Comparision of Active Cycle of Breathing Technique and Autogenic Drainage Technique in Patient Who Had Under Gone Laparotomy

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Abstract

Objective: To Find Out Effectiveness of AD and ADT in the Patients Who Had Under Gone Laprotomy

Method: Study design: Comparative Study

Study Setting: It Was Concluded In General Surgical Wards In Civil Hospital, Ahmadabad.

Study Duration: 3 months. The duration of treatment programmed for each subjects was 3-to 4 days.

Sample selection: Patients (between 25 years to50 years) who had under gone laprotomy were selected for this study, total 40 patients were selected for this study on the basis of inclusion and exclusion criteria.

Results: There was significant improvement in parameters of the patients of two groups after treatment by autogenic drainage and active cycle of breathing technique within the surgical wards.

Conclusion: This study suggests that there is no significant deference in effects of obtained with autogenic drainage and active cycle of breathing techniques. It was also observed that individually autogenic drainage and active cycle of breathing techniques are significantly effective.

Keywords: *AD, ACBT, laprotomy, PFT, Chest Expansion*

Introduction

Upper abdominal surgeries are predominantly major surgeries and the exploratory surgeries held higher risk of development of post operative complication such as Post operative hypoxia

- Lack of alveolar ventilation
- Bronchospasm
- Pneumothorax
- Atelectasis
- Pneumonia
- Pulmonary oedema

Atelectasis :Hypoxaemia often seen during the first 48 hours after most major operations. [1]

Due to a reduction in functional residual capacity and

- Significant atelectasis is more often seen with upper abdominal incisions rather than the lower abdominal incisions. [2]
- The basic mechanisms leading to atelectesis are
  - Increased volume of bronchial secretions.
  - Increased viscosity of secretions.
  - Reduced tidal volume and ability to cough.

Bronchitis, confleuentbroncho-pneamonia are

common complications occurring post operatively.[3]

Of these certain complications can be attributed to affect of general anesthesia in spite of recent technological advancement one of the bronchial secretions resulting in difficult mucolysis and mucokinesis ultimately leading to retention of secretion and partial blockage of the airways. [4]

Other changes in respiratory system (Post-operatively) also, occur as a effects of analgesics changes in the lung volumes diaphragmatic — dysfunction. Changes in the pattern of ventilators and alterations in gas exchange and responses to carbon dioxide and oxygen concentrations. Several authors have described postoperative, pulmonary complications (PPC) as being the largest cause of post operative morbidity and mortality.[5] The incident in post-operative pulmonary complications (P.P.Cs) can very between 20%-95% in laparotomic surgery(upper abdominal surgery) as a result of the high incidence of these complications (including mortality) and the cost during hospital stay, efforts have been the last, decade to identify, those patients who have a higher changes of developing complications and to find techniques to prevent such complications.' [6]

After surgery there is decrease in forced vital capacity (FVC) expiratory volume in first second of forced expiration (FEV1), peak expiratory flow rate (PEFR) and maximum voluntary ventilation. [7]

Laparotomice surgery associated with intense post-operative pain during lst post-operatively couching moving or turning out of the bed anddeep breathing especially give high pain score patient may be unable to breath deeply and inspiratory capability also, limit patient ability to cough deeply and effectively result in ineffective airway clearance.[8]

Physiotherapy is often prescribed after abdominal surgery as well in an attempt to counter the negative pathophysiological changes that occur in the post operative period.[9]

Adult patient undergoing upper abdominal surgery show lung function changes after surgery that may persist for up to two weeks. Chest physiotherapy is effective in clearing secretions from the lung of the patients with copious secretions. [10]

The conventional treatment for many years was postural drainage with percussion deleterious effect has been associated with manual technique including arterial desaturation, bronchospasm, atelectasis, increase oxygen consumption. [11]

In recent years technique have been developed which are effective less uncomfortable and can be used independent of an assistant. Autogenic drainage and active cycle of breathing techniques are among these new methods. [12, 13]

Autogenic drainage refer to a series of breathing exercises devised by the Belgian physiotherapist Jean chevalier autogenic drainage was developed in Belgian in 1960 and involves related breathing and air pressure principles. It uses breaths of different sizes to perform different roles :

- Unsticking the musuc. [14]
- Collecting the mucus. [15]
- Evacuating the mucus. [16]

