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Original Article

Surgery Section

Assessment of Surgical Outcome of Trocar versus Blunt Dissection Technique for Intercostal Drainage Insertion: A Prospective Interventional Study

ASHITA ELIZABETH THOMAS[1], ANUPAMA K PUJAR[2], VR ANILKUMAR[3], SREEKAR A PAI[4]

ABSTRACT

Introduction: Chest tube insertion is a common procedure designed to alleviate the accumulation of air, fluid, pus, or blood in the pleural cavity. Despite being a bedside procedure often performed by emergency residents, Intercostal Drain (ICD) tube insertion carries associated risks, if not executed with care. Complications such as misplacement, organ injury, bleeding and pain are noteworthy concerns.

Aim: To assess surgical outcome of Trocar versus Blunt dissection technique for ICD insertion.

Materials and Methods: The present prospective interventional study was conducted in the Department of General Surgery, M S Ramaiah Hospitals, Bengaluru, India, from September 2018 and August 2020, with a sample size of 64 after obtaining Institutional Ethical Committee approval. Patients requiring ICD insertion were divided into two groups: Blunt (group A) and Trocar (group B) dissection, with 32 participants in each group. Demographic, clinical and diagnostic data were meticulously documented. Statistical analyses, including descriptive statistics, t-tests and Chi-square test, were employed to compare variables such as insertion time, complications and pain scores. Both groups were assessed for the time required for insertion and complications with each method during and after the procedure.

Results: The mean age among subjects with the Blunt dissection method and Trocar method was 45.53±14.85 years and 45.06±10.46 years, respectively. In the Blunt dissection technique, 6 (18.8%) were females and 26 (81.3%) were males, while of those who underwent the Trocar method of insertion, 7 (21.9%) were females and 25 (78.1%) were males. The present study findings revealed that the Trocar method demonstrates comparable surgical outcomes to the Blunt dissection method. Trocar insertion proves notably quicker, especially in obese patients. The time taken for insertion was significantly longer (p-value<0.001) with the Blunt dissection method (17.53±8.835 min) compared to the Trocar method (2.31±0.998 min). Significantly more pain was experienced by patients with the Blunt dissection method compared to the Trocar method on day 1 (p-value<0.001). There was no statistically significant difference found between Visual Analog Scale (VAS) score and method of insertion postprocedure. There was a statistically significant difference found between malposition and method of insertion. With the conventional method of insertion, 43.8% of patients had malposition, whereas with the Trocar method of insertion, 18.8% had malposition. Postprocedural complications, including bleeding and infection rates, were comparable between the two methods.

Conclusion: In conclusion, the Trocar method exhibits similar surgical outcomes to the Blunt dissection method, with added advantages of reduced insertion time and reduced malposition. Proper training plays a pivotal role in mitigating potential complications, making the Trocar method a clinically viable option for ICD procedures.

Keywords: Chest tube, Pleural cavity, Thoracostomy, Treatment outcome

INTRODUCTION

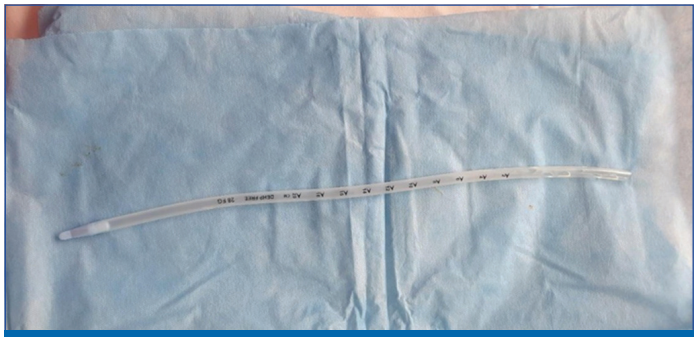
Chest tube insertion is a common procedure in General surgery practice to drain pneumothorax, haemothorax and pleural effusion. Most of the time, a single tube is required to drain the pleural cavity, unless specific indications warrant the use of two tubes. Pleural diseases are extremely prevalent, affecting approximately 3000 individuals per million in the United Kingdom (UK) annually [1].

Traumas, particularly those stemming from traffic accidents, stand as the leading cause of death within the initial four decades of life [2]. While thoracic traumas may not always necessitate surgical intervention, they can have severe consequences, with around 18% of patients requiring a chest drain and 2.6% undergoing thoracotomy [3]. In instances of penetrating chest trauma, ICD placement proves effective in up to 95% of cases without necessitating further surgical exploration [4,5]. Consequently, ICD emerges as a crucial, life-saving procedure in chest trauma and serves as the primary treatment option for various chest diseases.

