

Comparative Study of the Perioperative Care of Head and Neck Surgical Patients with and without Central Venous Pressure Line

Amjad Ali*, Muhammad Khurram**, Fozia Anis Khan***, Syed Muhammad Khalid Shah****

*Department of Anaesthesia, Bolan Medical College Quetta;

**Department of Medicine Holy Family Hospital and Rawalpindi Medical College, Rawalpindi;

***Department of Anaesthesia, Aga Khan University Hospital Karachi;

****Department of Medicine, Bolan Medical College Quetta.

Abstract

Background: To study the practice of central venous pressure (CVP) line insertion in perioperative head and neck surgical patients.

Methods: In this comparative study, patients undergoing elective major head and neck surgery were divided into two groups. Group I (n=22) included those with CVP line insertion and Group II (n=38) without CVP line insertion. Perioperative patient care was assessed in terms of clinical (perioperative hypotension, oliguria, and transfusion requirement) and laboratory parameters (pre and post operative hemoglobin, and estimated blood loss).

Results: No significant difference was noted between the two groups in terms of age, gender, weight, and pre-operative hemoglobin levels. Both groups differed significantly in terms of co-morbidities (68%:36%, $p<0.05$), hypotension (50%:15%, $p<0.05$), oliguria (31.8%:7.8%, $p<0.05$), post operative haemoglobin (9.75 ± 1.10 : 10.52 ± 1.11 g, $p<0.05$), and estimated blood loss (846 ± 420 : 588 ± 290 ml, $p<0.05$).

Conclusion: CVP line insertion in major head and neck surgery patients is influenced by presence of co-morbidities. Perioperative patient care does not improve with CVP line insertion.

Key Words: Central Venous Pressure, Head and Neck, Surgery, Co-morbidity.

Introduction

In 1959, Hughes and Magovern described technique of right atrial monitoring for guiding blood volume replacement in post-thoracotomy patients.¹ Subsequently relationship of central venous pressure (CVP) with blood loss and blood transfusion was described. Since then, CVP monitoring has become

standard tool for guiding fluid therapy in operating room and intensive care units (ICU). Precise information is not available regarding correlation between presence and absence of CVP monitoring and intraoperative fluid status.² Parameters like total urine output, oliguria, and hypotension, estimated blood loss, need for blood transfusion, and total intravenous fluid administration also need to be considered in assessment of fluid status in addition to CVP.

Major head and neck surgery, particularly in patients with oropharyngeal cancers entails complex and lengthy operations during which appropriate fluid management can be difficult.³ Use of CVP monitoring to assess intraoperative fluid status during major head and neck surgery is quite common.

Patients and Methods

This study was conducted at Aga Khan University Hospital. Patients undergoing elective major head and neck surgery in two successive years were included.

Patients were divided in two groups based on CVP line insertion or not. Major head and neck surgery was defined as a head and neck surgical procedure with a minimum duration of four hours and an expected blood loss equal to or greater than 500 ml. Perioperative patient care was assessed in terms of clinical and laboratory parameters. Clinical parameters included; perioperative hypotension [systolic blood pressures <90 mm Hg or more the 20 % drop from base line at any time during procedure following incision], oliguria (defined as a urine output of less than 0.5 ml/kg/hr at one or more hourly intervals), and transfusion requirement. Laboratory parameters included pre and post operative hemoglobin, and estimated blood loss which was calculated with modified Gross formula.⁴ Obtained data was analyzed for statistically significant difference between the two

groups employing t test or Chi² test wherever appropriate.

