

# Continuous Epidural Block and Balanced General Anesthesia in Abdominal Aortic Aneurysm Surgery in a General Hospital. Case Report

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**Received:** 12 May, 2022 | **Accepted:** 02 Jun, 2022 | **Published:** 08 Jun, 2022

**Citation:** Rafael CDG, Yamel FF, Héctor BR, Luis NCJ, Nicolás HDJ, et al. (2022) Continuous Epidural Block and Balanced General Anesthesia in Abdominal Aortic Aneurysm Surgery in a General Hospital. Case Report. J Surg Open Access 8(2): dx.doi.org/10.16966/2470-0991.262

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## Abstract

**Introduction:** Abdominal Aortic Aneurysms (AAA) are becoming more frequent in our population; the surgical management of this pathology represents a highly complex surgery which must be performed in a well-equipped medical unit, with implements and suitable personnel, since morbidity and mortality depends a lot on the preoperative evaluation of these patients with high coronary risk. Peripheral locoregional anesthesia techniques occupy an important place in anesthetic treatment and postoperative resuscitation due to the frequent possibility of cardiovascular, respiratory, renal complications or mesenteric ischemia, which justifies a treatment adapted to the high surgical risk, therefore, postoperative management should generally be in an Intensive Care Unit.

**Objective:** Present the case of a patient with Abdominal Aortic Aneurysm (AAA) with acute abdomen urgently operated in a second-level hospital using mixed anesthesia.

**Case:** Octogenarian patient with a diagnosis of infrarenal AAA, undergoing emergency surgery for abdominal pain, which was under balanced general anesthesia plus epidural block a bifurcated Dacron synthetic graft was interposed, with postoperative management in general surgery hospitalization area because there was no availability in the Intensive Care Unit (ICU), evolving properly.

**Conclusion:** Evolution depends a lot on the anesthetic technique, which must be directed towards a multimodal strategy, where hemodynamic stability is a priority.

**Keywords:** Abdominal aortic aneurysm; Epidural block; General anesthesia; General hospital

## Introduction

Atherosclerosis is becoming more frequent. To get an idea about this pathology, we will refer to Peripheral Arterial Disease (PAD).

According to previous studies, PAD prevalence ranges from 3 to 10%, increasing to 15-20% in patients with risk factors [1].

Atherosclerosis complications include AAA, which prevalence is 3.5 to 4% in males over 65 years of age, and 12.5% in 75-84 year-old males [2]; fortunately, 90 to 95% of cases are infrarenal aneurysms [3],

because of the high risks involved in clamping the abdominal aorta above the renal arteries level.

AAA is defined as dilation greater than 50% of the normal diameter, or when the transverse diameter is equal or greater than 3 cm. It predominantly affects caucasian men, smokers, with a male-to-female ratio of 6:1, and mortality from 7 to 23% [4].

AAAs are becoming more frequent; its surgical correction implies a high complexity surgery which must be performed in a well-equipped medical unit, with suitable implements and personnel, since

morbidity and mortality depends a lot on an adequate preoperative evaluation of these patients with high coronary risk [5].

Locoregional anesthesia techniques, balanced general anesthesia plus continuous epidural block (BPDC), occupy a prominent place in anesthetic treatment and postoperative resuscitation where AAA surgery is associated with a high probability of coronary and respiratory complications, acute renal failure (1.8-16.2%), mesenteric ischemia, medullary ischemia (2-10.8%) and ischemic stroke [6-8].

Aortic pathology is a challenge, both for diagnosis and treatment. Anesthetic techniques are aimed to reduce morbimortality, so in some studies it has been recommended to use BPDC plus balanced general anesthesia even though this method could increase the risk of spinal complications; on the other hand, some authors report that there are no statistically significant differences that support the use of this technique for the benefit for patients [9-11].

It is strongly believed that transferring a patient to a more experienced facility results in better outcomes and short- and long-term survival [12]. However, as already mentioned, most AAA debut as broken, being a real urgency that entails a high mortality which has to be resolved immediately in most cases [11]; AAAs that do not present rupture are generally asymptomatic and are diagnosed incidentally [13,14].

