%42,1)	P<0,001
Hemothorax + Pneumothorax	50 (%46,7)	11 (%28,9)	61 (%42,1)	P<0,001

There was no statistically significant difference between the groups in terms of intubation, thoracotomy and mortality (Table 1).

There was no significant difference between the two groups in terms of tube malposition, tube complication, empyema, additional tube requirement **(Table 3).**

Table 3. Complications of tube thoracostomy

	Trocar tube 20F (Group A)	Non-trocar tube 32F (Group B)	Total	P value
Tube Malposition	15 (%14)	3 (%7,9)	18 (%12,4)	P= 0,403
Tube Complication	8 (%7,5)	4 (%10,5)	12 (%8,3)	P= 0,514
Empyema	2 (%1,9)	1 (%2,6)	3 (%2,1)	P= 1,000
Additional tube requirement	5 (%4,7)	1 (%2,6)	6 (% 4,1)	P= 1,000

DISCUSSION

Tube thoracostomy is the main procedure used for traumatic pneumothorax and hemothorax treatment. Generally, chest tubes with large diameters are preferred in these types of patients but there is no scientific evidence that it is more useful (4). There is no precise consensus on the most effective and reliable chest tube diameter in a patient with an emergency thoracic trauma, yet.

Two methods are usually used to insert the chest tube. The lateral approach is the most commonly used of these methods. Tube is inserted to the junction point of 4-6. intercostal space and mid-axillary line (5,6). The lateral approach is considered as the most appropriate method in trauma patients. It is called as the anterior approach or the Monaldi method, when the tube is inserted to the junction of 2-3. intercostal space and the midclavicular line (5, 6). This method is generally preferred in pneumothorax.

Two basic techniques are applied to insert the chest tube: with trocar and without trocar. It is thought that the use of chest tubes with trocar has a higher complication rate (7, 8). However, when chest tubes with trocar used with the right

technique, are compared with the chest tubes without trocar, the chest tubes with trocar are more advantageous because of small skin cut, the patient's being less traumatized and easier manipulation. The most important factor is the dissection of subcutaneous tissue up to pleural space during the insertion of chest tubes with trocar. Insertion of the chest tubes with trocar may cause sever complications as intrathoracic organ injury without dissection (9).

In our study, no statistically significant difference was found between the chest tubes with trocar and without trocar when they were compared in terms of complications in our study. Similarly, Dural et al. reported that there was no difference in terms of complications between the technique with trocar and without trocar. When they were compared in terms of tube malposition, the rate of tube malposition is 7.9% in the technique without trocar and 14% in the technique with trocar; and there was no statistically significant difference between them.

Recent studies have shown that the use of particularly chest tubes with small diameters (<14 F) has increased. In many studies, it has been observed that the chest tubes with small diameters used in trauma are compared with the chest tubes with larger diameters and the results are similar (10).

Although the difference in the indications of 20F chest tubes with trocars and 32F chest tubes without trocars used in our study was found statistically significant, there was no statistically significant difference in terms of their efficacy.

In our study, although the data were not recorded at the level of the statistical analysis, the time until the insert of the intrapleural space was evaluated after the insert of the chest tubes with trocar and without trocar in emergency conditions. According to our clinical experience, we can say that the intrapleural space can be reached in a much shorter time with chest tubes with trocars.

As a result, the chest tubes with trocar in small diameters provide immediate intervention to emergency patients, and they are as efficient as chest tubes in large diameters without trocars. In addition, there is no need for any other surgical instruments except lancet to insert chest tubes with trocar and this enables emergency intervention to the patients with thoracic trauma in any conditions..

REFERENCES

1. Miller KS, Sahn SA. Chest tubes. Indications, technique, management and complications. Chest 1987; 91:258–64.

2. Bailey RC. Complications of tube thoracostomy in trauma. J Accid Emerg Med 2000; 17:111–14.

3. Lilienthal H. Resection of the lung for suppurative infections with a report based on 31 operative cases in which resection was done or intended. Ann Surg 1922; 75:257-320.

4. Inaba K, Lustenberger T, Recinos G, et al. Does size matter? A prospective analysis of 28–32 versus 36–40 French chest tube size in trauma. J Trauma Acute Care Surg 2012; 72:422–7.

5. Tomlinson MA, Treasure T. Insertion of a chest drain: how to do it. Br J Hosp Med 1997; 58:248-52.

6. Symbas PN. Chest drainage tubes. Surg Clin North Am 1989; 69:41-6.

7. Fitzgerald M, Mackenzie CF, Marasco S, et al. Pleural decompression and drainage during trauma reception and resuscitation. Injury 2008; 39:9-20.

8. Laws D, Neville E, Duffy J. BTS guidelines for the insertion of a chest drain. Thorax 2003; 58:53-9.

9. Ergin M, Yeğinsu A, Gürlek K. Göğüs tüpü takılması. Ulusal Cerrahi Dergisi 2010; 26: 115-21.

10. Mahmood K, Wahidi MM.S traightening out chest tubes: what size, what type, and when. Clin Chest Med. 2013; 34:63-71.