



A Short Report of the First Use of Catheter-over-Needle System (Contiplex® C) for Continuous Peripheral Nerve Block Placement in Children in the UK

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Abstract

Continuous peripheral nerve blocks (CPNB) are gaining popularity in paediatric practice owing to its superiority over neuraxial blocks in terms of side effects. The advent of ultrasound and development of new materials have made CPNBs feasible even in children, facilitating early ambulation, effective and prolonged post-operative analgesia. The usual perineural catheter sets we have used are “catheter through needle” types. The inability to fix and locate the catheter position after threading through and removing the block needle was the biggest problem. We describe a first use of the “catheter-over-needle” system (Contiplex® C) developed by BBraun, in a series of 7 children. Its features were evaluated by 5 paediatric anaesthetists who routinely do CPNBs using the former system.

Keywords

Peripheral Nerve Block, Catheter, Paediatric

Subject Areas: Anaesthesiology & Pain Management, Pediatrics

1. Introduction

Continuous peripheral nerve blocks (CPNB) provide effective long-lasting analgesia without some of the unwanted effects of continuous neuraxial blockade or systemic opioids.

CPNBs are one of the most promising developments in regional anaesthesia [1] and gaining in popularity [2]

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however catheter placement can be technically challenging, especially in children [3] [4]. Difficulties may occur during introduction of catheter, catheter tip visualization (if ultrasound-guided technique is used), and catheter fixation [3]. After their placement, mechanical problems such as accidental withdrawal, occlusion and leakage at catheter sites may occur [5].

Effective CPNB necessitates a good block/insertion technique as well as effective easy-to-use catheter kits. There are currently two basic types of catheterization sets: “catheter through needle” and “catheter over needle” [4]. The latter system has been recently developed as the BBraun Contiplex[®] C nerve block catheter kit.

2. Aim

We aimed to evaluate the use of BBraun Contiplex[®] C in ultrasound-guided CPNB techniques in our paediatric patients.

3. Methods

A total of 8 Contiplex[®] C catheter kits were used in 7 patients in whom a CPNB technique for post-operative pain control was indicated.

Evaluation was carried out prospectively on a data form by 5 consultant paediatric anaesthetists (CPNB experience ranging from 3 - 8 years). All were using the catheter-over-needle system (Contiplex[®] C) for the first time. Prior to this evaluation, catheter-through-needle sets (e.g. Contiplex Touhy) were the usual CPNB kits used. All blocks were performed using Sonosite[®] ultrasound machines of models S-nerve or M-turbo.

4. Results (See Table 1)

8 blocks were performed in 7 patients (4 males, 3 females), aged 6 weeks - 18 yr (median age 7 yr). Their weights ranged from 5 kg to 74 kg (mean weight 8 kg).

All nerve block techniques were performed by transverse scanning of the nerve and in-plane insertion of needle/catheter.

Five proximal lateral sciatic CPNB, one sub-gluteal sciatic and one femoral CPNB were performed for lower limb orthopaedic surgeries, e.g. club foot repair, tibia and fibula osteotomy, application of lower leg Ilizarov external fixator, below knee amputation. A paravertebral nerve block was attempted using the Contiplex[®] C catheter in one patient, but the procedure was abandoned as the catheter was kinked beyond use during placement. Hence, only seven observations were recorded in clinical evaluation of the Contiplex[®] C catheter in **Table 1**.

5. Discussion

We consider CPNBs an important part of the pain management of many complex surgeries. In our pursuit to improve our success rates for CPNBs, we evaluated the new catheter-over-needle system (Contiplex[®] C) in our paediatric patients. Our experience of the “catheter-through-needle” system that we used prior to this evaluation was that although we could visualize the needle, initial injectate and catheter well, there was a propensity for catheter migration on removing the Tuohy needle (either further in or out). If the catheter migrated, it was often very difficult to adequately view the catheter repositioning. We also found that the period of needle removal could not be observed under real time ultrasound without an assistant.

