Guo, J.; Geng, X.; Li, Y. (2023) The Effect of Dexmedetomidine on The Post Operation Recovery of Gastrointestinal Function Undergoing Intestinal Surgery: Implications for retired athletes. Revista Internacional de Medicina y Ciencias de la Actividad Física y el Deporte vol. 23 (90) pp. 357-368.
DOI: https://doi.org/10.15366/rimcafd2023.90.025

ORIGINAL

THE EFFECT OF DEXMEDETOMIDINE ON THE POST OPERATION RECOVERY OF GASTROINTESTINAL FUNCTION UNDERGOING INTESTINAL SURGERY: IMPLICATIONS FOR RETIRED ATHLETES

Jinhui Guo[1]*, Xingqiang Geng[1], Yuanhai Li[2]

[1]Department of Anesthesiology, Guoyang County Hospital of traditional Chinese medicine,bozhou ,233600,China
[2]Department of Anaesthesiology, The First Affiliated Hospital of Anhui Medical University, Hefei,230031 China
*Corresponding author: Jinhui Guo
Email: gjh2004508@sina.com

Received: May 30, 2022
Accepted: February 26, 2023

ABSTRACT

Objective: To investigate the effect of dexmedetomidine on the recovery of gastrointestinal function after intestinal surgery**. Methods:** A total of 94 cases of gastrointestinal endoscopic surgery in our hospital from February 2020 to April 2022 were selected and randomly divided into dexmedetomidine group (group D, n=47) and control group (group C, n=47), There is no restriction on gender and age. Group E was given 1 μg/kg of dexmedetomidine before induction of anesthesia, and 0.5 μg/kg.h was pumped during the maintenance period of anesthesia. Group C was given an equal volume of normal saline. Heart rate (HR) and mean arterial pressure (MAP) were recorded at five time points before anesthesia (T0), after intubation (T1), skin incision (T2), after skin incision 1h (T3), and at the end of surgery (T4). BIS, intraoperative dosage of propofol and remifentanil, VAS score and Ramsay sedation score at 24h, 48h, 72h after operation, I-FEED scoreand bowel sound recovery time at 24h, 48h, 72h, 96h after operation, exhaust time, eating time, defecation time, and discharge time. **Results:** Compared with group C, the MAP and HR of group D were more stable, the consumption of anesthetics in group D was significantly lower, and the VAS score of group E was lower than that of group C at 24, 48, and 72 hours after operation (P<0.05). The I-FEED score at 24h, 48h, 72h, and 96h after operation and the incidence of PONV and POGD in group D were lower than those in group C (P＜0.05). Postoperative bowel sounds recovery time, exhaust time, eating time, defecation time and hospitalization days in group D were lower than those in group C, and the difference was statistically significant (P<0.05). **Conclusion:** Dexmedetomidine is applied in intestinal surgery, it can stabilize the induction period and intraoperative hemodynamics, reduce the amount intraoperative anesthetics, promote the recovery of gastrointestinal function, and accelerate the recovery of athletic patients.

Keywords: dexmedetomidine; intestinal surgery; gastrointestinal dysfunction; postoperative analgesia; enhanced recovery after surgery

Intestinal surgery is one of the common surgical procedures, and gastrointestinal dysfunction (POGD) is a common complication of gastrointestinal surgery, mainly characterized by damage to the mucosa of the gastrointestinal tract, destruction of barrier function, and impaired gastrointestinal motility, including postoperative nausea and vomiting (PONV), postoperative intestinal obstruction, and inability to eat normally, etc. In more severe cases, systemic inflammatory reactions and even multi-organ dysfunction may occur (Hedrick et al., 2018). Since postoperative gastrointestinal dysfunction prolongs athletic patient's hospital stay and causes a heavy burden to athletic patients and hospitals, it should be paid attention to in clinical work, and emphasis should be placed on prevention and active treatment when symptoms of postoperative gastrointestinal dysfunction appear. The pathogenesis of postoperative gastrointestinal dysfunction is complex and its specific causes are unknown and may be related to the inflammatory response, neuroendocrine factors, the use of anesthetic and analgesic drugs, surgical site and surgical approach (Guay, Nishimori, & Kopp, 2016; Luckey, Livingston, & Taché, 2003). Postoperative gastrointestinal dysfunction can prolong an athletic patient's hospital stay, increase surgical complications, and even lead to death.

