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Effect of Threshold Inspiratory Muscle Training Device on Maximal Inspiratory Pressure in a Patient Post Exploratory Laparotomy for Anastomosis Leak from the Ileoileal Anastomotic Site: A Case Report

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Abstract: Postoperative Surgery care is important in the treatment of a variety of disorders as well as the alleviation of human suffering. Surgery is essential for meeting basic healthcare needs all across the world, although to varying degrees depending on disease subtypes and epidemiological regions. In this case study, there is a 47-year-old man who has been suffering from abdominal pain since 8 months and has a history of previous surgey for ileoileal anastomosis leak. Patient visited tertiary care hospital with these complaints and had undergone various investigations. On examination patient was diagnosed with diagnosed with an ileoileal anastomosis leak, but the blood in her urine persisted, so he underwent an exploratory laparotomy for anastomosis leak from the ileoileal anastomotic site The postoperative inspiratory muscle training device was initiated, and the maximal inspiratory pressure and two-minute walk distance both improved significantly.

Keywords: *Case Report, Exploratory Laparatomy, Ileoileal Anastomosis Leak.*

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I. CASE REPORT

A 47-year-old male patient appeared to be fine one year ago when she suddenly began experiencing back discomfort. He went to a nearby hospital where investigations discovered a 10 mm stone in her ureter and kidney infection. he took drugs for three months to reduce the discomfort, but it returned, so they tried ayurveda treatment for one month. After 8 months, she began to experience burning sensations as well as blood in her urine and abdominal pain that was gradual in onset and progressive. he went to a local hospital where several investigations were performed and he was diagnosed with an ileoileal anastomosis leak, but the blood in her urine persisted, so he underwent an exploratory laparotomy for anastomosis leak from the ileoileal anastomotic site Physiotherapy began on the first postoperative day. At the time of the examination, my heart rate was 114 beats per minute. The patient had a blood pressure reading of 110/60 mm Hg. The patient was alert, cooperative, and aware of time, location, and person. On postoperative day 1, the patient was checked in a supine laying

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posture with drains and a Foley catheter in place. Around the dressing region, there was tenderness. The patient was instructed to use an abdominal binder due to the midline incision. The respiratory rate was 16 breaths per minute, with a steady rhythm. The patient's breathing pattern was abdomino-thoracic. Auscultation revealed reduced air entry in both lower lobes of the lungs. The axillary and xiphoid chest expansions were extended by 2cm.

➢ *Pain History*

The patient had pain over the suture site.with 8/10 on movement and 2/10 at rest. Aggravates when a supine resting position is changed.

II. DIAGNOSTIC FINDINGS

- CECT abdomen-minimal retroperitoneal collection with bilateral perineal fat stranding
- Uitrasonography-urinary bladder is partially field with Foleys bulb insitu
- CECT Abdomen- leakage of urine from the upper and mid ureter on left side. Leakage of oral contrast from the ileal loop in the pelvis with ileocutaneous fistula in the pelvis with ileocutaneous fistula and large anterior abdominal wall collection at the scar site in the midline.

III. X-RAY FINDINGS

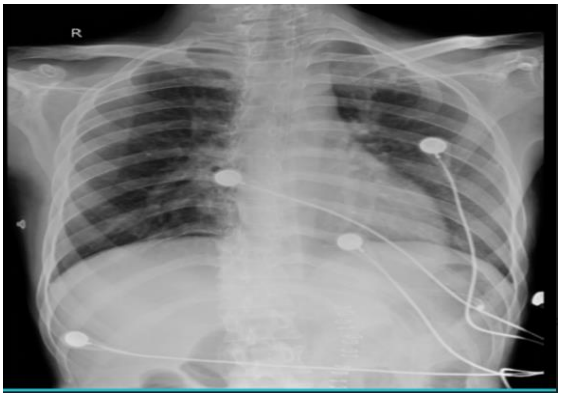

Fig. 1 X-ray– A 47 Year Old Male Chest X-Ray in AP View Showed Hyper Translucency of the Lung Field on the Right Lower Lobes.with Diminished Bronchovesicular Markings and Right Sided Obliterated Costophrenic Angle.

Date of admission	24/05/2022
Date of surgery 1st	2/05/2022
Date of surgery 2nd	8/05/2022
Post- operative day 1	9/05/2022
Follow up after 1 week	15/05/2022
Duration of treatment	7 days

IV. PHYSIOTHERAPY INTERVENTION

A portable handheld pressure manometer was used to measure the patients' maximum inspiratory pressure after the operation. To improve inspiratory muscle strength, a training apparatus was used. A 2-minute walk test was used to determine the patient's endurance and functional capabilities(1).The patient's distance traveled was measured. Before beginning the intervention, the patient is informed about post-abdominal surgery pulmonary issues and the significance of using an inspiratory muscle training device and exercising to prevent these complications. On postoperative day 2 hand-held pressure manometer was used to measure maximal inspiratory pressure (PI max). On Day 2, a Threshold Inspiratory Muscle Training device was used. The training lasted one week and consisted of two sessions per day, each lasting 15 minutes and incorporating an interval. After one week, patients were assessed using the same end measure to see how the intervention affected their training(2).

