The Use of Lumbar Drain for Spinal Cord Protection in a Thoraco Abdominal Aortic Aneurysm Surgery

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ABSTRACT

Thoraco-abdominal aortic aneurysm (TAAA) repair is a complicated and challenging surgery with high chances of unpredictable post-operative outcomes. This is a case of a 56-year man electively admitted for De Bakey type III TAAA repair. The case was done with the one-lung ventilation (OLV) technique by using a bronchial blocker. The other unique thing which was done in this case was the use of a lumbar drain for spinal cord protection. The patient had a prolonged hospital stay but ultimately recovered and was discharged home after two and a half months.

Key Words: *Lumber drain, Spinal cord injury, Aortic aneurysm surgery.*

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INTRODUCTION

Thoraco-abdominal aortic aneurysm (TAAA) repair is a complicated and challenging surgery with high chances of unpredictable post-operative outcomes. The anaesthesiologist plays a vital role in the management of TAAA repair. A detailed pre-operative assessment is the key to identify, evaluate, and optimise these patients possessing multiple co-morbidities.[1] The specific skills related to anaesthesia are one-lung ventilation (OLV), drainage of cerebrospinal fluid, massive blood transfusion, and trans-oesophageal echocardiography.[2] In this case, we used a well-established technique of placement of lumbar drain for spinal cord protection, as spinal cord injury can lead to undesirable postoperative outcomes including paraparesis and paraplegia.[3,4]

CASE REPORT

A 56-year man was electively admitted for De Bakey type III thoracoabdominal aortic TAAA repair. The pre-operative assessment was unremarkable except for the history of hypertension, which was controlled with Amlodipine. He was induced with Midazolam, Etomidate, Fentanyl, and Rocuronium. A lumbar drain was inserted at the level of L2-L3 in a sitting position and transduced just before induction.

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Baseline cerebrospinal fluid (CSF) pressure was 13 mm Hg. An ETT size 8.5 was inserted, and an Arndt bronchial blocker size 9.0 F was placed in the left main bronchus with the help of a fibreoptic bronchoscope. The right internal jugular vein was accessed for the central line and Swan Ganz catheter.

A posterior lateral thoracotomy incision was given with the patient in the left lateral position. After heparinisation, the common femoral artery and vein were cannulated. The venous cannula was placed in the right atrium with the help of the transoesophageal probe. Cardiopulmonary bypass (CPB) was commenced. The pericardium was then opened.

The surgeon inserted a left ventricular vent through the left atrial appendage into the left ventricle and this was hooked to suction, decompressing the left ventricle. The temperature of the patient was then dropped to 20^0C. During the process, the heart did fibrillate but was kept decompressed the whole time. Ice was placed around the patient's head and the aorta was then cross clamped just proximal to the left subclavian artery. Pump flow was then reduced to half. The aneurysm was approached longitudinally, and it was anastomosed end--to-end with a 28 mm Vascutek Dacron. The pump was restarted, and the clamp was released. The patient was then rewarmed and weaned off from CPB. Pump time was 310 minutes with a circulatory arrest period of 40 minutes. The patient received a total of 5 packed cells, 3 whole blood, cell saver blood 800 ml, 6 fresh frozen plasmas (FFPs), and 6 platelets.

The CSF pressure was monitored throughout and was maintained between 9-13 mm Hg by draining 10 to 20 ml of CSF during the procedure. Postoperatively, the patient was ventilated in the cardiac intensive care unit.

The lumbar drain was removed on the third post-op day and the patient was extubated on the fourth post-op day. He was reintubated on the sixth post-op day for fluctuating Glasgow Coma Scale (GCS) and a CT brain was done which did not reveal any significant finding. Finally, he was shifted with a portable ventilator in the special care unit, where he was weaned off and discharged home after approximately two and a half months.

DISCUSSION

According to the literature, the incidence of perioperative morbidity and mortality for TAAA repair is approximately 10–15%.[5,6] The evaluation of the anatomy of the aneurysm and its branches preoperatively is a crucial part of the assessment. The arteria radicularis magna, also known as the Artery of Adamkiewicz, can only be detected in 50-80% of the patient population with the help of radiological studies. The detection and reimplantation of this vessel during the procedure reduce the risk of paraplegia from 50 to 5%. Unfortunately, in this case, the surgical team was unable to identify this artery.

Drainage of CSF via the lumbar drain, preservation of stable haemodynamic status, hypothermia, re-implantation of intercostal/radicular arteries, and spinal cord cooling all can decrease the incidence of paraplegia. Literature reveals that the use of CSF drainage during thoracic and TAAA surgery results in an 80% reduction in neurological complications. Over drainage of CSF must be avoided as most of the complications can manifest due to it.[6]

This case of open TAAA repair using hypothermia, left heart bypass and CSF drainage posed several technical challenges for the anaesthesiologist including OLV in a patient with distorted bronchial anatomy, placement of a lumbar drain, haemodynamic management, and coagulation abnormalities.

COMPETING INTEREST:
The authors declared no competing interest.

AUTHORS' CONTRIBUTION:
SR: Wrote the manuscript.
MH: Designed, and analysed the manuscript.
SA: Revised and arranged the content.
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