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ANESTESIA EN LAPAROSCOPIA

- CURSO -
ANESTESIA PACIENTES
ESPECIALES

Paulo Mallea V.
Medico Veterinario

- 
- A grayscale photograph of two surgeons in an operating room. They are wearing surgical masks, caps, and gloves, focused on a procedure. The background shows medical equipment and a window.
- **TECNOLOGIA – POPULARIDAD**
 - **MINIMA INVASION**
 - **MENOR DAÑO TISULAR**
 - **MENOS MEDIADORES INFLAMATORIOS**
 - **MENOS ANALGESICOS - ALTA PRECOZ**
 - **DIAGNOSTICA Y QUIRURGICA**



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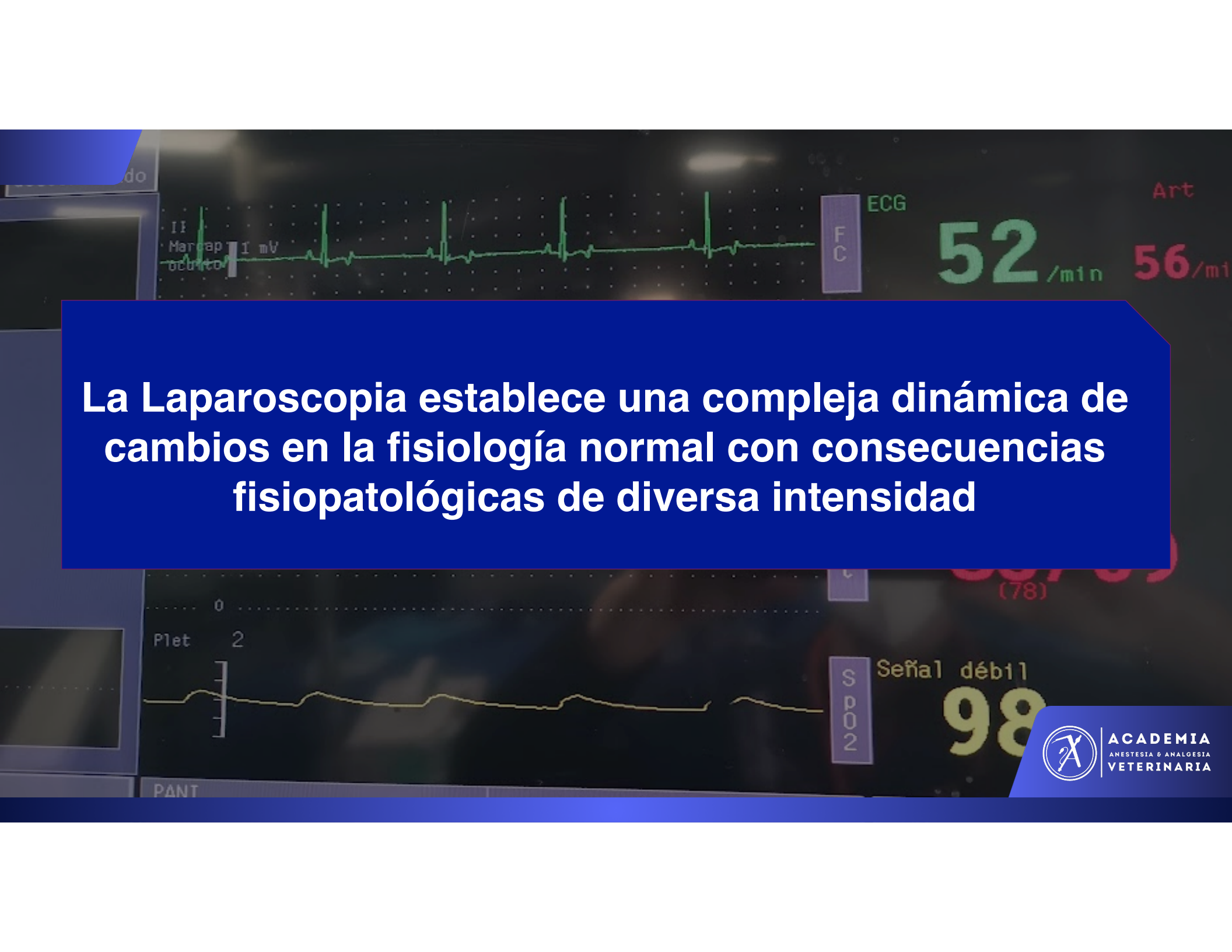
POTENCIALES COMPLICACIONES

- Propias de la patología de base
- Posicionamiento
- Procedimiento qx
- Insuflación gas (co2)

ALTERACIONES FISIOLÓGICAS



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La Laparoscopia establece una compleja dinámica de cambios en la fisiología normal con consecuencias fisiopatológicas de diversa intensidad



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CONSIDERACIONES ANESTESICAS

TIPO DE PACIENTE

INDICACION DE
LAPAROSCOPIA

PROCEDIMIENTO
RUTINARIO

- JOVEN
- ASA I-II
- OV LAP

PROCEDIMIENTOS
DE MAYOR
COMPLEJIDAD

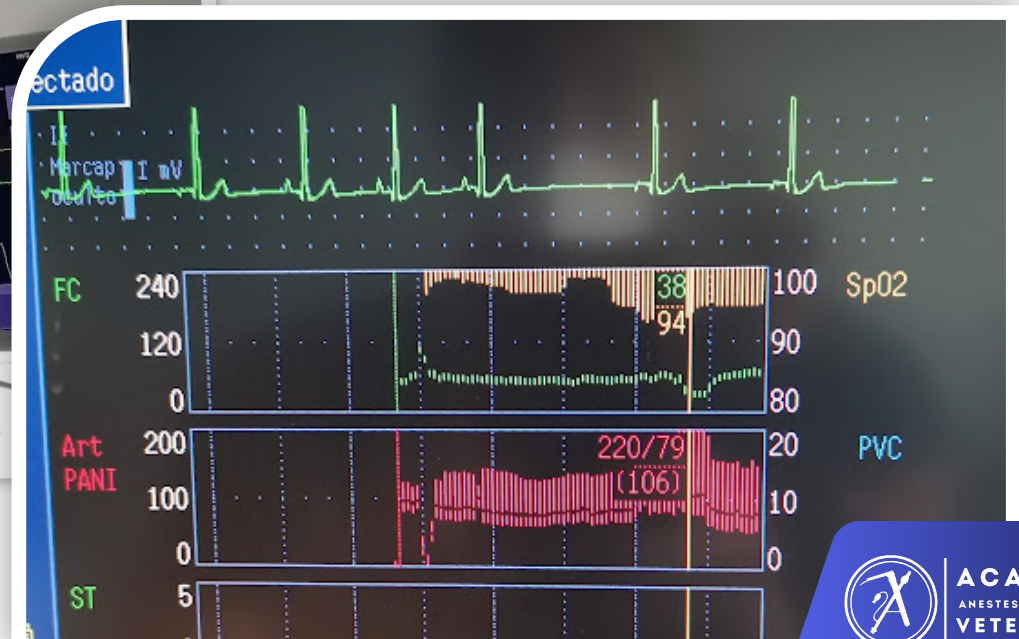
- GERONTE
- CANCER (HEPATICO/PULMONAR/ADRENAL)
- CARDIOPATIA



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CONSIDERACIONES ANESTESICAS

Tipo De Paciente



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CONSIDERACIONES ANESTESICAS

Procedimientos – Habilidad Quirurgical



- Punción inadvertida de órganos o vasos sanguíneos
- Principal causa de conversión
- Sangrado de Sitio Qx – Vigilancia
- Punción de Vejiga, Intestino o Estomago

