

Repair of the Abdominal Wall, Presentation of a Case from the Clinical Sports Medicine Therapeutic Physical Activity Intervention

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Abstract

Abdominal wall closure is one of the most frequently performed surgical procedures in surgical practice. For this reason, it is important to take into account the complications that may arise during this procedure. This is a case of a 54-year-old patient who presented with an open abdomen requiring multiple surgical interventions with multidisciplinary assessment, which included therapeutic physical activity supervised by a Sports Medicine Physician. The purpose is to show the significant clinical improvement according to body composition, body dynamics, functional capacity and physical independence of the patient who underwent the mentioned intervention as a multidisciplinary jointly assessment between the General Surgery and the Sports Medicine Departments who carried out a significant progressive increase in loads under medical supervision.

Introduction

Abdominal wall closure is a surgical procedure that is performed using different techniques, in patients with an open abdomen due to pathologies and/or complications; becoming very important because remaining with an open abdomen can reach a mortality of up to 60% (1) [1].

Therefore, important objectives have been considered for the aforementioned closure, such as avoiding lateral retraction of the aponeurosis of the rectus abdominis muscles and easily allowing reinterventions, in order to enable early and definitive closure of the abdominal wall [1].

Thus, when performing a closure of the abdominal wall, the physiological, nutritional and infectious conditions of the patient must be taken into account; watching how the definitive closure of the abdominal wall decreases in a stepwise manner, given the case additional complications take place. Achieving approximately 60% of all closure in the first week if only trauma without complications background in place and decreasing to less than 30% if septic or inflammatory abdominal conditions are present [1].

On some occasions, another laparotomy is necessary in the management of certain abdominal diseases, reaching approximately 10%. Current evidence suggests that these new laparotomies have a double risk of acquiring an incisional hernia, generating higher health costs, and reducing quality of life. Many studies have tried to identify the best method for abdominal wall closure, considering suture materials or surgical techniques, leaving aside patients with new laparotomy, and often not paying attention or importance to therapeutic physical activity in these patients [2,3].

Rehabilitation has undergone an important change in recent years, leaving aside joint mobilization and preventive care, to place an emphasis on therapeutic physical activity gaining muscle strength both before and after a surgical procedure and also to achieve independence in mobility. ; For this reason, in our hospital, a plus has been implemented in association with physical therapy in rehabilitation through physical intervention by specialists in Sports and Exercise Medicine, performing interventions in this type of patients through strength exercise from mild to moderate intensities, through loads and modes such as: elastic bands, free weights and self-loads; in addition to optimizing cardiovascular exercises with techniques such as the cycle ergometer, speed-controlled walking, static walking, among others [3,4].

With the above and as part of our experience, we have found that, in this type of case, it has been shown that therapeutic physical activity before and after surgery can determine a decrease in post-surgical complications, a significant decrease in pain, an improvement in the functional capacity of the patient, and likewise an improvement that favors healing during inflammatory processes [4-6].

Since a specific physical activity scheme has not been established for patients with this type of pathology, and taking into account that the interventions performed at our institution have been an additional method, this report aims to describe the case of a patient with an open abdomen with multiple interventions and attempts to close the abdominal wall, until jointly assessment between the general surgery and sports medicine departments was carried out, in order to achieve its definitive closure, as well as the functional rehabilitation and discharge of the patient with a degree of total independence.

Case Report

A 54-year-old patient (female) with a history of laparoscopic cholecystectomy in 2016, a caesarean section in 2000, and menopause, with no other significant history, with an initial weight of 60 kilos with a low risk of malnutrition, attended the San José hospital. She was admitted due to persistent abdominal pain in the epigastrium with subsequent irradiation and location in the right iliac fossa associated with emesis, asthenia and general malaise. The general surgery group based on symptoms and symptoms made a diagnosis of acute appendicitis, for which she was taken to surgery where they performed Exploratory laparotomy due to perforated appendicitis. During the surgical procedure, a gynecologist was called given intraoperative findings, for which they performed drainage of pelvic peritonitis and bilateral salpingectomy.

