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CENTRAL VENOUS PRESSURE LINE;

COMPLICATIONS IN SURGICAL CASES.

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ABSTRACT... Objective: To study the frequency of complications of central venous pressure line. **Study design.** Descriptive observational study. **Setting:** This study was carried out in surgical ward and intensive care unit of Fauji Foundation hospital Rawalpindi and Frontier Medical College Abbottabad. **Period:** From 2003-2007. **Methods and Materials:** One hundred consecutive surgical patients needing central venous line insertion above 14 years of age were included in the study. Patients under 14 years of age, with central venous line in situ at the time of admission, with thoracic trauma, chronic obstructive pulmonary disease, burns involving upper chest and neck areas, cardiovascular disease and bleeding disorders were excluded from this study. **Results:** 100 cases were included in the study with the range of age between 16-82 years. There were 76% female and 24% male. Out of these 100 cases 40 were suffering from malignancy, 20 were suffering from intestinal obstruction, 10 were with peritonitis and 30 cases were having miscellaneous disorders. Rate of complications of central venous line was 30% in this study. Rate of infection was 20%, rate of misplacement of catheter was 8% and rate of pneumothorax was 2% **Conclusion:** infection is the most common complication of the central venous line insertion followed by misplacement of catheter and pneumothorax, so it is important to take specific measures to minimize these complications

Key words: Central Venous (CV) line, Complications.

INTRODUCTION

In 1628 William Harvey discovered the anatomical basis for the intravenous infusion. Many studies were performed during the following centuries showing that solutions containing electrolytes and glucose could be given intravenously. Few years later it was shown that central venous catheter could be used to administer the infusions[1].

Central venous line is a flexible catheter inserted in to a large central vein with tip in the superior vena cava[2,3]. There are four types of central lines; including tunneled valve catheter, implanted port, non tunneled central venous catheter, peripherally inserted central catheter. Common sites of central line insertion are internal jugular and subclavian vein, femoral vein, median basilic vein at the elbow. The incidence reported in international literature is 2.25% for pneumothorax. There is a higher risk of pneumothorax during placement of this line in internal jugular. The incidence reported is 8% for misplacement of catheter tip and infection 1-14%. The left subclavian is more desirable than the right side, because this allows a smoother arc of the catheter once in place[4,17,18]. Central venous line is used for therapeutic and diagnostic purposes.

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Therapeutic indications are administration of chemotherapy, blood products, total parenteral nutrition, intravenous medications, Intravenous fluids, performance of plasmapheresis, or hemodialysis. Diagnostic indications are to establish or confirm a diagnosis, prognosis, or response to treatment, and for repeated blood sampling[5].

OBJECTIVES

The objective of this study is to evaluate the frequency of complications in patients with various problem needing central venous pressure line at Fauji Foundation Hospital Rawalpindi and Frontier Medical college abbottatabad.

MATERIAL AND METHODS

One hundred consecutive surgical patients needing central venous line insertion above 14 years of age were included in the study. Patients under 14 years of age, with central venous line in situ at the time of admission, with thoracic trauma, chronic obstructive pulmonary disease, burns involving upper chest and neck areas, cardiovascular disease and bleeding disorders were excluded from the study.

All patients included in this study were undergone the following routine investigations; blood complete picture, bleeding time/clotting time, blood glucose, urine routine examination, electrocardiogram, X-ray chest.

Under aseptic conditions with local anaesthesia, central venous lines were inserted according to standard method in right or left subclavian veins, internal jugular vein by using Seldinger technique. The accurate position of central venous lines was confirmed by x-ray chest and back flow of blood before the infusion of fluids. The central venous lines were adjusted as required on the basis of their positions on x-rays of chest. All these lines were secured with the skin suture and sterile dressings were done. After insertion of central venous lines the patients were monitored by recording of vital signs, Electrocardiogram, x-ray chest and serial examination of the patients.

Catheter- related mechanical complications were studied from insertion to removal, which were as follows; pneumothorax, haemothorax, misplacement of catheter tip, catheter- related infectious complications The catheter-related infections were identified by culture of the tip of central venous lines. All the complications noted were recorded in pre-designed Proforma. Frequency of occurrence of complication was assessed by using percentage.

RESULTS

Total 100 cases were included in this study average age of the patients was 46 years and the range was (16-82years). Total female patients were 76% and total male patients were 24%. In this study overall rate of complications was 30%. Frequency of various diseases with which the patients present for central venous line insertion were as fellows; 40% were with malignancy, 20% were with intestinal obstruction, 10% were included with peritonitis and 30% were with other Misc. diseases. Rate of complications was 30% in malignancy, 40% in intestinal obstruction, 40% in peritonitis and 20% in other Misc. diseases.