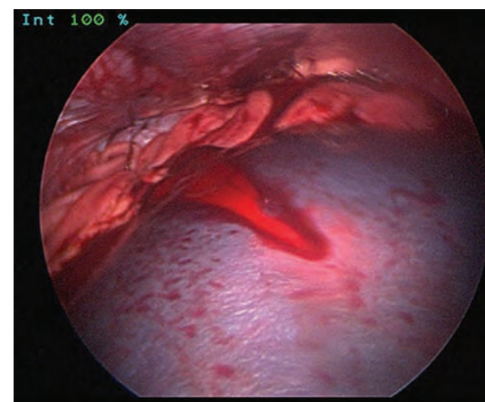


Figure 7-1 Inadvertent splenic puncture. (Courtesy of Eric Monnet.)



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CONSIDERACIONES ANESTESICAS

Fisiopatología Del Pneumoperitoneo – Efectos Hemodinamicos

$$\begin{array}{ccccc} \text{Oxygen delivery} & = & \text{Cardiac output} & \times & \text{Oxygen content} \\ \text{DO}_2 \text{ ml min}^{-1} & & \text{CO l min}^{-1} & & \text{CaO}_2 \text{ ml O}_2 \text{ dl}^{-1} \text{ blood} \end{array}$$

$$\begin{array}{ccccc} \text{Mean arterial} & = & \text{Cardiac output} & \times & \text{Systemic vascular} \\ \text{pressure} & & \text{CO l min}^{-1} & & \text{resistance} \\ \text{MAP mmHg} & & & & \text{SVR dynes s cm}^{-5} \end{array}$$



$$\begin{array}{ccc} \text{Heart rate} & \times & \text{Stroke volume} \\ \text{beats per min} & & \text{ml per beat} \end{array}$$

$$\text{Preload} = \text{Venous return or circulating blood volume}$$

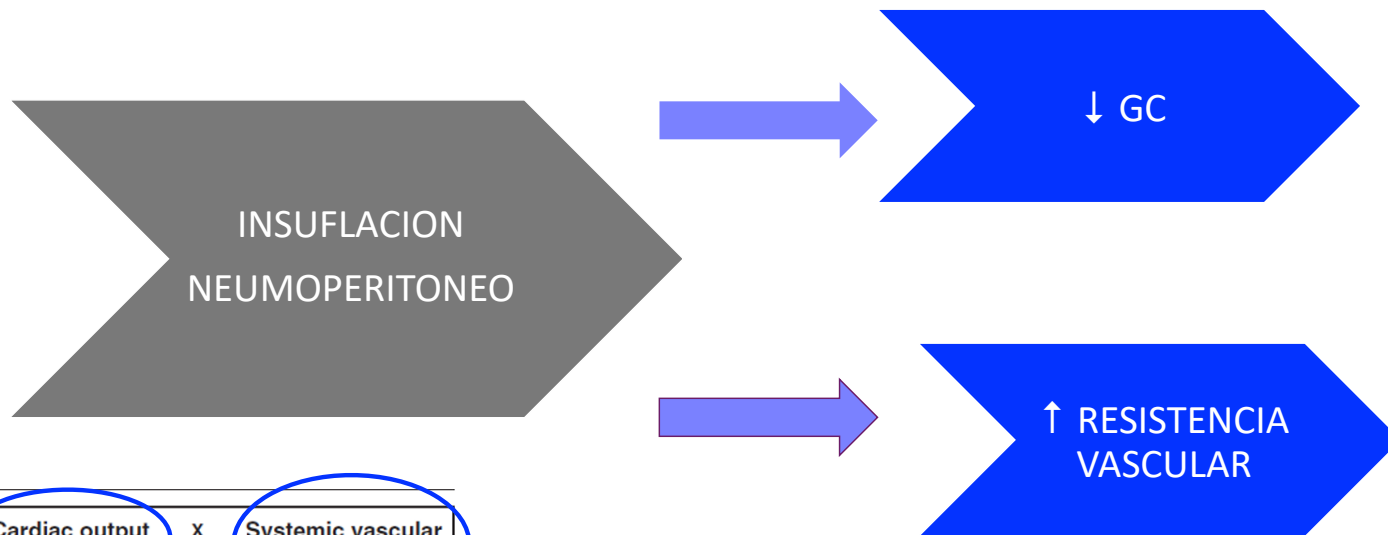
$$\text{Afterload} = \text{Resistance against systolic ejection}$$

$$\text{Contractility} = \text{Inotropy or strength of contraction}$$



CONSIDERACIONES ANESTESICAS

Fisiopatología Del Pneumoperitoneo – Efectos Hemodinamicos



$$\text{Mean arterial pressure} = \text{Cardiac output} \times \text{Systemic vascular resistance}$$

MAP mmHg CO l min⁻¹ SVR dynes s cm⁻⁵

LIBERACION VASOPRESINA

$$\text{Heart rate} \times \text{Stroke volume}$$

beats per min ml per beat

Preload

= Venous return or
circulating blood volume

COMPRESION V. CAVA

Afterload

= Resistance against
systolic ejection

Contractility

= Inotropy or strength of
contraction

PACIENTE SANO GENERALMENTE
COMPENSA EFECTOS HEMODINAMICOS



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Case Reports > [Obstet Gynecol.](#) 1992 May;79(5 (Pt 2)):840-1.

Asystolic cardiac arrest: a rare complication of laparoscopy

J L Shifren ¹, L Adlestein, N J Finkler

Affiliations + expand

PMID: 1533024

Asystolic Cardiac Arrest Following Pneumoperitoneum From Vagal-Mediated Bradycardia During Laparoscopic Gynaecologic Surgery: A Case Report



JACC Journals > JACC > Archives > Vol. 85 No. 12_Supplement

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BRADYCARDIA LEADING TO ASYSTOLE CARDIAC ARREST DURING LAPAROSCOPIC SURGICAL PROCEDURE: A RARE BUT CRITICAL INTRAOPERATIVE COMPLICATION

Authors: Amira Abdalla, Moktar Elgawire, Ahmed Elgawire, Emadeldeen Elgwairi, and Brian M. Friedman | [AUTHORS INFO &](#)

[AFFILIATIONS](#)

Publication: JACC • Volume 85, Number 12_Supplement



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CONSIDERACIONES ANESTESICAS

Fisiopatología Del Pneumoperitoneo – Efectos Hemodinamicos

- En Perros, PIA entre 16-20 mmHg **REDUCEN** el flujo venoso portal y arterial mesentérico.
- Se describe **OLIGURIA** con PIA entre 15 – 20 mmHg y **ANURIA** con PIA mayor
- Estudio en **Felinos**, PIA 16 mmHg no afecto Parámetros CV.



