

# Comparison Between Spinal Anesthesia Vs General Anesthesia in Patients Undergoing Open Appendectomy for Acute Appendicitis, A Retrospective Study

Medina Gabriel<sup>1</sup>, MSC Angos Veronica<sup>2</sup>, Pazmino Karen<sup>3</sup>, Gonzalez Maria<sup>1</sup>, Angos Gerardo<sup>1</sup>, Gordillo Daniela<sup>4</sup>

<sup>1</sup>Department of Anesthesiology and Pain Therapy, Pontifical Catholic University, Ecuador; <sup>2</sup>Department of Medicine, International University of Ecuador, Ecuador; <sup>3</sup>Department of Surgery, General Hospital Ecuadorian Institute of Social Security Ibarra, Ecuador; <sup>4</sup>Department of Medical, International University of Ecuador, Ecuador

## ABSTRACT

Appendectomy is one of the most common emergency surgical procedures, currently attempts are being made to define several strategies that ensure early, effective and safe post-surgical management and recovery, the use of spinal anesthesia may offer benefits. Data were collected from all patients who underwent open surgery for acute appendicitis in the span of one year in our institution, laparoscopic appendectomies or other diagnoses not compatible with acute appendicitis were excluded. A total of 342 patients underwent conventional surgery for appendicitis, 111 general anesthesia (GAG) and 231 spinal (GAR), the mean duration of pain in hours was 39 and 32 ( $p = 0.120$ ); the analgesic combination was paracetamol + NSAIDs (65.7% vs 15.6%), Tramadol + NSAIDs (28.6% vs 65.8%) and paracetamol + tramadol (5.7% vs 18.6%); postoperative pain at 8 hours (60.3% vs 75.3%), at 24 hours (37.8% vs 33.8%;  $p = 0.000$ ); postsurgical headache in him (19.8% vs 16.8%), urinary retention (2.7% vs 1.2%;  $p = 0.307$ ); start of diet in hours (24 vs 17;  $p = 0.01$ ) and hospital discharge in days (5.6 vs 3.4;  $p = 0.005$ ) respectively. According to several authors, spinal anesthesia is safe in intra-abdominal procedures, which was demonstrated in our study, with a good post-surgical result. Spinal anesthesia offers good pain control, and a shorter hospital stay, the adverse effects were minor compared to general anesthesia. Complicated pictures or large incisions show poorer pain control regardless of anesthetic technique.

**Keywords:** Spinal anesthesia; General Anesthesia; Conventional Appendectomy; Fast track; Postsurgical pain.

## INTRODUCTION

The most frequently performed emergent surgical procedure is undoubtedly appendectomy for acute appendicitis, with up to 250,000 cases per year<sup>1</sup>, and despite the fact that several studies indicate a potential benefit with the use of antibiotics to treat initial symptoms, surgery continues to be the gold standard [1,2], with several advantages of the laparoscopic approach over the open technique [3,4].

In general, appendectomy is considered as a non-complex procedure where fast, effective and safe management is sought in a few days in uncomplicated cases [5-7], however, there is little literature on the management of patients with appendicitis as "outpatient" [8,9].

The number of intra-abdominal procedures where the criteria for outpatient surgery are applied: stay less than 12 hours, discharge

the same day and perform it in specialized units is increasing, and some emerging procedures are even listed [5].

The anesthetic technique used can be a key factor for the application of the "fast-track" protocols [10,11], providing better control of postoperative pain [12,13], in this regard the use of spinal anesthesia and a good result in terms of control pain have been studied and demonstrated [11,14], and some authors even consider it safe in certain laparoscopic intra-abdominal procedures [15].

The main objective of our study was to compare postoperative pain in patients who underwent conventional appendectomy under spinal versus general anesthesia, secondarily the start of diet, the difference in terms of hospitalization time and complications in each one of the groups; in the span of 1 year in the General Hospital of Social Security in the city of Ibarra, Ecuador.