The primary objective of ICD tube insertion is to maintain lung ventilation for adequate oxygenation of body tissues. This is achieved through chest decompression, which reduces intrapleural pressure, enabling the lungs to fully expand [6].

ICD insertion is a common procedure, most of the time performed by residents. However, it is associated with risks, if not performed with care, as it requires skill and knowledge about the chest wall. The most common complications found in the literature which are noteworthy are misplacement, organ injury, bleeding, surgical emphysema and pain [6]. The debate surrounding the preferred approach, Blunt method versus Trocar insertion method adds to the complexity of the procedure. In 2008, a National Patient Safety Agency (NPSA) Alert, prompted by a considerable number of deaths and serious iatrogenic complications following chest drain insertion, underscored concerns about training, supervision and the limited availability of Thoracic Ultrasound (TUS) [7]. After this alert, the British Thoracic Society (BTS) Pleural Disease Guideline strongly recommended the use of TUS for all pleural procedures, advocating the development of local hospital policies and training for pleural diseases [8].

In the Blunt dissection method [Table/Fig-1,2], layers of the chest wall are traversed gradually until the pleural cavity is reached, at which point a finger is inserted to detect any pleural adhesions. However, this technique can be particularly challenging in obese individuals, as the thickness of the chest wall may hinder finger access to the pleural cavity, making the insertion of an ICD tube cumbersome.



[Table/Fig-1]: A 28F ICD used for Blunt dissection technique.

[Table/Fig-2]: Blunt dissection technique of ICD insertion.

In the Trocar technique [Table/Fig-3,4], navigating the chest wall is generally easier, especially in obese individuals, facilitating the insertion of an ICD tube. However, due to its blind nature, there remains a risk of vascular and organ injuries that cannot be entirely eliminated [6]. Amidst the evolving landscape of advanced diagnostic and therapeutic interventions for pleural diseases, specialist pleural services have emerged in numerous UK hospitals. Despite this, there remains a scarcity of studies analysing the various techniques of ICD insertion [6]. Thus, the present study was aimed to assess the surgical outcome of Trocar versus Blunt dissection technique of ICD insertion.

[Table/Fig-3]: A 28F trocar.

[Table/Fig-4]: Trocar method of insertion of ICD.

MATERIALS AND METHODS

This was a prospective interventional study conducted in the Department of General Surgery, M S Ramaiah Hospitals, Bengaluru, India, from September 2018 to August 2020 after receiving Institutional Ethical Committee approval (EC/PG37/2018).

Inclusion criteria: All patients requiring ICD tube insertion with moderate to severe pneumothorax, haemothorax, or pleural effusion and patients aged between 18-80 years were included in the study.

Exclusion criteria: Patients with mild pneumothorax/haemothorax or pleural effusion, with coagulopathies and those aged less than 18 years or more than 80 years were excluded from the study.

The study included patients requiring ICD insertion for various indications who met the predefined inclusion and exclusion criteria. Informed consent was obtained from all participating patients prior to their inclusion in the study.

Sample size calculation: The sample size was calculated based on a previous study conducted by Dural K et al., in which it was found that the complication rate was 13.3% for Blunt ICD insertion compared to 7.8% in the Trocar method of insertion [9]. In the present study, expecting a similar difference in the complication rate between the groups, considering a power of 80% and an alpha error of 5%, the sample size was calculated to be a minimum of 32 in each group.

Study Procedure

A total of 64 patients who required ICD tube insertion were included in the study after obtaining informed consent. They were allocated into two groups on an alternate basis into Group A and Group B. Group A consisted of 32 patients subjected to Blunt ICD tube insertion, and another 32 patients in Group B were subjected to the Trocar method of ICD tube insertion.

Data were collected in a preformed proforma that included demographic data, indications for ICD, and method of ICD insertion. The parameters assessed were:

1) Time required for insertion with each method;
2) Pain (VAS score assessed on Day 1, 5 and 10);
3) Complications during the procedure such as pain (VAS score) and bleeding;
4) Postprocedure complications such as malposition, bleeding (bleeding in the ICD bag when there was no haemothorax primarily), organ injury and infection.

