Effectiveness of core strengthening exercises in post-surgical management of umbilical hernia with safe handling techniques

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Abstract

Introduction and Aim: An umbilical hernia is defined by swelling or bulging in the umbilical region. Pain in the area of the bulge becomes more intense and excruciating while lifting weights, coughing, straining during a bowel movement, or intense physical activity. The aim of the study is to find the effectiveness of core strengthening exercises in post-surgical management of umbilical hernia with safe handling techniques.

Materials and Methods: 30 patients who had undergone umbilical hernia surgery around the abdominal region were selected dividing into the experimental group & conventional group using convenient sampling technique. They were given core strengthening exercise to strengthen the affected area in order to prevent the recurrence of the hernia in the same place. The difference in the development of the affected muscle region was seen with the help of ultrasound imaging as well as measures of before and after the treatment given, were noted by comparing both the groups.

Results: A significant difference between before and after the intervention of the core strengthening exercise given was clearly noted through the statistical analysis of quantitative data. Thus, Experimental study group has high statistical difference than conventional group.

Conclusion: From the result, it has been concluded that core strengthening exercise given to the post operative umbilical hernia patient has shown a good development in the strength of the abdomen muscles around the surgical region and the possibility of hernia recurrence is significantly low compared to the patient who didn't undergo core strengthening exercise program.

Key Word: Umbilical Hernia, post operative care, core strengthening exercises.

INTRODUCTION

Hernia is a medical condition where the organs bulges out through the weak area of the muscle group in the body. The majority of hernias happen between the chest and the hips, in the abdominalcavity. The most common types of hernia are Umbilical, femoral, Inguinal, hiatus, incisional, epigastric, spigelian and diaphragmatic hernia. Out of all the hernia almost 80% of hernia are inguinal or femoral, and 3% to 10% of hernia is umbilical wherein it affects 20% of newborns. Inguinal and femoral hernias are led by weakening muscles which may have existed since birth or are the resultant of ageing and periodic strains over the abdomen and groin regions. Physical exercise, obesity, pregnancy, regular coughing, and constipation can all cause strain on the bowels. Umbilical hernia occurs when the umbilical ring is not completely closed, allowing intra-abdominal contents to protrude. The frequency among adult population is 2%, with cirrhotic individuals and obese middle-aged multiparous women being the most affected.

A lump or bulge in the abdomen or groin caused by a hernia in the belly or groin might be pushed back in or eliminated while lying down. Laughing, sobbing, coughing, straining during a bowel movement, or physical activity may cause the lump to emerge after it has been pushed in. An umbilical hernia is defined by swelling or bulging in the umbilical region. Pain in the area of bulge has become more intense Lifting is painful. Over time, the bulge gets greater. An excruciating pain that lasts a long time.

A protrusion in the area where a hernia has developed can typically be seen or felt on physical examination. The doctor feels the area around the testicles and groin while asking the patient to cough as part of a normal physical exam for inguinal hernias in men. Soft- tissue imaging, such as a CT scan, may be used to identify the illness accurately in some situations. Following diagnosis, elective repair is recommended because suture repairs have a high recurrence rate, mesh reinforcement is advised. If an adult is diagnosed with hernia, they most likely need a surgery to avoid the risk of complication. The major type of surgery are hernioplasty, open surgery where mesh is used, laparoscopic surgery. Complications such as large seroma and surgical site infection are common and can lead to recurrence. Obesity and significant weight gain after surgery are both apparent risk concerns. Surgical failure has been linked to a patient's BMI of more than 30 kg/m2 and defects of more than 2 cm. Furthermore, smoking may increase the likelihood of recurrence.
The core muscles serve as a link between the upper and lower limbs, transferring force from the core, also known as the powerhouse, to the limbs. The core is like group of muscular alignment with the abdominals at front, paraspinal and glutes in the rear while diaphragm in the upper portion with pelvic and hip gridle occupying the bottom. The fundamental goal of core training is to strengthen and condition the regional and global muscles that cooperate to support the spine. Rectus abdomen, obliques, latissimus, and erector spinae are among the global (outside) musculature. They are the muscles that control trunk extension and flexion, and they are largely made up of 2nd type (rapid twitch) fibers.

Transverse abdomen, multifidous, pelvic floor are local (deeper) muscle groups. They are primarily made up of 1st type (slow-twitch) fibers of muscles, which helps in increasing trunk endurance. With a lesser force output, the inter-segmental muscular units provide equilibrium and hold for the supine posture. There is insufficient evidence or records to support that exercise interventions have proven to be beneficial in preventing or treating of hernia. Although theoretically the exercises can make a big influence in the management for the condition.

It has been proposed that the Pilates workout regimen will enhance dynamic posture control, joint mobility around the low back-pelvic-hip complex, and muscular endurance. The concept behind abdominal strengthening regimen is that by contracting all abdominal muscles, the horizontal diameter of the abdomen will be reduced. This, subsequently, will end in the generation of a horizontal force, which will shorten the distance between the two rectus abdominis muscles, especially at the level of the umbilicus.

MATERIALS AND METHODS:
Material required is the Ultrasonic Imaging Machine. A study was conducted on 30 patients who had undergone surgery for umbilical hernia, using convenient sampling technique based on inclusion and exclusion criteria after a clear explanation about the study and obtaining consent form. Subjects of both genders, from age group of 25-30 years, females undergone LSCS, with H/O previous hernioplasty were included. Subjects undergoing pregnancy, having open wounds or any psychological disorder were excluded. Pretest values are recorded using the outcome measure ultrasound imaging. The ultrasound scan uses high frequency sound waves to make an image of a person’s internal organs and muscle groups. Here, the ultrasound imaging scans the noticeable distance between the two muscles where the umbilical hernia surgery was done and the progression after the core strengthening exercise intervention was noted. The patients received core muscle strengthening which includes warmup includes Static abdominal exercise, Balancing exercise while seated, and aerobic exercise. The major exercise which are common among all modes of treatment in the abdominal region without hurting the suture region are gentle strengthening of core and lower abdominal muscles while stretching the lower extremities to prevent strain on navel area during high impact activities. The experimental group were given this exercise while the conventional group didn’t receive any exercises.

