

Cardiopulmonary Bypass an Evidence Based Change of Practice

Presented by
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Introduction

- ◆ ~ 1000 cardiac surgical procedures performed annually at Queen Mary Hospital,
- ◆ Hong Kong's premier cardiac surgical centre
- ◆ A large proportion belongs to the very high risk category
 - ◆ extreme life-threatening conditions
 - ◆ extensive comorbidity: DM, HT, renal, liver & vascular diseases

Introduction

- ◆ Extracorporeal circulation or Cardiopulmonary bypass (CPB) is an indispensable component of "Open-heart" surgery
- ◆ The key responsibility of the perfusionist:
 - ◆ *Setting up the CPB machine & circuitry -> demands great attention to precision & safety*
 - ◆ Management of CPB
 - ◆ Maintain & preserve normal physiological status
 - ◆ Adequate perfusion pressure
 - ◆ Normal acid-base status / electrolyte / Hct level
 - ◆ Provide optimal surgical conditions

Introduction

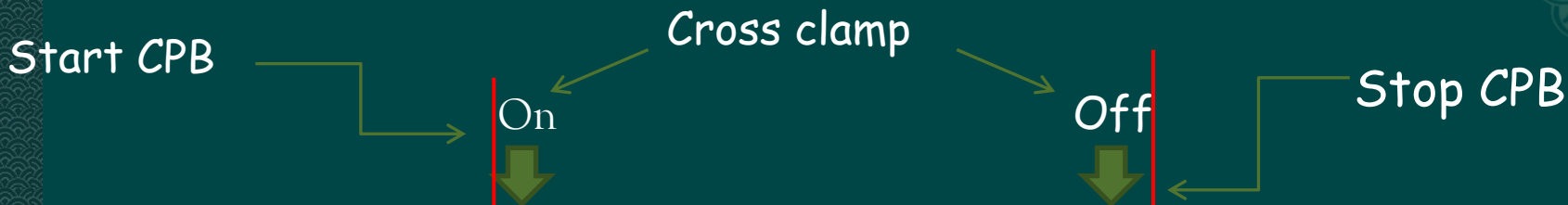
- ◆ Under normal circumstances , ~25-30 mins to set up the CPB circuit
- ◆ However, certain cardiac surgical emergencies may not allow the luxury of so much preparation time
- ◆ Rapid institution of CPB may offer the only hope for survival
- ◆ Emergencies happen outside of normal working hours (minimum manpower)
- ◆ The urgency & the nature of the EMS put enormous stress on the entire team



Objectives

- ◆ To evaluate safety & efficacy of a "Preassembled dry, ready to use, CPB circuit" prepared up to 48 hours in advance
- ◆ To enhance patient safety by enabling very rapid establishment of CPB

OHS Bypass Flow



Pre bypass	Ishaemic time of the heart	Post bypass
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- ✓ Check pump equipment functioning
- ✓ Calculate patient's BSA, C.I., blood volume used for priming
- ✓ Choose appropriate Bypass circuit, set up, assemble & de-bubbling
- ✓ Pre wash priming
- ✓ Cannulation
- ✓ Giving anticoagulant
- ✓ Check ACT level as baseline & post heparin given

- Delivery of Blood/ Crystalloid Cardioplegia solution
- Moderate to deep hypothermia
- Check ACT level
- In line monitoring
- Pressure & temp. monitoring
- Blood Sample for gas analysis
- Patient fully rewarmed toward of CPB

- ✓ MUF
- ✓ Give antidote of heparin
- ✓ Stop cardiotomy suction
- ✓ Cell saver device
- ✓ Decannulation
- ✓ Check ACT level
- ✓ Haemostasis

Maintain Good communication with Surgeon, Anesthetists and the team members

J Extra Corpor Technol. 1997

Dec;29(4):181-4.

◆ Extracorporeal circuit sterility after 168 hours.

◆ Young WV, Heemsoth CH, Georgiafandis G, Mitchell DC, Hackett DK, Bahna DG.

◆ Source

◆ Baptist Hospital of East Tennessee, Department of Perfusion, Knoxville 37920, USA.