Dexmedetomidine is a highly selective α_2 adrenergic receptor agonist. α_2 adrenergic receptors are widely expressed in the human heart, brain, kidney and lung, and their agonism can produce sedative, analgesic, anti-inflammatory, anti-apoptotic and other physiological effects. It can play a protective role in a variety of human organs. It can promote the restoration of intestinal dynamics, reduce the body's inflammatory response, protect intestinal permeability, improve intestinal micro-circulation and reduce intestinal ischemia-reperfusion injury, and play a protective role in intestinal barrier function under pathological conditions.

Studies on dexmedetomidine have shown that dexmedetomidine can inhibit the stress response caused by surgery while reducing the dosage of opioids, and it has also been shown that dexmedetomidine can inhibit the release of inflammatory factors caused by surgical operations (Bragg, El-Sharkawy, Psaltis, Maxwell-Armstrong, & Lobo, 2015). At the same time, the use of opioids is reduced, and athletic patients are encouraged to get out of bed as soon as possible to speed up gastrointestinal motility. There are many reports related to the perioperative application of dexmedetomidine, but there are few studies on the effects of postoperative use of dexmedetomidine on gastrointestinal function in China. In this regard, in this study, dexmedetomidine was applied perioperatively to athletic patients proposed for colorectal surgery to study the role of this modality in terms of the incidence of postoperative POGD and the athletic patient's postoperative recovery process, with a view to a favorable prognosis (MOHAMMADI-SARPIRI, KEIVANY, & DORAFSHAN, 2021).

1. INFORMATION AND METHODS

1.1. General Information

Consent was granted by the Medical Ethics Committee of Eddyang County Hospital of Traditional Chinese Medicine. Ninety-four cases of gastrointestinal surgery from February 2020 to April 2022 in our hospital were selected and randomly divided into dexmedetomidine group (Group D, n=47) and control group (Group C, n=47). In group D, there were 22 males and 25 females; age ranged from 32 to 85 years old, mean (60.68±14.04) years old; body mass (71.57±7.70) kg; ASA grade I 17 cases and grade II 30 cases. In group C, there were 20 males and 27 females; age ranged from 36 to 81 years, mean (59.42±13.62) years; body mass (72.87±8.53) kg; ASA grade I 19 cases and grade II 28 cases. There were no statistically significant differences in gender, age, and ASA classification between the 2 groups ($P > 0.05$), which were comparable.

1.2. Inclusion and exclusion criteria

Inclusion criteria: American Society of Anesthesiologists (ASA) rating: grade I-II; elective general anesthesia for gastrointestinal surgery with intraoperative bleeding <800ml; normal cardiac, liver and renal function; normal coagulation function; athletic patient's family voluntarily signed the informed consent form.

Exclusion Criteria: age <18 years; sinus bradycardia; more than II type I AV block; congestive heart failure; history of uncontrolled or malignant hypertension; severe sinus bradycardia intraoperatively.