The gentle exercises given to the experimental group to prevent the recurrence of the umbilical hernia after the surgery:
- Hamstring stretch
- Side to side Hip stretch
- Cat and Camel
- Piriformis stretch
- Bird Dog
- Butterfly stretch
- Heel Slides
- Pelvic Bridging

The exercise protocols were followed in order to avoid the collapse or further complications of hernia. The exercises were given regularly at the basis of specific intervals mentioned in the methodology. The stretches were meant to hold for 10 seconds while holding the breath and releasing it slowly through the mouth. The progression or any difference was noted with imaging ultrasound machine after the completion of the exercise program.

PELVIC BRIDGING: The subject is asked to be in lying position and lift their back as high as they can, taking a deep breath in & exhaling while going down.

**Fig 1:** Pelvic bridging
**BIRD DOG:** The subject is asked to be in quadruped position, extend right hand and left leg. They were instructed to pull their stomach in order to engage their core muscles. The exercise was done with alternate arm & leg.

![Fig 2: Bird Dog](image)

**HAMSTRING STRETCH:** The subject is asked to be in supine lying position, lift their leg upwards with their knee straight, take a deep breath through nose and count till five & then down with blowing out.

![Fig 3: Hamstring stretch](image)

**RESULTS:**
Evaluation correction system, an unpaired t test was employed to compare before and after the intervention of core strengthening exercises given for the experimental and conventional group. The experimental and conventional group have mean post-test scores of 0.68 and 1.96, respectively, with standard deviation of 0.77 and 0.55 (graphs 1 and 2). The post t test values indicates that there is a reduction in the space of the gap in the affected region of the abdomen. This illustrates that the people underwent core strengthening exercise treatment has shown a significant improvement in the muscle strength and the spacing in the suture site compared to the conventional group who did not undergo the core strengthening exercise. A significant difference between before and after the intervention of the core strengthening exercise given was clearly noted through the statistical analysis of quantitative data. Thus, Experimental study group has high statistical difference than conventional group.

**DISCUSSIONS:**
Strengthening the core has been a hypothetical basis in the treatment and prevention of many musculoskeletal disorders (9). A study was conducted to find the effectiveness of core resistance exercises which has shown to be more effective in improvising balance, trunk strength, leg strength for women who have trouble in balance & stability after aging more than 50 years (10). The abdomen muscle group is comprised of the diaphragm, the wall and the pelvic floor muscles. So, any injury or damage to this area will significantly affect the organs in the abdomen and the balance will be altered due to the muscle group influence over the back region. Few studies were conducted to find how and what disease or weakness will affect the muscle group at the front and the spinal stability. Here, study on hernia patients have been stated that they showed very low core stability and poor quality of life (11). A few other studies related to abdomen weakness which is caused by other than hernia like diastasis recti which is midline inter-recti separation, commonly affected in pregnant and post-pregnant women. The rectus abdominis muscle gap is predominant in the supra umbilical region which can be linked with
women’s age. The distance can be varied from 2-3 cm in width and 2-5 cm in length (12). This causes the functional capacity of abdominal wall to reduce as a result of separation for prolong period of time. This alters trunk movements and impair pelvic stability also affecting the lower back and inducing pain (13). Since diastasis recti provide a similar condition to that of hernia except hernia is more sensitive and the protocols need to be followed more precautious to avoid the collapse or further complication of the condition. Few authors have concluded that lack of current literature and evidence is showing that whether or not exercise help in the prevention of diastasis recti (15). Pilates exercise training is a comparatively new scheme of approach for improvising physical activity, compared traditional exercise (aerobic exercise or resistance training) but a different mode of structural physical activity which helps in improving muscle endurance, power, dynamic balance, and flexibility (19). Pilates exercises are often prescribed to people with low back pain, abdominal weakness, and pelvic floor weakness. Theoretically, Pilates increases the support of lower back, reduce pain and disability (17). Certain Pilates exercise training is said to increase transverse abdominis and oblique internus activation during the process (18). Since, the Pilates training program has very less risk like fall, reduction in quality of life. The research became focused on the benefits of the Pilates exercises. PET can specifically target functional, muscle power measures such as core strengthening and physical fitness. After certain examination and evaluation PET has proven to be more beneficial to strengthen the core and improvises the stability, and balance (19). Initial ideas into the possible benefits and drawbacks of Pilates based exercise. Despite any drawbacks, the effects have proven to be more beneficial after each session of flexibility exercise, the progress was gradual and standard (20). Modern Pilates practitioners perform a series of simple and repetitive, low impact flexibility, and muscular endurance exercises which focuses in abdominals, lower back, hips, thighs, and buttocks. They claim this exercisetraing program will be suitable for rehabs, or a great workout scheme for athletes (21). So, A group of less invasive Pilates exercise is given with appropriate measure is prescribed for the treatment of post-surgical management of hernia.
CONCLUSION:
The main purpose of this research was to determine how much strengthening the core muscles will impact the recurrence of umbilical hernia in the future. From the result of the findings, it has been concluded that the people in the experimental group who underwent core strengthening exercise protocols has shown a significant improvement in the muscle strength compared to the conventional group.

CONFLICT OF INTEREST:
Author asserts no conflict of interest.

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