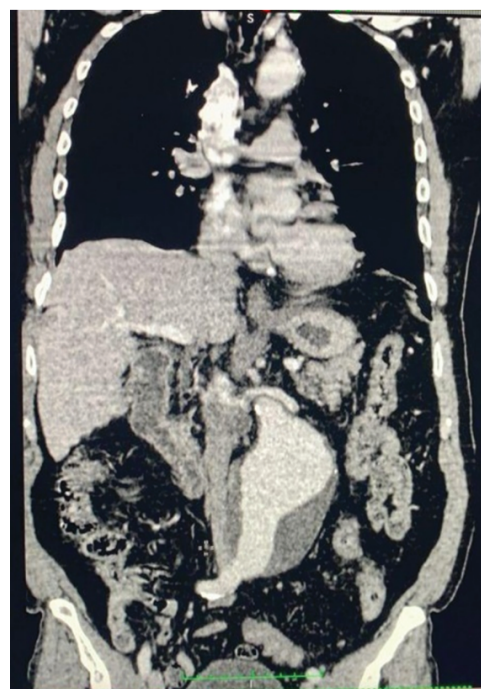
The open surgical technique generates great surgical exposure, with high morbimortality, attributed to factors such as the complexity of the repair, extent of the disease, comorbidities, surgeon experience and quality of perioperative care [15].

Generally, the diagnosis of AAA is fortuitous, the classic triad is not always present, including in dissection, rupture imminence or rupture, which contributes to the fact that it is not always possible to attend them at the right time or transfer them to a specialized center, with an experience staff in this pathology, so it has been proposed the creation of a protocol called aneurysm code, for early recognition which implies an adequate treatment in time and form, since this directly influences the morbidity and mortality that accompanies this entity [15].

We present a case report of AAA which was initially diagnosed as probable acute chronic cholecystitis and acute abdomen, with pathological personal history of an AAA, was operated on in our hospital and despite having several limitations it was properly addressed with optimal anesthetic-surgical results.

## Clinical Case

80-year-old male patient, with history of positive smoking for 8 years, Systemic Arterial Hypertension (SAH) 15 years of evolution; surgical-anesthetic history of appendectomy 75 years ago, hemorrhoidectomy 55 years ago, left ankle fracture 45 years ago without complications; he reports that in his medical unit in Guanajuato he was diagnosed as a fortuitous finding, an infrarenal AAA of  $9 \times 7$  cm with a CT scan (Figure 1) and was being protocolized for derivative surgery. During his stay in Mexico city, he presents abdominal pain of two days of evolution oppressive, constant in the upper right quadrant accompanied with nausea without vomiting; to physical examination, hemodynamically stable with positive Murphy's sign and abdominal muscular stiffness; positive Blumberg sign; at the admission time, there are no cabinet diagnostic assistants available at the moment, so he is subjected to exploratory laparotomy with an initial diagnosis of acute abdomen due to acute chronic cholecystitis; preoperative assessment is requested by the anesthesiology service, which find:



**Figure 1:** Angiotomography presented by the patient with an infrarenal AAA of  $9 \times 7$  cm with extension to the iliac arteries.

## Physical examination

BP: 148/88 mmHg, HR 68 bpm, RR: 18 rpm, T:  $36.2^{\circ}\text{C}$ , weight 63 kg, size: 166 cm, BMI:  $23.3 \text{ kg/m}^2$ . Adequate general condition, without predictors for difficult airway. Painful abdomen with muscular endurance; on palpation pulsatile mass of 3-5 cm in the left lower quadrant not painful, without murmurs; limbs with homocrotic synchronous pulses, immediate capillary filling, no varicose veins in legs or edema; with preserved neurological status.

## Laboratories

Glucose 107 mg/dl, urea: 54 mg/dl, BUN: 25 mg/dl, creatinine: 1.31 mg/dl, sodium: 139 mEq/L, potassium: 4.7 mEq/L, chlorine: 105 mEq/L, leukocytes: 8.4 U/L, hemoglobin: 14.1g/dl, hematocrit: 42.5%, platelets: 209000 per  $\text{mm}^3$ , PT: 14.2 sec, INR: 1.03, PTT: 31 sec.

## Chest X-ray

Calcium density nodule in right middle lobe lung probable calcified granuloma.

Previous thoracoabdominal angiotomography: AAA with extension to the iliac arteries.

## Cardiology assessment

EKG with sinus rhythm, 66 bpm, no heart failure or ischemic heart disease data, moderate thrombotic risk, with Gupta 0.15% for presenting acute myocardial infarction, Lee less than 10%, Respiratory therapy, ASA III, Goldman LEE II.