CONSIDERACIONES ANESTESICAS

Fisiopatología Del Pneumoperitoneo – Efectos Hemodinámicos

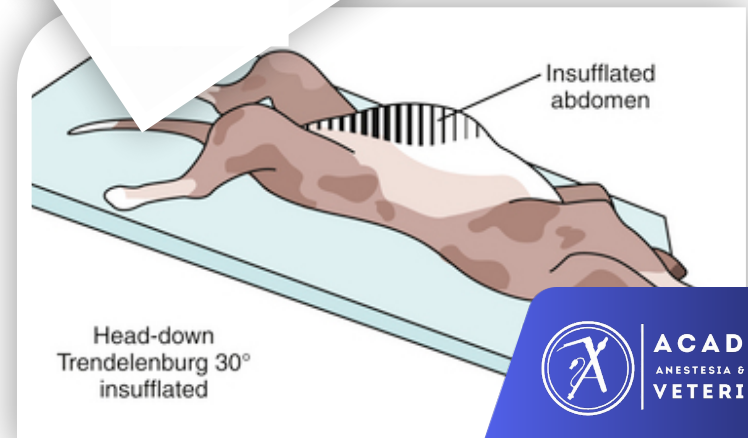
- **Fowler (Trendelenburg Reverso)**

- ↓ RV (efecto Gravitacional) → ↓ GC
- Anestesia y Reflejo Baroreceptor
- *Mayor Impacto Hemodinámico*



- **Trendelenburg**

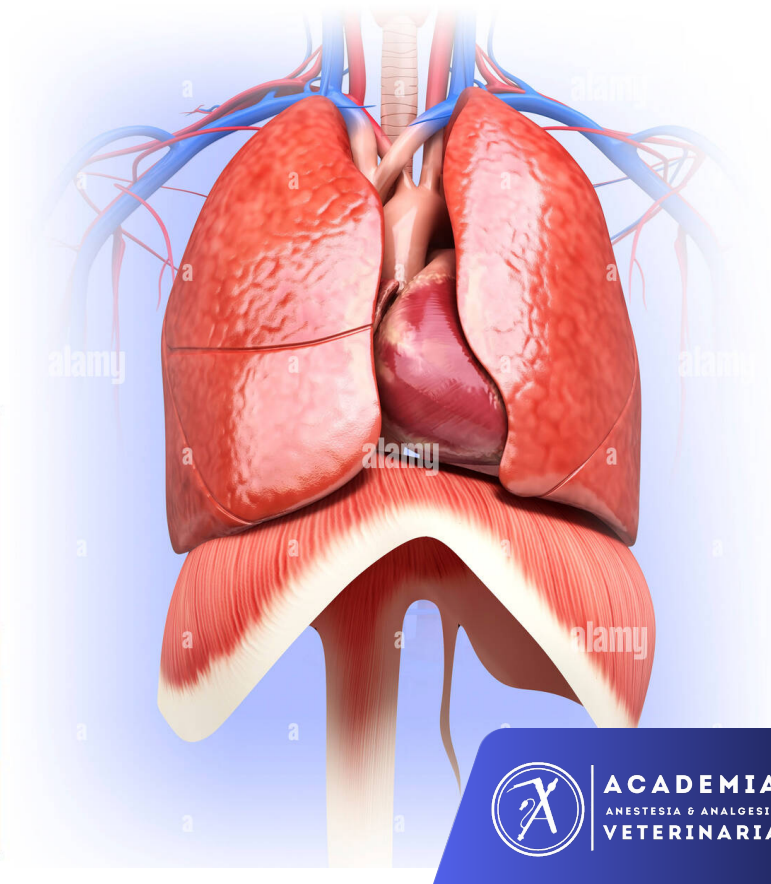
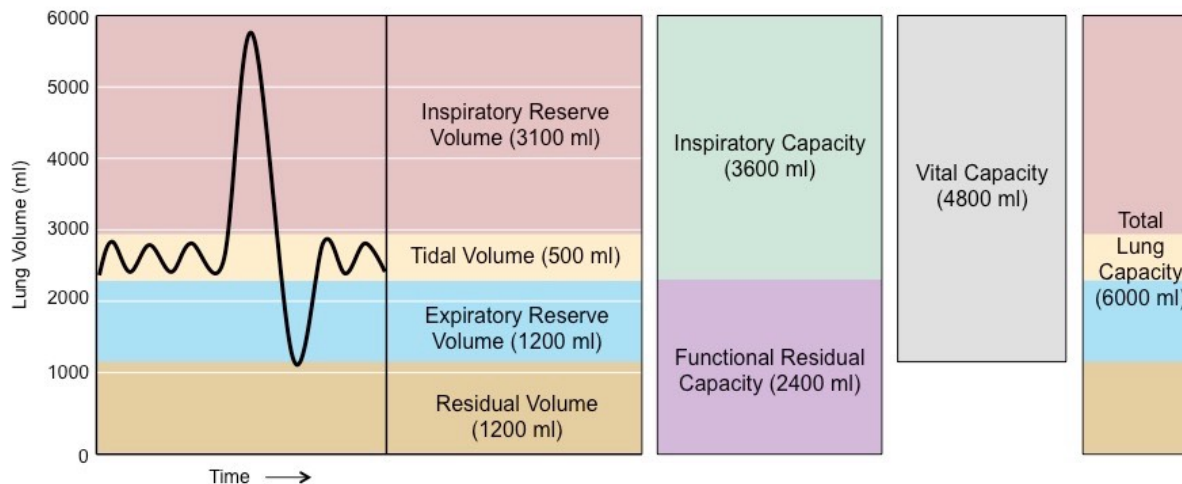
- ↓ FC y Tono Vascular → ↓ GC



CONSIDERACIONES ANESTESICAS

Fisiopatología Del Pneumoperitoneo – Efectos Hemodinamicos

- $\uparrow$ PIA $\rightarrow$ Limita las excursiones diafragmáticas
- Reduce Compliance Pulmonar
- Reduce CRF