Autogenic drainage is an airway clearance technique using expiratory airflow throughout the whole range of breathing from residual volume to total lung capacity. The aim of autogenic drainage is to achieve an optional expiratory flow progressively through causing dynamic airway collapse. Assisted autogenic drainage not yet capable of carrying out this technique actively themselves with autogenic drainage, it is important to adjust how fast you breathe out at each level, so that you reduce airway compression (tight lung) when exhaling. The goal is to achieve a mucous "rattle" rather than a whistling "wheeze" which would mean your airways are getting tight. [17]

This method can also be adjusted somewhat for people with poor lung function. That subject can expand all the air sacs in their lungs by simply taking a number of deep breaths, holding their breath briefly with each. When they let go of the breath the mucus is encouraged to move in the direction of the air-up towards their

mouth. [18]

Autogenic drainage can be adapted to each person's particular lung and mucus problems. The techniques is said to be less likely to cause uncontrolled coughing than others. [19]Active cycle of breathing technique, developed by New-zeland pulmonary physiotherapist. Jennifer Prior in the 1970s and now used quite widely in Australian. [20 ,21 , 21]

Most physiotherapist and all pulmonary physiotherapist have been trained to teach this technique to people who have trouble getting mucus up. It is simple to learn, safe and takes only 15-20 minutes. It involves a special pattern of three different types of breathing. [22]

v Relaxed normal breathing expanding the abdomen when, breathing

v Deep breaths which are held in a few seconds and

v Huffing or forced expiration.

ACBT has been combined with postural drainage in the head down Position at various angles, but this has no advantages over ACBT done lying horizontally and is certainly less comfortable (cecins, et al 1999). The angle makes no difference to the amount of mucus produced. So subject may as well be comfortable. [23]The ACBT consists of a cycle of huffs from mid to low lung volume interspersed with deep breathing and relaxed abdominal breathing. [24]

It is a cycle of breathing control thoracic expansion exercise and forced expiration technique. The original studies on the forced expiration technique (FET) used this cycle of techniques, but people began to use a regimen of huffing alone or other variations on the FET. [25,26]

Aims and Objectives

AIM: To study of comparision of ACBT and AOT in pt who had under gone laparotomy

Objectives:

1) To study the effect of ACBT in pt who had under gone laparotomy to present post operative pulmonary complication

2) To study the effect of ADT in pt who had under gone laparotomy to present post operative pulmonary complications.

3) Comparativaty effectiveness of ACBT & ADT

Null hypothesis (Ho):

There is no significant difference in effect of pre and post, ACBT and autogenic drainage technique in patient who had under gone laprotomy.

Alternative hypothesis (H1):

1) To assess the effect of active cycle of breathing technique and autogenic drainage technique for prevention of post operative pulmonary complication in patient who had under gone laprotomy.

2) To utilize the above understanding for helping mankind life free from post operative pulmonary complications after laprotomy.

Methodology

Study Design :

It is comparative study to find out difference between the effect of autogenic drainage technique and active cycle of breathing technique in patients who had under gone laparotomy.

· **Study Setting :**

This study was concluded in general surgical words in civil hospital, asarva, ahmedabad.

· **Duration of study :**

Total duration of the study was 3 months. The duration of treatment programme for each subject was 3-4 days.

· **Sample Selection :**

For this study a convenient sample of 43 patients with laparotomic surgery were selected on basis of inclusion, exclusion criterions. All the subjects are admitted general

surgical wards, civil hospital. Explanation regarding the objective of the study was given. All of them took part in the study on a voluntary basis after signing consent form.

Inclusion Criteria :

· Patient with abdominal surgery or exploratory laparotomy.

· Patient with supra umbilical midline incision or above umbilicus transverse incision or pera-midline incision also included.

· Age of pt bet 25 years to 50 years. Pt with laparotomy within one week of surgery having lung congestion. Willing to participate.

Exclusion Criteria :

· Patient with tracheotomy

· Pt with history of co-existing medical problems like

· Angina

· Neurological Deficits

· Orthopedic abnormality

· Uncontrolled diabetes

· Hypertension

· T.B.

· Patient with Preexisting lung disease

· Chronic smokers

· Indication for ventilatory support

· Homodynamic instability

· Pulmonary embolism

· Pneumo_thorax

· CHF were excluded from this study.