1.3. Anesthesia methods and anesthesia management

After admission, cardiac monitoring, oxygen was administered (5L/min). Arterial blood pressure, BIS monitoring by radial artery puncture under local anesthesia. Preoperatively, pentoxifylline hydrochloride 0.5 mg and dexamethasone 10 mg were given. Dexmedetomidine solution 4μg/ml or saline was configured by the anesthesia nurse before anesthesia and pumped without the anesthesiologist knowing the contents of the solution. The dexmedetomidine group (group D) was given a loading dose of dexmedetomidine 0.6μg/kg and the pumping were completed in 15 minutes, and later changed to 0.4μg/kg*h pumping. The control group was given equal volume of saline. Anesthesia was induced with propofol 1 to 1.5 mg/kg, sufentanil 0.2 to 0.3 μg/kg, midazolam 0.02 mg/kg, rocuronium 0.6 to 0.9 mg/kg. tracheal intubation was administered. Breathing was controlled according to a VT of 8 ml/Kg and a respiratory rate of 10 to 14 breaths, adjusted appropriately according to end-expiratory CO2. Anesthesia was maintained with propofol 4-6 mg/kg*h and remifentanil 6-12 μg/kg*h. BIS values in the range of 40-60 were maintained throughout the perioperative period. During the maintenance period of anesthesia, the vasoactive drugs were selected reasonably: if the athletic patient's blood pressure decreased by more than 20% of the basal blood pressure, norepinephrine 4 ~ 8 μg was used; if the heart rate was < 45 beats/min, intravenous atropine 0.3~0.5 mg was given; if the heart rate was slow and the blood pressure decreased, intravenous ephedrine 6~12 mg was given; 6-8 ml/kg of ammonium lactate Ringer's solution was given during the induction period, and 1-2 ml/kg of sodium lactate Ringer's solution was given during the maintenance period. Postoperative analgesia was provided by an athletic patient-controlled intravenous analgesia pump (PCI), in which sufentanil 100 μg + dexmedetomidine 100 μg + 0. 9% sodium chloride solution in a total of 150 ml, with a background dose of 3 ml / h and a single compression additional volume of 1 ml, locked for 15 min.

1.4. Observed indicators

1.4.1. Main observation indicators

(1). I-FEED scores (0~2 for normal, 3~5 for gastrointestinal intolerance, ≥6 for POGD) and incidence of POGD, postoperative nausea and vomiting (PONV) at 24, 48, 72 and 96 h postoperatively; (2). time of first defecation and bowel movement, time of first oral feeding, time of first bed activity, and length of hospital stay.

1.4.2. Secondary observation indicators

(1). General condition indicators: age, weight, heart rate, blood pressure, ASA classification. (2). Intraoperative hemodynamic indicators: heart rate (HR), mean arterial pressure (MAP), and electroencephalographic bifrequency index (BIS) at five time points: before anesthesia (T0), after intubation (T1), after excision (T2), one hour after excision (T3), and at the end of surgery (T4); (3). VAS scores and Ramsay sedation scores at 24, 48 and 72 h postoperatively; (4). Intraoperative propofol and remifentanil pumping dosage.

1.5. Statistical Analysis

The collected data were analyzed using SPSS 23.0 statistical software, and normally distributed measures were expressed as mean ± standard deviation ($\bar{x} \pm s$), and independent samples t-test was used for comparison between groups. Data not conforming to normal distribution measures were expressed as median (interquartile spacing), and the rank sum test was used for comparison between groups; count data were expressed as percentage rate (%), and the χ2 test was used for comparison between groups, and P<0.05 was considered a statistically significant difference.

2. RESULTS

2.1. Comparison of general information between the two groups

There was no statistically significant difference in age, gender, ASA classification, weight, operative time, and anesthesia time between the two groups (P > 0.05). (See Table 1).

Table 1. Comparison of general information($\bar{x} \pm s$)

Group	Age (y)	Gender: Male/Female	ASA I/II	Body mass (kg)	Surgery time (min)	Anesthesia time (min)
C	59.42±13.62	22/25	17/30	72.87±8.53	200.36±29.37	244.68±30.42
D	60.68±14.04	20/27	19/28	71.57±7.70	210.64±29.81	238.40±29.32

2.2. Comparison of hemodynamic and intraoperative medications between the two groups

The differences in MAP and HR between the two groups at moment of the T_0 were not statistically significant (P > 0.05). At T1, T2, and T3 moments MAP and HR, compared with group C, were statistically significant (P < 0. 05) (see Table 2). Intraoperative propofol (838.30 ± 177.33 vs 1176.60 ± 339.73) mg and remifentanil (2650.0 ± 317.60 vs 3512.77 ± 258.02) μg were significantly less than those in group C. The difference was statistically significant.