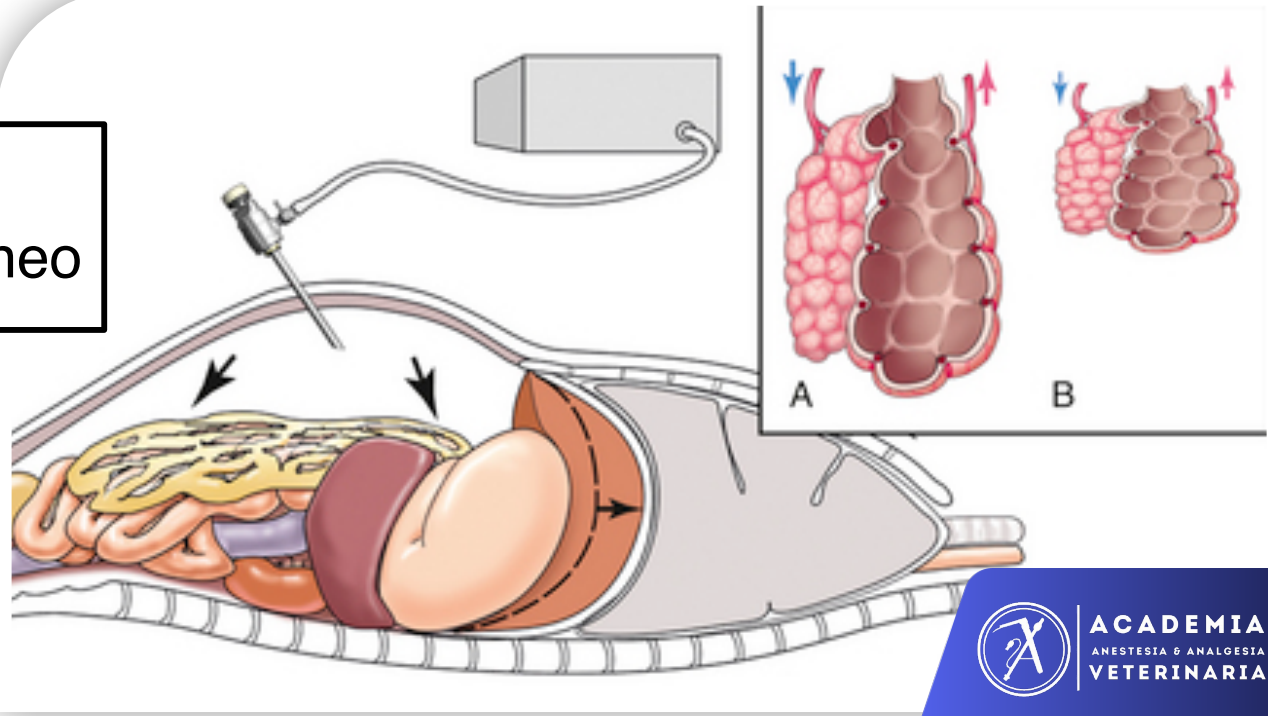


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CONSIDERACIONES ANESTESICAS

Fisiopatología Del Pneumoperitoneo – Efectos Hemodinamicos

- CO₂ altamente Difusible
- Ingresa a Torrente Sanguíneo



CONSIDERACIONES ANESTESICAS

Fisiopatología Del Pneumoperitoneo – Efectos Hemodinamicos

¿VENTILACION ESPONTANEA ?

Published: July 1970

Ventilation in patients anaesthetized for laparoscopy

John Desmond & R. A. Gordon

Canadian Anaesthetists' Society Journal 17, 378–387 (1970) | [Cite this article](#)

278 Accesses | 39 Citations | [Metrics](#)

SUMMARY

Spontaneous ventilation during laparoscopy is dangerous and must be condemned. Adequate controlled ventilation, sufficient to remove the carbon dioxide being excreted by the lungs, must be instituted in all cases. Some of the more serious complications peculiar to this procedure have been discussed, as these directly affect the anaesthetic management of these patients. These include reduction of cardiac output by impedance of venous return, carbon dioxide embolism, visceral perforation, and haemorrhage.

ANALYSIS OF RESULTS

Group 1

1. The pre- and post-insufflation expired gas collections showed that four of the patients produced 66–133 ml of carbon dioxide per minute more following the insufflation than before.
2. Minute volumes increased from 50 to 100 per cent during the post-insufflation period.
3. A significant change in respiratory rate following the insufflation was also noted.
4. One patient developed bigeminal rhythm and multi-focal ventricular contractions shortly after the insufflation of the carbon dioxide. The arrhythmia lasted for eight minutes even though the patient was immediately given 100 per cent oxygen.
5. Analysis of the blood gases showed a rise in arterial PaCO_2 to 59 mm Hg in case no. 3.
6. There appeared to be some respiratory and metabolic acidosis present during the post-insufflation period.
7. Low PaO_2 (46–64 mm Hg) was noted in case no. 4 of this group.



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CONSIDERACIONES ANESTESICAS

Fisiopatología Del Pneumoperitoneo – Efectos Hemodinamicos

VENTILACION ESPONTANEA

- Existe un **reducción proporcional** entre el aumento de la presión de insuflación y la $\downarrow$ VT
- Esto conlleva a un **aumento del etCo2**
- **Aumento del WOB $\rightarrow$ Fatiga**



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Healthy nonobese bitches maintain acceptable spontaneous ventilation during laparoscopic ovariectomies

Tristan Merlin, Dr vét, MSc, MVetMed, DECVA¹; Filippo Cinti, DVM, PhD, DECVS²; Tim M. Charlesworth, MA, VetMB, DSAS^{1*}

¹Eastcott Referrals, Swindon, UK

²Clinica Veterinaria Apuana, Marina Di Carrara (MS), Italy

*Corresponding author: Dr. Charlesworth (timcharlesworth1@gmail.com)

<https://doi.org/10.2460/javma.22.03.0128>

Table 1—Mean $\pm$ SD of end-tidal carbon dioxide (P_{ETCO_2}), respiratory rate (RR), tidal volume (V_T), and inspiratory minute volume ($\dot{V}_I$) for 21 client-owned dogs that underwent general anesthesia and abdominal insufflation to a pressure of 10 mm Hg for laparoscopic ovariectomy between January 1 and June 30, 2019, with variables recorded before abdominal insufflation (T2), immediately after insufflation (T3), immediately after extraction of the first ovary (T4), immediately after extraction of the second ovary (T5), and after abdominal deflation (T6).

Variable	T2	T3	T4	T5	T6
P_{ETCO_2} (mm Hg)	44.3 $\pm$ 4.3	43.5 $\pm$ 5.7	47.0 $\pm$ 4.7	47.8 $\pm$ 5.1	44.1 $\pm$ 5.9
RR (bpm)	11 $\pm$ 5.5	16.5 $\pm$ 7.6	14.8 $\pm$ 5.1	15.4 $\pm$ 5.9	15.9 $\pm$ 6.8
V_T (mL/kg)	12.1 $\pm$ 3.6	10.5 $\pm$ 3.9	11.9 $\pm$ 4.4	12.4 $\pm$ 4.6	13.9 $\pm$ 5.0
$\dot{V}_I$ (mL/kg/min)	122.9 $\pm$ 43.5	154.7 $\pm$ 52.2	165.3 $\pm$ 56.6	178.4 $\pm$ 68.5	201.8 $\pm$ 64.9