Table-I. Frequency of various diseases presenting for CV line insertion

Diseases	No of pts	No of complicated pts	%age
Malignancy	40	12	30%
Intestinal obstruction	20	8	40%
Peritonitis	10	4	40%
Miscellaneous	30	6	20%
Total	100	30	30%

In 96% cases the CVP lines were inserted in subclavian vein and in 4% cases the CV lines were inserted in internal jugular vein. Infection was recorded in 18 cases in subclavian vein, 2 cases in internal jugular vein. Rate of complications was 18.75% in subclavian vein CV line and 50%in the CV lines inserted in internal jugular vein. Total cases of misplacement were 8 at the insertion site in subclavian vein and the rate of complication was 8.33%. In these cases the tip of CVP lines were found in internal jugular vein and there was no misplacement in CVP lines inserted in internal jugular vein. Pneumothorax was noted in two cases only in subclavian vein and rate of complication was 2.08%. Complication rate was 0% at

the insertion site in the internal jugular vein.

Table-II. Percentage of complication of central venous line

Complications	Site of catheter insertion	
	Subclavian vein (n=96)	Internal jugular vein (n=04)
Infections	18(18.75)	2 (50%)
Misplacement of catheter	8(8.33)	0 (0%)
Pneumothorax	2(2.08)	0 (0%)

DISCUSSION

Central venous lines are increasingly used in critically ill patients for therapeutic and diagnostic purposes. Early complications of central venous insertion are injury to the surrounding vital structures and mal positioning of the catheter tip.

Catheter-related sepsis is one of the most common life threatening complications of CVP line. It is defined as signs of sepsis plus colonization of catheter. In most cases, the microorganisms invade the blood stream through the catheter insertion site, either by migration along the catheter external surface or through contamination that enters the internal port. The factors which increase patient's risk of catheter-related sepsis are: Poor insertion technique, multiple-lumen catheters, jugular insertion site, catheter material, long-term catheterization, frequent dressing changes, poor patient health and skin preparation.

In this study total number of patients was one hundred. Seventy-six were female and twenty-four were male patients. 98% of the complications were observed in females and 2% in male patients. Total number of patients with various malignancies was 40, rate of complications was 30%, total number of patients with intestinal obstruction was 20, rate of complications was 40%, total number of patients with peritonitis was 10, rate of complications was 40%, total number of patients with other diseases was 30 and rate of complications was 20%. There are studies showing that the rate of complications is increased in seriously ill and immunosuppressant patients[6,7]. The infections rate in this study was 20% while in international studies the infection rate between 1-14% has been reported[8,9]. Various causes of increased rate of infection in this study are poor aseptic technique, seriously ill immunosuppressed patients, quality of catheter as polyethylene catheters, are associated with highest risk of colonization and the silicon catheters have lowest risk of infection, multiple attempts of insertion, late dressing of the catheter insertion site, placement of catheter for long duration more than 4 days, lack of flushing of catheter with heparin solution, administration of prophylactic antibiotics before insertion of CVP lines were not given in two to five % cases[10,11,12,19,20]. In this study the rate of misplacement of the catheter was 8% while in other studies the rate of misplacement was 5.5%. This rate may be reduced up to that reported in international literature; if image guided insertion of CV line is practiced. This facility is not freely available. This increased incidence of misplacement is due to lack of experience of doctors and by not following the recommended procedure mentioned in various books[13, 14, 15].

Pneumothorax has been mentioned as the most common complication in international literature with an incidence of 2.55%. The incidence of this dreaded complication can be further reduced if image guided procedure is adopted for the insertion of CV line[16].In this study the incidence of pneumothorax is 2%, which is less than that reported in literature. This 2% incidence of pneumothorax has probably occurred due to multiple attempts at insertion of CVP and lack of experience of practicing doctors[21].

CONCLUSION

In this study the occurrence of infection is more than the reported one. It is necessary to adapt all possible aseptic measures to avoid sepsis. Misplacement is the 2nd most common complication which leads to loss of haemodynamic function of the CV line. To avoid this complication it is necessary that the doctor should be experienced and standard procedure of catheter insertion should be adopted with image guidance. Pneumothorax is the 3rd most common complication and the rate of pneumothorax in this study is less than the already reported. With the use of Image guided technique to pass CV line the incidence can be further reduced.

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