◆ The purpose of this study was to evaluate ECC sterility using an open reservoir oxygenator, over a time period of seven days. After obtaining 792 bacterial cultures from three sites within the ECC, the study was terminated. There were **"no positive bacterial cultures"** during the study period. Assuming there is no deliberate contamination, pump circuits assembled in **an unused operating room can be maintained sterile for a period of seven days.**

Acta Medica (Hradec Kralove).

1998;41(2):91-3



◆ How long can the previously assembled cardiopulmonary bypass circuit stay sterile?

◆ Lonský V, Voxová B, Dominik J, Mandák J, Kubíček J, Bímová J, Marková D, Matoulková P.

◆ Source

◆ Department of Cardiac Surgery, Charles University, Faculty of Medicine and Teaching Hospital, Hradec Králové.

◆ The mean time from point of setup to point of priming for the 100 consecutive circuits was 32 hours, with a range of 19 to 89 hours

◆ **All were found to be free of microbial contamination.** The results of this investigation demonstrate that the sterility of the extracorporeal circuit, pre-assembled in advance of actual priming, can be maintained over an extended interval when **"Standard Aseptic Technique"** is used. This allows the utilization of a pre-assembled circuit for emergency cardiopulmonary support.

J Extra Corpor Technol. 1999

Sep;31(3):125-9.

- ◆ Investigations into the sterility of manually assembled extracorporeal circuits with vented reservoirs.

- ◆ Searles B, O'Leary CE, Pettit D, Alexander S, Picone A.

- ◆ **Source**

- ◆ State University of New York Upstate Medical University, Department of Cardiovascular Perfusion, College of Health Professions, Syracuse 13210, USA.

- ◆ This study was designed to investigate the ability of an extracorporeal circuit (ECC) with a vented hard shell reservoir to remain sterile for a period of 72 h under dry conditions.

- ◆ The chance of an open ECC developing a **detectable level of contamination within 72 h of its dry assembly is insignificant.**

Methodology



- ◆ Consensus among perfusionists, cardiac anesthetists, surgeons, the Infection Control Team and Microbiologist.
- ◆ A protocol was drawn up for the perfusion team to follow

Protocol



- ◆ The "Preassembled dry CPB circuit was prepared in the Cardiac Operating Theatres under aseptic conditions
- ◆ Wrapped in sterile towels
- ◆ Kept on a sterile trolley for up to a maximum of 48 hrs
- ◆ Duration for which the circuitry was hypothesized to be sterile

Pilot test



- ◆ Period from 1 Jan 2011 to 27 Jun 2011
- ◆ Samples of priming fluid from 30 consecutive "Preassembled circuits" for microbiological examination
- ◆ All culture results demonstrated sterility even after 5 days of incubation
- ◆ Discarded the first five circuits