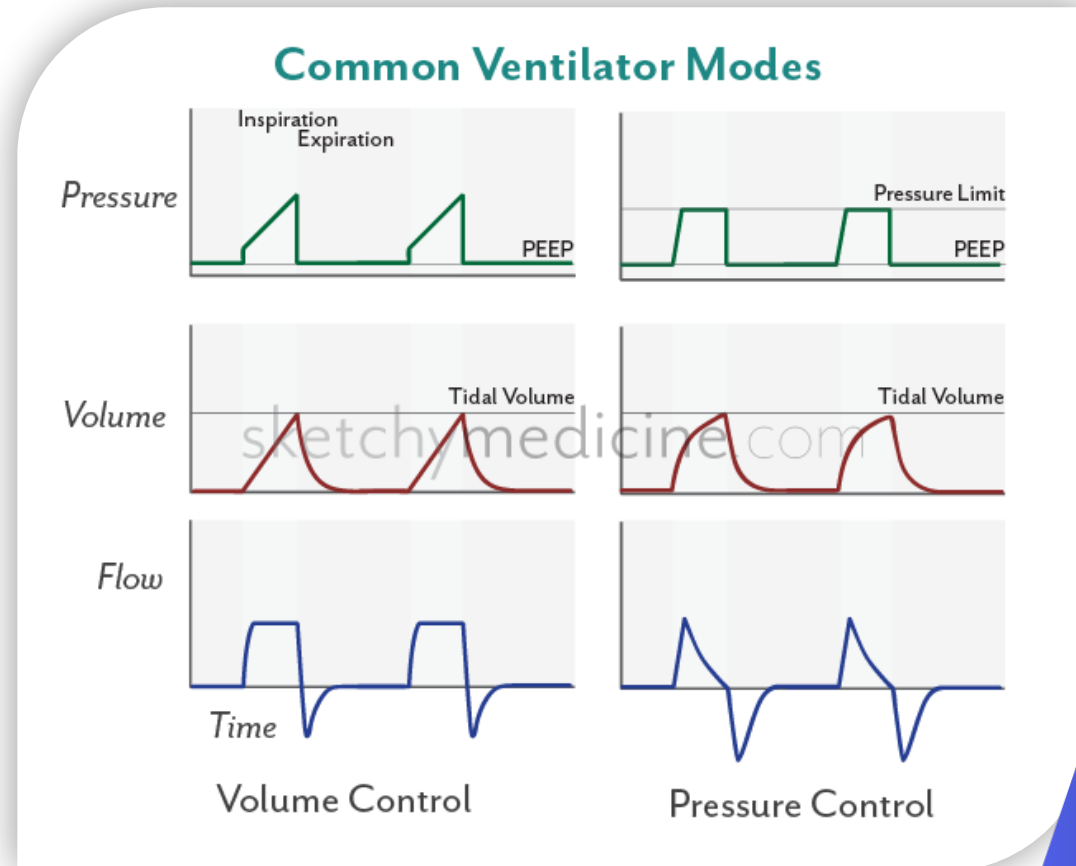
22 Perros Jovenes Sanos
Media de Peso 10 $\pm$ 8.3 Kg
CC (3/9 - 7/9)
T Insuflación max 30 min
1 Necesitó Rescate Ventilatorio



CONSIDERACIONES ANESTESICAS

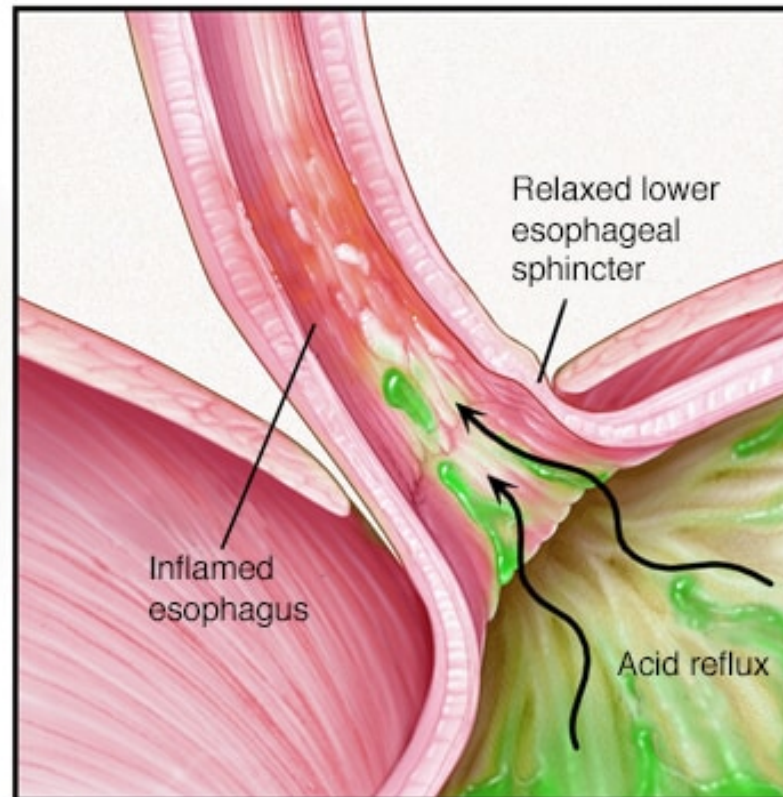
Fisiopatología Del Pneumoperitoneo – Efectos Hemodinamicos

Ventilacion Mecanica

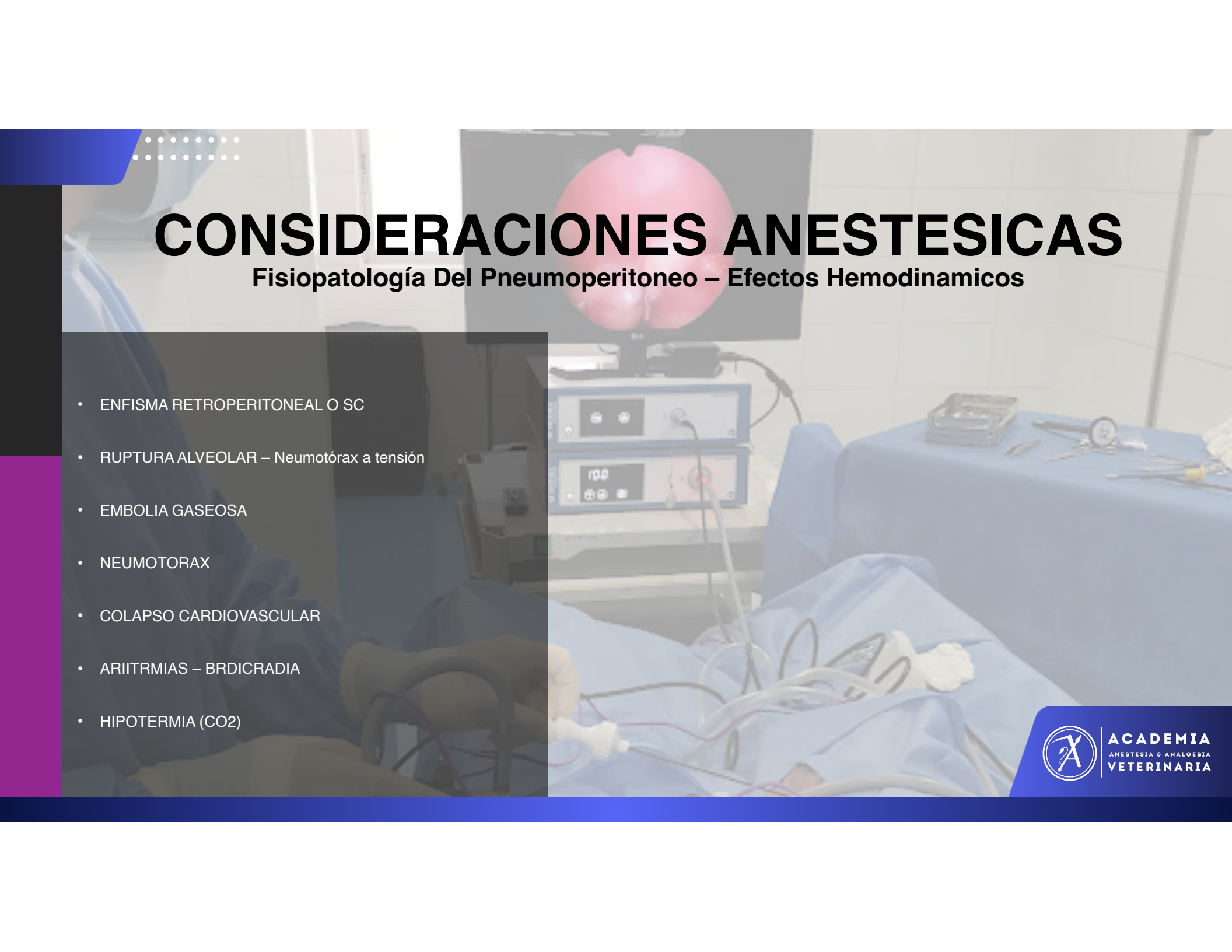


CONSIDERACIONES ANESTESICAS

Fisiopatología Del Pneumoperitoneo – Efectos Hemodinamicos



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CONSIDERACIONES ANESTESICAS

Fisiopatología Del Pneumoperitoneo – Efectos Hemodinamicos

- ENFISMA RETROPERITONEAL O SC
- RUPTURA ALVEOLAR – Neumotórax a tensión
- EMBOLIA GASEOSA
- NEUMOTORAX
- COLAPSO CARDIOVASCULAR
- ARIITRMIAS – BRDICRADIA
- HIPOTERMIA (CO2)