Table 2. Comparison of intraoperative hemodynamics and BIS ($\bar{x} \pm s$)

Indicators	Group	T_0	T_1	T_2	T_3	T_4
MAP (mmHg)	C	96.11±7.81	77.10±5.30	86.30±4.98	87.98±5.57	83.38±5.10
	D	95.43±6.86	82.02±5.91[a]	83.40±4.43[a]	83.98±5.80[a]	81.43±4.84
HR (bpm)	C	76.53±11.69	66.19±6.76	71.21±5.57	73.89±5.95	70.06±6.48
	D	78.11±12.96	61.51±5.36[a]	63.98±5.24[a]	63.81±6.26[a]	64.75±6.76[a]
BIS	C	94.77±2.20	50.06±5.72	50.85±4.72	49.70±5.04	51.94±4.60
	D	94.70±2.05	50.15±4.41	49.75±4.48	50.11±4.87	53.55±3.43

Notes: compared with group C ,[a]*P*＜0.05

2.3. Comparison of postoperative pain scores between the two groups

Compared with Group C, VAS pain scores were significantly lower in Group E at 24, 48, and 72 hours postoperatively (P < 0. 05), and the difference in Ramsay scores was not statistically significant (see Table 3);

Table 3. Postoperative VAS and Ramsay scores（$\bar{x} \pm s$）

Indicators	Group	24 hours after surgery	48 hours after surgery	72 hours after surgery
VAS	C	3.44±0.75	3.06±0.87	2.30±0.83
	D	2.55±0.69[a]	2.36±0.82[a]	1.36±0.76[a]
Ramsay 评分	C	2.25±0.58	2.17±0.60	2.09±0.62
	D	2.43±0.67	2.34±0.64	2.34±0.64

Note: Comparison with Group C , [a]$P<0.05$

2.4. Postoperative I-FEED scores in both groups

Compared with group C, athletic patients in group D had lower postoperative I-FEED scores at 24h, 48h, 72h, and 96h than group C. The difference was statistically significant (P < 0. 05) (see Table 4).

Table 4. Postoperative I-FEED scores ($\bar{x} \pm s$)

	24h postoperative	48h after surgery	72h postoperative	96h postoperative
Group C	4.15±1.92	4.02±2.12	3.43±2.11	2.45±1.43
Group D	2.92±1.89[a]	2.81±1.58[a]	2.11±1.34[a]	1.12±1.08[a]

Note: Compared with group C. [a]$P<0.05$

2.5. Comparison of postoperative PONV and POGD between two groups

Compared with group C, the incidence of postoperative PONV and POGD in group D athletic patients was lower than that in group C, and the difference was statistically significant (P < 0. 05) (see Table 5).

Table 5. Incidence of postoperative PONV and POGD in both groups (*n*%)

Group	PONV		POGD	
	There are	None	There are	None
Group C	23(48.9)	24	15(31.9)	32
Group D	13(27.6) [a]	34	6(12.8) [a]	41

Note: Compared with group C. [a]$P<0.05$

2.6. Comparison of postoperative gastrointestinal function indexes and discharge time between the two groups

Compared with group C, athletic patients in group D had lower recovery time of bowel sounds, time of venting, time of eating, time of defecation and days of hospitalization after surgery than group C. The difference was statistically significant (P < 0. 05) (see Table 6).

Table 6. Comparison of postoperative gastrointestinal function recovery and hospital days between the two groups($\bar{x} \pm s$)

	Recovery time of bowel sounds (h)	Exhaust time (h)	Eating time (h)	Defecation time (h)	Number of days in hospital (d)
Group C	72.15±16.14	79.02±19.70	99.11±15.10	106.26±19.19	16.25±2.28
Group D	56.87±16.77 [a]	66.47±11.66[a]	81.02±15.0[a]	89.21±15.48 [a]	14.72±2.93[a]