STATISTICAL ANALYSIS

The data were analysed using SPSS software. All quantitative variables will be summarised using descriptive statistics such as mean and standard deviation. All qualitative variables will be summarised and presented using frequency and percentage. The comparison of time required between the two groups will be carried out using an Independent t-test or Mann-Whitney U test. The comparison of complication rates between the two groups will be carried out using a Chi-square test. A p-value of ≤0.05 was considered statistically significant.

RESULTS

The study included 64 patients, with 32 in each group (Blunt dissection and Trocar method). Among the patients subjected to the Blunt dissection technique, 6 (18.8%) were females and 26 (81.3%) were males, while of those who underwent the Trocar method of insertion, 7 (21.9%) were females and 25 (78.1%) were males. The mean age among subjects with the Blunt dissection method was 45.53±14.85 years, and the mean age among subjects with the Trocar method was 45.06±10.46 years. Although there was a variation in

the percentage of overweight and obese individuals between the Blunt dissection and Trocar insertion methods, this variance was not statistically significant (p-value=0.421) [Table/Fig-5].

Category	Method of insertion		Total	p-value
	Conventional	Trocar		
Normal	16	13	29	0.421
	50%	40.6%	45.3%	
Overweight	9	14	23	
	28.1%	43.8%	35.9%	
Obese	7	5	12	
	21.9%	15.6%	18.8%	
Total	32	32	64	-
	100%	100%	100%	

[Table/Fig-5]: Distribution of subjects according to Body Mass Index (BMI) and method of insertion of chest tube.
Values presented as n and %; Chi-square test used; p-value<0.05* statistically significant

When comparing the method of insertion in relation to various medical conditions such as Chronic Obstructive Pulmonary Diseases (COPD), diabetes, hypertension, and smoking, no statistically significant differences were observed between the groups (p-value>0.05). The distribution of these medical conditions was comparable in both the Blunt dissection and Trocar insertion groups [Table/Fig-6]. Although there were slight variations in the percentages of moderate/severe haemothorax and pleural effusion between the methods, these differences were not found to be statistically significant (p-value=0.803). Consequently, the choice of insertion method does not significantly impact the distribution of indications for ICD insertion [Table/Fig-7].

Co-morbidities	Method of insertion		Total	p-value
	Conventional	Trocar		
COPD	3	3	6	1.00
	9.4%	9.4%	9.4%	
Diabetes	4	5	9	0.719
	12.5%	15.6%	14.1%	
Hypertension	4	4	8	1.00
	12.5%	12.5%	12.5%	
Smoking	3	1	4	0.302
	9.4%	3.1%	6.3%	

[Table/Fig-6]: Distribution of subjects according to co-morbidities and method of insertion.
Chi-square test used; p-value<0.05*; Statistically significant

Variables	Method of insertion		Total	p-value
	Conventional	Trocar		
Moderate/severe pneumothorax	12	12	24	0.803
	37.5%	37.5%	37.5%	
Moderate/severe haemothorax	12	14	26	
	37.5%	43.8%	40.6%	
Moderate/severe pleural effusion	8	6	14	
	25.0%	18.8%	21.9%	
Total	32	32	64	-
	100%	100%	100%	

[Table/Fig-7]: Distribution of subjects according to aetiology and method of insertion.
Chi-square test used; p-value<0.05; statistically significant

The time taken for insertion was significantly longer (p-value <0.001) with the Blunt dissection method (17.53±8.835 min) compared to the Trocar method (2.31±0.998 min) [Table/Fig-8]. There was a statistically significant difference found between Body Mass Index (BMI) and the time taken for insertion of the ICD. In the Blunt technique, the time taken to insert the ICD was longer as BMI increased, which was statistically significant (p-value=0.01). However, in the Trocar technique, the time taken to insert the ICD considering BMI was found to be statistically insignificant [Table/Fig-9].

Method of insertion	Mean (minutes)	SD	p-value
Conventional	17.53	8.835	<0.001*
Trocar	2.31	0.998	

[Table/Fig-8]: Comparison of mean time taken for insertion between two methods of insertion.
Independent t-test used; p-value<0.05* statistically significant

Method	BMI	Mean (minutes)	SD	p-value
Conventional	Normal	13.25	7.620	0.01*
	Overweight	17.56	7.552	
	Obese	27.29	4.716	
Trocar	Normal	2.00	0.913	0.334
	Overweight	2.57	1.089	
	Obese	2.40	0.894	

[Table/Fig-9]: Comparison between method of insertion and BMI with mean time taken in minutes.
Independent t-test used; p-value<0.05*; statistically significant

There was a significant difference in the VAS scores for pain on day 1 between the two methods (p-value<0.001), but not on days 5 and 10 [Table/Fig-10]. All patients experienced pain during the procedure. Bleeding during the procedure was observed in a slightly higher percentage with the Trocar method, but the difference was not statistically significant [Table/Fig-11].

