

Unforeseen Rupture of Pseudoaneurysm of Common Carotid Artery: An Arduous Anesthetic Challenge

Devishree Das, Sandeep Chauhan, Sambhunath Das, P. Praveen

Department of Cardiac Anaesthesia, Cardiothoracic Centre, CNC, All India Institute of Medical Sciences, Ansari Nagar, New Delhi, India

ABSTRACT

Pseudoaneurysm of the common carotid artery (CCA) is exceptionally unstable and unpredictable; it mandates quick medical attention in order to circumvent neurologic sequelae or hemorrhage. Unanticipated rupture is extremely lethal and a potential provocation for the anesthesia caregiver. It is an arduous challenge for an anesthetist to establish emergency airway when a huge bleeding pseudoaneurysm is compressing and deviating the trachea, securing invasive lines in collapsing vessels, volume and vasopressor resuscitation in deteriorating hemodynamics in order to maintain cerebral perfusion without compromising other vital organs, arranging huge amount of blood and blood products in a short span of time, and transferring an exsanguinating patient for the rapid institution of cardiopulmonary bypass. Not only preoperatively it also necessitates appropriate neuromonitoring and neuroprotection during and after surgery. The association of unforeseen rupture of common carotid artery pseudoaneurysm secondary to the tubercular spine and lifesaving management by the rapid institution of cardiopulmonary bypass (CPB) is a rare occasion. To the best of the authors' knowledge, there is not any similar case in the peer-reviewed literature. Therefore, the authors enumerate the clinical experience of an unexpected rupture of CCA pseudoaneurysm requiring lifesaving CPB and emphasize the "Timely Teamed Effort Approach" that can sustain a life in such an inevitable situation.

Keywords: Anesthetic challenge, cardiopulmonary bypass, common carotid artery, deep hypothermic circulatory arrest, pseudoaneurysm, unforeseen rupture

Address for correspondence: Dr. Sambhunath Das, Department of Cardiac Anaesthesia, Room No. 7, 7th Floor, Cardiothoracic Centre, All India Institute of Medical Sciences, Ansari Nagar, New Delhi - 110 029, India.

E-mail: sambhunathds833@gmail.com

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INTRODUCTION

Pseudoaneurysm of the common carotid artery (CCA) is an extremely rare entity.^[1] It is inherently unstable and unpredictable, warrants rapid assessment and prompt treatment in order to avoid neurologic sequelae or prevent exsanguinating hemorrhage.^[2] Atherosclerosis, vasculitis, blunt or penetrating trauma, and prior endarterectomy are the common etiology for the development of CCA pseudoaneurysm,^[3,4] nevertheless secondary to tubercular infection is a seldom occurrence.^[5,6] Conventional management, albeit challenging constitutes

antituberculosis therapy followed by endovascular stent-graft placement or aggressive surgical debridement with possible reconstruction based on the anatomic complicity.^[4] Occasionally, unanticipated rupture may bleed the patient to death, however, quick recognition and expeditious management may sustain the life.

The authors present the clinical experience of an unforeseen rupture of pseudoaneurysm of the CCA, resulting in exsanguination and requiring rapid institution of cardiopulmonary bypass (CPB).

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CASE REPORT

A 45-year-old female presented with progressive increasing swelling in the right side of the neck for 3 months and occasional bleeding from the swelling since 2 days. The patient had been diagnosed with the tubercular cervical spine and lymphadenitis 2 years before admission and was on antitubercular therapy. There was no history of blunt or penetrating trauma, and there were no associated neurologic sequelae. Local physical examination revealed an approximately 10 × 12 cm-sized painless, pulsatile mass on the right side of the neck extending from the angle of the mandible to the supraclavicular fossa. The irregular mass had a bosselated surface with multiple erosions and healed scars [Figure 1]. Her vital signs were within the normal range, and there was no active bleeding. Therefore, the patient was admitted to the hospital for undergoing necessary evaluation and favorable management.

