

Original Article

FREQUENCY OF IMMEDIATE PNEUMOTHORAX AFTER SUBCLAVIAN VENOUS CANNULATION

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Objective: To determine the frequency of immediate pneumothorax after subclavian venous cannulation.

Material and Methods: This clinical trial was carried out in Mayo Hospital in all four medical ward (East, West, North, and South) and Nephrology ward of Mayo Hospital, Lahore during the period from 15th March 2013 to 15th September 2013. It was descriptive case series study. A total of 450 cases fulfilling inclusion and exclusion criteria attending in patient department were selected. After antiseptic preparation of field, local anesthesia was administered. The subclavian vein was punctured at the junction between the middle and inner thirds of the clavicle. Negative pressure was maintained in the syringe to facilitate blood return when the subclavian vein was entered. A J guide-wire was advanced through the cannula to a length of 20 (15-16) cm. A small skin incision was placed at this site for ease of catheter passage. After dilatation, a catheter was inserted and advanced to predetermined point over the guide-wire. The lumen of catheter was sutured to avoid intra cardiac tip displacement and to prevent kinking and accidental withdrawal. Pneumothorax was checked by Chest X-ray taken within four hours of procedure.

Results: In our study, 41.56%(n=187) patients were between 30-50 years while 58.44%(n=263) were between 51-70 years, Mean+SD was calculated as 51.92 ±11.23 years, 57.56%(n=259) male and 42.44%(n=191) were females, frequency of immediate pneumothorax after subclavian venous cannulation was 6.44%(n=29) while 93.56%(n=421) had no findings of the such complications.

Conclusion: We concluded that the frequency of immediate pneumothorax among patients with subclavian venous cannulation is in agreement with other studies and not very high. But it is recommended that every patient who undergo with subclavian venous cannulation should be sorted out for pneumothorax. However, it is also required that every setup should have its surveillance in order to know the frequency of this complication.

Keywords: Subclavian venous cannulation, immediate pneumothorax, frequency.

Introduction

Central venous cannulation has become an integral component of modern medical care and has become an important skill for all hospital doctors and staff.¹ Central venous catheterization is implemented for volume resuscitation, hemodynamic monitoring, vasopressor administration, frequent blood sampling, parental nutritional support, hemodynamic monitoring and the administration of long term chemotherapy.² For hemodialysis, central venous catheters are used as a secure access to central circulation.³ The subclavian vein access has been the standard recommended approach for central venous catheterization both for short term and long term use. The advantages are attributed to its large size, patient comfort and the lower rate of catheter related infections, also carry a lower risk of catheter related thrombus when compared to femoral or internal jugular vein cannulation.⁴ The subclavian vein is 3-4cm long and

lies posterior to the medial third of the clavicle and is thought to be held upon by surrounding tissues in circulatory collapse. It has always been fraught with complications because it is performed blindly, guided by certain surface landmarks.⁵ One of the major complications associated with insertion of central venous catheter is pneumothorax due to inadvertent puncture of the lung at the time of inserting a needle into large vein.⁶ The risk factors includes multiple attempts, inexperienced hands, body mass index (> 30 or < 20), large catheter size, previous failed attempts and previous operation or radiotherapy in the area of interest.⁷

If pneumothorax occurs, it is important to recognize its signs and presence of asymptomatic pneumothorax. In a normal clinical routine, a chest X-Ray should be obtained within 4 hours after the procedure of subclavian venous cannulation.⁸ The overall frequency is typically quoted 4.9%.^{5,9} but this increases to about 10% if multiple attempts at

overall frequency is typically quoted 4.9%.5.9 but this increases to about 10% if multiple attempts at venepuncture are made.¹⁰ Subclavian venous cannulation is a common procedure in our setup and pneumothorax is its life-threatening complication. The purpose of my study is to determine the accurate frequency of this life threatening complication in our setup, as no specific local data regarding immediate pneumothorax is available here, with variable range of pneumothorax from (0.5% to 10%), so I wanted to estimate the actual frequency of immediate pneumothorax in our local setup with adequate sample size (450 cases), so that we can have preventive measure to avoid this life-threatening complication and take timely steps to manage it accordingly.