VAS score for pain	Method of insertion				p-value
	Conventional		Trocar		
	Mean	SD	Mean	SD	
Day 1	6.44	0.50	5.22	0.75	<0.001*
Day 5	2.84	0.57	2.75	0.76	0.580
Day 10	0.47	0.51	0.66	0.48	0.135

[Table/Fig-10]: Comparison of VAS score for pain according to method of insertion.
Independent t-test used; p-value<0.05* Statistically significant

Variables	Method of insertion		Total	p-value
	Conventional	Trocar		
Pain	32	32	64	-
	100%	100%	100%	
Bleeding	8	10	18	0.576
	25%	31.3%	28.1%	

[Table/Fig-11]: Distribution of subjects according to complication during procedure and method of insertion.
Chi-square test used; p-value<0.05* statistically significant

Complication rates during the procedure (other than bleeding) were comparable between the two methods. Malposition after the procedure was significantly higher (p-value=0.031) in the Blunt dissection group compared to the Trocar group [Table/Fig-12]. Infection rates after the procedure were similar between the two groups. Organ injury was observed only in the Trocar method group, but the difference was not statistically significant. Bleeding after the procedure did not show a statistically significant difference between the two groups. The bleeding was mild, which did not require any surgical intervention.

DISCUSSION

The current study reveals a noteworthy contrast in the insertion time of ICDs, with the Trocar method exhibiting swifter performance. While complication rates remained relatively comparable across both methods, the Trocar group demonstrated a notably reduced incidence of mispositioning.

The ICD insertion is an invasive procedure, and complications can result from inadequate knowledge of thoracic anatomy or

Variables	Method of insertion		Total	p-value
	Conventional	Trocar		
Malposition	14	6	64	0.031*
	43.8%	18.8%	100%	
Bleeding	3	2	5	0.641
	9.4%	6.3%	7.8%	
Organ injury	0	2	2	0.151
	0	6.3%	3.1%	
Infection	2	1	3	0.554
	6.3%	3.1%	4.7%	

[Table/Fig-12]: Distribution of subjects according to complication postprocedure and method of insertion.
Chi-square test used; p-value<0.05* statistically significant

inadequate training and experience. A sound knowledge of the anatomy of the thorax is important to avoid some complications of ICD insertion. The mean age of subjects in the present study with the conventional method of insertion was 45.53±14.85 years, and among subjects with the Trocar method of insertion was 45.06±10.46 years, and the study group was dominated by male patients in numbers. In a study by Kong VY et al., 91% were males (918/1,006). The median patient age was 24 years with Interquartile Range (IQR): 20-29 years [10]. This may be because most outdoor activities are done by males, and smoking is more prevalent in men. They are more prone to road traffic accidents and COPD, leading to a higher chance of developing pneumothorax. The hospital where the study was conducted, being a tertiary care center with an acute trauma unit, had the majority of the study cases in both methods as road traffic accidents attributing to the cause for pneumothorax and haemothorax.

The mean time taken for insertion was significantly lower with the Trocar method compared to the conventional method (2.31 minutes vs 17.53 minutes, p-value<0.001). The Trocar method exhibits a lower standard deviation, indicating less variability in the time taken for insertion compared to the conventional method. This was a significant finding in the present study, which was not previously considered in other studies. For the conventional method, there was a significant difference in mean insertion time among different BMI categories (p-value=0.01). The mean insertion time increases with increasing BMI, with the highest mean time observed in the obese category.

For the Trocar method, there was no significant difference in mean insertion times among different BMI categories (p-value=0.334). The mean insertion time remained relatively consistent across normal, overweight, and obese categories. This may be because of the larger subcutaneous plane and thus difficulty in obtaining access in the Blunt method. A large body habit has been reported to be associated with more difficult ICD placement and higher complication rates [11,12].

The average rate of complications during or following the placement of a chest tube is less than 10%, and mainly depends on operator experience, the size of the tube, and the use of imaging to guide insertion [13]. In a study by José M, the most frequent immediate complication was pain (4.1%) [14]. In Molnar TF study, bleeding was the most common complication, and it was related to intercostal vein or artery injury (reported to be up to 75% of serious complications) [4]. However, other intrathoracic vessels can be injured as well, with a lower incidence but with significantly higher morbidity and mortality [15]. In the present study, during ICD insertion, patients experienced pain and bleeding; however, the difference between the two methods was not statistically significant. However, the VAS showed the Trocar method had less pain compared to the conventional method, and it was statistically significant on day one. But there was no significant difference between the pain scores on days 5 and 10.

