



Blunt Abdominal Trauma and Surgical Reintervention, Presentation of a Case from the Perspective of Sports and Exercise Medicine

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Abstract

Blunt abdominal trauma has a higher prevalence in traffic accidents, and is important because of its high morbidity and mortality, it is considered an emergency pathology requiring surgical intervention -which can be done on multiple occasions-, which implies a higher rate of complications and prolonged in-ward stay. This is a case of a 30-year-old patient with a diagnosis of blunt abdominal trauma requiring a colostomy, closure of the colostomy, and the need for a new surgical intervention due to stenosis of the colorectal anastomosis with a high risk of intestinal obstruction, in whose multidisciplinary treatment management was included the medical specialty of Sports Medicine. The purpose is to demonstrate the importance of the supervised medical physical conditioning program carried out by the sports medicine physician for the improvement of the physical and functional capacity of patients undergoing this type of surgical intervention.

Keywords: Abdominal Surgery; Abdominal Injuries; Exercise; Sports Medicine; Exercise Therapy

Introduction

Blunt abdominal trauma refers to those injuries generated by impacts on the abdomen secondary to external compression due to blows, falls or traffic accidents, the latter being the most prevalent. Likewise, blunt abdominal trauma has been associated with significant morbidity and mortality, and it has been determined that intestinal disorders are the third most frequent injuries after blunt abdominal trauma [1].

On the other hand, colostomy is a procedure to completely or partially divert the colon due to inflammatory pathologies, trauma wounds or tumors. It has been considered that the most frequent indication for colostomy today is abdominal trauma, both blunt and open; followed by diverticular disease and flange obstruction with irreversible ischemic changes [2].

It has been determined that the ideal time for closing the colostomy should be when there is an absence of: severe intra-abdominal sepsis, malnutrition, acute inflammatory processes of the colon, among others, and there are studies that determine that

the recommendation for closing this is between 1 to 3 months; [2]. complication rates have been reported to be approximately 55% and mortality up to 4% [3].

Patients who undergo a surgical procedure secondary to blunt abdominal trauma tend to develop postoperative complications such as sepsis, dehiscence of the intestinal repair suture, postoperative wound infection, intra-abdominal abscesses, anastomotic leak and peritonitis [1,2] which are more likely to require a new laparotomy, prolonged in-ward stay, multiple organ failure or even cause fatal outcomes.

Some studies have reported a low degree of mobilization after abdominal surgery. In the study carried out by Haines and her collaborators, only 48% of patients undergoing abdominal surgery were able to walk more than 10 meters away from the bed. Their study included both emergent patients (22%) and elective surgery (78%), and the primary surgeries were hepatobiliary (60%) and colorectal (31%).

A study by Browning and colleagues that included patients undergoing elective upper abdominal surgery also reported a low level of physical activity within the first 4 days. Consequently, a recent study by Bailey, *et al.* It was concluded that 22.6% of older people (≥ 70 years) who underwent non-elective abdominal surgery experienced a loss of independence, and this was associated with higher healthcare costs.

These results show that patients without independent mobility one week postoperatively were significantly older, more inactive, and had a higher risk of prolonged hospital stay. These results confirm that, after high-risk surgery, older people are vulnerable and at risk of losing physical performance when hospitalized [4]. Furthermore, loss of physical performance after discharge in elderly patients is associated with an increased risk of falls, readmission, social isolation, home replacement, and, in the worst cases, death.

According to the above, preoperative rehabilitation programs aim to optimize a patient's physical condition to obtain better results both intra- and post-operatively [5,6]. It has been considered that the start of rehabilitation prior to the surgical procedure should include structured exercise, nutritional management, psychological support and cessation of negative health behaviors (cessation of smoking, diabetes and optimization of comorbidities) [4-6].

It has been described that early mobilization and exercise are of vital importance in postoperative care and recovery after abdominal surgery since it is associated with fewer postoperative complications and improved postoperative physical status [4,7]. Among such early mobilization and exercise prescription, hypopressive exercises must be taken into account, which consist of postural techniques that generate a decrease in intra-abdominal pressure and reflex activation of the abdominals and pelvic floor [8].

The goal of hypopressive exercises is to generate beneficial muscle strengthening for the abdominal area, which is an increase in strength and overall strength of the abdominal, pelvic and paravertebral muscles, a decrease in abdominal pressure, an increase in the extensibility of the muscles, increased circulation, reduced waist perimeter or circumference, and reduced fat compartment [8].

As there is no rehabilitation program with an emphasis on physical conditioning established demonstrating the positive effects on pre- and postoperative clinical and/or functional results, this report aims to describe the case of a patient with blunt abdominal trauma requiring surgery on multiple occasions to document the experience and benefits of medical management by the

sports medicine physician in the process of physical rehabilitation with therapeutic exercise.