**Correspondence to:** Gabriel Medina Donoso, Postgraduate Anesthesiology and Pain Therapy Pontifical Catholic University Ecuador, Tel: +593992778775; E-mail: gmedinad@puce.edu.ec

**Received:** November 18, 2020, **Accepted:** December 03, 2020, **Published:** December 11, 2020

**Citation:** Gabriel MD, Veronica A M, Karen P, Maria G, Gerardo A, Daniela G A (2020), Comparison between spinal anesthesia vs general anesthesia in patients undergoing open appendectomy for acute appendicitis, a retrospective study, J Hepatol Gastroint Dis 7:178. doi: 10.35248/2475-3181.7.178

**Copyright:** © 2020 Gabriel MD, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

## MATERIALS AND METHODS

The work is a retrospective cohort-type study; The data were obtained from the single integrated system of medical records of the Ecuadorian institute of social security AS-400, in 2019.

All patients who underwent appendectomy for acute appendicitis with open or conventional technique, subsequently confirmed with the histopathological report and with a range of 15 to 75 years, were included.

Those cases that were resolved laparoscopically or that presented other causes of acute abdomen diagnosed in the surgical trans were excluded.

The surgical techniques used were the Mc Burney, Rocky Davis or the mid-infraumbilical approach, which were selected according to the surgeon's preference when it came to lateral approaches and in the case of patients in whom an advanced condition was suspected, the option was chosen midline approach.

The anesthesia used was neuro-axial (spinal) in one group and balanced general in the other, depending on the preference of the anesthesiologist or the suspicion of complicated conditions such as peritonitis, contraindications to any of the techniques or failure in the block that forced conversion to general.

For the assessment of post-surgical pain, the visual analogue VAS scale was applied to all patients in the postoperative period in two stages: at 8 and 24 hours by the same resident doctor on duty and it was recorded in the clinical history, qualifying as positive for pain a score greater than 5.

The following were assessed as additional variables: the type of analgesia used, time to start the diet, adverse effects related to the anesthesia technique such as headache and urinary retention, and hospital stay. In the same way, the following variables that could influence the results of the study were included, such as: the time or duration of the clinical picture prior to surgery, type of incision and definitive diagnosis. A multivariate logistic regression was applied between the variables type of incision (mean) and grade of appendicitis (phase IV), since there is a close relationship between the latter and a greater presence of pain according to the literature.

## STATISTICAL CONSIDERATIONS

The data were collected in an electronic spreadsheet matrix and were processed through the use of statistical tests for the analysis of variables such as student's t, Fisher's test, chi-square and Levene's test, independent for each variable and according to type. Of the same. The Student's t test was applied for independent samples in the following variables: duration of pain, start of diet, and hospital discharge. When applying the t test for independent variables as in the duration of the clinical picture, it is assumed that equal variances have not been assumed since p value is 0.011 of  $F \leq 0.05$ ; therefore, the analysis is done taking the p value of t,  $p = 0.120$ . For the analysis of the type of post-surgical analgesia, the  $\chi^2$  (Pearson's Chi-square). When applying the t test for the start variable of the diet, it is assumed that equal variances have not been assumed since p value is 0.000 of  $F \leq 0.05$ , the analysis is made taking the p value of t,  $p = 0.01$ . Regarding the hospital stay when applying the t test for independent variables, it is assumed that equal variances have not been assumed since p value is 0.000 of  $F \leq 0.05$ . The analysis is done taking the p value of t,  $p = 0.005$ .

## RESULTS

A total number of 342 patients underwent conventional appendectomy were obtained, of whom received general anesthesia (GAG) 111 (32.5%) and spinal anesthesia (GAR) 231 (67.5%) [Table 1]. The average duration of the clinical picture was 34.9 hours in both groups. The Mc Burney incision was the most frequent, followed by Rocky Davis and a median incision. The most frequent diagnosis was stage II (suppurative) appendicitis. The analgesics used were: intravenous opioids, NSAIDs and paracetamol alone or in combination. The presence of postoperative pain (VAS greater than 5) at 8 and 24 hours was present especially in the first 8 compared to 24 hours. The most common adverse effects associated with anesthesia were headache and urinary retention. The start of the diet was at 19.5 hours, the hospital stay averaged 4 days; the most frequent postoperative complication was surgical site infection in 6.4% of cases [Table 2].

