

An artifice in the insertion of the Hickman catheter in small children

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Although the Hickman catheter is commonly used in pediatric patients, it is difficult to place this catheter safely in small children, especially infants. A multiple-step method, starting with a thinner catheter, makes the placement easier and safer. *Ann Pediatr Surg* 11:59–60 © 2015 Annals of Pediatric Surgery.

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Introduction

Hickman double-lumen central venous (CV) catheters are commonly used in chemotherapy and peripheral stem cell transplantation to treat pediatric patients with malignancies [1]. Insertion of the catheters in infants can be difficult due to the small size of the central veins and the proximity to the pleura. Complications can be serious and include arterial puncture and pneumothorax [2,3]. Ultrasound and fluoroscopy have been used to increase the success rate of the procedure and to reduce complications, but complications persist [4–7]. Although the 7.0 Fr Hickman catheter kit (Hickman 7.0 Fr dual lumen pediatric catheter with surecuff tissue ingrowth cuff with a peel-apart percutaneous introducer system, product ID – 0600570) includes a 19 G metal needle for venipuncture, the 19 G puncture needle is obviously too large for small children. Therefore, we have modified the standard insertion procedure by making use of a thinner catheter to minimize complications and to maximize the success rate. First, a 16 G single-lumen CV catheter is placed using standard acceptable methods, because this 16 G catheter can be inserted using a 24 G puncture needle. Then, using this catheter, the guide wire in the Hickman catheter kit is introduced to insert the intended catheter.

Procedure

Typical insertion of a 7.0 Fr Hickman catheter (Bard Access system, Salt Lake City, Utah, USA) in pediatric patients involves percutaneous insertion into the right internal jugular vein or the right subclavian vein. The Hickman catheter kit includes a 19 G metal needle, which is usually used for venipuncture. However, the 19 G puncture needle is too large for small children and infants. Therefore, we modified the insertion technique by making use of a thinner catheter that can be inserted using a finer needle.

We changed the insertion technique on the basis of the vein selected for access. For the internal jugular vein, a 24 G Jelco I.V. catheter (Jelco Plus Jelco I.V. Catheter II, Product

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ID – 19120; Smiths Medical Japan Ltd, Tokyo, Japan) is used for puncture with ultrasound guidance. Through this catheter, a 0.018 inch guide wire in a 16 G single-lumen CV catheter kit (Safe Guide Microneedle Seldinger kit, Product ID – 1916–8GE; Nippon Covidien Co., Tokyo, Japan) is inserted. This is necessary because the 0.018 inch guide wire cannot pass through all 24 G peripheral intravenous catheters. The internal diameter, especially at the tip, varies even with catheters of the same gauge. Before insertion, it is necessary to confirm that the guide wire can pass into the 24 G catheter. After successful insertion of the 0.018 inch guide wire, the 24 G intravenous catheter is changed to a 16 G single-lumen CV catheter. If the Hickman catheter is placed in the right subclavian vein, a 16 G single-lumen CV catheter kit (Nippon Covidien Co.) is also used. A 20 G cannula needle in the kit is used for the first puncture of the vein, because a 24 G Jelco I.V. catheter is too short and flexible.

After insertion of the 16 G catheter, the catheter is cut about 15 cm from the skin. The standard 0.032 inch guide wire in the Hickman catheter kit is inserted into the internal lumen of this 16 G single-lumen catheter. The 16 G catheter is replaced with the Hickman catheter for the final placement according to the kit instructions. This insertion technique of the Hickman catheter was performed by pediatric surgeons who had more than 5 years of experience. We have used this technique in 20 small children of body weight ranging from 7.5 to 15 kg in our hospital from 2002 to 2013 without any complications.

Discussion

Our multiple-step insertion method of the Hickman catheter is safe and successful in small children. This is accomplished using a finer needle than that in the Hickman catheter kits. Taken together, we can use a 24 G needle to insert a 7.0 Fr Hickman catheter using our method. This method can be adapted to place even relatively thick catheters, including a Broviac catheter (Bard Access system, Salt Lake City, Utah, USA) or a

hemodialysis catheter. Although our technique requires additional equipments and therefore increases costs, we feel that safety is a priority and it may prevent expensive complications. Our method requires no special equipment or technique to reduce the risk and can improve the probability of correct CV catheter placement. Therefore, anyone can use this technique regardless of their experience even if ultrasound and/or fluoroscopy are not available. This technique can be used in not only small children but also in high-risk adult patients with a bleeding tendency. Widespread adoption of this technique may increase the number of successful catheter placements and decrease complications.

Conclusion

Our multiple-step insertion method of the Hickman catheter, starting with a thinner catheter, is safe and effective in small children. This technique has a possibility to improve the success rate and reduce the risk.

Acknowledgements

Conflicts of interest

There are no conflicts of interest.

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