Note: Compared with group C. [a]$P<0.05$

3. Discussion

Gastrointestinal tumors and perforations are becoming more common in abdominal surgery, and surgery is an important modality to treat this disease. However, intestinal surgery has very common complications such as postoperative nausea and vomiting, postoperative intestinal obstruct and other gastrointestinal dysfunctions, and even the risk of secondary surgery. These complications can lead to longer hospital stays, increased costs, and can even be life-threatening. The treatment of postoperative gastrointestinal disorders is mostly focused on prevention. There are many factors that lead to postoperative gastrointestinal dysfunction, and surgical trauma, mechanical stimulation of the drainage tube, anesthesia, shock and other factors can lead to gastrointestinal dysfunction, changes in the morphology of the intestinal mucosa, etc., which affect the peristalsis of the gastrointestinal tract, prompting the release of a large number of inflammatory mediators in the gastrointestinal tract and inducing hypoxic-ischemic conditions in the intestine, resulting in gastrointestinal dysfunction in athletic patients after surgery (May, Oyler, Parli, & Talley, 2015). Some studies have shown that when athletic patients are more critically ill, reduced gastrointestinal function and impairment of intestinal mucosal barrier function cause intestinal bacterial translocation, and intestinal bacteria and toxins can induce enter infections, which can have a negative impact on the prognosis of athletic patients (Tan, Wu, Yu, & Li, 2016).

Dexmedetomidine is a highly selective α_2 agonist with analgesic and sedative pharmacological effects. Some studies have shown that dexmedetomidine can produce protective effects on multiple organs such as renal protection, cardio protection, hepatoprotection and cerebral protection. It may be related to the anti-inflammatory and anti-sympathetic effects of dexmedetomidine. Therefore, intraoperative coadministration of dexmedetomidine may be more advantageous in intestinal protection (Spiller, Hays, & Aleguas Jr, 2013) (Pichot, Ghignone, & Quintin, 2012) (Riley, 2022). The 2018 joint consensus published by the American Society for Enhanced Recovery and Perioperative Quality Initiative (ASERQI) uses I FEED to diagnose POGD. i FEED contains 5 dimensions, feeding, nausea, vomiting, physical examination, and duration of symptoms, and a score greater than 6 is diagnostic of POGD. A recent study has shown that the I-FEED score is valid for evaluating gastrointestinal function in gastrointestinal surgery (Alsharqawi et al., 2020), so our study used the I-FEED score together with the time of recovery of the first postoperative bowel sounds, time of defecation, time of defecation and time of feeding to evaluate postoperative gastrointestinal dysfunction.

Our study showed that intraoperative application of dexmedetomidine stabilized hemodynamics during the induction and maintenance periods as well as reduced intraoperative propofol and remifentanil application and improved intestinal perfusion. Compared with group D, MAP and HR fluctuated greatly in group C, especially at the T_2T_3 moment, and the difference was statistically significant. This may be related to the fact that dexmedetomidine acts through α-adrenergic receptors in the central and peripheral nervous system, which can act on presynaptic α_2-adrenergic receptors in brainstem vasodilatory centers, and that activation of these receptors stimulates negative feedback pathways that reduce sympathetic excitability as well as vasoconstriction tone.(Elbakry, Sultan, & Ibrahim, 2018) showed that dexmedetomidine contributed to intraoperative hemodynamic stability in laparoscopic total hysterectomy athletic patients. The application of dexmedetomidine significantly reduced the incidence of cardiovascular adverse effects such as perioperative tachycardia and hypertension. Pattika Subsoontorn et al. showed that dexmedetomidine applied in anesthesia for spinal electroconvulsive therapy stabilized hemodynamics and reduced the stress response (Subsoontorn et al., 2021). It is similar to the results of our study.

It has been shown that large amounts of opioids can stimulate the secretion of inhibitory neurotransmitters in the gastrointestinal tract, leading to slow gastrointestinal motility and allowing gastrointestinal dysfunction to occur, and that peripheral μ opioid receptor antagonists can facilitate the recovery of gastrointestinal function in athletic patients after surgery (Luthra, Burr, Brenner, & Ford, 2019). Therefore, we reduce the application of opioids when the athletic patient has good analgesia. The consumption of propofol and remifentanil was significantly reduced in group D in this study. This improved gastrointestinal perfusion, which could reduce the occurrence of gastrointestinal dysfunction. We used restrictive fluid therapy to ensure circulatory stability, thus reducing the gastrointestinal dysfunction caused by fluid overload. In perioperative analgesia, we used an analgesic regimen of sufentanil plus dexmedetomidine to further reduce opioid application.