## Anesthetic plan

Balanced general anesthesia plus epidural block. After review of the anesthesia machine and room preparation, the patient was admitted, type I monitoring. He was premedicated with midazolam 2 mg IV. Epidural block was performed in left lateral position, with Tuohy

needle No. 17G, obtaining resistance loss Pitkin (+); lidocaine 2% 300mg plus fentanyl 100 µg is administered and transtuohey catheter is placed verifying proper position and permeability. Subsequently, previous oxygenation at 5 Lt/min with facial mask for three minutes, basal narcosis with fentanyl 200 µg IV, anesthetic induction is carried out with etomidate 50 mg IV and neuromuscular relaxation with rocuronium 50 mg IV in bolus, video laryngoscopy is performed with curved leaf # 4, observing Cormacke-Lehane III, Murphy 8.0 type probe with balloon is placed and infused with 3 cc of air. It is fixed at 20 cm in lip commissure, mechanical ventilation in volume mode: VT: 6 ml/kg; Max 35 cm of water; FR: 12-16x'; PEEP 2 cm of water. Two peripheral intravenous lines are installed with catheters number 16 G (right and left forearm). After Allen's test, under sterile technique, the left radial artery is accessed for invasive blood pressure measurement. For CVP measurement, the patient already had from his admission a central venous catheter (right subclavian); we started invasive PA monitoring, EtCO<sub>2</sub>, CVP and bladder catheter.

Anesthetic maintenance with sevoflurane 1-1.5 vol% (CAM 0.8) FiO<sub>2</sub> of 50%. IV infusion with fentanyl 0.02-0.04 µg/kg/min, total dose of 756 µg; dexmedetomidine 0.2 µg/kg/h total dose of 13mg; pre-unclamping noradrenaline 4-6 µg/min (0.04-0.09 µg/kg/min). Lidocaine 2% 100 mg epidural. During the transanesthetic stable vital signs (Table 1); serial control arterial blood gases are shown in table 2. As an adjuvant management intravenous: dexamethasone 8mg, ketorolac 60 mg, heparin DTF 3000 iu, phenytoin 1 gr, ceftriaxone 1 gr, 40 ml of bicarbonate 7.5% and ondansetron 8 mg.

Water balance: 7940 ml of Hartmann solution income, 600 ml of erythrocyte concentrate, 500 ml of fresh frozen plasma, uresis 640 ml (1.4 ml/kg/h), 5420 ml discharges, 1800 ml from bleeding and positive total balance of 1,795 L.

### Surgical findings

Distended gallbladder, no pathological data, normal liver and pancreas; retroperitoneal tumor which corresponds to infrarenal AAA of approximately 9 × 7 cm; renal arteries without compromise; dilated iliac arteries; without data of imminence of rupture; it is dissected; time of infrarenal aortic clamping time of 120 min total; Interposition of Dacron graft with double Velour of 16 × 8 mm in abdominal aorta to the common femoral arteries.

Ends surgical and anesthetic procedure without complications; orotracheal catheter is removed with the presence of protective airway reflexes and transferred to the floor of the surgery service with daily inter consultation for intensive therapy (there were no beds available). The epidural catheter is removed 24 hours after the end of the surgical

event with coagulation times in normal parameters. He was followed by our service and was discharged from the general surgery service after 11 days of hospital stay, without data of renal, cardiac, medullary or brain injury.

### Discussion

Our patient debuted with Einstein sign which is known for acute pain in right upper quadrant with data of peritoneal irritation caused by AAA rupture, that would explain why it was thought of vesicular pathology on the first place, however in the exploratory laparotomy, vesicular pathology was excluded and the AAA was corroborated, which by the dimensions and by not having a current study of an angiotomography, it was decided to resect the aneurysm [16].

In this case it was decided to use combined anesthetic technique (balanced general anesthesia plus epidural block), due to the patient's history of being an AAA carrier, with the aim of promoting the best conditions for the performance of the surgical procedure, which in addition to maintaining adequate hemodynamic stability and oxygenation, are attributed a variety of advantages, such as improved quality of analgesia, increased patient satisfaction, preservation of normal lower extremity muscle activity, and reduced postoperative complications [17], along with decreased anesthetic requirements, lower morbimortality, lower neuroendocrine response to stress, and with faster extubation [18]. It facilitates an early recovery and a short post-anesthetic follow-up in our patient.

According to scientific publications and anesthetic recommendations, any procedure that may trigger an Antonio Maria Valsalva maneuver or catecholamine discharge should be avoided [19]. During orotracheal intubation, the induction of general anesthesia should be slow and controlled to not increase blood pressure and condition a rupture. It is advisable to decrease the sympathetic and hyperdynamic response to laryngoscopy, which is achieved with loading doses of esmolol (0.3-1.5 mg/kg) or IV infusion of nitroglycerin (0.5-1.5 µg/kg/min) [19].