In the GAG the average duration of the clinical picture was 39 hours, in the GAR of 32 hours, no significant differences were found in terms of the duration of pain or the clinical picture, between GAG

**Table 1:** Patients undergoing conventional appendectomy at the Ibarra Social Security General Hospital, in 2019 and anesthetic technique used.

TYPE OF ANESTHESIA	NUMBER
GENERAL ANESTHESIA(GAG)	111 (32.5%)
SPINAL ANESTHESIA (GAR)	231 (67.5%)
Total	342 (100%)

**Table 2:** Distribution of the variables used in the general population n: 342 of patients undergoing open appendectomy during 2019 at the Hospital del Seguro Social de Ibarra

Variables	Duration of pain (mean) in hours	Incision			Analgesia			EVA greater than 5		Complications		Diet start in hours	Hospital discharge (mean) in days
		Mc Burney	Rockey davis	Half	Paracetamol + NSAIDs	Tramadol + NSAIDs	Paracetamol + NSAIDs	8 hours	24 hours	Headache	Urinary retention		
Patients undergoing conventional appendectomy (n: 342)	34.9	60%	24%	16%	37.70%	32.50%	29.80%	70.50%	35%	17.8%	2%	19.5	4

vs GAR [Table 3]. In the GAG, the middle incision predominated in the GAR, there was a great predominance of lateral incisions, the Mc Burney incision being the most frequent. The most frequent diagnosis in both groups was phase II appendicitis, however, phase IV doubled in frequency in the GAG compared to the GAR (25.2% vs 12.12%). The presence of pain was evaluated at 8 and 24 hours, being present in 60.3% and 37.8% of the cases respectively in the GAG; and 75.3% and 33.8% of the cases respectively in the GAR, here it can be observed that there are significant differences both for the GAG ( $p = 0.001$ ) and for the GAR group ( $p = 0.001$ ). The most used analgesic were NSAIDs in 95% of the GAG and 98% of the GAR; the most used combination for the first group was paracetamol + NSAIDs and in the second opioids + NSAIDs, when comparing the groups with respect to post-surgical analgesia, it was found that there are significant differences ( $p = 0.001$ ) between the two anesthesia groups Regarding the use of opioids, the groups with paracetamol behave in a similar way ( $p = 0.001$ ), however, when comparing the groups with the analgesic NSAID, it was observed that there is no significant difference ( $p = 0.134$ ), (or that the differences are not statistically significant). Regarding the presence of headache and urinary retention, no significant difference was found ( $p = 0.307$ ) (Fisher's Exact Test p The most used combination for the first group was paracetamol + NSAIDs and in the second opioids + NSAIDs, when comparing the groups with respect to post-surgical analgesia, it was found that there are significant differences ( $p = 0.001$ ) between the two anesthesia groups Regarding the use of opioids, the groups with paracetamol behave in a similar way ( $p = 0.001$ ), however, when comparing the groups with the analgesic NSAID, it was observed that there is no significant difference ( $p = 0.134$ ), (or that the differences are not statistically significant). Regarding the presence of headache and urinary retention, no significant difference was found ( $p = 0.307$ ) (Fisher's Exact Test p the most used combination for the first group was paracetamol + NSAIDs and in the second opioids + NSAIDs, when comparing the groups with respect to post-surgical analgesia, it was found that there are significant differences ( $p = 0.001$ ) between the two anesthesia groups Regarding the use of opioids, the groups with paracetamol behave in a similar way ( $p = 0.001$ ), however, when comparing the groups with the analgesic NSAID, it was observed that there is no significant difference ( $p = 0.134$ ), (or that the differences are not statistically significant). Regarding the presence of headache and urinary retention, no significant difference was found ( $p = 0.307$ ) (Fisher's Exact Test p When comparing the groups with respect to post-surgical analgesia, it was found that there are significant differences ( $p = 0.001$ ) between the two anesthesia groups with respect to the use of opioids, the groups behave in a similar way with paracetamol ( $p = 0.001$ ),