Given the torpid evolution and persistence of abdominal pain, they take paraclinical images which show inflammatory changes in the surgical bed of the abdominal wall, without collections; local inflammatory changes at the base of the cecum with interloop fluid and collection with fluid air level (10 cc), intestinal ileus with little gas in the colon considering postoperative ileus for which they give recommendations for ambulation, diet and optimization of analgesia, rehabilitation through conventional physical therapy and before clinical improvement, patient is discharged.

Readmission was presented 9 days later, presenting the patient in poor general condition with abdominal pain 10/10 on a visual analogue scale, disabling with limitation of basic daily activities, hypotensive, for which they are transferred to the recovery room, volumetric expanders are started with additional medical management and studies for abdominal sepsis. Finding images compatible with pneumoperitoneum. intraperitoneal collections and diffuse thickening, given the symptoms, a new laparotomy was performed where intraperitoneal collection drainage was performed, finding a punctate lesion of the cecum with ischemic changes, with generalized fecaloid peritonitis of 4 quadrants, for which they performed partial colectomy with ileostomy and mucous fistula via open, total omentectomy, leaving open cavity with only skin closure, managed postoperatively in intensive care. Despite management, she persisted with poor clinical evolution, subsequently presenting mechanical intestinal obstruction, performing new surgical lavage plus ileostomy remodeling, nutritional improvement through parenteral nutrition was decided.

After the above, the sports medicine department was consulted, who carried out a functional evaluation using exercise testing (Table 1), evaluating body composition, muscle strength and cardiovascular performance, evidencing a greater deterioration with a musculoskeletal risk, for which reason it was considered start daily rehabilitation for functional improvement, emphasizing recovery of the ambulation muscles and strengthening of the core area, taking into account that at that time the patient had an open abdomen and enteral nutrition.

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

	IN-WARD ADMISSION	MEDICINE SPORTS INTERVENTION STARTS	IN-WARD DISCHARGE
HEIGHT (m2)	1.55	1.55	1.55
WEIGHT (Kg)	60	54	58
FAT %	Not taken	40.7	37.4
FAT WEIGHT (Kg)	Not taken	22KG	21.6KG
MUSCLE %	Not taken	17.8	24.2
MUSCLE WEIGHT (Kg)	Not taken	9.6KG	14KG
RIGHT HANDGRIP (Kg)	Not taken	7KG	24.8KG
LEFT HANDGRIP (Kg)	Not taken	5KG	22.1KG
FUNCTIONAL CAPACI- TY (MET's)	Not taken	1.76 METS	3.5 METS

After clinical improvement and physical intervention, the patient began to present a slow but adequate clinical evolution, requiring peritoneal lavages on multiple occasions plus placement and changes in the VAC system, given that the intestinal fistulas and mobilization generated extravasation of the intestinal content; however, continuity was given to physical interventions which the patient accepted and understood was necessary to perform.

Once there is musculoskeletal improvement, it is decided to advance nutrition to a mixed diet (parenteral and staggered oral route). Fistula closure and reconstruction of the abdominal wall are considered, initiating management with BOTOX therapy and later fistula closure, performing fistula closure in a surgical procedure by means of resection and anastomosis of the small intestine plus functional and anatomical reconstruction of the abdominal wall without new complications, performed successfully.

Finally, the patient presents adequate recovery after surgical management, adequately tolerating enteral nutrition, physical-functional improvement by walking and daily activities by his own means, for which reason discharge and multidisciplinary outpatient follow-up are decided.