Unfortunately, we do not have these drugs in our institution, but orotracheal intubation was atraumatic and at the first attempt; as for arterial cannulation, we consider performing it immediately after induction to meet this objective and perform accurate vital signs monitoring. The use of fentanyl, etomidate and Rocuronium allows an adequate anesthetic state and fewer hemodynamic changes [19,20], as it was achieved in the patient.

Surgery on the descending aorta requires the placement of a proximal and distal clamp to the lesion, with hemodynamic and metabolic changes depending on the level, both due to the interruption of blood flow distal to impingement, and proximal arterial hypertension due to increased Systemic Vascular Resistance (SVR) and catecholamine levels secondary to ischemia. This may compromise cardiac contractility as a result of increased ventricular after load [21,22]. The International Anesthesiology Clinics manifests the control of proximal arterial hypertension and distal perfusion pressure, in order to avoid undesirable effects on the heart, central nervous system, splanchnic and renal circulation, among others. Values of 90-100 mmHg of systolic blood pressure are considered adequate, and in case of hypertension, anesthesia should be deepened. If it persists, the use of venous or arterial vasodilator drugs (nitroglycerin or sodium nitroprusside) or beta-blockers, with their different effects should be contemplated [23,24].

It is recommended during aortic clamping to modify ventilatory parameters, since the expired CO<sub>2</sub> tends to decrease due to the lack

**Table 1:** Vital signs during procedure.

	BP (mmHg)	MAP (mmHg)	HR (x")	RR (x")	SatO <sub>2</sub> (%)	EtCO <sub>2</sub> (mmHg)	CVP (cm H <sub>2</sub> O)
Initial	175/80	112	98	19	98%	-----	----
Trans	110/70	83	60	14	99	30	5
End	150/80	103	60	20	99	----	5

**Table 2:** Arterial blood gases during procedure.

	pH	pCO <sub>2</sub>	pO <sub>2</sub>	Lactate	HCO <sub>3</sub>	BEE
Initial	7.37	40	261	1.4	23.1	-2.0
Trans	7.31	38	228	2.6	19.1	-7.2
End	7.24	50	134	5.4	21.4	-6.0

of venous return, which conditions a decrease in Cerebral Blood Flow (CBF) in addition to metabolic alterations and release of myocardial depressant factors from the ischemic areas to the general circulation [21,22]. It is suggested to attenuate this effect by administering fluids before releasing the aortic clamp to raise the PVC between 3-5 mmHg above the pre-clamping values, suspending infusion of beta-blockers and vasodilators if they are being administered, and gradually release the clamp (2-4 minutes) to recapture the aorta if necessary and administer vasopressors [22,23] to maintain a systolic blood pressure between 150-160 mmHg [19].

In our case, prior the unclamping, we administer crystalloids and blood products to maintain normovolaemia; IV noradrenaline infusion (0.04 to 0.09 µg/kg/minute) allowed us an adequate control of blood pressure parameters, being suspended at the end of the procedure.

The location of the aneurysm and the duration of the clamping are predisposing factors for the development of acute kidney damage [24], with an increasing incidence greater than 10 times when suprarenal clamping time is greater than 50 minutes or ischemia secondary to thromboembolism of the renal arteries by surgical manipulation or dissection [25], so it is recommended to maintain cardiac output to ensure optimal renal perfusion before, during and after clamping [26]. The ideal is to have an arterial line for the maintenance of an adequate pressure, and we do not always have the implements for it.

It is of the utmost importance to maintain hemodynamic stability and careful follow-up of the patient in the postoperative period; opting for an early extubation as we saw in our case, who was discharged without data of renal, cardiac, medullary or brain injury [26,27].

However, we must not forget that elderly, hypertensive patients have a very high mortality in case of AAA, so ideally, they should be managed minimally in an intermediate intensive care unit in the postoperative period. The patient over 80 years of age, is a fragile patient; patients with an AAA are hypertensive postoperatively in 57% of cases; in 10.7% have postoperative complications [9].

## Conclusions

The best anesthetic technique is still uncertain, heading towards a multimodal strategy, where hemodynamic stability is a priority. A timely pre-anesthetic assessment generates guidelines that give clarity in both the transoperative and postoperative periods, with an effective anesthetic act [26].

## Conflict of Interest

The authors declare that there is no conflict of interest.

## Ethical Responsibilities

Right to privacy, confidentiality of data and informed consent. The authors state that they have followed their workplace's protocols on publication of patient data and that no patient data appear in this article.

## Financing

This research has not received any specific grants from public sector agencies.

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