· Unconscious and uncooperative patients

· Patient with 2nd time laparotic surgery.

· Patient with history of any lung surgery.

· Patient Hypersensitive patient

· Patients with age <25yr, >50yrs, very old, periodic patient.

Material

· Measure tape

· Couch

· Pen pencil & paper

· Bed sheets

· Pillow

· Consent form

· Digital camera

· Stethoscope

· Sputum mug

· Thick cotton gauge piece

· An ISO 9001 company RMS (Medspiror) recorders and Medicare systems Pvt

OUTCOME MEASURES

1. FVC, FEVI, PEFR measured using P.F.T machine.

2. Chest expansion or excursion measured using measure tape.

· Instruments

1. P.F.Testing Machine

RMS (Medspiror) Recorder and Medicare Systems Pvt. Ltd.

2. Measure tape:

Having both centimeters and inch markings, it's150 centimeters long.

FIGURE 1

Pulmonary function testing

Machine

· **Parameters.**

Following parameters were made to know the effectiveness of the active cycle of breathing technique and autogenic drainage technique in patients who had undergone laparotomy.

1. FVC, FEV1, PEFR : was measured with the help of pulmonary function testing machine. The patient was made to do the vital capacity test. The patient was made to sit in bed half lying in comfortable position and was explained about the procedure of the test. first of all patient have to take a deep breath as much as he can ,than mouth piece was kept inside his mouth, and nose clip was used to close the nose and than exhale forcefully completely and than again breath in deeply. The test was carried out thrice and the maximal value was taken into consideration.[27]

2. Chest expansion / excursion : The patients was in sitting position in bed and chest measurement was taken with minimal clothing as possible. The chest expansion was taken at two different levels. i.e. at axilla and at xiphoid. The measurement were taken thrice at each level and the mean was taken into consideration. The patient was asked to exhale out completely and on reaching the residual volume reading on measure tape was noticed. Then patient was asked to inhale slowly and as deep as possible and reading on themeasure tape was noticed. The difference between two reading shoes the chest excursion. [28]

Procedure:

Ethical clearance was obtained from the ethical clearance committee of Government Physiotherapy College and general surgical wards prior to study. The procedure was explained to all the subjects a written informed consent of all 40 patients was taken. All patients were evaluating on 1st post operative day with. P.F.T. and chest expansion to know the condition of patient before the treatment given to them. Then for two days that is 2nd & 3rd post-operative day, the treatment was given that is in form of two technique autogenic drainage and active cycle of breathing techniques and measurement are taken again on the 4th postoperative day in surgical wards.[29]

After completely the physical therapy examination, treatment was introduced. Treatment program was tailored for each subject depending on their evaluation.[30]

· **Two group.**

Group-1 Autogenic drainage the technique was given for 3 to 4 days.

Group-2 Active cycle of breathing technique was given for 3 to 4 days.

GROUP-1 AUTOGENIC DRAINAGE THE TECHNIQUE WAS

GIVEN FOR 3 to 4 DAYS.

· 20 subjects were there in group 1, who were treated by autogenic drainage for two days that is 2nd and 3rd post-operative day.

· That patient can perform the technique alone in sitting position or half lying position it is a "Concentration intensive" technique useful for people with cystic fibrosis bronchiectasis or other lung conditions that produce a large volumes of retained secretions. Autogenic drainage requires one or two initial one hour session with an instructor one to three, 30-45 minutes fallow-up teaching sessions may be needed. mucus

· Autogenic drainage utilized expiratory airflow to mobilize muss from the smaller airways first and large airways last.

· There are three phases of the breathing exercises.

· "Unsticking", the muscles in smaller airways by breathing at low lung volumes.

· "Collecting" the mules from the middle airways by breathing at low lung volume to mid lung volumes.

· "Evaluating" the museles from central airways by breathing at mid to high lung volumes.

.

Patient performed Autogenic drainage Technique

Patient performed cough

FIGURE 2

GROUP-2 ACTIVE CYCLE OF BREATHING TECHNIQUE WAS

GIVEN FOR 3 to 4 DAYS.

· Group 2 also include 20 subjects who were treated by active cycle of breathing technique.

Patient preformed breathing exercise

Patient performed cough

FIGURE 3

Results

· There was significant improvement in all parameter of the patients of two groups after treatment by autogenic drainage technique and active cycle of breathing technique within the surgical wards

· All four parameters that is FVC, FEV, PEFR and chest expansion were analyzed with t- test.

