

Comparison of Pre and Post Expiratory Muscle Strength in Abdominal Surgery. An Observational Pilot Study

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ABSTRACT:

Background: According to literature Abdominal surgery covers surgical procedures that involve opening the abdomen and exploring the peritoneal cavity. Anaesthesia as does surgery alters the ventilatory function. In major surgeries that is including abdominal surgery general anaesthesia is used which is given through a breathing mask or bag which leads to altered ventilatory function, airway manipulation with its potential for secretion and bronchospasm, beginning with the induction of anaesthesia and lasting till the post-operative period.

Method: An observational study done with 10 patients who were undergoing upper abdominal surgery. The patients were selected based on inclusion criteria. The mean age of the patients who participated in the study was 20-40 years. We compared the pre-operative and post-operative day 1, 5 and 7 MEP values were taken.

Results: The results showed altered values of MEP post-operative day 1 but by post op day 7 all values had come to baseline. The mean MEP pre operatively was 81.7, and post-operatively on 1st day the mean was 75.7 which showed reduction compared post operatively, on post op 5 mean 81.1 and on post op 7 mean value was 84.4 which showed an increment.

Conclusion: Patients undergoing upper abdominal surgery experience reduction in expiratory values postoperative on 1st day but there is regain of strength by 7th post op day compared to baseline.

KEYWORDS: MEP, PFT, POST-OPERATIVE PULMONARY COMPLICATIONS, ABDOMINAL SURGERY

I. INTRODUCTION

According to literature Abdominal surgery covers surgical procedures that involve opening the abdomen and exploring the peritoneal cavity. The

incisions used are midline approach, it is the most common which can be upper, central or lower abdominal, or a full laparotomy, from xiphoid process to pubis symphysis. Upper abdominal surgery is any surgery in which the incision is taken above the umbilicus. And the administration of anaesthesia is done. (1)

Anaesthesia as does surgery alters the ventilatory function. In major surgeries that is including abdominal surgery general anaesthesia is used which is given through a breathing mask or bag which leads to altered ventilatory function, airway manipulation with its potential for secretion and bronchospasm, (2) beginning with the induction of anaesthesia and lasting till the post-operative period. Due to which there is reduced functioning of the lung and loss of strength of inspiratory and expiratory muscles.

Expiratory muscles are recruited in patients during rest and loaded breathing. From functional point of view expiratory muscles are known to have high activation force generation during coughing. (3) Since weakness of these muscles lead to post-operative pulmonary complications.

And so post-operative pulmonary complications after surgery are very common due to weakness of ventilatory muscles which is a leading cause of increase in the length of hospital stay so the need of the study is to observe and compare Pre and post expiratory muscle strength in abdominal surgery.

II. METHODOLOGY

Procedure:

The Study was approved by institutional ethical committee which is registered by govt of India. In this Observational study 10 patients were

recruited by convenient sampling method from a tertiary care hospital. The eligibility criteria included patients undergoing elective upper abdominal surgery, aged 20 to 50 years, stable hemodynamic, willing to participate. Patient's demographic data, history and baseline parameters were recorded. Before and after surgery MEP was assessed pre-operatively one day before surgery and post operatively on the first, fifth and seventh day. All data were collected and compared statistically

PROCEDURE FOR MEASUREMENT OF MAXIMUM EXPIRATORY PRESSURE

Maximum expiratory pressure measuring gauge ABP model was used for assessment

purpose. Begin with the patient in sitting position with nose clipped. Patient is then asked to inhale completely and then perform maximal expiratory effort. Ask the patient to hold it for 1 to 2 seconds. There should be a 2 mm wide mouthpiece opening, which can be rigid tube or rubber mouthpiece. The manoeuvre is repeated 2 to 3 time and of the three readings the highest value is record. (7) hydraulics for use as an internal combustion engine valve actuator. Furthermore, in conjunction with variable timing, the piezoelectric control-based pilot allows for direct regulation of other engine valve parameters including variable lift and seating velocity.



Fig 2: shows patient performing MEP



Fig 1: MEP device

STATISTICAL ANALYSIS

10 patients were taken for the study based on inclusion and exclusion criteria. Statistical test was done using

GraphPad. Data was compared that is pre-operative 1 day before surgery and postoperative day 1,5,7.

Table 1: Demographic data of 10 patients

Demographic data	Mean
Age	68.8 ± 4.67
Height	158.11 ± 10
Weight	61.45 ± 7.49

Table 2: Mean and SD of MEP pre-operative and post-operative

	Pre op	Post op 1	Post op 5	Post op 7
Mean	81.7	75.7	81.1	84.4
SD	15.592	13.334	13.000	16.14

