Original Article

Peripheral venous pressure as a reliable predictor for monitoring central venous

Vikas S Joshi[1*],Lulu Sherif[2]

[1]Junior Resident, [2]Associate Professor, Department of Anaesthesiology and Critical Care Medicine, Father Muller Medical College, Manglore, Karnataka, INDIA.
Email: vikass_joshi@yahoo.com

Abstract

Objectives: To determine a reliable association between changes in CVP and PVP in varied hemodynamic status in burns. To determine long term correlation during the first 10 hours. **Method:** The CVP and peripheral venous pressure (PVP) were measured simultaneously in 30 patients within 10 consecutive hours. **Results:** The mean difference between CVP and PVP was 1.628±0.84 mmHg. ($p<0.001$). The linear regression equation showed that CVP was 0.374+0.774 PVP (r2 = 0.725). Conclusion: PVP measured from a peripheral intravenous catheter in burns patients is an accurate estimation of CVP and its changes has good concordance with CVP over a long period of time.
Keywords: Peripheral venous pressure; Central venous pressure, Monitoring; burns

[*]**Address for Correspondence:**
Dr. Vikas S Joshi, Junior Resident, Department of Anaesthesiology and Critical Care Medicine, Father Muller Medical College, Manglore, Karnataka, INDIA.
Email: vikass_joshi@yahoo.com
Received Date: 17/01/2015 Revised Date: 13/12/2015 Accepted Date: 15/01/2016

Access this article online	
Quick Response Code:	Website: www.medpulse.in
	DOI: ---

INTRODUCTION

Burns patients frequently require monitoring of central venous pressure(cvp). There are some risks associated with catheterisation , including arterial puncture,pneumothorax,surgical sites, altered anatomy due to burns and contractures pose a significant risk for CVP catheter placement in certain patients[1,3]. In view of the above restrictions, studies were carried out to show the correlation between CVP and peripheral venous pressure (PVP)measurements[1,3,4]. In emergency conditions, the estimation of CVP is possible via measurement of PVP.

AIM OF THE STUDY

To determine a reliable association between changes in CVP and PVP in varied hemodynamic status in burns. Long term correlation during the first 10 hours.

MATERIALS AND METHODS

SOURCE OF DATA

30 burns patients admitted to burns ICU at Father Muller Medical College Mangalore.

CVP access- 7 Fr triple-lumen, Arrow International catheter with placement via the left or right internal jugular or subclavian vein. The peripheral measurement of CVP was obtained from a peripheral intravenous (IV) site using a standard IV catheter. CVP was measured from both the central venous catheter and the peripheral IV catheters, simultaneously.

MONITORS

Philips and Spacelabs monitoring device

The following parameters were recorded hourly, for a period of 10 hours.

Age
Weight
Height
Site of CVP
Site of PVP and IV catheter size.

ANALYSIS OF DATA

The differences between the central and peripheral CVP were evaluated using paired t test.

The predictability of CVP by PVP was examined using linear regression analysis at a p value of ≤ 0.05.

RESULTS

Demographic data:
Age : 18 to 65 years
Weight : 40 to 65 kgs
Gender distribution: 20 males and 10 females
The predictability of CVP by PVP was tested by applying the linear regression
The overall mean difference between CVP and PVP was 1.628±0.84 mmHg ($p<0.001$).

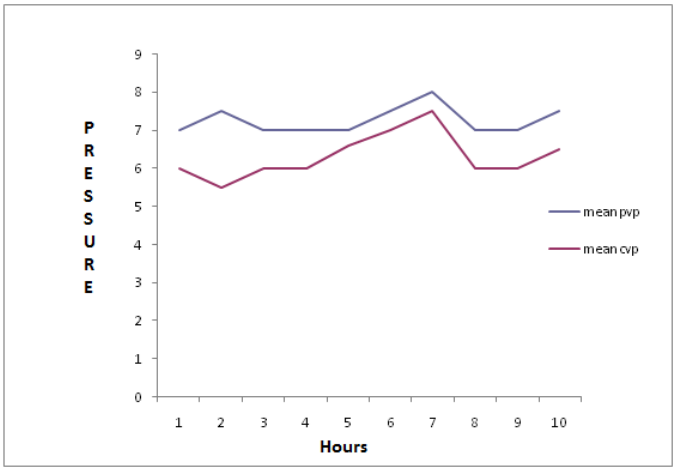

Figure 1: Linear regression plot of PVP versus CVP during 10 hours with 95% confidence interval

The mean difference between CVP and PVP in each hour is shown below.