Group-1 PFT AND CHEST EXPANTION

· In all patient the pre Ad, FVC mean was 2.80 ± 0.32 and ad was of j, tool+ 3.08± 0.32 and there was significant difference between,](t=0.54 , p<0.001)

· In all Patient the pre As FEV1, mean was 2.61± 0.44 and post ad was 2.93 ± 0.44 and there was also significant difference between pre and post values. (t= 0.97 , p<0.001)

· In all patient the pre Ad PEFR mean was 263.5 ± 24.96 and post Ad was 294.2± 24.96 and there was

also significant difference between pre and post values. (t= 0.84 , p<0.01)

Table 1: Outcome measures

P.F.T.	T values	P values
FEV1	0.54	0.001
FVC	0.97	0.001
PEFR	0.84	0.001
	T (values)	P. Value (<)
Chest expansion	0.20	0.001

In all patients the pre ad, chest expansion mean was 0.21 and 1.58 and post ad, chest expansion mean was 1.25 and 1.58 and there was also significant difference between pre and post values. (t = 0.20, p<0.001)

Group-2 PFT AND CHEST EXPANTION

· In all patients the pre ACBT, FVC mean was 2.71 to 0.52 and post ACBT was 3.08 to 0.52 and there was significant difference between pre & post values (t= 0.38, p<0.001)

· In all patients the pre ACBT, FEV1, mean was 2.54 to 0.18 and post ACBT, was 2.78 to 0.18 and there was significant difference between pre and post values. (t= 0.77, p<0.001)

· In all patients the pre ACBT, PEFR values mean was 279.8 to 19.80 and Post ACBT was 307.9 to 19.80 and there was significant difference between pre and post values. (t= 1.03, p<0.001)

· In all patient the precise chest expansion mean was 0.8 to 0.4 and post exercise mean was 1.4 t o.4 and there was significant difference between pre and post values. (t= 0.86, p<0.001)

Table 2

P.F.T	T values	P. values
FVC	0.38	0.001
FEV1	0.77	0.001
PEFR	1.03	0.001
	T value	P values (<)
Chest expansion	0.86	0.001

· All above results shows that this two techniques that is autogenic drainage and active cycle of breathing techniques has a significant role in improving patient's condition after the laparotomy.

· There is no significant difference between two techniques. Both techniques are equally effective. But, it

was observed that individually both techniques are significantly effective.

· **DATA ANALYZED WITH THE HELP OF MICROSOFT EXCEL USING t-test AND THE RESULT REVELS THE FOLLOWING**

TABLE 3

NO	GROUP	OUTCOME MEASURES	PRE MEAN	POST MEAN	T VALUE	P VALUE
1	GROUP 1	FVC FEV1 PEFR CEST EXPANSION	2.80 2.61 263.5 0.21	3.08 2.93 294.2 1.25	0.54 0.94 0.84 0.20	<0.001 <0.001 <0.001 <0.001
2	GROUP 2	FVC FEV1 PEFR CEST EXPANSION	2.71 2.54 279.8 0.8	3.06 2.78 307.9 1.4	0.38 0.77 1.03 0.86	<0.001 <0.001 <0.001 <0.001

Table -4 Demographic data

Age In Year	AD	ACBT
25-30	6	4
31-35	4	11
36-40	10	5
TOTAL	20	20
Sex	AD	ACBT
Male	11	7
Female	9	13
Total	20	20

TABLE 5: Average value of FVC, FEV1 , PEFR and chest expantion of all patients in both group.

PFT	AD		ACBT
FVC	Pre	2.80	2.71
	Post	3.08	3.08
FEV1	Pre	2.61	2.54
	Post	2.93	2.77
PEFR	Pre	263.5	279.8
	Post	294.2	307.9
	AD		ACBT
CHEST EXPANTION	pre	0.21	0.8
	post	1.25	1.4

Discussion

To compare the effectiveness of the autogenic drainage and active cycle of breathing technique in patient who had under gone laprotomy.