Material and Methods

Patients were selected from four Medical wards (East, West, North, South) and nephrology ward of Mayo Hospital, Lahore. The duration of the study was Six months after the approval of synopsis (15-03-2013 to 15-09-2013). A total of 450 cases fulfilling inclusion and exclusion criteria attending in patient department were selected. Informed written consent was taken before the procedure. After antiseptic preparation of field, local anesthesia was administered. The SV was punctured at the junction between the middle and inner thirds of the clavicle. Negative pressure was maintained in the syringe to facilitate blood return when the SV was entered. A J guide-wire was advanced through the cannula to a length of 20(15-16) cm. A small skin incision was placed at this site for ease of catheter passage. After dilatation, a catheter was inserted and advanced to predetermined point over the guide-wire. The lumen catheter was sutured to avoid intra cardiac tip displacement and to prevent kinking and accidental withdrawal. Pneumothorax was checked by Chest X-ray taken within four hours of procedure. All information was recorded on a specially designed Performa (attached).

According to Pneumothorax size, the management of Pneumothorax depends upon simple oxygen inhalation. (To resolve completely) to formal chest drain. Data was entered in computer program SPSS version 12. Descriptive statistics were used to analyze the data and frequency of Pneumothorax was calculated and presented in the form of frequency and percentages. Mean±S.D was calculated for graduation of data like age.

Results:

A total of 450 cases fulfilling the inclusion/exclusion criteria were enrolled to

determine the frequency of immediate pneumothorax after subclavian venous cannulation. Age distribution of the patients was from which shows that 41.56%(n=187) were between 30-50 years while 58.44%(n=263) were between 51-70 years, Mean+SD was calculated as 51.92+11.23 years. **(Table-1&2)**. Gender distribution of the patients shows 57.56%(n=259) male and 42.44%(n=191) were females. Frequency of immediate pneumothorax after subclavian venous cannulation reveals 6.44%(n=29) while 93.56%(n=421) had no findings of such complications. **(Table-3)**. Stratification for frequency of immediate pneumothorax after subclavian venous cannulation with regards to age was done which shows that out of 29 cases, 37.93%(n=11) were between 30-50 years and 62.07%(n=18) were between 51-70 years. **(Table-4)**.

Table-1-2: Age and Gender distribution (n=450).

Age in Years:	No of Patients	Percentage
30-50	187	41.56
51-70	263	58.44
Total	450	100
Gender:	No of Patients	Percentage
Male	259	57.56
Female	191	42.44
Total	450	100

Table-3: Frequency of immediate pneumothorax after subclavian venous cannulation (n=450).

Immediate Pneumotharax:	No of Patients	Percentage
Yes	29	6.44
No	421	93.56
Total	450	100

Table-4: Stratification for frequency of immediate pneumothorax after subclavian venous cannulation with regards to age (n=29).

Age in Years	No of Patients	Percentage
30-50	11	37.93
51-70	18	62.07
Total	29	100

Discussion

Catheterization of the subclavian vein viewed by physicians as a potentially dangerous procedure; in inexperienced hands, can lead to life-threatening complications. Pneumothorax is a well-known complication of central venous catheterization using

the jugular or subclavian approach.¹² It can occur within days after central venous catheterization, and diagnosis can sometimes be delayed.¹³

We planned this study with the view to determine the accurate frequency of this life threatening complication in our setup, as no specific local data regarding immediate pneumothorax is available here, with variable range of pneumothorax from (0.5% to 10%), so that we may have preventive measure to avoid this life-threatening complication and take timely steps to manage it accordingly. In our study, 41.56%(n=187) were between 30-50 years while 58.44%(n=263) were between 51-70 years, mean+SD was calculated as 51.92±11.23 years, 57.56%(n=259) male and 42.44%(n=191) were females, frequency of immediate pneumothorax after subclavian venous cannulation reveals 6.44%(n=29) while 93.56%(n=421) had no findings of the morbidity. The findings of the current study are in agreement with other studies showing the overall frequency i.e. 4.9%.^{5,9} and similarly with another study who recorded as 10% if multiple.¹⁰ Plaus WJ recorded pneumothoraxes in 6.6% and were most frequent after the insertion of large catheters.¹⁴ Another study by Taylor RW and

co-workers¹⁵ recorded that more than 15% of patients who undergo central catheterization experience complications such as pneumothorax, this frequency is higher than in our study, the reason is unknown. Though the current data is primary in our setup and more trials are required to authenticate the results of this study. However, by determining the frequency of this complication we may develop preventive measure to avoid this life-threatening complication and take timely steps to manage it accordingly.

Conclusion

We concluded that the frequency of immediate pneumothorax among patients with subclavian venous cannulation is in agreement with other studies and not very higher. But it is recommended that every patient who undergoing with subclavian venous cannulation should be sort out for pneumothorax. However, it is also required that every setup should have their surveillance in order to know the frequency of the problem.

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