Postprocedural complications following ICD insertion can stem from various technical issues such as malpositioning, blocked drains, kinking of drains and potential organ injury or infective complications ranging from simple surgical site infection to necrotising fasciitis. As far as large catheter (≥20F) is concerned, commonly reported postinsertion complications are malposition (6.5%), drain blockage (5.2%), organ injuries (1.4%) and empyema [16]. Studies done in different clinical settings found the rate of Chest Tube Malposition (CTM) to be over 20% [17-19]. Harris A et al., noted that intrapulmonary placement was the most common adverse clinical event, constituting 38% of complications. Additionally, besides lung complications, laceration of the diaphragm could occur, potentially leading to injuries to abdominal organs such as the liver, spleen, stomach, and colon [17]. Empyema secondary to tube thoracostomy has been reported with complication rates, as low as, 1% and, as high as, 25%. The rate of infection increases with the presence of pleural effusion [20].

In the present study, malposition was found to be more common with the Blunt dissection method than the Trocar method, which was statistically significant. Two patients who underwent the Trocar method experienced organ injuries; one had a diaphragm perforation, and the other had a lung injury. The patient with diaphragm perforation required surgery. The infection rate was higher in the Blunt method; however, it did not reach statistical significance. These complications can potentially be mitigated through adequate training and proper positioning of the ICD tube within the safety triangle.

Limitation(s)

The present study faced several limitations, such as the lack of randomisation, variability in surgeon experience levels, and a single-centre design. The absence of long-term follow-up may impact the interpretation of the results.

CONCLUSION(S)

The Trocar method demonstrated significantly shorter insertion times, offering potential efficiency benefits. While both methods showed similar complication rates, the Trocar method had lower malposition rates. The present findings suggest the superiority of the Trocar method, emphasising its efficiency and accuracy for ICD insertion. Further research, particularly randomised controlled trials with larger sample sizes, is needed to confirm these results and effectively inform clinical practice.

REFERENCES

[1] Rand D, Maskell I. Introduction and methods: British thoracic society pleural disease guideline 2010. Thorax. 2010;65(2):01-03.
[2] Simon B, Ebert J, Bokhari F, Capella J, Emhoff T, Hayward T 3rd, et al. Management of pulmonary contusion and flail chest: An Eastern Association for the Surgery of Trauma practice management guideline. J Trauma Acute Care Surg [Internet]. 2012;73(5 Suppl 4):S351-61. Available from: https://dx.doi.org/10.1097/TA.0b013e31827019fd.
[3] Bertoglio P, Guerrera F, Alberto VA, Terzi AC, Ruffini E, Lyberis P, et al. Chest drain and thoracotomy for chest trauma. J Thorac Dis. 2019;11(2):S186-91.
[4] Molnar TF. Thoracic trauma: Which chest tube when and where? Thorac Surg Clin. [Internet]. 2017;27(1):13-23. Available from: https://dx.doi.org/10.1016/j.thorsurg.2016.08.003.
[5] Kong VY, Oosthuizen GV, Clarke DL. Selective conservatism in the management of thoracic trauma remains appropriate in the 21st century. Ann R Coll Surg Engl [Internet]. 2015;97(3):224-28. Available from: https://dx.doi.org/10.1308/003588414X14055925061559.
[6] Omar P, Borkar A, Surin S. Trocar thoracostomy or blunt dissection thoracostomy-Which is safe? Int J Med Sci Public Health [Internet]. 2018;7(5):1. Available from: https://dx.doi.org/10.5455/ijmsph.2018.02058240022018.
[7] Lamont T, Surkitt-Parr M, Scarpello J, Durand M, Hooper C, Maskell N. Insertion of chest drains: Summary of a safety report from the National Patient Safety Agency. BMJ [Internet]. 2009;339(dec02 3):b4923. Available from: https://dx.doi.org/10.1136/bmj.b4923.
[8] Evison M, Blyth KG, Bhatnagar R, Corcoran J, Saba T, Duncan T, et al. Providing safe and effective pleural medicine services in the UK: An aspirational statement from UK pleural physicians. BMJ Open Respir Res [Internet]. 2018;5(1):e000307. Available from: https://dx.doi.org/10.1136/bmjresp-2018-000307.