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MANEJO ANESTESICO

Estableciendo Una Estrategia Anestésica/Analgesica – Evaluación Preanestésica



Contraindicaciones Absolutas

Shock Séptico

Shock Hipovolémico



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Contraindicaciones
Trendelenburg



PIC

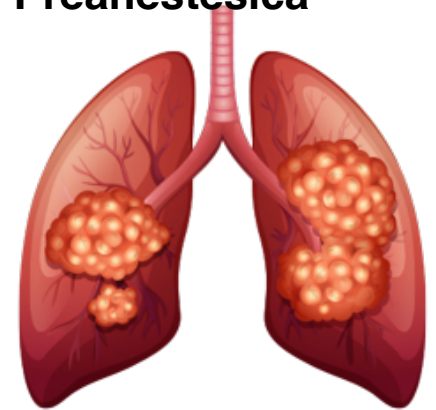


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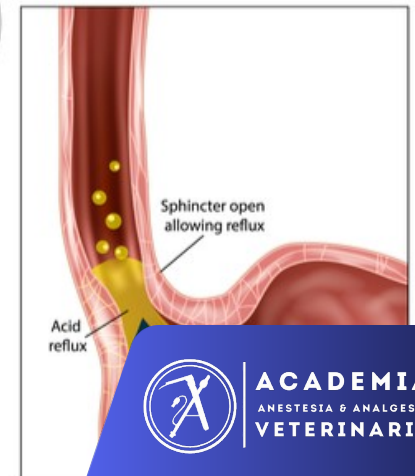
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Patología Pulmonar Preexistente



Riesgo De Reflujo Gastroesofagico



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Estableciendo Una Estrategia Anestésica/Analgésica – Evaluación Preanestésica



Procedimiento Ambulatorio



Farmacos Corta Duración



Rápida Recuperación



Reducción Náuseas



Evitar Prurito

Development of Enhanced Recovery After Surgery (ERAS) protocols in veterinary medicine through a one-health approach: the role of anesthesia and locoregional techniques

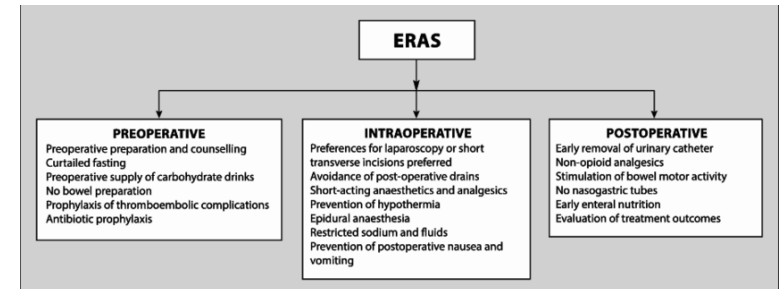
Luis Campoy LV, Dip. ECVA

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Open Access Article

Veterinary Enhanced Recovery After Surgery (Vet-ERAS) Program in Dogs Undergoing Emergency Laparotomy

by Aida Fages Carcéles^{1,2}, Massimiliano Degani^{1,3,*}, Carme Soler^{2,4}, Claudio Iván Serra⁴, Nuria Fernández-Salesa⁴, Alejandra García de Carellán Mateo⁴, Vicente José Herrera-Bustillo⁴, Chiara Di Franco¹ and Angela Briganti¹



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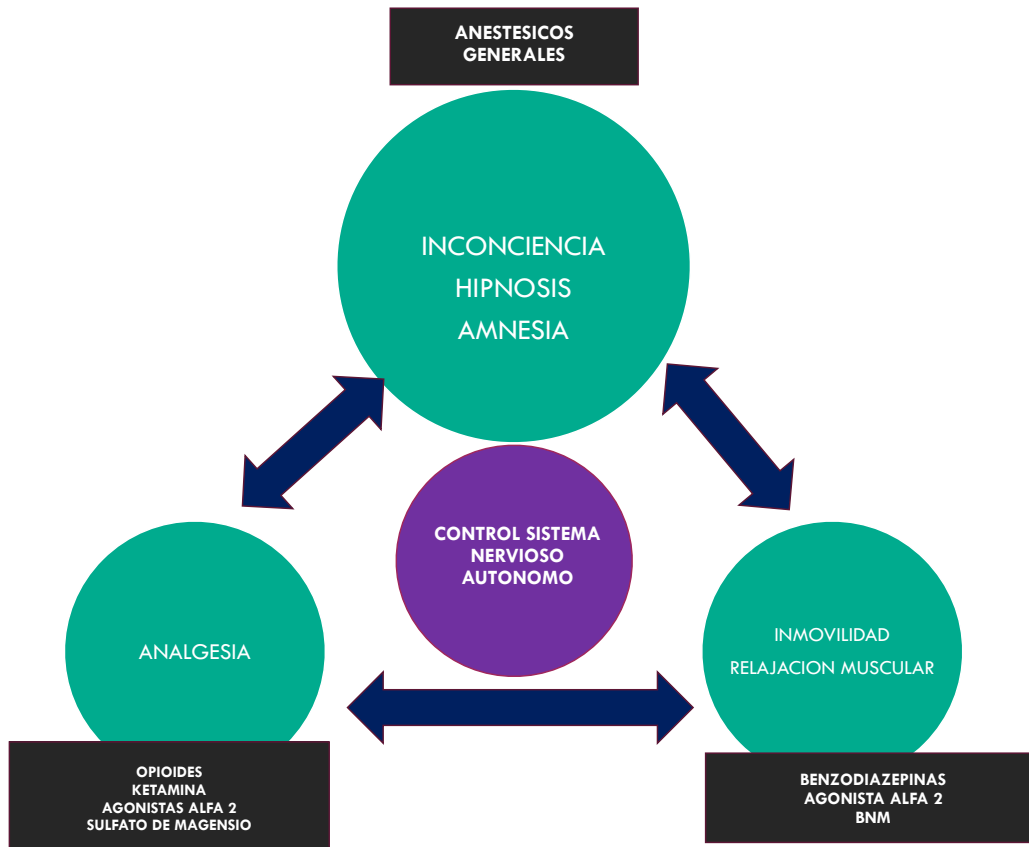
GENERAL O REGIONAL ?