The Contiplex[®] C system consists of a 188 mm 19 G echogenic end-hole polyamide catheter (with markings for easy insertion depth identification), over a 190 mm 25 G insulated 15° facet bevel needle (high-grade medical steel), connected to a 500 mm injection port. A movable C-grip hub slides over the system facilitating its manipulation as a unit. The set comes with a 0.2 µm Perifix[®] filter, and 300 mm extension tubing. A 50 mm electrode cable for nerve-stimulator techniques is available, but was not used in our series (**Figure 1**).

Once the needle and catheter are positioned at the desired location the needle can be withdrawn with one hand whilst continuing to monitor catheter tip position in real time.

With practice, the system does make it possible for the user to insert the needle and catheter with one hand, freeing the other hand to hold the ultrasound probe, hence allowing real-time ultrasound-guided catheter placement. Compared to the Contiplex Touhy set, the Contiplex[®] C catheter was better visualised under ultrasound; and its tip effectively maintained in position as the needle was easily withdrawn. Although the system has a limited length of catheter (to about 188 mm), it was sufficient for the paediatric patient, and suitable for in-plane

Table 1. Summary table of clinical evaluation of Contiplex® C catheter.

Ultrasonic view	Poor	Fair	Good	Remarks
Ultrasound view of needle (within catheter)	0	4	3	
Ultrasound view of catheter (needle out)	0	3	4	
View of LA spread from catheter tip	Not visualized (2)		Definite (5)	
Procedure				
Ease of getting needle past skin	Difficult (1)		Easy (7)	Catheter was kinked in trying to “get past skin” during the paravertebral block insertion, procedure was thus abandoned, and the conventional catheter set was used.
Ease of LA injection through needle	Some resistance (2)		Easy (5)	May be due to small gauge of 25 G needle.
Ease of needle withdrawal from catheter	Difficult (0)		Easy (7)	
Ease of catheter placement	Moderate, on my own (3)		Easy, on my own (4)	All blocks were performed with one-hand, under real-time US-guidance
Time taken compared to usual technique	Longer (0)	Same (6)	Faster (1)	
Ease of catheter fixation	Tricky (0)	Same (5)	Easy (2)	No “tunneling” done in all cases
Outcome of block				
	Failed (0)	Partial (2)	Complete (5)	The end-hole catheter meant that precise placement of the catheter tip near the nerve is necessary to achieve a complete block.
Need for supplementary analgesics	Yes (4)		No (3)	IV ketamine (2) Systemic opioids (2)
Leakage	No (7)		Yes (0)	Tissue glue used in 4 patients
Overall anaesthetist’s satisfaction compared to usual catheters	NA (1)	Same (3)	Better (3)	
Pros		Cons		
Facilitates single-handed technique under ultrasound guidance.		25 G needle too flexible, bends too easily.		
Allows for accurate positioning of catheter tip.		Difficulty in manipulating needle direction once in tissue, unless initial needle trajectory is right on target.		
Easy withdrawal of needle, with catheter tip position maintained.		C-grip hub does not “bite” onto the catheter-over-needle quite well.		
Suitable for in-plane technique.		Catheter may kink or fracture if its tip is pushed beyond and against the tip of the needle.		
Good echogenicity of needle and catheter.		Takes practice.		
Natural tunnel, good for in-plane needling technique.		Extension system too short, may pose a problem in large patients, or if “tunneling” is desired.		
No leakage, keeps dressing dry.				

