The efficiency of Single-needle vs Double-needle delivery of Extracorporeal Photopheresis (ECP) treatment to adults patients with graft-versus-host-disease (gvhd)

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The efficiency of Single-needle vs Double-needle delivery of Extracorporeal Photopheresis (ECP) treatment to adult patients with graft versus host disease (gvhd)

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INTRODUCTION

As demand for ECP increases, together with a broader eligibility, it is important to establish the most efficient method to deliver effective ECP treatment to patients with GvHD. Patients presenting for ECP with GvHD repeatedly present a challenge to the ECP team due to poor venous access resulting from previous therapies and skin changes. This may often result in multiple cannulation attempts on a regular basis, leading to bruising, haematoma, transient pain and syncope. The insertion of a tunnelled Hickman line catheter presents alternative problems, with increased incidence of infective episodes and blocked catheter lumens often resulting in the deferral of treatment. In both situations treatment delivery may be adversely affected with multiple alarms and extended treatment times.

OBJECTIVE

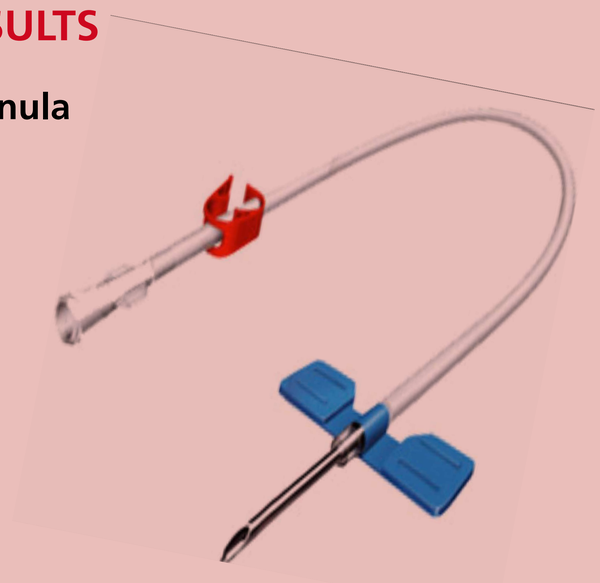
To ascertain the most efficient method of delivery of ECP treatment, we performed a retrospective analysis of treatment times and alarm rates of both single and double needle mode treatment delivery, via either a 16G peripheral IV cannula, or a tunnelled Hickman line catheter. It was hoped that this would help us to fully optimise the efficiency of the Rotherham Photopheresis Service.

METHOD

This retrospective study analysed 317 Photopheresis treatment procedures which were completed at The Rotherham NHS Foundation Trust on 51 adult patients with GvHD, during a 3 month period between 1st July 2014 and 30th September 2014. 25 Males and 26 Females with an age range of 21-69 years were included. The median age was 54 years (mean age 50.65). All procedures were completed using the Therakos Cellex Photopheresis System *(Version 4.1)*. *(Figure 1)*, allowing for single and double-needle treatments to be compared.

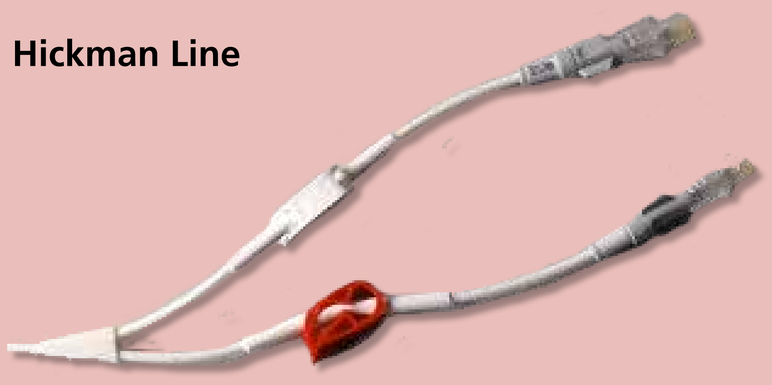
RESULTS

Cannula



250 treatments (78.9% of total in 3 months):
Single needle = 217 (86.8%)
Double needle = 33 (13.2%)
Median treatment time:
Double = 1hr 50min
Single = 2hr 15min
(See Figure 2)

Hickman Line



67 treatments (21.1% of total in 3 months):
Single needle = 44 (65.7%)
Double needle = 23 (34.3%)
Median treatment time:
Double = 1hr 55min
Single = 2hr 30min
(Figure 2)

CONCLUSION

Double needle treatment may decrease treatment time in comparison to single needle treatment by approximately 25 min for treatments via a cannula, and 35 min when using a Hickman line.

- The majority (78.9%) of patients were treated via cannula, over a median time of 2hr 15min.
- Out of 317 treatments, only 17.7% were completed in double needle mode (33 cannula and 23 Hickman) due to problems with peripheral vascular access and Hickman line patency.
- Reduced requirement for Hickman lines, therefore reduced risk of infection/Hickman line issues
- Patient preference should play a role in treatment mode selection.
- In order to fully optimise the ECP service at The Rotherham NHS Foundation Trust, each patient should continue to be individually and holistically assessed at each visit to ensure optimal treatment and patient satisfaction.