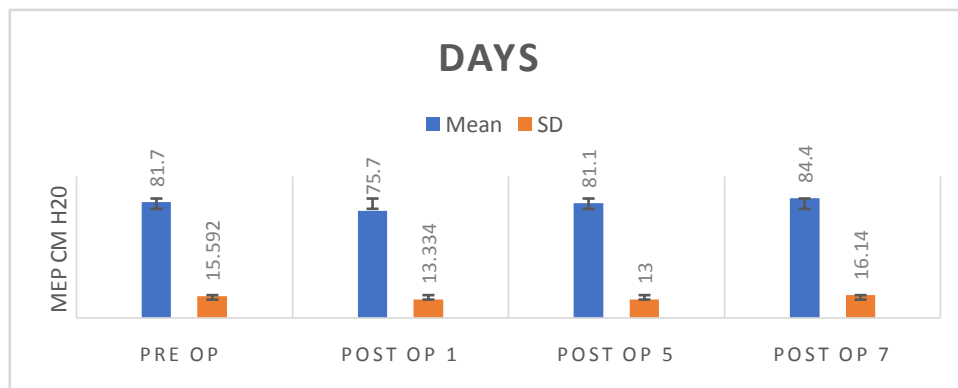
Interpretation: Mean of pre-operative and post-operative data in comparison of POD 1 AND 7 is reduced but POD 7 showed increment in mean.

Table 3: Mean difference of preoperative and post op day 1,5,7 and P value considered as 0.05 as significant.

Comparison	Mean Difference	P value	Confidence Interval From	To
Preoperative vs postoperative day 1	6.000	P < 0.01	2.061	9.939
Preoperative vs post op 5	0.9000	P > 0.05	3.030	4.839
Preoperative vs post op 7	-2.600	P > 0.05	6.556	1.339
Post op 1 vs post op 5	-5.100	P < 0.01	9.015	-1.162
Post op 1 vs post op 7	8.600	P < 0.001	12.456	1.220

Interpretation: Table 3 shows that there were significant changes in mean of MEP values post operatively when compared.

GRAPH 1: MEP of Pre op, POD 1, POD 5, POD 7



Interpretation: Pre op MEP shows a higher value compared to Post op day 1 but the readings come back to baseline by POD 7.

III. DISCUSSION

The study was conducted to observe effect of MEP values on pre post abdominal surgery patients. Postoperative pulmonary complications after laparoscopic upper abdominal surgery may result from respiratory muscle dysfunction leading to impaired physical capacity which is associated with PPC so therefore the strength of the muscles should be assessed. (4)

The baseline demographic data of both male and female are shown which is homogeneously distributed. The mean of Age, height and weight distribution is shown. As these parameters have an effect on the MEP values.

As there was an improvement in MEP values observed on Postoperative day 7 compared to pre-operative day 1. This could be due to reduction

IV. CONCLUSION

Conclusion: Patients undergoing upper abdominal surgery experience reduction in expiratory values postoperative on 1st day but there is regain of strength by 7th post op day compared to baseline.

STUDY LIMITATION: The sample size was small

FUTURE SCOPE: This study could have been done been done with a larger sample size.

REFERENCES

- [1]. Anscombe A. Pulmonary complication of abdominal surgery. *Annals of Surgery*.1958;147(4):586.
- [2]. Manzano R, Carvalho C, Saraiva-Romanholo B, Vieira J. Chest physiotherapy during immediate postoperative period among patients undergoing upper abdominal surgery: randomized clinical trial. *Sao Paulo Medical Journal*. 2008;126(5):269-273.
- [3]. Rocha.M, Merino.D, Souza.S, Montebelo.M, Rasera.Júnior I, Pazzianotto-Forti E. Inspiratory loading exercises on respiratory muscle function in post-operative gastroplasty patients: a randomized clinical trial. *Fisioterapia em Movimento*. 2019;32
- [4]. Silvia Maria de Toledo Piza Soares Pulmonary function and physical performance outcomes with preoperative physical therapy: *Clinical Rehabilitation* 27(7) 616–627
- [5]. S. Souza Possaa,b, C. Braga Amador, Implementation of a guideline for physical therapy in the postoperative period of upper abdominal surgery reduces the incidence of atelectasis and length of hospital stay.
- [6]. Tanya Castelino, MD,a Julio F. Fiore, The effect of early mobilization protocols on postoperative outcomes following abdominal and thoracic surgery: A systematic review.
- [7]. Caruso.P, Albuquerque.A, Santana.P, Cardenas.L, Ferreira.J. Diagnostic methods to assess inspiratory and expiratory muscle strength. *Journal Brasileiro de Pneumologia*. 2015;41(2):110-123.
- [8]. Katsura M, Kuriyama A, Takeshima T, Fukuhara S, Furukawa T. Preoperative inspiratory muscle training for postoperative pulmonary complications in adults undergoing cardiac and major abdominal surgery. *Cochrane Database of Systematic Reviews*. 2015

in effect of anaesthesia by the post-operative day 7. The decrease in expiratory muscle strength post-operative day 1 may be due to incisional pain and failure to cough efficiently. (5) which is associated with paralysis of expiratory muscle due to effects of anaesthesia. (6)

A marked reduction in flow rate indicates that a mechanical problem exists during the expiratory phase. Flow rates may be reduced to as low as 20 litres per minute in extreme cases. Ability to cough is greatly decreased by such severe reductions in MEFR and is particularly serious because it decreases the patient's ability to remove secretions from his airway.

The graphical presentation states that Pre-op data of MEP shows a higher value compared to Post op day 1 but the readings come back to baseline by POD 7.

Hence this study concludes that this type of variation in MEP following surgery is seen pre-post abdominal surgery.