Set-up and Perform Dialysis Using the Manual Single Lumen Alternating Micro-Batch Hemofiltration (mSLAMB) System

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Purpose

- The mSLAMB system is a novel sterile closed-loop dialysis system designed to provide kidney support in emergency situations (e.g., fluid overload, hyperkalemia, acidemia) where dialysis machines, peritoneal dialysis, and/or electricity are unavailable
- An mSLAMB circuit costs <$50
- We conducted in vitro experiments to determine the best training method, ease of set-up, and efficiency. We describe supplies, set-up, and a single cycle of the mSLAMB procedure

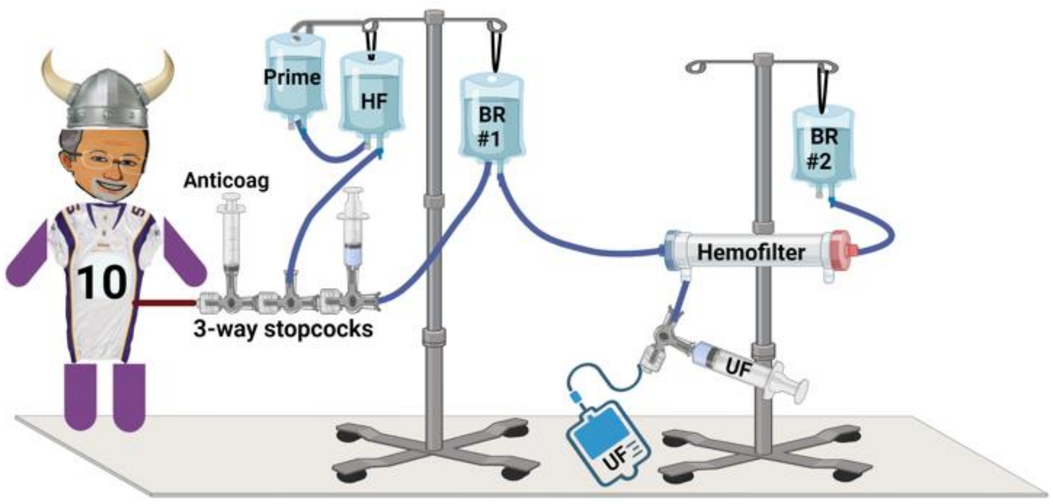
Methods: Supplies/ Set-up & Prime Phase

Supplies

Disposable mSLAMB kit: 4 accessory hooks, 1 Hansen cap, 3 separate tubing pieces

Supplies not included: 2 IV poles, 1 Liter prime solution (PS), Hemofiltration fluid (HF), 1 filter, 1 filter holder; 2 50 mL syringes, 1 graduated cylinder, 2 hemostats

Set-up and Prime



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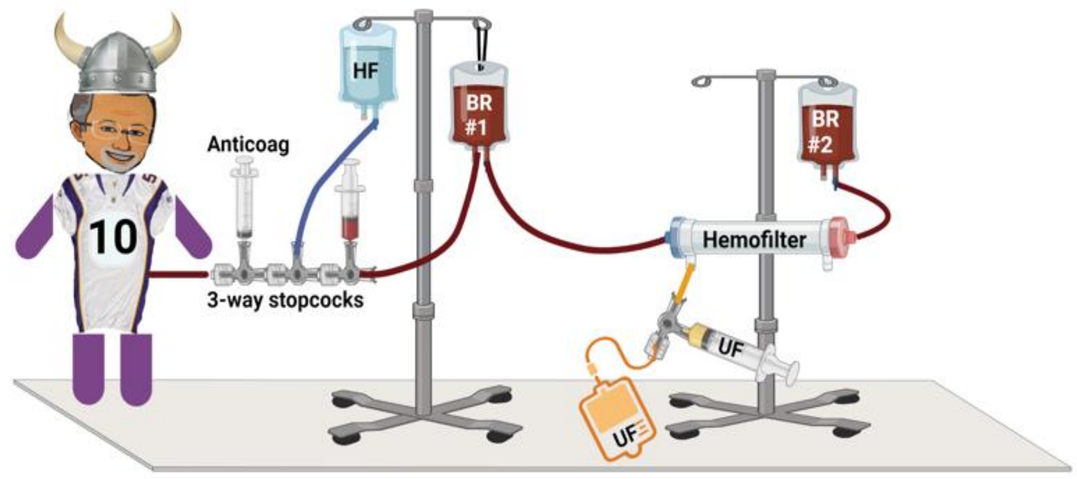
1. Staircase 2 IV poles (#1 closest to the patient and in high position, #2 in low position)
2. Hang PS on IV pole #1
3. Hang HF bag and blood reservoir (BR) #1 to the right of PS and attach 50 mL syringe to stopcock to the right of the HF stopcock (SC)
4. Attach filter holder & filter to IV pole #2 and attach red luer lock from BR #1 to filter inlet
5. Hang BR #2 on IV pole #2 and attach red luer lock to filter outlet
6. Attach Hansen to one side of the filter and attach 50 mL syringe to SC
7. Spike PS and begin gravity prime
8. Discard PS

Methods: Procedure Phase



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1. Attach bloodline to access & turn stopcock off to patient
2. Open HF stopcock
3. Pull 50 mL's of HF and push plunger to fill BR #1
4. Turn SC off to HF bag and open patient SC
5. Pull 50 mL's of blood and push plunger to fill BR #1
6. Close white clamp before BR #1 and begin dialysis (BR #1 → filter → BR #2)
7. Pull 50 mL's of HF from Hansen SC
8. Raise BR #2 higher than BR #1 and gravity drain back into BR #1
9. Perform pull/ push to return dialyzed blood back to patient

Note: 50 mL increments create a 150-200 mL batch of mixed fluid (blood & HF) for each cycle

Summary

- mSLAMB procedural training was accomplished in 1 day. Instructional videos will be provided and a "training the trainer" approach will build a group of competent users who can teach others
- mSLAMB can be prepared and ready for use in ~10 minutes. The procedure is easier using small batches (50-100 mL) of blood and more efficient with 2 people but can be performed by 1 person

Conclusion

- mSLAMB is a simple, cost effective, and potentially life-saving alternative for low resource settings
- Treatment requires good single lumen access (e.g., IV) but does not require a pump or special dialysis solution
- Any sterile balanced solution (e.g., LR) will allow provision of sufficient kidney support until the patient can be relocated/ transferred