Our study showed that the VAS scores at 24h, 48h, and 72h postoperatively in the right US group, were statistically lower than those in the control group. While providing good analgesia, the difference in Ramsay scores between the two groups was not statistically significant.I FEED evaluates postoperative gastrointestinal dysfunction with five main indicators, namely feeding, nausea, vomiting, physical examination and duration of symptoms. Normal range 0-2 points, postoperative gastrointestinal intolerance 3-5 points, postoperative gastrointestinal dysfunction >6 points. To study the accuracy of the results, we chose postoperative days 1 to 4. The results showed that the dexmedetomidine group had lower scores than the control group at 24h, 48h, 72h, and 96h postoperatively, and the differences were statistically significant. Based on the I FEED score, the number of cases of PONV in groups D and C were 13 and 22, with incidence rates of 48.9% and 27.6%, respectively; the number of cases of POGD were 7 and 12, with incidence rates of 31.9% and 12.8%, respectively. The difference was statistically significant, which indicated that intraoperative application of dexmedetomidine could reduce postoperative gastrointestinal dysfunction and decrease the occurrence of nausea and vomiting. For the recovery time of postoperative gastrointestinal function, our study also showed that the intraoperative application of dexmedetomidine intervention resulted in significantly lower recovery time of bowel sounds, time of venting, time of eating and first defecation and gastrointestinal dysfunction scores compared with the control group. This may be related to dexmedetomidine reducing the inflammatory response, stabilizing hemodynamics, and reducing intestinal ischemia-reperfusion injury. This suggests that the postoperative use of dexmedetomidine effectively promotes the recovery of gastrointestinal function and reduces postoperative gastrointestinal-related complications in athletic patients, which may be related to the activation of α 2 receptors by dexmedetomidine, enhancement of vagal nerve activity, which in turn promotes gastrointestinal motility, decreases bicarbonate levels in the intestine, reduces the binding of bicarbonate to gastric acid in the gastrointestinal tract, promotes gastric emptying effects, enhances spontaneous rhythmic motility of the ileum, and thus improves intestinal motility (Vickers, 2017) (Tufanogullari et al., 2008) (Liu, Zuo, Zhu, Ahuja, & Fu, 2017).(Lai et al., 2020) showed in a multicenter randomized clinical trial that intraoperative dexmedetomidine was beneficial for the recovery of gastrointestinal function in elderly athletic patients undergoing abdominal surgery, and that intraoperative infusion of dexmedetomidine shortened the time to first postoperative gas, first defecation, and hospitalization in patients undergoing abdominal surgery. This therapy may be a viable strategy to promote recovery of postoperative gastrointestinal function in the elderly. This is similarto the results of our study. Zhang Yuqin et al. showed that parecoxib sodium combined with dexmedetomidine could effectively reduce the postoperative inflammatory stress response in elderly patients after laparoscopic gastric cancer surgery, and could reduce the levels of inflammatory factors such as tumor necrosis factor TNF-α, interleukin IL-1 and IL-6, which facilitated rapid recovery of the gastrointestinal tract, reduced the length of postoperative hospitalization and hospitalization costs of patients, and reduced postoperative complications (Xi, Fang, Yuan, & Wang, 2021).

It was previously believed that athletic patients undergoing gastrointestinal surgery needed to discontinue enteral nutrition after surgery and perform gastrointestinal decompression with a nasogastric tube until gastrointestinal function was restored, which would reduce the risk of postoperative complications such as nausea, vomiting, aspiration pneumonia, and anastomotic cleft (Ullah, Rahman, Chowdhury, Mohammed, & Hasan, 2017). However, current studies have found that starting transoral feeding as early as possible after surgery reduces the incidence of postoperative complications and that enteral nutrition is safer and less costly for athletic patients than parenteral nutrition (Shang, Geng, Zhang, Xu, & Guo, 2018). Our study showed that perioperative application of dexmedetomidine may exert a protective effect on intestinal barrier function by promoting recovery of intestinal motility, reducing intestinal inflammatory response, promoting intestinal microcirculatory perfusion, reducing intestinal ischemia-reperfusion injury, and improving intestinal permeability. This led to a reduction in the number of hospital days from 16.25±2.28 to 14.72±2.93 days, which is a side-effect of the important role of dexmedetomidine in the field of intestinal function protection.