[9] Dural K, Gulbahar G, Kocer B, Sakinci U. A novel and safe technique in closed tube thoracostomy. J Cardiothorac Surg [Internet]. 2010;5(1):21. Available from: https://dx.doi.org/10.1186/1749-8090-5-21.
[10] Kong VY, Oosthuizen GV, Sartorius B, Keene C, Clarke DL. An audit of the complications of intercostal chest drain insertion in a high volume trauma service in South Africa. Ann R Coll Surg Engl [Internet]. 2014;96(8):609-13. Available from: https://dx.doi.org/10.1308/003588414x14055925058599.
[11] Kwiatt M, Tarbox A, Seamon MJ, Swaroop M, Cipolla J, Allen C, et al. Thoracostomy tubes: A comprehensive review of complications and related topics. Int J Crit Illn Inj Sci [Internet]. 2014;4(2):143-55. Available from: https://dx.doi.org/10.4103/2229-5151.134182.
[12] Hernandez MC, Laan DV, Zimmerman SL, Naik ND, Schiller HJ, Aho JM. Tube thoracostomy: Increased angle of insertion is associated with complications. J Trauma Acute Care Surg [Internet]. 2016;81(2):366-70. Available from: https://dx.doi.org/10.1097/TA.0000000000001098.
[13] Filosso PL, Guerrera F, Sandri A, Roffinella M, Solidoro P, Ruffini E, et al. Errors and complications in chest tube placement. Thorac Surg Clin [Internet]. 2017;27(1):57-67. Available from: https://dx.doi.org/10.1016/j.thorsurg.2016.08.009.
[14] José M. Chest tube drainage of the pleural space: A concise review for pulmonologists. Tuberc Respir Dis. 2018;81:106-15.
[15] Gabriel CA, Adama DP, Salmane BP, Magaye G, Souleymane D, Mohamed L, et al. A case report of iatrogenic pulmonary artery injury due to chest-tube insertion repaired under cardiopulmonary bypass. Case Rep Med [Internet]. 2013;2013:590971. Available from: https://dx.doi.org/10.1155/2013/590971.
[16] Anitha N, Kamath SG, Khymdeit E, Prabhu M. Intercostal drainage tube or intracardiac drainage tube? Ann Card Anaesth [Internet]. 2016;19(3):545-48. Available from: https://dx.doi.org/10.4103/0971-9784.185561.
[17] Harris A, O'Driscoll BR, Turkington PM. Survey of major complications of intercostal chest drain insertion in the UK. Postgrad Med J [Internet]. 2010;86(1012):68-72. Available from: https://dx.doi.org/10.1136/pgmj.2009.087759.
[18] Remérand F, Luce V, Badachi Y, Lu Q, Bouhemad B, Rouby J-J. Incidence of chest tube malposition in the critically ill. Anesthesiology [Internet]. 2007;106(6):1112-19. Available from: https://dx.doi.org/10.1097/01.anes.0000267594.80368.01.
[19] Struck MF, Ewens S, Fakler JKM, Hempel G, Beilicke A, Bernhard M, et al. Clinical consequences of chest tube malposition in trauma resuscitation: Single-center experience. Eur J Trauma Emerg Surg [Internet]. 2019;45(4):687-95. Available from: https://dx.doi.org/10.1007/s00068-018-0966-z.
[20] Kesieme EB, Dongo A, Ezemba N, Irekpita E, Jebbin N, Kesieme C. Tube thoracostomy: Complications and its management. Pulm Med [Internet]. 2012;2012:256878. Available from: https://dx.doi.org/10.1155/2012/256878.

PARTICULARS OF CONTRIBUTORS:
1. Postgraduate Student, Department of Vascular Surgery, M S Ramaiah Medical College, Bengaluru, Karnataka, India.
2. Professor, Department of General Surgery, Sapthagiri Institute of Medical Sciences and Research Centre, Bengaluru, Karnataka, India.
3. Associate Professor, Department of Emergency Medicine, M S Ramaiah Medical College, Bengaluru, Karnataka, India.
4. Associate Professor, Department of General Surgery, M S Ramaiah Medical College, Bengaluru, Karnataka, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:
Sreekar A Pai,
No. 15, 1st Main Road, Industrial Workers Layout, Bengaluru-560096, Karnataka, India.
E-mail: sreekarpai76@gmail.com

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