Converting from off-pump coronary artery bypass to on-pump: when, how and why.

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Objectives:
1. Discuss the timing and appropriateness of various anesthetic and surgical interventions during off-pump coronary artery bypass (OPCAB).
2. Discuss intraoperative findings and events that indicate a necessity to convert to an on-pump procedure.
3. Discuss the anesthesiologist’s role in conversion to an on-pump procedure. In other words: “How do you get the big wheel to turn?”

The case:

The patient is a 75 year old man who awoke with substernal chest pain 2 hours PTA. He had a history of CAD with an MI 4 yrs. PTA and AODM. ECG revealed a SR with a rate of 85, Q waves in II, III, aVf, and 3 mm ST depression in aVL, V3-6. His BP was 107/62. The pain and ST depression resolved quickly with IV heparin and NTG. TTE revealed moderately impaired LV function with EF 35% and akinesis of the base of the inferior wall. There was moderate MR and RV function was normal. Cardiac cath that afternoon showed occlusion of the RCA with collateral filling from the LAD, a 70% proximal LAD lesion, and 95% lesions in 2 large OM branches of the LCx. He was scheduled for CABG the next day.

The surgeon believes that this patient would be a good candidate for OPCAB. You will be his anesthesiologist.

1. What factors play a role in deciding to do a CABG with or without CPB?
2. What impact does this decision have on your anesthetic plan?
3. How would you monitor this patient? Would you use a PA catheter?
4. What role does TEE play preoperatively and intraoperatively?

After uneventful induction, baseline TEE exam shows LV EEF 40% with thinning and akinesis of the basal and mid inferior segments, severe hypokinesis of the of the basal inferolateral segment, and mild hypokinesis of the mid and apical anterolateral segments.
of the LV. There is 2+ MR. The RV function is normal with trace TR. There is moderate (grade 3) atherosclerotic disease in the descending thoracic aorta and arch. The ascending aorta appears normal on TEE.

5. How does the coronary artery anatomy fit with the LV function?
6. Is an epiaortic examination of the ascending aorta indicated? What impact could it have on the surgery?

The surgeon elects to perform the distal anastomoses in the following order: SVGs to RCA, OM2, OM1, and then LIMA to LAD, and then perform the proximal anastomoses for the SVGs to the ascending aorta with a partially occluding clamp.

7. What do you think of this plan?
8. What alternative might you prefer?

While positioning the heart for the distal RCA anastomosis, the BP drops to 80/50. HR 65, CVP 9.

9. What initial measures would you use to combat the hypotension?
10. What pressor or inotrope would you use, if indicated?
11. Would you like any additional information?

The patient rebounds from this initial hypotension. The RCA is ligated, and the heart rate drops to 30.

12. What caused this bradycardia?
13. What interventions would you consider?

The surgeon decides to place an intracoronary shunt.

14. Discuss benefits and potential risks of this intervention.

The distal RCA, OM2, and OM1 anastomoses are completed. The surgeon stabilizes the anterior wall and ligates the LAD. The patient is again hypotensive. TEE demonstrates akinesis of the anterior and anteroseptal walls, as well as 3+ MR.

15. What hemodynamic, electrocardiographic, and echocardiographic findings point to impending hemodynamic collapse?
16. Intracoronary shunt does not improve the situation. Would this patient benefit from an intraaortic balloon pump?
17. Temporary use of ventricular assist devices during OPCAB has been described in the literature. How important is it to stay off-pump?
18. How do you approach the surgeon when you feel conversion to an on-pump CABG is necessary?

Despite your best efforts, the patient goes into refractory ventricular fibrillation. Emergent cardiopulmonary bypass is necessary.
19. How does this patient’s prognosis compared to a patient who was converted to on-pump CABG in a more controlled fashion?

References

Articles regarding anesthetic management of off-pump coronary artery bypass


Articles regarding monitoring for off-pump surgery


Articles regarding interventions during off-pump surgery


**Articles regarding outcome (conversion to on-pump)**


**Recent articles regarding general outcome (on-pump vs off-pump)**