however, when comparing the groups with the analgesic NSAIDs, it was observed that there is no significant difference ( $p = 0.134$ ), (or that the differences are not statistically significant). Regarding the presence of headache and urinary retention, no significant difference was found ( $p = 0.307$ ) (Fisher's Exact Test p When comparing the groups with respect to post-surgical analgesia, it was found that there are significant differences ( $p = 0.001$ ) between the two anesthesia groups with respect to the use of opioids, the groups behave similarly with paracetamol ( $p = 0.001$ ), however, when comparing the groups with the analgesic NSAIDs, it was observed that there is no significant difference ( $p = 0.134$ ), (or that the differences are not statistically significant). Regarding the presence of headache and urinary retention, no significant difference was found ( $p = 0.307$ ) (Fisher's Exact Test p However, when comparing the groups with the analgesic NSAIDs, it was observed that there is no significant difference ( $p = 0.134$ ), (or that the differences are not statistically significant). Regarding the presence of headache and urinary retention, no significant difference was found ( $p = 0.307$ ) (Fisher's Exact Test p However, when comparing the groups with the analgesic NSAIDs, it was observed that there is no significant difference ( $p = 0.134$ ), (or that the differences are not statistically significant). Regarding the presence of headache and urinary retention, no significant difference was found ( $p = 0.307$ ) (Fisher's Exact Test p 0.05). The diet was started at 24 and 17 hours in the GAG and GAR respectively, with a statistically significant difference for both groups ( $p = 0.001$ ). The average hospital stay was 5.6 and 3.4 days in the GAG and GAR, respectively, statistically significant results ( $p = 0.001$ ) [Table 3]. Using a multivariate logistic regression, the patients in whom a median infraumbilical incision was made, it was evidenced that the presence of pain at 24 hours was not greater compared to the other incisions, but there was no statistically significant difference ( $p = 1$ ); Regarding patients with stage IV appendicitis, no differences were found with respect to pain compared to the other phases, but these data were not significant either ( $p = 0.09$ ),

## DISCUSSION

According to several authors, it is feasible to perform intra-abdominal procedures with spinal anesthesia, even if it is decided by the laparoscopic route [16], in this case it is described that the adequate level of blockage should be at least between T4 and T6 [17,18], in the same way postoperative pain is controlled better with the use of this type of anesthesia, especially at 24 hours according to the data of our study, the same ones that agree with other reported series [15] where good pain control is emphasized as an advantage of neuro anesthesia -axial.

**Table 3:** Results and comparison of variables between the general anesthesia (GAG) and spinal anesthesia (GAR) groups, with their p value for each variable

GROUPS	Duration of pain (mean) in hours (p = 0.120)	Analgesia ( $p = 0.001$ )			VAS greater than 5 (p = <0.001)		Complications (p = 0.307)		Hospital discharge (mean) in days (p = 0.005)	
		Paracetamol + NSAIDs	Tramadol + NSAIDs	Paracetamol + NSAIDs	8 hours	24 hours	Headache	Urinary retention	Start of diet in Hours (p = 0.01)	
General anesthesia group (GAG)	39	65.70%	28.60%	5.70%	60.30%	37.8%	19.8%	2.7%	24	5.6
Spinal anesthesia group (GAR)	32	15.60%	65.80%	18.60%	75.30%	33.8%	16.8%	1.2%	17	3.4

In intracavitary abdominal surgery, general anesthesia is conventionally chosen as it provides a higher safety profile with respect to the risk of aspiration, abdominal discomfort, and better exposure secondary to muscle relaxation [19]; however, at present it is considered safe to do so. Spinal anesthesia in various abdominal procedures, even where significant muscle relaxation is required such as laparoscopy [20-21] or in certain complex cases such as peritonitis, in our study many patients with complicated conditions were operated under spinal anesthesia, which did not significantly interfere with surgical technique or exposure.