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General Articles

Section Editor: Thomas R. Vetter

SPECIAL ARTICLE

OPEN
CME

Multimodal General Anesthesia: Theory and Practice

Emery N. Brown, MD, PhD,*†‡§|| Kara J. Pavone, BS, BSN, RN,* and Marusa Naranjo, MD†

Table 1. Multimodal General Anesthesia: Explicit and Implicit Maintenance of the Anesthetic State

I. Anesthetic State	II. Explicit Maintenance	III. Implicit Maintenance
A. Antinociception	Ketamine (NMDA antagonist); remifentanyl (opioid agonist); dexmedetomidine (α -2 agonist); magnesium (NMDA agonist); lidocaine (anti-inflammatory, sodium channel blockade); oral NSAID (anti-inflammatory)	Propofol (GABA agonist); sevoflurane (GABA agonist and other targets)
B. Unconsciousness (amnesia)	Propofol (induction and maintenance); sevoflurane	Ketamine (NMDA antagonist); remifentanyl (opioid agonist); dexmedetomidine (α -2 adrenergic agonist); magnesium (NMDA receptor); cisatracurium/rocuronium (decreased proprioception)
C. Immobility	Cisatracurium (induction and maintenance); rocuronium (induction and maintenance); succinylcholine (induction)	Magnesium (smooth muscle relaxant); propofol (central muscle relaxation); sevoflurane (central muscle relaxation)

Column I defines the behavioral component of general anesthesia. Column II gives examples of anesthetic agents that can be used to maintain the behavioral state of general anesthesia in column I. Column III shows the additional behavioral states to which the anesthetic contributes.

Abbreviations: GABA, γ -aminobutyric acid; NMDA, N-methyl-D-aspartate; NSAID, nonsteroidal anti-inflammatory drug.



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BENZODIAZEPINAS

FENOTIACINICOS

ALFA 2 AGONISTAS

OPIOIDES

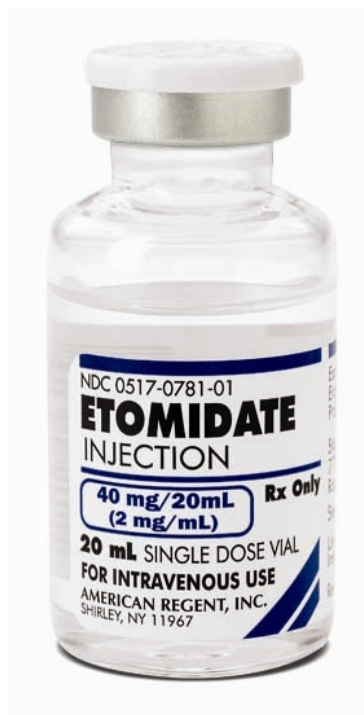
ADYUVANTES



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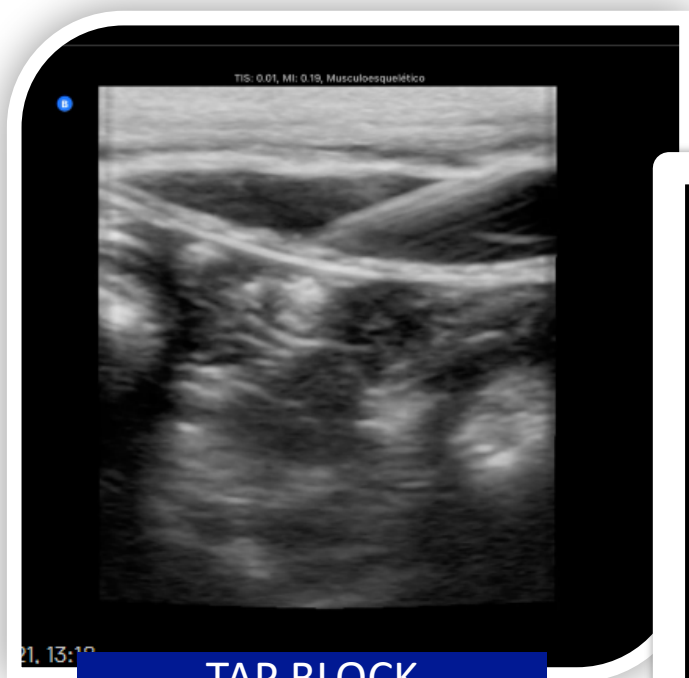
COINDUCTORES



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TAP BLOCK



QLB



VAINA DEL RECTO



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Perioperative analgesic efficacy of quadratus lumborum block versus transversus abdominis plane block in dogs undergoing laparoscopic ovariectomy: a prospective randomized clinical trial

Eleonora Fumanelli^{1*}, Giorgia Cocca¹, Giorgia Giannetti¹, Marianna Parabella¹, Roberto Rabozzi¹ and Diego Sarotti²

¹Policlinico Veterinario Roma Sud AniCura, Rome, Italy, ²Centro Veterinario Fossanese, Cuneo, Italy

Even though the technique was performed by expert anesthesiologists and considered adequate in the presence of hydro dissection, the accuracy of execution and potential variability in the spreading of local anesthetic were not further investigated.

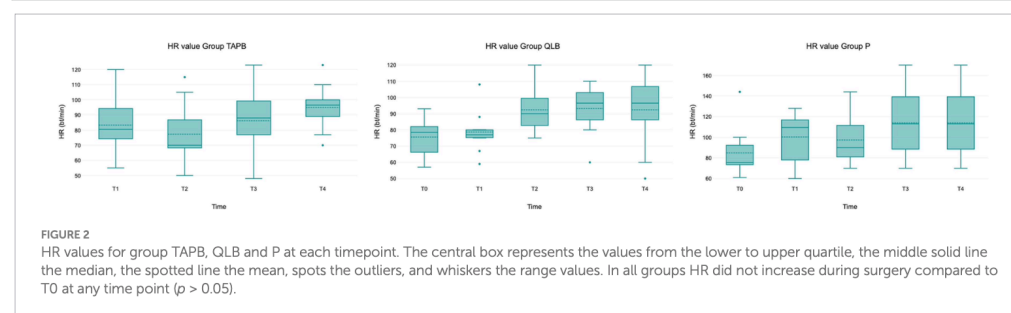
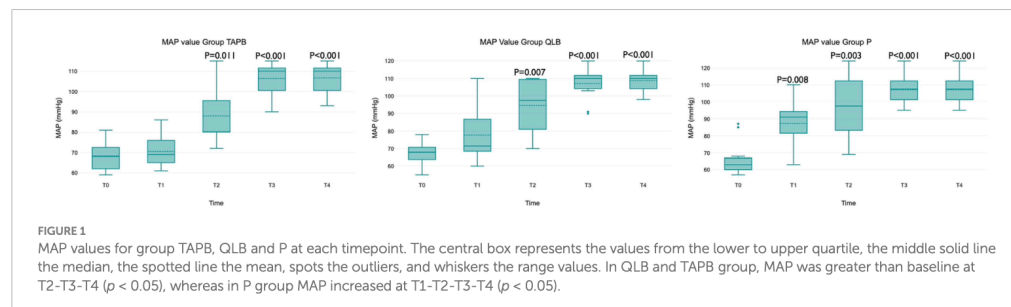


TABLE 2 Incidence of cardiovascular response (CR) and intraoperative rescue analgesia (iRA) between group TAPB, QLB, and P.

