Keeping HD Patients Home Using AVF Plastic Cannula

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Background

Home haemodialysis improves patient survival and quality of life compared with haemodialysis delivered in-centre or in satellite units. Fear of self-cannulation is the key barrier to home haemodialysis. In addition, access damage caused by poor needling technique is one of the main reasons for in-patient admissions, surgery, loss of their lifeline, or withdrawing from home therapy.

AVF plastic cannula is a fistula catheter for haemodialysis access, after cannulation, the metal needle is removed and only a plastic cannula is left inside the vessel during dialysis. The characteristics of plastic cannula are specially ideal for patients with difficult fistulas, anxiety, dementia, or restlessness, also beneficial for nocturnal haemodialysis patients.

Aim

Plastic cannulas were introduced to Australia in recent years, but only utilised in some haemodialysis units. Home haemodialysis has been shown to have distinct impact upon patient morbidity and mortality rates compared with hospital-based dialysis therapy. Successful management of cannulation of AVF is one of the key factors keeping patients safe at home. The aim of this project is to find out whether using plastic cannulas can reduce access related issues, also to examine the features of plastic cannulas compared to traditional metal needles and to determine the reliability and safety of using plastic cannulas on home haemodialysis patients

Method

A literature review was conducted in order to evaluate the evidence and provide the rationale and justification for this project. It was evident that plastic cannulas can be used for new patients starting haemodialysis and particularly suited for use in restless and unpredictable patients. Following the literature review, an education plan was established including staff training, patient selection, and tools for outcome measurement. Patient training did not commence until staff training was completed. The patient training programme was tailored to meet the individual circumstances, ongoing evaluation and monitoring to ensure that patient safety is not compromised during the project. All patients included had mature fistulas and therefore only 15G AVF plastic cannulas (Medtronic Argyle®) were utilised and evaluated.

Results

As of December 2019, a total of 9 patients were trained using plastic cannulas successfully at home. Three patients were discharged as they had received kidney transplants and one patient was transferred to a satellite dialysis unit due to medical and cognitive deterioration. One patient experienced an incident of plastic cannula dislodgment resulting in withdrawn from home haemodialysis. Another patient experienced unresolved access issues and was unable to manage the technique for safe insertion of plastic cannulas and as a result decided to switch back to traditional metal needles in order to continue dialysing at home. Currently three EH patients are on home haemodialysis using plastic cannulas..

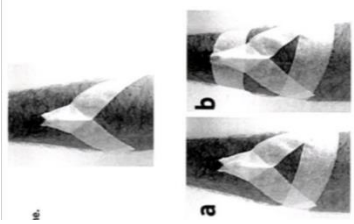
Table 1

Patient's experience with the use of the plastic cannula compared to the traditional needle

	Traditional Needles	Plastic Cannula
Pain/discomfort on dialysis	Frequent	Reduced/non
Use in nocturnal patient	Difficult	Easy and safe
Use in restless patient	Difficult	Easy and Safe
Blown needle on dialysis	Occasional	Never
Accidental sharps injury to patient/family	Occasional	Never
Sharps disposal	Yes	No sharps
Use of AVF section near elbow	Avoiding	Easy and safe
Use of tortuous AVF section	Difficult	Easy and safe
Blood spill during connection/disconnection	Occasional	Never
Fear of blown needle on dialysis	Frequent	No fear
Accidentally inject air during insertion	Possible	Impossible
Small/deep AVF	Difficult	Increased
Secure of AVF needle	Easy	Difficult
AVF needle dislodgement	Low possibility	Higher possibility
Assistance required with dialysis procedure	Not Necessary	Needed
Pain during insertion	Tolerable pain	Increased pain

Figure 1

New taping technique using for AVF cannula provided by Medtronic



Discussion

A review and survey was conducted, Table 1 provides a summary of patient experiences with plastic cannulas compared to traditional metal needles.

The flexibility of the plastic cannula allows it to follow the direction of the vessel and decreases mechanical impact to the vessel wall. As a result all patients reported significantly reduced pain and discomfort in fistula during treatment. This flexibility also allows patients to use difficult regions and areas of fistula, therefore increasing puncturing areas, and potentially increasing survival rate of the fistula.

As no sharp portion is present in the vessel during dialysis, there is less risk of vessel wall injury and infiltration known as a 'blown needle'. The feature of a safety cap covers the needle tip once it is removed from the cannula, all participants in this study reported no 'blown needles' since switching to plastic cannulas, and felt safer for themselves and family members as it eliminates the risk of needle stick injury greatly.

Because the mechanical structure of the plastic cannula, it requires greater dexterity and eye-hand coordination to be able to master this technique single-handed, assistance is needed with needling and connection, which makes it less feasible for someone who without supports.

Plastic cannulas do not have wings which present greater risk of cannulas falling out during treatment if the taping techniques for standard needles are used. One patient lost confidence on home therapy following cannula dislodgment, as a result we established an alternative technique of taping. With help from the manufacturer of Argyle plastic cannula, new taping technique was introduced (Figure 1).

Conclusions

We found that using plastic cannula can reduce access-related issues, patients also reported significantly increased satisfaction with home therapy because of less fears and anxiety. As no sharps are produced, it is proven to be safer compared traditional metal needles for patients and their family. However, due to the complexity of mechanical structure of plastic cannula, it requires greater dexterity to complete the task, and assistance maybe be needed, in fact, is mostly needed