Additional advantages of spinal anesthesia include faster recovery, better oral tolerance, and shorter hospital stay compared to general anesthesia [22], data that were evident in our study, and with significant statistical significance; while, regarding the complications related to this technique, we did not see a statistically significant difference between the two variables that were studied as urinary retention and headache [22,23].

Regarding the type of analgesia used, the results in general are variable since, compared to other series, the use or not of opioid medications is not standardized in our hospital; However, within the strategies for correct pain management in abdominal surgery, the technique of spinal anesthesia stands out, which also reduces the use of opiate medications [24]. During open surgery, the approach to the abdominal cavity may depend on the level of muscle relaxation, which would give general anesthesia a certain advantage in this case [25]. However, if it is a non-complex procedure and if it is performed by experienced surgeons, the operative time and results do not vary significantly [26].

The data obtained indicate that it is feasible to use this anesthetic technique in non-complex open abdominal surgery, which can optimize waiting times between surgery and surgery, reduce costs, ensure good control of postoperative pain without major complications and a short stay hospital.

## CONCLUSION

In our hospital, spinal anesthesia is used more frequently in patients with acute appendicitis undergoing conventional surgery, with good pain control, and a shorter hospital stay compared to general anesthesia, the rate of adverse effects between the two techniques It was lower in the spinal technique, however there was no statistical relevance. Complicated pictures or large incisions show poorer pain control regardless of anesthetic technique.