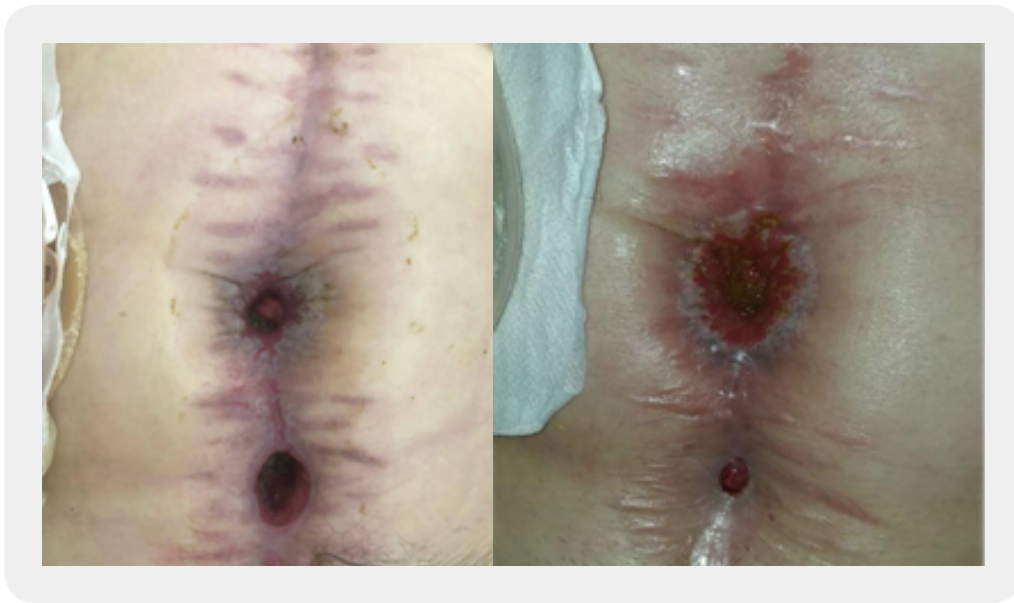


Figure 1 & 2: Dehiscence of the wound at the umbilical and infraumbilical level without signs of infection in the process of closure by secondary intention.



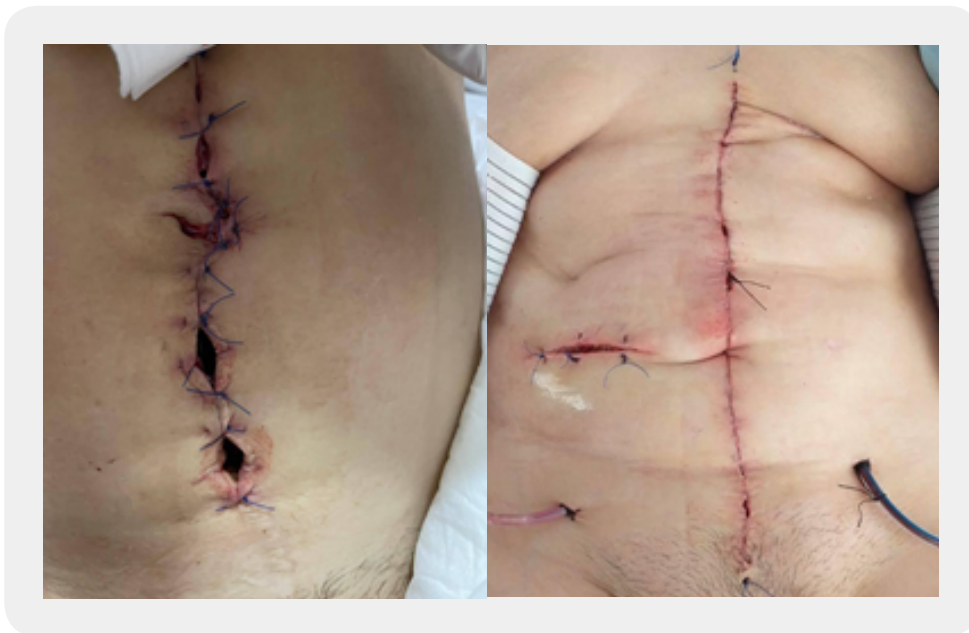


Figure 3 & 4: *Dehiscence at the umbilical level with erythematous borders and vital functional colostomy without signs of infection.*

Discussion

The clinical sportology is an emerging field getting more importance, and nowadays it even already has “the international academy of Sportology” since March 2011 [7].

