PublisherInfo		
PublisherName	:	BioMed Central
PublisherLocation	:	London
PublisherImprintName	:	BioMed Central

Incidence and predictors of central venous catheter related infection in intensive care patients

ArticleInfo		
ArticleID	:	4152
ArticleDOI	:	10.1186/ccf-1999-201
ArticleCitationID	:	201
ArticleSequenceNumber	:	11
ArticleCategory	:	Paper Report
ArticleFirstPage	:	1
ArticleLastPage	:	4
ArticleHistory	:	RegistrationDate : 1999–5–10 OnlineDate : 1999–5–10
ArticleCopyright	:	Current Science Ltd1999
ArticleGrants	:	
ArticleContext	:	1305422

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Keywords

Catheter-related infection, central venous, critical illness, intensive care, nosocomial infection

Comments

This study contains a small group of patients with half being neurosurgical patients. I am sure that much can be gained by combining this group with other 'general' intensive care patients. Almost by definition the groups will have a very different case mix and it would have been interesting to see some evidence of this. The total number of non-neurosurgical patients was only 36 which makes significant statistical analysis difficult to reach.What can we learn from this study? Firstly it reinforces the message that the risk of internal jugular line infection greatly exceeds that of the subclavian site. We know that at the time of insertion risks of the internal jugular site are less; reduced risk of pneumothorax, local bleeding can be controlled with pressure. It is my own personal observation that where no clear contraindication to either site exists the choice of site comes down to personal preference with most anaesthetists probably feeling happier with the internal jugular site. Perhaps the subclavian site should be utilised more in the respiratory and possibly the cardiac patient.Duration of catheterisation has recently been challenged as an independent risk factor for infection and this study supports that challenge suggesting that routinely line change in the absence of clinical evidence of local infection is unnecessary. However the importance of strict asepsis is clearly reinforced.

Introduction

Central venous catheters (CVC) have a higher infection risk than other indwelling vascular access lines. This causes significant morbidity and mortality to the critically ill patient.

Aims

This prospective study sets out to define risk factors for central venous catheter infection and to quantify the risk.

Methods

The study was conducted in a 20 bedded intensive care unit which encompassed eight neurosurgical beds. Patient anticipated to need central venous cannulation for in excess of 72 h were included in the study. The catheters in the study were of a polyethylene multi-lumen type (Arrow International, Reading, PA).Catheters were routinely removed at 7 days and the distal tip cultured on a plate of 5% sheep agar for 48 h. Demographic data were collected on each patient along with a primary diagnosis, CVC insertion site and dates of insertion and removal. Daily data were collected regarding any inflammation of the catheter site, antibiotic usage and any other invasive monitoring.The following endpoints were defined: CVC related infection; > 15 colony forming unitsCVC related bacteraemia; isolation of the same species from both blood and catheter tip; CVC related sepsis; CVC related bacteraemia with clinical sepsis.

Results

One hundred and eighty-one CVCs were studied in 75 patients, 52% of whom were neurosurgical patients.There were 31 cases (26.1%) of CVC related infection; bacteraemia being found in five (4.2%) of the catheters and there were no cases of CVC sepsis.On analysis by nonadjusted odds ratio, there was significant correlation between CVC related infection and primary diagnosis with neurosurgical patients having significantly lower risks (odds ratio, OR 0.3) than either cardiac (OR 2.3) or respiratory patients (OR 1.0). Internal jugular lines had 3.6 times the incidence of CVC related infection of subclavian lines ($P< 0.01$).On multivarate analysis, when controlled for duration of catheterisation and diagnosis, the internal jugular site had an odds ratio of 3.69 compared with the subclavian site. Neurosurgical patients had an odds ratio of 0.3 compared with respiratory patients. There was no significant difference between cardiac and respiratory patients but numbers in each group were small.No significant increased risk was demonstrated for age, gender, total parenteral nutrition (TPN), repeat catheterisation or duration of catheterisation.Gram positive cocci were responsible for 66% of cases of CVC infection, Gram negative for 19%, mixed for 12% and Gram positive mixed with yeasts for 3%. Coagulase negative staphylococcus was the most commonly isolated organism.

Discussion

Rates of CVC infection have been quoted as being 2.5-70%. Postulated reasons for this wide range include variations in local practise to detect infection. In this study infection was diagnosed by routine sending of CVC tips and was found to occur in 26% of patients.Previous reports have shown many risk factors for CVC related infection including type of catheter, insertion site and technique, apparatus, patient characteristics and duration of catheterisation. This relatively small study shows a higher infection rate in respiratory patients compared with neurosurgical patients. The latter group are less

likely to be mechanically ventilated or to have multiple system failure which may explain this difference.The increased risk of infection at the internal jugular site compared with subclavian is well recognised and is attributed to difficulty in keeping the area clean; the close proximity to the mouth leads to contamination with saliva and the adherence of occlusive dressings is a problem.Duration of catheterisation has recently been questioned as a risk factor for infection and this study finds no correlation.The authors conclude by suggesting that infection rates could be reduced by the preferential use of the subclavian site especially in the respiratory and probably cardiac patient. The importance of strict asepsis is reinforced.

References

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