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Central venous catheter care for children with cancer should focus on early infections

Managing central venous catheters (CVC) for paediatric cancer patients is important, as they allow safe infusions of chemotherapeutic agents, parenteral nutrition and blood products and minimise the discomfort of repeated venipuncture procedures. However, they also have disadvantages, as the insertion and use of CVCs is a risky procedure, especially for immunocompromised patients. Perioperative complications, such as pneumothorax or haemorrhage, have been related to difficulties with insertions and infections, thrombosis and dysfunctions of CVCs are common long-term problems. In this issue of *Acta Paediatrica*, a Swedish study by Moell et al. (1) reports that having an early blood stream infection (BSI) was a risk of premature catheter removal in children with cancer.

Paediatric cancer patients normally need long-term CVCs, and this can range from weeks to years. Catheter infections are the major cause of premature removals, and catheter-related infections increase morbidity and may contribute to a patient's death (2). CVC infections also have indirect effects on cancer, as infections may cause delays in scheduled treatment.

There are four different types of CVCs in use: non-tunnelled CVCs, tunnelled CVCs, implantable ports and peripherally inserted central catheters. Every CVC type has advantages and disadvantages. The lowest risk of blood-borne infections occurs in totally implantable venous access ports, but children who need parenteral nutrition may have a higher risk of an infection with these ports than with an external CVC (3). However, they were the most common form of venous access used in Moell et al.'s study (1).

A CVC infection can be defined in several ways. During surveillance, a central line-associated BSI is the most commonly used concept. This is defined as a laboratory-confirmed bacteraemia or fungaemia in a patient who has had a central line for at least 48 hours before the infection develops and where the issue is not related to an infection at another site. In fact, the definition does not always mean that the CVC is the source of infection or even that the CVC is infected. Another concept is the central line-related BSI, which is defined by precise laboratory findings that identify the CVC as the source of the blood stream infection. In a study by Chaftari et al. (4), about 50% of central line-associated BSI infections were also definite central line-related BSIs. Central line-related BSI is a more accurate definition in patients with mucosal barrier injuries, but the use of that definition in everyday hospital life is too complex and it is usually just reserved for clinical studies.

In their study, Moell et al. (1) noted that the overall incidence of central line-associated BSIs in their hospital

was 2.0 per 1000 catheter days, which was similar to other published studies (5,6). They also reported that an early central line-associated BSI one month after the insertion of a CVC was a risk of a premature catheter removal. However, it is difficult to make direct comparisons between the infection rates reported by different studies, and one reason for this is that the definitions of catheter infections vary between studies. One approach to comparing the infection rates of CVC in different hospitals is participating in national or multinational databases of quality indicators. Databases use the shared criteria of catheter infections, and it is easy to compare an organisation's own infection rates with the overall infection rates in a database.

Moell et al. (1) found that the most common pathogen isolated in blood cultures was coagulase-negative staphylococcus, which colonises normal skin and can sometimes contaminate blood cultures. Daily handling of CVCs increases the risk of infections from skin bacteria, and staphylococci are the most common pathogen in real catheter-related infections, namely central line-related BSIs (6,7). Some bacteria, such as alpha-haemolytic streptococci, the streptococcus viridans group, are often associated with a mucosal barrier injury in cancer patients. However, about one-third of BSIs caused by alpha-haemolytic streptococci can be classified as catheter-related infections (8).

But is it possible to prevent these infections? Several studies have found that interventions have reduced the incidence of central line-associated BSIs (9,10). The key element in lowering infection rates is to follow a strict aseptic technique when inserting and handling CVCs. Checklists have been developed for this, and nurses and doctors need to be trained in their use, with only skilled and properly trained healthcare workers allowed to handle CVCs without supervision. Another major point is to perform daily audits to assess whether the CVC is still needed and remove it when it is not required.

In paediatric cancer patients, CVCs are usually used on a long-term basis. For example, children with leukaemia need CVCs for an average of two years and most of this time is

spent at home, underlining the importance of education caregivers about hygiene measures. Such an intervention was found to be effective in preventing central line-association BSIs in children with leukaemia (10).

In conclusion, two main questions arise from the Moell et al. study: How to avoid early bacteraemia after CVC insertion and how to prevent infections from CVC in children with cancer?. If we can find the solution to these problems, we could avoid most premature catheter removals in these patients. At the moment, the only way is to follow high hygiene standards when inserting or using CVCs.

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