Day by day, the role of the sports doctor gains more popularity and importance from the clinical point of view, with a published editorial mentioning that it is already a “must have in in-ward and ICU hospitalizations” [8].

It should be remembered that the abdominal region is located between the thorax and the pelvis; It is delimited, upwards by an imaginary line that runs below the costal margins and downwards by the iliac crests and the inguinal folds. Its lateral walls are made up of soft tissues, while the posterior face is delimited by the lumbar spine and the iliac bones [9].

The correction or repair of the abdominal wall is not only based on the decision of a surgical technique, it has been seen in clinical practice that comprehensive rehabilitation and care both pre and postoperatively are of great importance. importance of strengthening the muscles that comprise and delimit the abdominal cavity, which are [4-6]:

- Lateral: oblique major, oblique minor and transversus abdominis.
- Anterior: rectus abdominis and triquetrum.
- Posterior: quadratus lumborum, iliopsoas and psoas minor.
- Superior: thoracic diaphragm
- Lower: pelvic floor (levator ani muscle and coccygeus muscle which form the so-called pelvic diaphragm) [10]

It should be known that the rectus abdominis, internal and external obliques, and transversus muscles are muscles that share the same motor innervation (T6-T12), and that the proportion of type I fibers they possess is 75%, while the type IIb is approximately 4%. The importance of these is because they provide the support and lining of the digestive organs, thus allowing a respiratory synergy by offering a counter-support to the diaphragm which can be evidenced in forced expiration [11].

Currently, the hypopressive technique is defined as “a set of postural techniques that cause a decrease in intra-abdominal pressure and reflex activation of the abdominals and pelvic floor, achieving an increase in tone in both muscle groups in the long term” (9), consist of maintaining a series of postures in a rhythmic, repetitive and sequential way, which allow the integration and memorization of sensitive proprioceptive messages that aim to inhibit hypertonia of the diaphragm, responsible for abdominal hyperpressure [11].

The core zone is a muscular complex, which is made up of the lumbar spine, the muscles of the abdominal wall, the back extensors and the quadratus lumborum, some studies also include the upper and lower sections of the body: shoulders, trunk, hip and thighs. A well-trained core area is essential for optimal performance and injury prevention, where the abdominal muscles will stabilize the lower back.

When selecting the exercises for the conditioning of the abdominal muscles, it is necessary to be based on a series of principles, which include: First, that the exercise triggers between 20% and 60% of the maximum voluntary contraction. Second, that the hip flexors are inhibited as far as possible, since one of the factors that increases spinal instability is the involvement of the hip flexor musculature, since activation of the psoas increases the load on the spine. lumbar. Third, that the values of lumbar compression and anteroposterior shear are below 3,000 and 1,000 Newtons, since higher values are a risk factor [12].

For this reason, from the beginning of the intervention by the sports medicine service and taking into account that at the beginning of the assessment the patient was bedridden, not tolerating long or short sitting, emphasis was placed on strengthening the different muscles of the abdominal cavity and/or core area.

Initially using isometric abdominal work, when evidence of improvement, hypopressive abdominal work was started, as well as unilateral elevations in the lower limbs with and without knee flexion respectively, work was also carried out to strengthen the lower limbs by means of knee flexion, hip flexion with and without knee flexion, hip abduction and adduction with and without knee flexion, ankle flexion and extension, quadriceps isometrics, plantar pressure.