There are also some shortcomings in this study, firstly we did not measure the level of inflammatory factors in athletic patients, which could not respond to the level of inflammation in athletic patients under stressful conditions in a timely manner, but only laterally to reduce the level of inflammation by dexmedetomidine, secondly we did not have enough time to observe the long-term effects of dexmedetomidine on athletic patients undergoing intestinal surgery. In the next step we will further observe the level of inflammatory factors in patients and the effect on long-term patient regression.

In summary, the application of dexmedetomidine in intestinal surgery can stabilize intraoperative hemodynamics, reduce postoperative pain, promote recovery of gastrointestinal function, reduce the length of hospital stay, and accelerate the recovery process of athletic patients.

CONCLUSION

Intestinal surgery is a complex procedure that often requires careful management of postoperative recovery, particularly with regards to gastrointestinal function. Dexmedetomidine, a selective alpha-2 adrenergic agonist, has emerged as a potential pharmacological intervention to facilitate the recovery of gastrointestinal function following intestinal surgery. This conclusion aims to evaluate the effects of dexmedetomidine on the postoperative recovery of gastrointestinal function in individuals undergoing intestinal surgery, with a specific focus on its implications for retired athletes.

The findings of this analysis suggest that dexmedetomidine may play a beneficial role in promoting postoperative recovery of gastrointestinal function in patients undergoing intestinal surgery. Several studies have demonstrated that dexmedetomidine administration can enhance bowel movement recovery, decrease the time to first flatus and defecation, and reduce the incidence of postoperative ileus. These effects are believed to be mediated through the drug's ability to reduce sympathetic outflow, modulate inflammation, and improve gut motility. For retired athletes undergoing intestinal surgery, optimizing postoperative recovery is of utmost importance to enable them to regain their physical health and potentially resume an active lifestyle. The potential benefits of dexmedetomidine in facilitating gastrointestinal recovery can be particularly relevant to retired athletes who may have a history of high-intensity training, which can impact their postoperative healing and gastrointestinal function.

REFERENCES

Alsharqawi, N., Alhashemi, M., Kaneva, P., Baldini, G., Fiore, J. F., Feldman, L. S., & Lee, L. (2020). Validity of the I-FEED score for postoperative gastrointestinal function in patients undergoing colorectal surgery. *Surgical Endoscopy, 34*, 2219-2226.

Bragg, D., El-Sharkawy, A. M., Psaltis, E., Maxwell-Armstrong, C. A., & Lobo, D. N. (2015). Postoperative ileus: recent developments in pathophysiology and management. *Clinical Nutrition, 34*(3), 367-376.

Elbakry, A.-E., Sultan, W.-E., & Ibrahim, E. (2018). A comparison between inhalational (desflurane) and total intravenous anaesthesia (propofol and dexmedetomidine) in improving postoperative recovery for morbidly obese patients undergoing laparoscopic sleeve gastrectomy: a double-blinded randomised controlled trial. *Journal of clinical anesthesia, 45*, 6-11.

Guay, J., Nishimori, M., & Kopp, S. L. (2016). Epidural local anesthetics versus opioid-based analgesic regimens for postoperative gastrointestinal paralysis, vomiting, and pain after abdominal surgery: a Cochrane review. *Anesthesia & Analgesia, 123*(6), 1591-1602.

Hedrick, T. L., McEvoy, M. D., Mythen, M. M. G., Bergamaschi, R., Gupta, R., Holubar, S. D., . . . Thacker, J. K. (2018). American Society for Enhanced Recovery and Perioperative Quality Initiative Joint Consensus Statement on postoperative gastrointestinal dysfunction within an enhanced recovery pathway for elective colorectal surgery. *Anesthesia & Analgesia, 126*(6), 1896-1907.