Results

Sixty (60) patients were included. Head and neck cancer resection and reconstruction with a pectoralis major myocutaneous flap were most frequently performed procedures. 36.6% (n=22) patients had CVP line insertion and were grouped as Group I. 63.4% [n=38] patients in whom CVP line insertion was not done were grouped as Group II. Difference of age, gender, weight and preoperative haemoglobin were insignificant between the two groups (Table 1). Both groups differed significantly in terms of comorbidities, hypotension, oliguria, post operative haemoglobin and estimated blood loss (Table 2)

Table I. Mean age, weight, duration of procedure, pre and post operative haemoglobin

	Group I n = 22	Group II n = 38	p Value
Age	58.36 ± 7.6	55.49 ± 8.5	> 0.05
Gender (m/f)	12/10	27/12	> 0.05
Weight (Kg)	71.14 ± 8.9	68.92 ± 8.6	> 0.05
Duration of surgery (hours)	5.82 ± 0.95	5.36 ± 0.85	> 0.05
Co-morbidities	15 (68 %)	14 (36 %)	< 0.05

Table 2: Frequency of gender, presence of co-morbidities, need for blood transfusion, hypotension, and oliguria

	Group I n = 22	Group II n = 38	p Value
Pre operative haemoglobin (gm/dl)	11.99 ± 1.32	12.3 ± 1.48	>0.05
Post operative haemoglobin (gm/dl)	9.75 ± 1.10	10.52 ± 1.11	<0.05
Estimated blood loss (ml)	864.28 ± 420	588 ± 290	<0.05
Blood transfusion	6 (27 %)	4 (10.5 %)	<0.05
Drop in urinary output	7 (31.8%)	3 (7.8%)	<0.05
Hypotension	11 (50%)	6 (15 %)	<0.05

Discussion

Preventing dehydration, effective circulating volume maintenance, and appropriate perfusion of tissues are goals of intravenous fluid therapy in patients undergoing major surgical procedures.⁵ CVP monitoring is considered important in this context and majority of anaesthesiologists use CVP monitoring during surgical procedures.⁶ CVP monitoring was performed in 36.6% patients in present study. Data, regarding worldwide utilization and in local context, for the utilization of CVP monitoring is ill-illuminated. In a random evaluation of over 100 charts at the University of Iowa Hospitals, CVP monitoring in major head and neck surgery was done in 49% of cases.²

On one hand no significant difference was noted between the two groups with reference to age, gender, weight, and pre-operative haemoglobin levels that make the groups comparable. On the other hand both groups differed significantly in terms of co-morbidities that were reason for passing CVP line in these patients. CVP monitoring in Group I was meant for better fluid and volume management, intraoperative and postoperative hemodynamic stability and to avoid complications like hypotension, oliguria, pulmonary edema, congestive heart failure, and myocardial infarction.⁷

Significantly more Group I patients had higher estimated blood loss, drop in post-operative hemoglobin, and need for blood transfusion. Similarly hypotension and drop in urinary output were also more frequent in Group I. It is interesting that CVP monitoring in Group I patients was done to circumvent these problems. Higher frequency of co-morbidities seems most important reason for this difference.

CVP monitoring is associated with adverse events that are hazardous to patients and expensive to treat.^{7,8} More than 15% patients who have CVP line insertion have complications which include mechanical problems(5-19%), infections(5-26%), and thrombosis (2-26%).^{8,9} No mechanical complication was noted by us during CVP line placement. Other complications were not investigated.

Less is known regarding whether the benefits of CVP monitoring in routine surgery outweigh the risks and costs or not. Majority of intensivists and similar percentage of anaesthesiologists use CVP to guide fluid therapy.⁶ It has been suggested that use of central venous monitoring to provide a gauge for fluid and blood replacement during major head and neck surgery doesn't alter the amount of total intravenous

fluid or blood administered.¹⁰ A systematic review concluded that although measurement of the CVP may be useful in select circumstances, it should no longer be routinely measured in the ICU, operating room, or emergency department⁸. In our patients CVP is usually passed in patients with higher frequency of comorbidities for better volume replacement..

Conclusion

1. Major reason for CVP line insertion and monitoring in patients undergoing elective major head and neck surgery is presence of co-morbidities.

2. Significantly accelerated hypotension, drop in urinary output, blood loss, drop in post-operative hemoglobin, and need for blood transfusion is noted in these patients.

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