As the patient was tolerating the mobilization, the intervention was continued in a long sitting position and later in a short sitting position. Once the short sitting position was achieved, the cardiovascular component was incorporated into the strength work using a dual-purpose cycle ergometer (arm with leg extension) and standing work until assisted ambulation is achieved.

When starting the rehabilitation with an emphasis on therapeutic physical activity, the strength work was managed through a volume distributed in 3 series of 5 repetitions, progressing to 8, 10, 12 and 15 repetitions and later progressing in 4 and 5 series of each daily exercise, When the cardiovascular component was incorporated, it began with a minimum of 3 minutes on a cycle ergometer progressing to 5, 8, 10, and 15 minutes divided into 2, 3, and 4 times a day.

After achieving standing and assisted ambulation, a global strengthening was started where the work of the upper area was also taken into account, which was worked with opening of the upper limbs, lateral flights, front flights, biceps curl, triceps cup, two-handed cup triceps, shoulder abduction and adduction. Static standing and later gait with support were also implemented as an addition to the cardiovascular component.

Regarding the exercise prescription based on the objectives achieved, prior to discharge, the patient reached a tolerance of 4 to 5 series of 12 to 15 repetitions of each of the exercises performed, which comprised between 1 to 2 exercises for each exercise. zone of the body (upper zone, middle zone and lower zone), in addition to a minimum cardiovascular component of 30 to 45 minutes divided into 3 daily sessions of 10 to 15 minutes.

In addition to this, it is important to highlight that the perineal muscles are the base that closes the lower part of the pelvis, as this area presents a weakness or injury, it will predispose women to conditions given their specific anatomical characteristics, presented symptoms such as: urinary and fecal incontinence, genital prolapse, chronic pelvic pain, sexual dysfunction, among others (9). For this reason, the mission of abdominoperineal rehabilitation becomes vital not only to tone and strengthen the different types of muscle fibers located in this area, but also manages to have an effect on the increase of motor units, improvement of the frequency of excitation and increase in muscle mass [9].

The daily monitoring of patients carried out by sports medicine in conjunction with surgical specialties, allows the patient to be educated not only regarding the technical gesture of the exercise to be performed, but also to achieve adequate synchronization of the breathing technique, which generates learning prior to surgery, so that at the post-surgical moment the patient has the necessary substrate to restart with rehabilitation and likewise has the adequate and necessary adaptation to perform physical activity.

From the previous case, it is evident that in patients with multiple surgical interventions, supervised and guided therapeutic physical activity by sports medicine specialists achieves important changes in body composition, evidencing in this case a marked recovery of lean mass, as well as a muscle strength recovery, body dynamics and cardiovascular performance that is reflected in the functional capacity and physical independence of the patient.

Conclusions

A multidisciplinary management that includes rehabilitation by specialists in physical activity and sport, generates that the patient has a better and adequate education of the techniques of exercises and breathing, which allows an effective recovery, as well as a lower risk of complications due to movements. inappropriate.

Monitoring by qualified personnel in the exercise allows a better muscular progression, an effective increase in loads, an effective musculoskeletal recovery, and an improvement in the functional capacity of the patient, which results in a greater ease of carrying out activities of daily living and a soon reintegrate into society.

This case report allows increasing the evidence of the management of patients with complex pathologies from the therapeutic physical activity perspective, as example we have the correction or repair of the abdominal wall.

Promoting the publication of more cases is very important to achieve more evidence that sooner or later would end up by have clinical practice guidelines from this view worldwide, giving importance to the sports Medicine physician not only in the sports field but also in the clinical field (clinical sports medicine or clinical sportology) is getting more and more relevance as part of the inward and ICU physicians personnel.

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, likewise following resolution number 8430 of 1993 of the Colombian Ministry of Health, the This study is considered a risk-free investigation, since the measurement of body composition is routinely performed in the patients evaluated in the sports medicine department of the San José hospital.

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

The authors declare that they have followed the protocols of their work center regarding the publication of patient data.

The authors have obtained the informed consent of 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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