Pursed lip breathing, segmental breathing, and diaphragmatic breathing were taught as breathing retraining exercises. Techniques for monitoring in-bed mobilization were introduced. From bedside sitting to standing and spot walking, the patient was progressed. Spirometer with volume-based incentive was recommended, and marks were gradually progressed from 400cc/sec to 600cc/sec, 800cc/sec, and 1000cc/sec).Overall bed mobility, ambulation, and cardiovascular fitness are associated with lung volume and capacity(3)**.** Inspiratory Muscle Threshold Training (IMT) before the treatment, the patient and his caretakers were educated about the treatment protocol as well as the need for physiotherapy and early rehabilitation, and the patient's informed consent was obtained. The patient was instructed to take a deep breath in while shutting their lips over the mouthpiece, then continues to breathe in and out without removing the device from their mouth. Participants normally begin with a light load, about one-third of their maximum capacity (PImax), and gradually raise the tension by tightening a screw until they achieve the desired result. The training load has been increased to 30% of its previous maximum level. The intervention was administered twice a day for a week. (4)

Fig 2 Shows Patient Performing Inspiratory Muscle Training Device.

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Fig 3 Patient is in Semi Fowlers Position While Performing Threshold IMT Device.

V. RESULTS

Table 1- Significant Improvement in Maximal Inspiratory Capacity from Post Op Day2-Post Op Day 7.

	POST OP DAY 1	POST OP DAY 7
Maximal inspiratory pressure	**50 mmHg**	**60 mmHg**

Table 2- Significant Improvement in Lung Capacity from Post op day 1-Post op Day 7

	POST OP DAY 1	POST OP DAY 7
Incentive spirometry	**400cc**	**550cc**

Table 3- Significant Improvement in Functional Capacity from Post op Day 1-Post Op Day 7

	POST OP DAY 1	POST OP DAY 7
2 Min walk test	**60m**	**90 m**

VI. DISCUSSION

Surgery is essential for meeting basic healthcare needs all across the world, although to varying degrees depending on disease subtypes and epidemiological regions. Laparoscopic surgery is now widely established. Its benefits include improved cosmetic results, reduced postoperative pain, and reduced length of hospital stay with patient satisfaction.

The first step of abdominal surgery is to make an incision in the abdomen. The incision is created in the midline, from the sternum's xiphoid process to just above the umbilicus, in upper abdominal surgeries. Surgery and general anesthesia have a direct impact on the respiratory system(4).

Postoperative lung volume gets hampered as the incision is close to the diaphragm as compared to other surgical procedures, abdominal surgery may results in higher incidence of post pulmonary complications (5). Following surgery, anesthetics and analgesics impair upper airway and auxiliary muscle function, increasing the risk of Postoperative Pulmonary Complications (PPC) (6). Because of direct or indirect trauma to the diaphragm, post-abdominal surgery resulted in a decrease in static respiratory maximal pressure, Consist both pressure reflects the strength of the respiratory muscles(7). Abdominal surgery combined with early chest physiotherapy intervention was described in this case study as a safe and effective option for pain relief and early return to daily activities. The use of respiratory muscle training equipment enhances a person's lung performance by increasing their strength, endurance, and capacity to exercise lung muscles IMT devices with a Pressure Threshold are typically spring-loaded and occluded to varying degrees. As a result, the goal of this research is to see how people respond to Threshold Inspiratory Therapy (8). When compared to other surgical procedures, the closer the incision is to the diaphragm, the lower the postoperative lung volume. In Exploratory laparotomy, using postoperative inspiratory muscle training devices is critical for achieving maximum inspiratory pressure and avoiding additional respiratory problems. Inspiratory muscle training devices have been utilized preoperatively in abdominal procedures to minimize post-operative pulmonary issues and increase patient quality of life(9).

VII. CONCLUSION

Ureter infection and ileoileal anastomosis leak causes abdominal pain and diseases and requires surgical interventions. In this case study, we have given systematic week wise physiotherapy management to the patient who had undergone Exploratory laparotomy. The threshold inspiratory muscle training device improved maximal inspiratory pressure, patient quality of life, and hospital stay, and was useful for reducing problems postoperatively with shorter hospital stays and higher patient satisfaction.

Conflict of interest: The authors declare that they have no conflict of interest.

INFORMED CONSENT-Patients informed consent was obtained with complete assurance of his confidentiality.

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