Pilot test

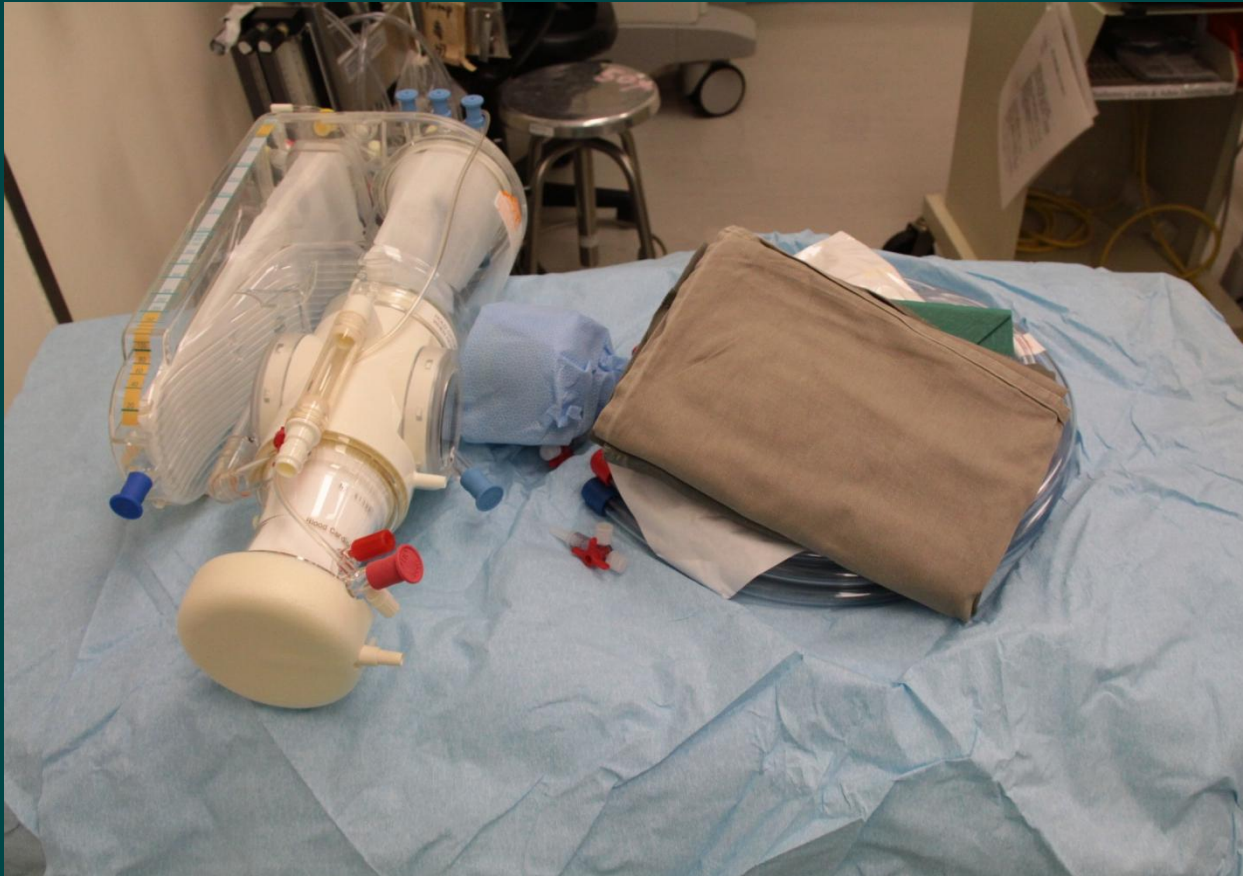


- ◆ Subsequent "Preassembled circuits were used
- ◆ Either used for an emergency, or an elective operation
- ◆ Thus there was no wastage