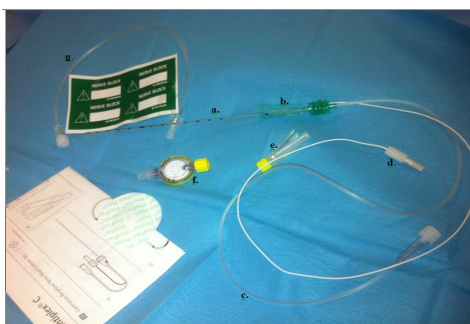


Figure 1. Contiplex® C catheter set. (a) Contiplex® C catheter ϕ G19/188 mm, over insulated 15° needle ϕ G25/190 mm; (b) C-grip hub; (c) Injection tubing 500 mm; (d) Electrode cable 500 mm; (e) Perifix® Connector; (f) Perifix® Filter; (g) Extension tubing 300 mm.

needling approaches (**Figure 2**). Substantial soft tissue traversing meant “natural tunneling”.

The small gauge of the needle (25 G) in relation to the catheter (19 G) helped minimize leakage of local anaesthetic through the entry site thus reducing the chances of lifting the site dressing and catheter dislodgement. However, the 25 G needle meant that the system was very flexible and prone to bending. Hence, manipulation of needle trajectory was difficult once in the tissue, especially if the nerve is deep or a multi-point injection is desired to surround a large nerve with local anaesthetic, e.g. sciatic nerve.

The sliding C-grip hub over the system takes practice to get used to. The catheter could be fixed in the same way as most other catheters. A longer catheter would be preferred, but could be overcome by placing the Perifix filter distal to the 300 mm extension tubing.

6. Pitfalls and Tips

This set is probably not useful for deep blocks due to the flexibility of the needle. We found at least 2 needles kinked, after withdrawal from the catheter (**Figure 3**). However, this may be less of a problem in children, as nerves are more superficial. Gripping the needle with the C-grip hub not more than 2 cm from the skin, gives better control of the needle as it is pushed through tissues.



Figure 2. In-plane approach to proximal lateral sciatic nerve block.

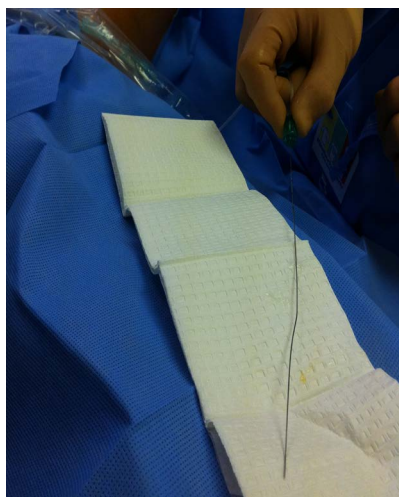


Figure 3. Contiplex® C needle kinked.

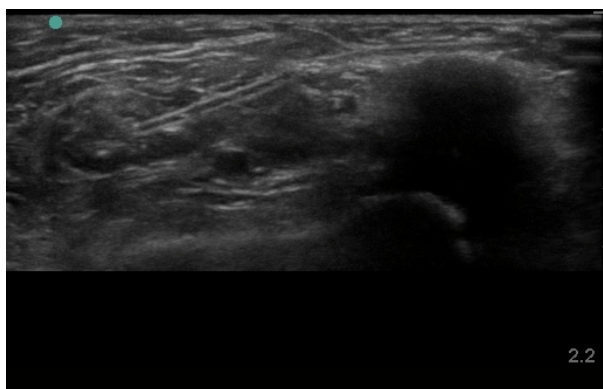


Figure 4. Ultrasound view of the Contiplex® C catheter (without needle). White arrow = Tip of catheter. Circle = Sciatic nerve, surrounded by LA.

Of note is that the catheter has a single orifice at its end, which ends 1 - 2 mm before the needle's tip. This means that the position of catheter tip may not be precisely where the needle tip ends. This may have explained for the partial blocks in two of the patients. However, owing to the improved echogenicity of the Contiplex® C catheter (**Figure 4**), real-time ultrasound scanning of local anaesthetic spread from the catheter tip after removal of the needle, may help to identify catheter tip displacement.

7. Conclusion

The “catheter-over-needle” system has good potential in reducing leakage from and facilitating the placement of CPNBs in the paediatric patient, especially if the needle can be stiffened.

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