A Comparative trial to assess pain and injury associated with arterio-venous fistula (AVF) cannulation using the Argyle Safety Fistula Cannula versus the standard metal AVF needle.

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INTRODUCTION & AIM

Many patients fear haemodialysis because it involves the insertion of needles, on multiple occasions into a arteriovenous fistula (AVF). The concern for patients has always been the pain and injurious effects associated with cannulation, success of cannulation and completion of dialysis treatment. There is an increasing group of patients who require AVF access for treatments other than haemodialysis due to exhausted use of peripheral vessels. Two patients from this group were recruited for this trial.

At Monash the Argyle fistula cannula was introduced to trial as an alternative to the standard metal AVF needle. Patients were informed of this plastic cannula and many were interested to utilise immediately.

In February 2014 a small sample of patients (n= 4) were chosen to participate in this trial. The trial involved satellite, home haemodialysis and non-dialysis patients. The first cannulation took place on 28 February 2014 on a patient with a brachiocephalic arterio-venous fistula.

METHOD

An information and consent sheet was drafted for the patients who volunteered for the trial. This included product information, the cannulation technique and the expected outcomes for the patient. The patient consent form included video and photographs of the procedure at time of insertion and removal for teaching purposes and online uploads, with all patients consenting to this. Covidiem provided product, information and training to the renal access coordinator prior to the first cannulation and were present at the first cannulation.

• The first patient cannulation was completed with ultrasound guidance using the Sonosite Nanomaxx ultrasound machine (Figure 1).

• The plan was for 6 consecutive dialysis treatments and 12 cannulations with the Argyle cannula followed by 12 standard metal needle cannulations, this was revised and limited to 3 consecutive dialysis treatments and 6 cannulation attempts.

• A staff information sheet was drafted and distributed to the units where the patient’s had dialysis outlining the cannulation procedure and information required at each dialysis session. Staff at the in centre, satellite and home training unit were instructed on insertion procedure, which was undertaken by the access nurse and home dialysis nurse on a single occasion.

RESULTS

Patient 1: cannulated on 3 dialysis sessions: 6 cannulations
Patient 2 cannulated at 1 treatment session: 2 cannulations
Patient 3 cannulated at 2 treatment sessions: 4 cannulations
Patient 4 cannulated at 1 treatment session: 1 cannulation
Total sessions = 7
Total cannulations = 13

<table>
<thead>
<tr>
<th>PATIENT</th>
<th>AVF ACCESS</th>
<th>TREATMENT</th>
<th>CANNULA SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Left BC</td>
<td>HD</td>
<td>15g</td>
</tr>
<tr>
<td>2</td>
<td>Left BC/G</td>
<td>PE</td>
<td>15g</td>
</tr>
<tr>
<td>3</td>
<td>Left BC</td>
<td>HD</td>
<td>15g</td>
</tr>
<tr>
<td>4</td>
<td>Left BC</td>
<td>IV Infusion</td>
<td>15g</td>
</tr>
</tbody>
</table>

PAIN & INJURY

Pain

• Pain scores using standard post surgery pain score scale 0 – 10
  (0 = no pain / 10 = worst pain)
  - Pain scores 0 – 2 were recorded in all patients (n=4) Argyle AVF Cannula
  - Pain scores 4 – 8 were recorded in all patients (n=4) Standard AVF needle

A pain score was assessed at insertion, during treatment and at removal of cannula. Patients expressed the reduced discomfort of the plastic cannula compared to standard metal needle as a significant difference that allowed increased mobility of the AVF arm during treatment.

Table 2. Pain Score 0-10

<table>
<thead>
<tr>
<th>PATIENT No.</th>
<th>PAIN SCORE ARGYLE</th>
<th>PAIN SCORE METAL</th>
<th>INSERTION</th>
<th>REMOVAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>4</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
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<td>0</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>8</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>3</td>
<td>8</td>
<td>3</td>
<td>0</td>
</tr>
</tbody>
</table>

Injury

A single missed cannulation at the 2nd treatment in patient no 3. (Figure 3) was obtained. If this was a standard metal needle, this would have punctured through the vessel wall causing extravasation, hematoma, swelling and bruising, and limited sites for cannulation resulting in a missed dialysis treatment.

• Evidence of bruising and hematoma noted from previous metal needle cannulation in patient No. 3.

• No evidence of extravasation, hematoma or bruising in the other 3 patients was observed during the trial period.

• Patients No. 2 and 4 were not on haemodialysis and were not exposed to the frequency of AVF cannulations compared to patients 1 and 3.

• 2 incidents of missed cannulation occurred during the trial.

• No extravasation or haematoma occurred during the trial.

CONCLUSION

Future plans for a larger scale trial of the Argyle cannula at Monash Health to give patients the choice of plastic cannula vs metal needle is under development & implementation. Frequent AVF cannulations are a reality that any haemodialysis patient must endure. Its injurious nature contributes to many immediate and long term complications associated with multiple punctures. Therefore, a plastic cannula would be considered a better option, a less injurious alternative to achieve a less painful outcome for patients. To quote the first patient in the trial “It’s a no brainer”.

CORRESPONDENCE

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