Prepare Pump Circuit items



Open the circuit with Aseptic Technique



Antiseptic hand washing & gowning up

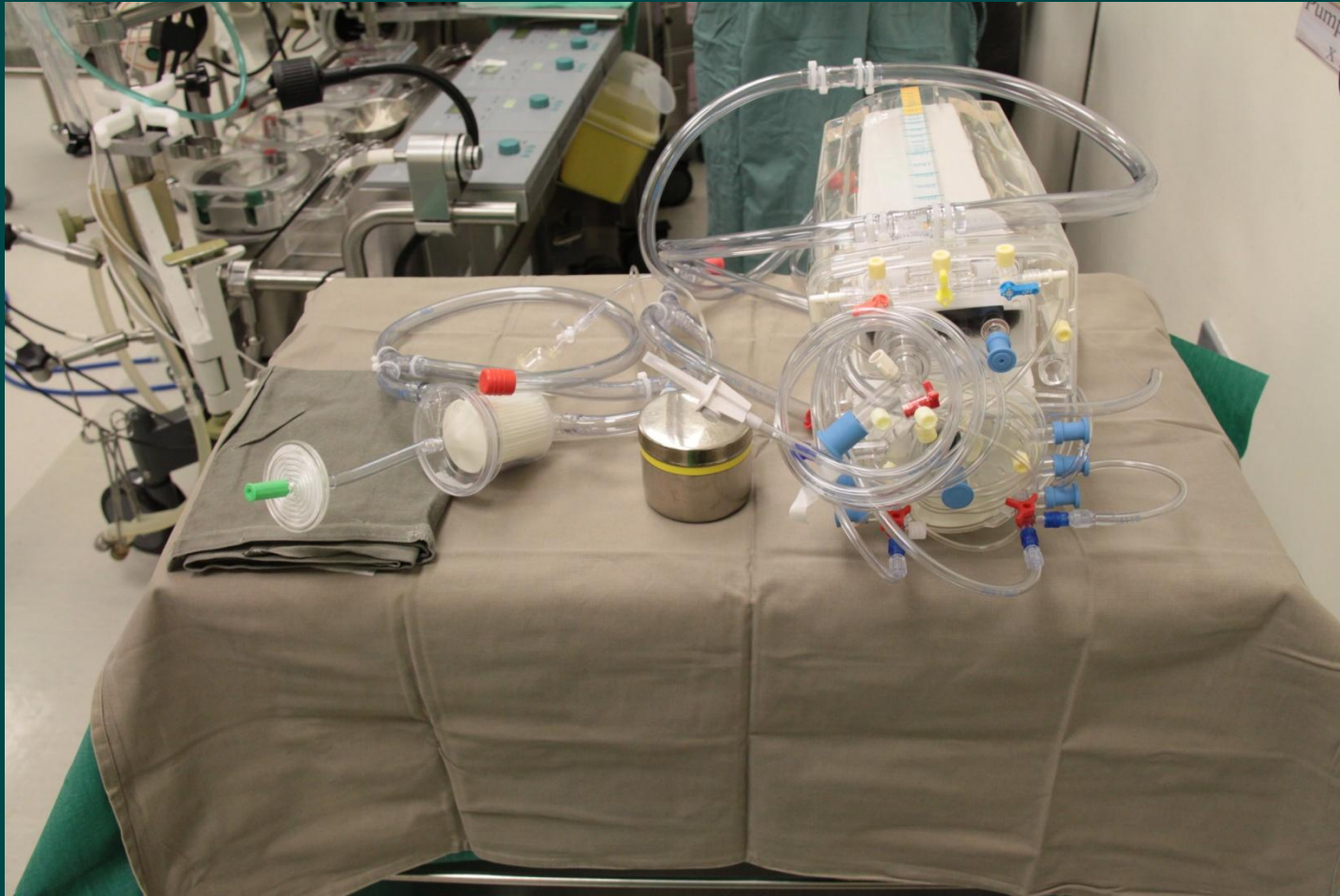


2013 HA Convention
Jackie Fung/F5OTS/CTSD/QMH

Assemble the pump circuit with aseptic technique



Before covering the trolley, all the outlet ports are covered with caps



Use sterile towel to cover the trolley well



Put the trolley aside (to avoid unnecessary contact) & left inside the empty theatre



Results & Outcome



- ◆ The time required to prime a "Preassembled dry circuit" → 10mins, significantly shorter than 25 mins
- ◆ The new practice demonstrated to be entirely safe from the point of view of infection
- ◆ No increase of infections in our patients
- ◆ The evidence based change of practice is **NOW** "Our routine practice"



Results & Outcome

- ◆ The change has enhanced the safety margin for critical emergencies
- ◆ Increased the team's confidence
- ◆ Reduced the stress levels of personnel in such crises
- ◆ Overall, a "Positive Impact"

On Bypass: Advanced Perfusion Techniques

Linda B. Mongero, James R. Beck



- ◆ P.408, Policy and Procedure Guidelines CP33
- ◆ Policy for Perfusion Set up for Standby cases and Emergency Backup
- ◆ The setup should remain ready for use within 72 hrs.

In the Future



- ◆ Endeavour to extend the safe shelf-life to

72 hours

Acknowledgements



To My Whole Pilot Team

- ◆ Dr. Au WK (C.O.S., CTSD, QMH)
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- ◆ Ms Li WC (D.O.M., CTSD, QMH)
- ◆ Ms Hui SK (WM, F5OTS, CTSD, QMH)
- ◆ F5OTS - the Perfusion Team Members

Thank you very much
for your attention