The X-ray showed a highly vascularized mass of approximately 10 × 12 cm size on the right side of the neck causing a gross tracheal deviation to the left with normal cardiopulmonary shadow [Figure 2a]. Ultrasound neck revealed 6 × 12 cm aneurysmal sac with wide neck occupying almost the entire right side of the neck, and the wall thickness being 2.5 cm. The turbulent, low resistant forward flow was found to be originating from the right CCA. Hence, the diagnosis of pseudoaneurysm of the right CCA was established. Non-contrast CT scan disclosed large, fairly well-circumscribed, heterogeneously dense cystic lesion measuring 8 × 8 cm with mixed attenuation [Figure 2b]. The localized mass effect on the thyroid, larynx, trachea, and esophagus with a shift towards the left was detected. Inferiorly, the retrosternal extension was visible with splaying of the right brachiocephalic vein



Figure 1: External neck evaluation showing irregular mass having a bosselated surface with multiple erosions and healed scars

and left CCA distal to the origin. On 3D reconstruction, the aneurysm was found to be extending from the C3–4 to T2 vertebra level approximately 9 cm in supero-inferior extent [Figure 2c]. The patient was scheduled for elective endovascular intervention with a prior intracranial angiogram for adequacy of collateral blood flow and integrity of the circle of Willis.

While planning for elective endovascular intervention, the pseudoaneurysm ruptured suddenly draining almost one liter of blood. The patient immediately developed hypotension, tachycardia with deterioration of consciousness and continued exsanguination. Instantly, one large-bore venous line and arterial line were established while colloid and crystalloid fluid bolus continued in the previously secured IV line. Noradrenaline infusion was started while fluid boluses were infused continuously. Fast-tracking the airway management, one anesthetist continued bag-mask ventilation and intubated after paralyzing the patient. Meanwhile, the blood bank was informed of an urgent arrangement of adequate blood and blood products. Despite the administration of uninterrupted fluid boluses and vasopressor support, the patient developed bradycardia requiring atropine and adrenaline administration for the maintenance of vital parameters. The surgeon continued compressing the swelling to avoid further bleeding, and the patient was quickly shifted to the operation theatre (OT) without delay while persistently administering fluid bolus and vasopressor for preserving hemodynamics.

The anesthetic team attached all the required monitors including the femoral artery pressure line while briskly femoral veno-arterial CPB was instituted by the surgical team after adequate heparinization. After the establishment of CPB, the patient was cooled rapidly to 20°C and planned for deep hypothermic circulatory arrest (DHCA). Neuroprotection strategies like topical cooling with ice packs and injection methylprednisone and thiopentone were administered with continued near-infrared spectroscopy (NIRS) monitoring. Midline

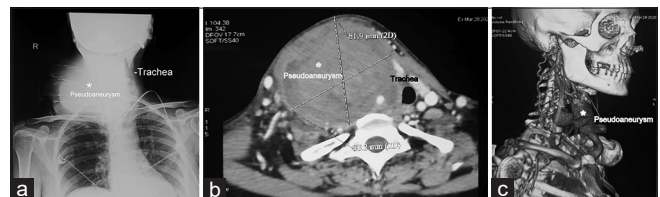


Figure 2: Radiographic images (a) Chest X-ray PA view revealing a highly vascularized mass on the right side of the neck causing gross tracheal deviation (b) Noncontrast CT scan image disclosing a large heterogeneously dense cystic lesion (c) 3D reconstruction of CT image reporting the super-inferior extent of aneurysm

sternotomy was done, and the neck was explored. Further, the aneurysmal sac was evacuated. The diseased segment was resected and replaced with a 16/8/8 mm size Gortex graft. The proximal end was sutured to the ascending aorta and the distal “Y” limb was attached with the common carotid artery and subclavian artery [Figure 3]. The DHCA time and CPB times were 15 min and 243 min, respectively. Thereafter, the patient was weaned from CPB with dopamine, dobutamine, and noradrenaline support. Hemostasis was achieved, and sternotomy was closed. Intraoperatively, the patient required transfusion of 8 units of packed red blood cells (PRBC), 4 units of fresh frozen plasma (FFP), and 3 units of platelet concentrate, which reflected the seriousness of the situation and the important role of blood bank in providing an adequate amount of blood and blood products in a short span of time.

The neck wound could not be opposed and was planned for reconstruction by plastic surgery subsequently. After shifting the patient to the ICU, the patient was weaned, and a neurological assessment was done. Regardless of all possible measures of neuroprotection, the patient developed weakness in the left side of the upper limb (below elbow), which gradually improved with time. Noncontrast CT scan brain was found normal postoperatively. The noradrenalin infusion was gradually stopped after 3 hours postoperatively. Other intensive care management was as per the routine institutional protocol. On 2nd postoperative day, the neck wound was closed by a plastic surgeon by pectoralis major myocutaneous flap. The patient was weaned from the ventilator and extubated on the 2nd postoperative day. The patient had an uneventful recovery and after a month of hospital stay, she was discharged.