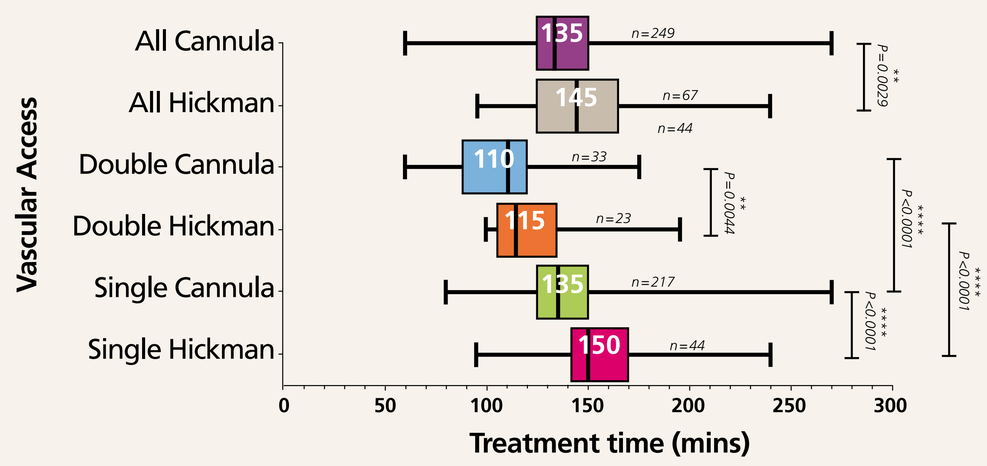
Figure 1: Cellex Device

Machine alarms and treatment problems	Double Cannula (n=33)	Double Hickman (n=23)	Single Cannula (n=217)	Single Hickman (n=44)	TOTAL
Red Cell Pump Alarm	2 (6.1%)	0	9 (4.1%)	0	11 (3.5%)
Collect Pressure Alarm/ Slow Draw	0	1 (4.3%)	10 (3.2%)	6 (13.6%)	17 (5.4%)
System Pressure Alarms	1 (3%)	1 (4.3%)	1 (0.5%)	0	3 (0.9%)
Cannulation /Hickman Line Problems	0	1 (4.3%)	10 (3.2%)	3 (6.8%)	14 (4.4%)
Vasovagel	1 (3%)	0	2 (0.9%)	0	3 (0.9%)
Negative Pressure	0	0	3 (1.4%)	0	3 (0.9%)
Slow Return Rate	0	0	0	2 (4.5%)	2 (0.6%)
TOTAL	4 (12.1%)	3 (13%)	35 (16.1%)	11 (25%)	53 (16.7%)

Table 1:
Number (and frequency) of machine alarms and treatment problems per total number of treatments in each vascular access method group. Alarms/problems were more common in treatments using Hickman lines than cannulas.

Rotherham Photopheresis Unit
ECP treatment times for different vascular access methods

Figure 2:
Box and whiskers plots showing treatment times for different types of vascular access used for all adult ECP treatments performed in a 3 month period. Plots show the medians in 25-75th percentile boxes, with the minimum and maximum range. Mann Whitney U tests revealed statistically significant differences between treatment times using a cannula or Hickman line for vascular access (single, double or all treatments) and between single and double of either cannula or Hickman lines



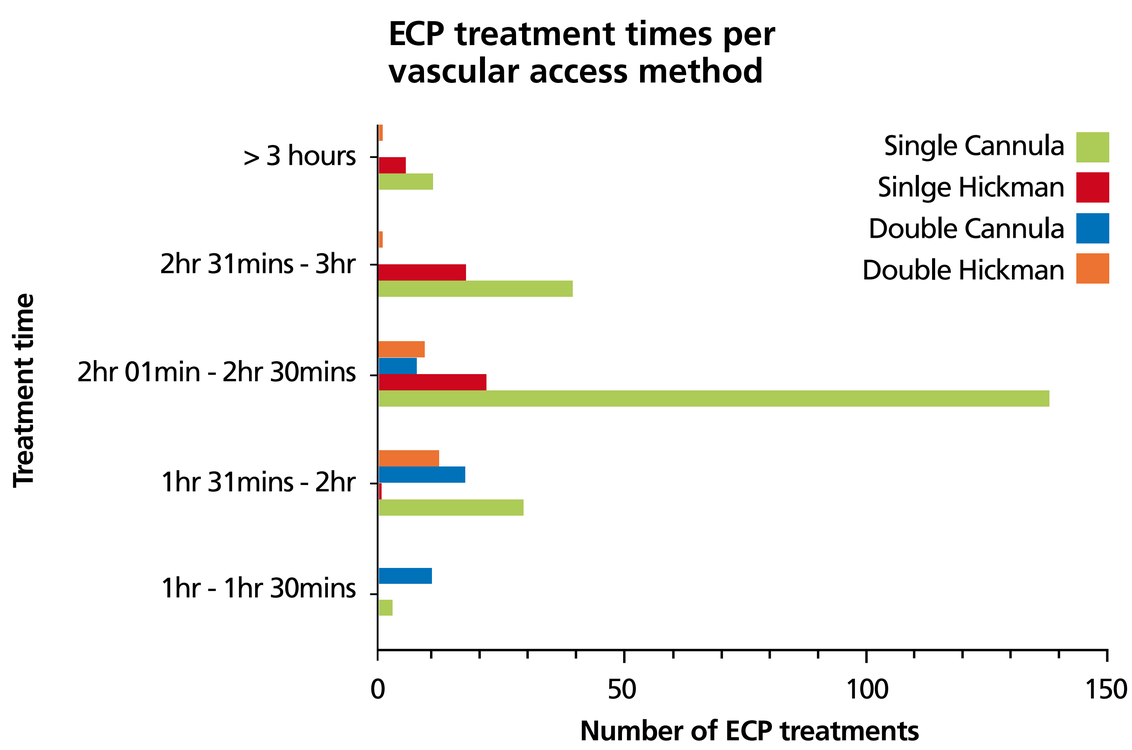


Figure 3:
Number of treatments per vascular access method completed in different time groups, ranging from 1hr to >3hr, in a 3 month period. The majority of treatments were completed in 121 – 150 min using a single cannula. The quickest treatments, completed in 60 – 90min, were performed via cannulas (single or double), only.