Case Report

A 30-year-old patient with a history of recto-vaginal reconstruction and remodeling plus colostomy in August 2021 and colostomy closure in November 2021 due to severe perineal trauma secondary to blunt abdominal trauma secondary to polytrauma as consequence of a traffic accident, who was admitted to the emergency department from Hospital San José on 01/2022 referred for coloproctology consultation due to suspicion of colorectal anastomotic stenosis with high risk of intestinal obstruction. Upon admission, the patient weighed 44 kg and was 160 cm tall for a body mass index of 17.19 kg/m², in the malnutrition range.

They performed colonoscopic dilation; however, given the findings (90% sigmoid colon stenosis with subsequent successful pneumatic dilation with residual stenosis greater than 50%), they considered an indication for surgical management. Prior to this, nutritional repletion is required; thus, they consulted the service of nutrition and indicate initiation of parenteral nutrition, followed by a mixed diet. Management with pain clinic, psychology, psychiatry, and toxicology also took place.

Subsequently, they request a sports medicine assessment to begin supervised medical physical conditioning prior to the surgical procedure, it is considered to request an exercise tolerance test for functional evaluation (Table 1) and carry out daily interventions to guarantee independence in the activities of daily living, favor physical independence, strengthen muscles with emphasis on the core area and lower limbs, promote muscle gain and achieve improvement in body composition.

According to the results of the physical exercise tolerance test, it was determined that the patient had compromised muscle strength in the sarcopenia range, very compromised proprioception, and flexibility, altered body composition due to a decrease in fat mass and a marked decrease in lean mass. With the above, sports medical diagnoses of physical deconditioning, low weight and sarcopenia are undertaken.

The physical conditioning interventions carried out daily had a focus on the execution of isometric and hypopressive exercises in the abdominal area, recovery and strengthening of ambulation muscles (through self-loading, free weights and use of elastic bands) as well as strengthening of lumbar area, quadriceps, glutes, abductors, adductors, hip flexors and extensors, and concurrent exercises were performed for the benefit of both the cardiovascular and musculoskeletal systems.

They performed a surgical procedure of resection and colocolonic anastomosis 30 cm from the anus, plus lysis of peritoneal adhesions with subsequent stationary clinical evolution with a tendency to deterioration, dehydrated, tachycardic, with a requirement for volumetric management adjustment, they performed a contrast-enhanced CT scan of the abdomen with a report of multiple collections in the abdominal cavity, so the general surgery service considers carrying out exploratory laparotomy as a vital emergency.

In the surgical reintervention there were findings of ileo-jejunal perforations requiring primary enterorrhaphy, drainage of he-

moperitoneum and peritoneal lavage, patient requiring transfusion of 1 unit of red blood cells, subsequently patient with clinical evolution towards improvement, so it is possible to restart postoperative rehabilitation interventions by sports medicine with greater emphasis on strengthening and muscle recovery in the core area and ambulation.

Finally, a patient who presents an adequate recovery after surgical management, adequately tolerating enteral nutrition, optimal improvement from a physical and functional point of view, the treating physician decides to discharge and multidisciplinary outpatient follow-up.

	In-ward entry	Sports medicine intervention	Outpatient care by sports medicine
Height (m2)	1.60	1.60	1.60
Weight (kg)	44	47.1	47.1
BMI (kg/m2)	17.9	18.4	18.4
Fat %	Not measured	25.9	24.4
Fat mass (kg)	Not measured	12.2	11.5
Muscle %	Not measured	26.2	28.7
Muscle mass (kg)	Not measured	12.3	13.5
Right handgrip (kg)	Not measured	11.9	Not measured
Left handgrip (kg)	Not measured	13.8	Not measured
Calculated functional capacity (Met's)	Not measured	2.94 METS	6 METS

Table 1: Evaluation of body composition, strength, and functional capacity.



Figure 1: Outpatient sports medicine consultation 15 days after hospital discharge.

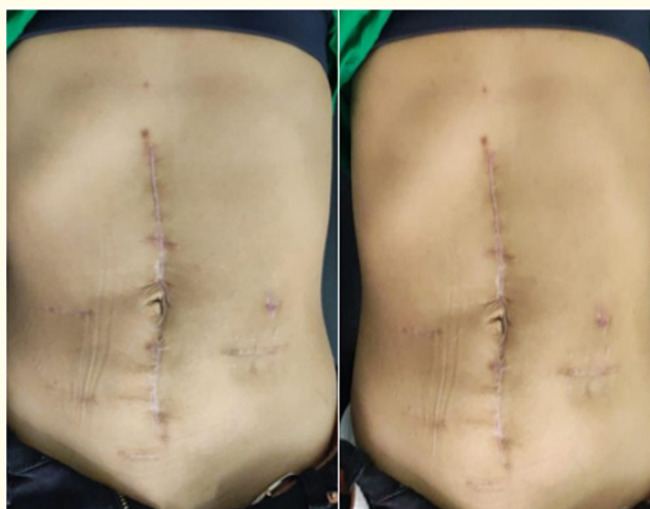


Figure 2: Outpatient sports medicine consultation 2 months after hospital discharge.