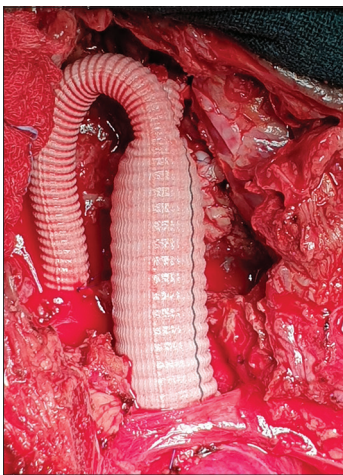


Figure 3: Gortex graft where the proximal end was sutured to ascending aorta, and the distal “Y” limb was attached with the common carotid artery and subclavian artery, respectively

DISCUSSION

This action-packed intriguing case perfectly justified the “Timely Teamed Effort Approach” for optimal patient management. For a successful outcome, especially unforeseen crises in our case, it mandates arrest of surgical bleeding source, restoration of blood volume for the preservation of tissue perfusion and oxygenation, as well as correction of coagulopathy. Here, comes the vital role of a multidisciplinary team consisting of a surgeon, anesthetist, nursing staff, and perfusionist. Continuous bleeding necessitates expeditious action without halt by each team member. Another member of this clinical team should act as the coordinator for the arrangement of the operation theatre and timely communication with the blood bank staff. The conduct of a blood bank should not be forgettable in supplying a huge amount of blood and product in a brief notice.^[7]

The crucial role of an anesthesiologist is not only stabilizing the hemodynamics but also prompt decision-making for fast-tracking airway management, establishing invasive monitoring, and rapid patient transport. Hemodynamics has to be maintained with judicious use of inotropes and vasopressor along with appropriate fluid and blood administration in order to optimize hematocrit and blood volume. Exceptionally, in our case of unanticipated rupture where blood and blood products were not available at the bedside, fluid transfusion and vasopressor became the savior. However, fluid transfusion in the form of colloid and crystalloid was titrated along with vasopressor so as to balance the organ perfusion and counterbalance hemodilution till the arrival of blood and blood products. There should be “balanced resuscitation” by accepting lower than normal blood pressure to avoid the risk of rebleeding.^[8]

It is an arduous challenge for an anesthetist to maintain a difficult airway and sinking hemodynamics at the same time. The physical characteristics of large mass deviating the airway with compression by the surgeon in order to prevent further bleeding forecast a difficult airway. However, bag-mask ventilation was adequate. Fast-tracking the airway management, the airway was secured at breathtaking speed by external laryngeal maneuver while maintaining the hemodynamics. Adequate anesthetic depth is required to avoid the sympathetic response of laryngoscopy and intubation while the patient is bleeding.^[9] In our case, we have used injection ketamine, fentanyl, and rocuronium for induction and facilitate intubation with a negligible hemodynamic stress response. Securing invasive lines in the collapsing vessel is very difficult. We secured arterial

and central venous lines in the left femoral vessels, leaving the right side untouched for femoral cannulation by the surgeon.

In the operating room, shifting the patient to the OT table, attaching all the essential monitors, maintaining anesthesia depth while maintaining the vitals by multiple transfusion and titrating vasopressor, giving heparin to the rapid institution of CPB require multiple hands. This mandates proper communication and team effort, which were well accomplished by the authors. As the patient became severely pale because of multiple fluid transfusions, the CPB pump was primed with blood. During the conduction of DHCA, all possible neuroprotection strategies were followed. The blood gas parameters were maintained by the perfusionist while providing a bloodless field to the surgeon to operate efficiently. Meticulous surgical hemostasis after crossing over the emergency steps of establishing CPB support and graft anastomosis was very crucial. Epsilon aminocaproic acid, FFP, and platelet concentrate (PC) were used to reduce postoperative bleeding. After surgery, intensive postoperative care was provided, and the patient was extubated successfully suggestive of efficient work by all the team members at each step of the requirement.

There have been rare reports in the literature enumerating the association of unforeseen rupture of common carotid artery pseudoaneurysm secondary to tubercular spine and lifesaving management by the rapid institution of CPB. Anesthetists play a key role in resuscitation, airway management, stabilization of vital parameters, neuro-protection, and restoring hemoglobin and coagulation. To the best of the authors' knowledge, there is not any similar case in the peer-reviewed literature. The authors emphasize the "Timely Teamed Effort Approach" can sustain life in such an inevitable situation.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. The patient has given her consent

for her images, investigations, and clinical information to be published in the journal. The patient understands that her name and initials will not be reported and due efforts will be made to conceal her identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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