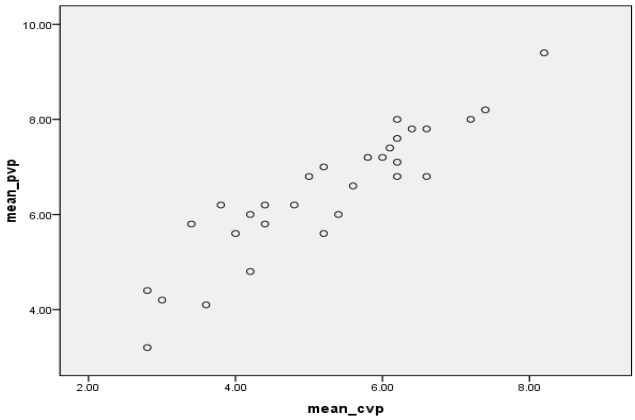

Figure 2: The top tracing shows the mean PVP and the bottom tracing is the simultaneous mean CVP. The distance between the two tracings shows the difference of pressure over a long period of time remains almost constant.

For estimation of agreement between CVP and PVP during the 10 hours period, Bland-Altman diagram was used.

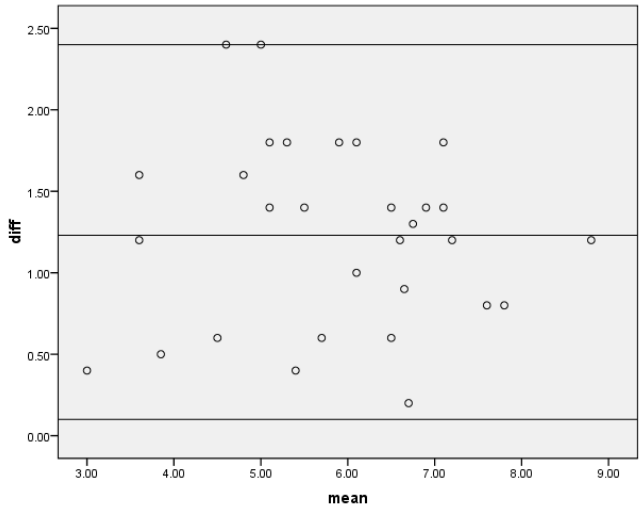

Figure 3: Bland-Altman diagrams for the comparison between CVP and PVP measurements during 10 hours in 30 patients. The dotted horizontal line indicates perfect agreement (difference of -1.2),the dotted lines indicate a clinically relevant difference of plus or minus 1.96. standard deviation (SD)

DISCUSSION

Previous studies have shown a consistent correlation between CVP and PVP measurements. However, studies in burns groups are limited and shows controversial results. The results in our study were comparable with Amar *et al*. who demonstrated the same intra operatively during both mechanical ventilation and spontaneous ventilation.[1] Tugrul *et al.,*[4] used different catheter sizes (for PVP measurement) and different patient positions during simultaneous measurement of PVP and CVP measurement at random time points. They concluded that a constant relationship exists between PVP and CVP with 2-mmHg difference. Hoftman *et al.,*[5] confirm that PVP correlates with CVP even under adverse hemodynamic conditions in patients undergoing liver transplantation. Munis et al.[6] Reported their experience with PVP in 15 patients undergoing neurosurgical procedures. They observed a significant relationship between PVP and CVP with a Pearson coefficient of 0.82.

CONCLUSION

CVP can be estimated from PVP measurement. The differences between CVP and PVP remain relatively constant over a period of time. Therefore, evaluation of hemodynamic changes occurring with dehydration or volume overload can be made by measuring PVP.

REFERENCES

1. Amar D, Melendez JA, Zhang H, Dobres C, Leung DH, Padilla RE. Correlation of peripheral venous pressure and central venous pressure in surgical patients. *J Cardiothorac Vasc Anesth* 2001;**15**:40-3. [11254838][doi:10.1053/jcan.2001.20271]
2. Drazner MH, Rame JE, Dries DL.Third heart sound and elevated jugular venous pressure as marker of the subsequent development of heart failure in patients with asymptomatic left ventricular dysfunction.*Am J*
3. Otto CW. Central venous pressure monitoring. In: Blitt CD. Monitoring in anesthesia and critical care medicine1980. Churchill Livingstone,New York 1985; p. 121-165
4. Tugrul M, Camci E, Pembeci K, Al-Darsani A and Telci L. (2004). Relationship between peripheral and central venous pressures in different patient positions, catheter sizes, and insertion sites.Journal of Cardiothoracic and Vascular Anesthesia; 18 (4 August): 446-50.
5. Hoftman N, Braunfeld M, Hoftman G and Mahajan A. (2006).Peripheral venous pressure as a predictor of central venous pressure during orthotopic liver transplantation. Journal of Clinical Anesthesia; 18: 251-55.
6. Munis JR, Bhatia S,Lozada IJ(2001) Peripheral venous pressure as a hemodynamic variable in neurosurgical patients .Anesth Analg 92:172-79.

Source of Support: None Declared
Conflict of Interest: None Declared