According to rezaiguia S Jayre; that pulmonary complications subjected to abdominal operations clearly indicates that the lungs are the are the most endangered organ during the post operative period . [31,32]

According to Sampson H, and leavard H, they said that the rate of pulmonary complication is directly dependant on the type of surgical method with less severe impairment to abdominal wall and allowing better patient's mobility which is of almost important for the prevention of respiratory complication. [33,34]

According to Remake BM Ringer S. J Oomja kalkman Co said that post –operative respiratory insufficiency develops include quite breathing because of deficient respiratory excursions caused by the presence of post – operative deep breathing and expectoration.[35,36,37]

These all things authors have also described post –operative complications as being the largest cause of post operative morbidity and mortality. The incident in post –operative pulmonary complications can vary between 20% -90% in abdominal surgery.[38,39]

As a result of high incidence of these complications and the high cost during hospital stay, efforts have been made during the last decade to identify those patients who have a higher change of developing complications and to find techniques to prevent such complications, physiotherapy has an important role not only before surgery but also during post –operative care.

The airway clearance techniques have been to maintain and improve pulmonary function and to prevent post –operative pulmonary complications.

There is a decrease in FVC, FEV1 and PEFR and also decreases in chest expansion .so these are taken as an outcome measurement.

The main aims of airway, clearance techniques are to mobilize the secretion and remove out it.

The mean FVC, FEV1, PEFR and chest expansion of AD and ACBT were 3.08, 2.93, 294.2 and 1.25, 3.09, 2.77, 307.95, 1.4 respectively. This difference between two treatments was statistically significant at $p< 0.001$.

The result clearly demonstrated that there was no, overall difference between result obtained. In this study both treatment technique found equally effective.

Hall DO, Clayton compared the AD and ACBT with PD and concluded that AD was found to be as

good as ACBT at clearing mucus in patients with cystic fibrosis and therefore and effective method of home physiotherapy.[40]

Similar results were obtained by savci et al. they studied the effects of AD and ACBT in 30 male COPD patients and concluded that AD is as effective as ACBT in clearing and improving lung functions [41,42].

Limitation of this study included that present study has been carried out on 40 patients for getting a universally acceptable result. This study should be carried out in different categories and class of people.

Limitations:

1) Sample size small

2) here, measure tape was used measure chest expansion instead chest caliper, could be a better tool to measure chest expansion.

3) Medical treatment was not stopped and natural resolution or recovery of the condition is also possible so that it can alter the results as the sample size is too small.

4) Duration of surgical ward stay may be different in different hospitals.

4) P.F.T only 3 values are taken, it would more appropriate if more values can be taken.

Conclusion

A study of comparison between effectiveness of AUTOGENIC DRAINAGE and ACTIVE CYCLE OF BREATHING TECHNIQUE in patients who had undergone laprotomy was carried out .there was total 43 patients who were selected for the study. From the group 1, one patient was excluding, and from group 2, two patients were excluded. So study was carried out at general surgical wards at civil hospital, Ahmadabad. All 40 patients had taken treatment as per format.

This study suggests that there is no significant difference in effects obtained with autogenic drainage and active cycle of breathing techniques.

It was observed that individually autogenic drainage and active cycle of breathing techniques are significantly effective.

Summary

In this study of comparison between effectiveness of AUTOGENIC DRAINAGE and ACTIVE CYCLE OF BREATHING TECHNIQUE in patients who had undergone laprotomy, the total 40 patients were assessed by pulmonary function tests and chest expansion.

The results were analyzed with the help of Microsoft excel using t-test and results showed that there was increase in all parameters which are significant.

Here two techniques were to improve post –operative status of the patient. Autogenic drainage and active cycle of breathing techniques were given. It helps to mobilize and loosening the secretions and then expel out it which is necessary to prevent further pulmonary complications .it also help to patients to regain near normal physical and mental health which affect after surgical wards stay .

So, these two techniques are useful for better patient post –operative outcome in hospital and early recovery from operation.

Table 6 : After comparison between GROUP1 and GROUP 2

NO	PFT	t- value	p- value
1. 2. 3.	FVC FEV1 PEFR	3.15 1.14 0.31	<0.001 <0.001 <0.001
1.	CHEST EXPANSION	0.73	<0.001

No significant difference between Autogenic drainage technique and and Active cycle of breathing technique in patient who had under gone laprotomy.

Ethical Clearence: The study was approved by

The Institutional Ethics Committee

B.J MEDICAL COLLEGE, CIVIL HOSPITAL, AHMEDABAD.

Written patient consent was obtained prior to publication of this study.

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