Discussion

Supervised medical physical conditioning is effective both pre- and post-operatively as it implies a reduction in the length of hospital stay and the number of complications after major abdominal surgery [3,6,9]. Additionally, there is evidence that preoperative exercise can help postoperative recovery, from a physical and functional point of view after thorax, abdomen and major joint replacement surgery [6].

This is why, based on the experience of the sports medicine physician in the clinical setting, physical rehabilitation should begin with an emphasis on supervised medical physical conditioning prior to performing the surgical procedure with a focus on respiratory muscles, core area and lower limbs. ; One of the studies has shown that personalized, well-monitored and assessed moderate-high intensity training is necessary to achieve improvements in the patient's functional capacity [6,7,10].

Additionally, other studies have demonstrated the importance of early mobilization and physical conditioning in postoperative abdominal surgery patients, given the decrease in mainly pulmonary complications [9-11]. due to conditions such as pain, use of opioids and residual anesthetics, taking into account barriers to independent mobilization such as fatigue and abdominal pain.

Additional studies are needed to investigate strategies to achieve adequate early mobilization and mobilization barriers in the immediate postoperative period after high-risk abdominal surgery with work focused on concurrent exercise with objectives in improving cardiovascular capacity as well as multi-joint strength exercises mainly focused on respiratory muscles through struc-

tured breathing exercises (inspiratory muscles, deep breathing exercises) and likewise exercises based on abdominal hypopressives in standing that reduce the risk of abdominal muscle diastasis [8], as well as a reduction in costs and length of hospital stay [5,11].

On the other hand, it is considered that subsequent studies will help improve the physical performance of our patients taking into account that the main findings during the hospital stay are patients with a low level of physical performance, in the first postoperative weeks despite performing early mobilization, measured with simple submaximal tests performed in-office such as the 6-minute walk test (6MWT) that allows us to make comparisons during the hospital stay and after discharge [6], structuring protocols in the different services are in need to improve physical fitness of patients. Taking into account that one of the included clinical trials successfully identified a significant improvement in 6MWT, incorporating dietary supplements in the preoperative regimen, as well as cardiovascular endurance exercise, this observation is consistent with the hypothesis that Skeletal muscle mass and function require anabolic stimulation through exercise and nutrition [6,9] and how exercise supervised by a sports medicine physician improves adherence to programs and compliance during hospital stay.

Furthermore, given that physical inactivity during the hospital stay is associated with a high risk of sarcopenia, where we will find loss of muscle strength, decreased functional performance with a reduction in lean mass; in severe cases a decrease in walking speed, therefore postoperative physical exercise care should be started as soon as possible after surgery in accordance with the principles of rapid and enhanced recovery after surgery.

Likewise, more strategies and programs should be created with a focus on early intervention prior to the surgical procedure to prevent postoperative complications; be able to change the fatigue rates in our patients during hospital stay, decrease abdominal pain through improved physical fitness, activation of endogenous analgesia pathways that improve the condition of patients, taking into account that a physically active healthy person has the ability to cope with physiological stress (including surgical stress) and restore the physiological balance of the body [6,11].

Previously conducted studies in patients undergoing abdominal surgery, physical fitness and activity is significantly and strongly associated with postoperative outcomes such as mortality, length of stay, and recovery of functionality. Adding these variables to prediction models involving conventional factors significantly improved prediction of mortality, discharge destination, and length of stay [11].

Conclusion

The importance of medical management by the sports medicine physician in patients with blunt abdominal trauma and requiring surgical intervention must be considered; since from this, and the joint management with other specialties, the benefits and positive effects of structured and supervised exercising have been seen regarding improvement and optimization of the physical and functional capacity of patients both pre- and post-surgery, as well as the reduction of postoperative complications with demonstrated benefits in avoiding complications; mainly pulmonary, given that they can correspond to 30% of the cases after abdominal surgery.

This case report allows increasing the evidence of patient management by physicians specialized in exercise and sports in the clinical setting, and the need to have this specialty in different health institutions, given the high-quality evidence that exercise Perioperative in patients scheduled for major surgeries is well tolerated and effective.

Ethical Considerations

The data collected during the investigation were handled with total discretion and confidentiality as contemplated by the regulations on medical ethics in Colombia, under law 23 of 1981, as well as following resolution number 8430 of 1993 of the Ministry of Health of Colombia, the study is considered a risk-free investigation, since the measurement of body composition is routinely performed in patients evaluated in the sports medicine service of the San José hospital.

The authors declare that no experiments have been carried out on humans or animals for this research.

The authors declare that they have followed their workplace's protocols regarding the publication of patient data.

The authors have obtained informed consent from the patients and/or subjects referred to in the article. This document is in the possession of the corresponding author.

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Declaration of Conflict of Interest

The authors of this article declare that they have no conflict of interest.

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