Groups	T1	INCISION PIEL	T2	INSUFLACION PERITONEAL	T3	OVARIO DERECHO	T4	OVARIO IZDO
TAPB	CR 0/12 (0%)* iRA 0/12 (0%)		CR 8/12 (67%) iRA 7/12 (58%)		CR 12/12 (100%) iRA 11/12 (91%)		CR 12/12 (100%) iRA 12/12 (100%)	
QLB LATERAL	CR 2/10 (20%)* iRA 2/10 (20%)		CR 8/10 (80%) iRA 5/10 (50%)		CR 10/10 (100%) iRA 10/10 (100%)		CR 10/10 (100%) iRA 10/10 (100%)	
P	CR 7/10 (70%)* iRA 4/10 (40%)		CR 8/10 (80%) iRA 7/10 (70%)		CR 10/10 (100%) iRA 10/10 (100%)		CR 10/10 (100%) iRA 10/10 (100%)	

The incidence of CR at T1 was different between the P group compared to the TAP and QLB groups ($p = 0.001$). At T2, T3, T4 the incidence of CR was not different between groups ($p > 0.05$). Regarding the incidence of iRA there were not statistically significant differences among groups ($p > 0.05$). TAPB, group receiving transversus abdominis block; QLB, group receiving quadratus lumborum block; P, control group; T1, skin incision; T2, peritoneal insufflation; T3, right ovarian ligament manipulation; T4, left ovarian ligament manipulation.

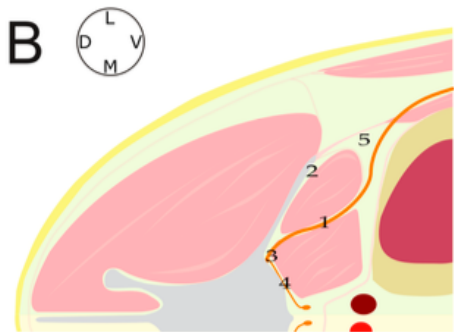
CR: >20% valor basal
iRA : >30% valor basal

Comparative study between lateral versus latero-ventral quadratus lumborum block for perioperative analgesia in canine laparoscopic ovariectomy

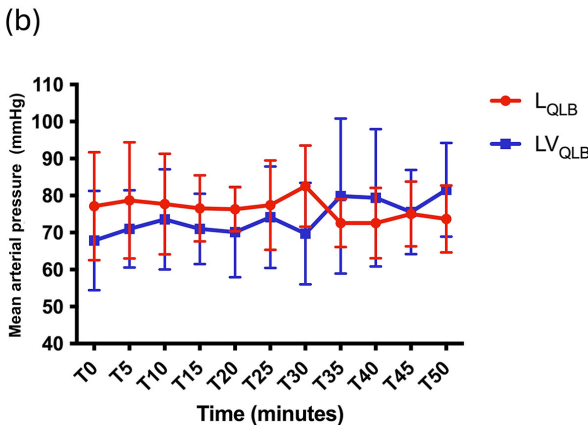
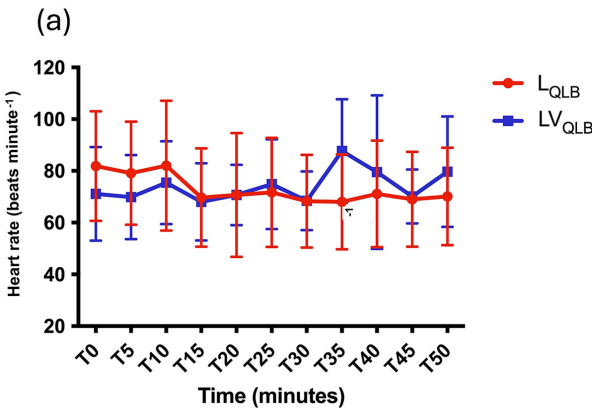
Massimiliano Degani^a • Andrea Paolini^b • Amanda Bianchi^b • ... • Lorenzo Di Matteo^b • Charlotte Sandersen^a • Angela Briganti^c ... Show more

Veterinary Anaesthesia and Analgesia 2024, 51, 738–745

methadone 0.2 mg kg + dexmedetomidine 3 mg kg



- 1. Garbin et al.
- 2. Garbin et al.
- 3. Alaman et al.
- 4. Marchina-Gonçalves et al.
- 5. LVQL



P1 - INCISION PIEL
P2 - INSUFLACION
P3 - PUERTO 2
P4 - OVARIO 1
P5 - OVARIO 2
P6 - DEFLACION
P7 - SUTURA PIEL

iRA : >20% valor basal

Group	Dog	Distribution of intraoperative rescue fentanyl boluses						
		P ₁	P ₂	P ₃	P ₄	P ₅	P ₆	P ₇
L _{QLB}	1		x					
	2							
	3		x					
	4							
	5							
	6							
LV _{QLB}	1				x	x		
	2					x		
	3				x	x		
	4					x		
	5					x		
	6				x			
	7					x		

MANEJO ANESTESICO

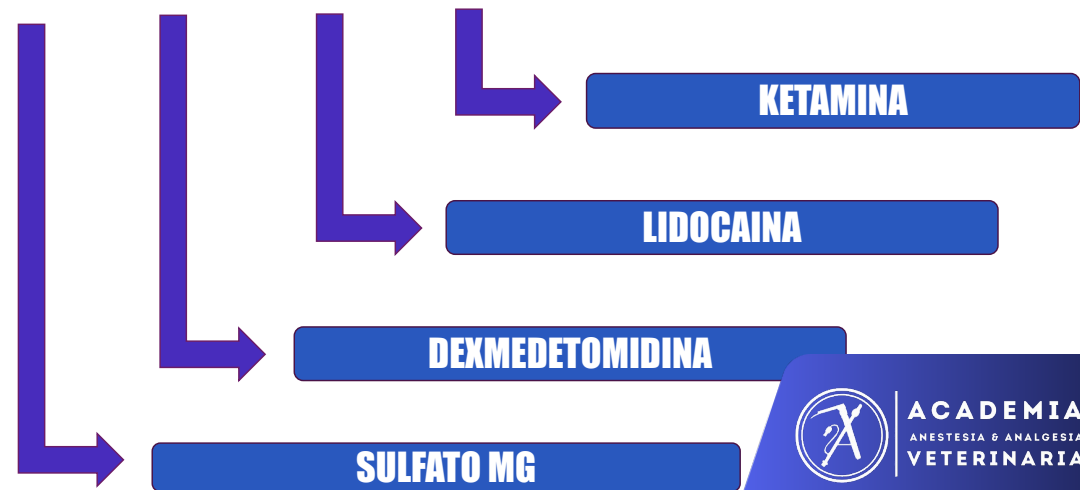
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Opioide Fuerte

+/-

Adyuvantes



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MANEJO ANESTESICO

Mantenimiento Anestésico

Control y Monitorización de los parámetros Cardiorespiratorios, Analgesia y Plano Anestésico considerando las alteraciones fisiopatológicas de la técnica quirúrgica, comorbilidades y otros eventos propios de una cirugía



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**Muchas Gracias
por su atención**



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ANESTESIA EN LAPAROSCOPIA

- CURSO -
ANESTESIA PACIENTES
ESPECIALES

Paulo Mallea V.
Medico Veterinario