## REFERENCES

- Aubry A, Saget A, Manceau G, Faron M, Wagner M, Tresallet C. Outpatient Appendectomy in an Emergency Outpatient Surgery Unit 24 ha Day: An Intention-to-Treat Analysis of 194 Patients. *World J Surg*; 05.2017; DOI 10.1007 / s00268-017-4034-3.
- Styrud J, Eriksson S, Nilsson I. Appendectomy versus antibiotic treatment in acute appendicitis. A prospective multicenter randomized controlled trial. *World J Surg* 2006; 30: 1033-1037; doi: 10.1007 / s00268-005-0304-6
- Vettoretto N, Gobbi S, Corradi A. Consensus conference on laparoscopic appendectomy: development of guidelines. *Colorectal Dis* 2011; 13: 748-754.
- Sauerland S, Jaschinski T, Neugebauer EA. Laparoscopic versus open surgery for suspected appendicitis. *Cochrane Database Syst Rev*, 2010; doi: 10.1002 / 14651858.CD001546
- Wodey E, de la Brie`re F. Ambulatory surgery in France: practical and medicolegal considerations. *Ann Fr Anesth Reanim* 2013; 32 (12): e243-e246.
- Kraft K, Mariette C, Sauvanet A. Indications for ambulatory gastrointestinal and endocrine surgery in adults. *J Visc Surg* 2012; 148: 69-74.
- Le Sache`F, Birenbaum A, Delorme S. Mise en place d'une filie`re de chirurgie ambulatoire en urgence. *Ann Fr Med Urgence* 2012; 2: 303-309.
- Ramesh S, Galland RB. Early discharge from hospital after open appendectomy. *Can J Surg* 1993; 80: 1192-1193.
- Cash CL, Frazee RC, Abernathy SW. A prospective treatment protocol for outpatient laparoscopic appendectomy for acute appendicitis. *J Am Coll Surg* 2012; 215: 101-105; discussion 105-106.
- Borendal Wodlin N, Nilsson L, Kjølhede P. For the GASPI study group. The impact of mode of anesthesia on postoperative recovery from fast-track abdominal hysterectomy: a randomized clinical trial 2011; 118: 299-308.
- Kehlet H, Wilmore DW. Evidence-based surgical care and the evolution of fast-track surgery. *Ann Surg* 2008; 248: 189-98.
- Lavand'homme P, De Kock M. The use of intraoperative epidural or spinal analgesia modulates postoperative hyperalgesia and reduces residual pain after major abdominal surgery. *Acta Anaesthesiol Belg* 2006; 57: 373-9.
- Dahl JB, Jeppesen IS, Jørgensen H, Wetterslev J, Møiniche S. Intraoperative and postoperative analgesic efficacy and adverse effects of intrathecal opioids in patients undergoing cesarean section with spinal anesthesia: a qualitative and quantitative systematic review of randomized controlled trials. *Anaesthesiology* 1999; 91: 1919-27.
- Katz J, Cohen L, Schmid R, Chan VW, Wowk A. Postoperative morphine use and hyperalgesia are reduced by preoperative but not intraoperative epidural analgesia: implications for preemptive analgesia and the prevention of central sensitization. *Anaesthesiology* 2003; 98: 1449-60.
- Erdem VM, Donmez T, Uzman S, Ferahman S, Hatipoglu E, Sunamak O. Spinal / epidural block as an alternative to general anesthesia for laparoscopic appendectomy: a prospective randomized clinical study. *Wideochir Inne Tech Maloinwazyjne* 2018; 13 (2): 148-156. doi: 10.5114 / wiitm.2018.72684.
- Uzman S, Donmez T, Erdem VM. Combined spinal-epidural anesthesia in laparoscopic appendectomy: a prospective feasibility study. *Ann Surg Treat Res* 2017; 92: 208-13.
- Jun GW, Kim MS, Yang HJ. Laparoscopic appendectomy under spinal anesthesia with dexmedetomidine infusion. *Korean J Anesthesiol* 2014; 67: 246-51.
- Mane RS, Patil MC, Kedarshvara KS, Sanikop CS. Combined spinal epidural anesthesia for laparoscopic appendectomy in adults: a case series. *Saudi J Anaesth* 2012; 6: 27-30.
- Tzovaras G, Fafoulakis F, Pratsas K. Spinal vs general anesthesia for laparoscopic cholecystectomy: interim analysis of a controlled randomized trial. *Arch Surg* 2008; 143: 497-501.
- Sinha R, Gurwara AK, Gupta SC. Laparoscopic surgery using spinal anesthesia. *JSLs* 2008; 12: 133-8
- Lal P, Philips P, Saxena KN. Laparoscopic total extraperitoneal (TEP) inguinal hernia repair under epidural anesthesia: a detailed evaluation. *Surg Endosc* 2007; 21: 595-601.
- Brown DL. Spinal, epidural and caudal anesthesia. In: *Miller's Anesthesia*. 7th ed. Miller RD (ed.). Churchill Livingstone Elsevier, Philadelphia, PA, USA 2010; 1611-38.

23. Hartmann B, Junger A, Klasen J. The incidence and risk factors for hypotension after spinal anesthesia induction: an analysis with automated data collection. *Anesth Analg* 2002; 94: 1521-9.
24. Hemmerling TM. Pain management in abdominal surgery. *Langenbecks Arch Surg* 2018; 403 (7): 791-803. doi: 10.1007 / s00423-018-1705-y.
25. Azurin DJ, Go LS, Cwik JC, Schuricht AL. The efficacy of epidural anesthesia for endoscopic preperitoneal herniorrhaphy: a prospective study. *J Laparoendosc Surg.* nineteen ninety six; 6: 369e373.
26. Singh RK, Saini AM, Goel N, Bisht D, Seth A. Major laparoscopic surgery under regional anesthesia: A prospective feasibility study. *Med J Armed Forces India.* 2015; 71 (2): 126-131. doi:10.1016 / j.mjafi.2014.12.010.