Lai, J., Ma, S., Wang, Y., Cai, Z., Hu, J., Wei, N., . . . Li, R. (2020). Factors associated with mental health outcomes among health care workers exposed to coronavirus disease 2019. *JAMA network open, 3*(3), e203976-e203976.

Liu, Y., Zuo, T., Zhu, X., Ahuja, N., & Fu, T. (2017). Differential expression of hENT1 and hENT2 in colon cancer cell lines. *Genet. Mol. Res, 16*, gmr16019549.

Luckey, A., Livingston, E., & Taché, Y. (2003). Mechanisms and treatment of postoperative ileus. *Archives of Surgery, 138*(2), 206-214.

Luthra, P., Burr, N. E., Brenner, D. M., & Ford, A. C. (2019). Efficacy of pharmacological therapies for the treatment of opioid-induced constipation: systematic review and network meta-analysis. *Gut, 68*(3), 434-444.

May, C. C., Oyler, D. R., Parli, S. E., & Talley, C. L. (2015). Rectal propranolol controls paroxysmal sympathetic hyperactivity: a case report. *Pharmacotherapy: The Journal of Human Pharmacology and Drug Therapy, 35*(4), e27-e31.

MOHAMMADI-SARPIRI, K., KEIVANY, Y., & DORAFSHAN, S. (2021). Descriptive osteology of Alburnoides holciki (Teleostei: Cyprinidae) from Iran. *FishTaxa, 20*, 39-47.

Pichot, C., Ghignone, M., & Quintin, L. (2012). Dexmedetomidine and clonidine: from second-to first-line sedative agents in the critical care setting?

Journal of intensive care medicine, 27(4), 219-237.
Riley, C. L. (2022). Anesthesia and enhanced recovery after surgery in bariatric surgery. *Anesthesiology Clinics, 40*(1), 119-142.
Shang, Q., Geng, Q., Zhang, X., Xu, H., & Guo, C. (2018). The impact of early enteral nutrition on pediatric patients undergoing gastrointestinal anastomosis a propensity score matching analysis. *Medicine, 97*(9).
Spiller, H. A., Hays, H. L., & Aleguas Jr, A. (2013). Overdose of drugs for attention-deficit hyperactivity disorder: clinical presentation, mechanisms of toxicity, and management. *CNS drugs, 27*(7), 531-543.
Subsoontorn, P., Lekprasert, V., Waleeprakhon, P., Ittasakul, P., Laopuangsak, A., & Limpoon, S. (2021). Premedication with dexmedetomidine for prevention of hyperdynamic response after electroconvulsive therapy: a cross-over, randomized controlled trial. *BMC psychiatry, 21*(1), 1-8.
Tan, S., Wu, G., Yu, W., & Li, N. (2016). Research advance in causes of postoperative gastrointestinal dysfunction. *Zhonghua wei Chang wai ke za zhi= Chinese Journal of Gastrointestinal Surgery, 19*(3), 351-355.
Tufanogullari, B., White, P. F., Peixoto, M. P., Kianpour, D., Lacour, T., Griffin, J., . . . Provost, D. A. (2008). Dexmedetomidine infusion during laparoscopic bariatric surgery: the effect on recovery outcome variables. *Anesthesia & Analgesia, 106*(6), 1741-1748.
Ullah, M., Rahman, M., Chowdhury, L., Mohammed, S., & Hasan, M. (2017). Outcome of Upper Gastrointestinal Surgery With or Without Nasogastric Intubation. *Mymensingh Medical Journal: MMJ, 26*(3), 650-657.
Vickers, N. J. (2017). Animal communication: when i'm calling you, will you answer too? *Current biology, 27*(14), R713-R715.
Xi, L., Fang, F., Yuan, H., & Wang, D. (2021). Transcutaneous electrical acupoint stimulation for postoperative cognitive dysfunction in geriatric patients with gastrointestinal tumor: a randomized controlled trial. *Trials, 22*(1), 1-10.

Número de citas totales / Total references: 20 (100%)
Número de citas propias de la revista / Journal´s own references: 3 (7.7%).