Central venous catheter

A central venous catheter (CVC), also known as a central line, central venous line, or central venous access catheter, is a catheter placed into a large vein. Catheters can be placed in veins in the neck (internal jugular vein), chest (subclavian vein or axillary vein), groin (femoral vein), or through veins in the arms (also known as a PICC line, or peripherally inserted central catheters). It is used to administer medication or fluids that are unable to be taken by mouth or would harm a smaller peripheral vein, obtain blood tests (specifically the “central venous oxygen saturation”), and measure central venous pressure.

Indications

Central venous catheterization is useful for hemodynamic monitoring, rapid fluid infusion, and administration of hyperosmolar medications, including vasopressors, antibiotics, chemotherapy, and parenteral nutrition.

It remains unclear whether the use of central venous catheters (CVC) improves a patient's clinical outcome after elective intracranial supratentorial procedures.

METHODS: This two-armed, single-center retrospective study sought to compare patients undergoing elective intracranial surgery with and without CVCs. Standard anaesthesia procedures were modified during the study period resulting in the termination of obligatory CVC instrumentation for supratentorial procedures. Peri-operative adverse events (AEs) were evaluated as primary endpoint.

RESULTS: The data of 621 patients in total was analysed in this study (301 with and 320 without CVC). Patient characteristics and surgical procedures were comparable between both study groups. A total of 132 peri-operative AEs (81 in the group with CVC vs. 51 in the group without CVC) regarding neurological, neurosurgical, cardiovascular events and death were observed. CVC patients suffer from AEs almost twice as often as non CVC patients (ORadjusted = 1.98; 95%CI[1.28-3.06]; p = 0.002). Complications related to catheter placement (pneumothorax and arterial malpuncture) were observed in 1.0% of the cases. The ICU treatment period in patients with CVC was 22 (19;24) vs. 21 (19;24) hours (p = 0.413). The duration of hospital stay was also similar between groups (9 (7;13) vs. 8 (7;11) days, p = 0.210). The total time of ventilation (350 (300;440) vs. 335 (281;405) min, p = 0.003) and induction time (40 (35;50) vs. 30 (25;35) min, p<0.001) was found to be prolonged significantly in the group with CVCs. There were no differences found in post-operative inflammatory markers as well as antibiotic treatment.

CONCLUSION: The data of our retrospective study suggests that patients undergoing elective neurosurgical procedures with CVCs do not demonstrate any additional benefits in comparison to patients without a CVC [1)].

Complications

Prolonged fever is the common complication in neurosurgical patients. The risks of prolonged fever in patients are attributed to antibiotic therapy, use of central venous catheter and prolonged mechanical ventilation. Indicators of prolonged fever are helpful for better identification of high-risk patients and

fever control [2].

Duesing et al from the Division of Pediatric Neurosurgery, Medical College of Wisconsin, Children's Hospital of Wisconsin, Milwaukee, Wisconsin, USA Central venous catheters are often necessary in the pediatric population. Access may be challenging, and each vessel presents its own unique set of risks and complications. Recent advances have improved the catheters used as well as techniques for insertion. A serious complication of central access is infection, which is associated with morbidity, mortality, and significant financial costs. Reduction of catheter-related bloodstream infections is realized with use of ethanol locks, single lumens when appropriate, and prudent adherence to insertion and maintenance bundles. Ultrasound guidance used for central venous catheter placement improves accuracy of placement, reducing time and unsuccessful insertion and complication rates. Patients with central venous catheters are best served by multidisciplinary team involvement [3].

In the Istanbul University, Cerrahpaşa Medical Faculty Hospital, Neurosurgery Intensive Care Unit, in Turkey a study was conducted between January 2012 and December 2013. The sampling consisted of 160 patients compatible with study inclusion criteria (80 protocol and 80 control patients). Routine care was applied to the control group while the protocol group received catheter care according to the protocol formed in accordance with the suggestions of the Centers for Disease Control and Prevention. The data were collected from Patient Information Form, Follow-Up Form, and APACHE II scores.

A significant difference existed between the two groups in terms of mean APACHE II scores on discharge ($p<0.05$) whereas no significant difference in terms of mean fever, number of leucocytes and lymphocytes, C reactive protein, and days of catheter carriage ($p<0.05$). Hemoculture positivity was less in protocol group, and this difference was statistically significant ($p<0.05$).

The suggested nursing care protocol is significantly efficacious in the prevention of CVC-related infections. Training of healthcare workers on using this protocol is recommended [4].

A study was conducted at the Department of Neurosurgery, G.B. Pant Hospital, New Delhi, India, to find out the occurrence of septicemia in NNICU patients in this tertiary center, along with the microbiological profile and risk factors associated with it.

One hundred patients admitted in the neurology neurosurgery intensive care unit (NNICU) of a tertiary care hospital for more than 24 h were included in the study. After detailed history, blood samples were collected from catheter hub and peripheral vein of all patients for culture, followed by identification and antibiotic sensitivity testing of the isolates.

Out of 100 patients, laboratory-confirmed bloodstream infection (LCBI) was detected in 16 patients. Five patients had secondary BSI, while 11 had central venous catheter (CVC)-related primary BSI. Gram positive organisms constituted 64% of the isolates, especially coagulase-negative Staphylococcus and Staphylococcus aureus. Increased duration of CVC was a significant risk factor for catheter-related BSI (CR-BSI).

Septicemia pose a significant burden for neurosurgery intensive care unit patients, and increased duration of central venous catheter insertion is a significant risk factor [5].

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