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Research Article

TO STUDY THE CHANGES IN PEAK AIRWAY PRESSURE AFTER POSITIONING AND THE EFFECT OF TENTING OF THE ABDOMINAL WALL ON PEAK AIRWAY PRESSURE IN ROBOTIC RADICAL PROSTATECTOMY SURGERY

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A R T I C L E I N F O

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A B S T R A C T

Robotic radical prostatectomy is known for its requirement of pneumoperitoneum and deep Trendelenburg position. Such requirement comes with increased IAP (intra-abdominal pressure), decreased FRC (functional residual capacity), reduced pulmonary compliance and significant V/Q mismatch with hemodynamic instability. Deep Trendelenburg position causes cephalad shift of diaphragm leading to increased intra-thorasic pressure which is reflected on peak airway pressure in positive pressure ventilation, so increase in airway resistance and reduction in compliance potentiates the risk of barotrauma with positive pressure ventilation.

Tenting of the abdominal wall was performed after insertion of the abdominal port. After robotic arm docking, abdominal wall is lifted with the help of robotic arms with the aim of tenting which result in a decrease in intra-abdominal pressure, ultimately leading to decrease in peak airway pressure and to better ventilation.

INTRODUCTION

The most common technique for airway management under general anaesthesia involves placement of a cuffed oral endotracheal tube, neuromuscular relaxation, and positive pressure ventilation with a mechanical ventilator.Mechanical ventilators function by providing external positive pressure to force the medical gases such as air, oxygen, nitrous oxide and other anaesthetic agents into the lungs. After introduction of modern mechanical ventilators which include a pressure-based mode that makes it possible to precisely control the volume and the pressure of the medical gas being delivered to the patient.

Peak airway pressure: It is also known as Peak inspiratory pressure (PIP). It is the highest level of pressure applied to the lungs during inhalation. Duringmechanical ventilation, the number reflects a positive pressure in centimeter of water (cmH2O). In normal breathing, it may sometimes be referred to as the maximal inspiratory pressure (MIP), which is a negative value.Peak airway pressure is routinely displayed by mechanical ventilators. It represents the total pressure needed to push a volume of gas into the lung and is composed of pressures resulting from inspiratory flow resistance (resistive pressure), the elastic recoil of the lung and chest wall (elastic pressure), and the alveolar pressure present at the beginning of each breath [positive end-expiratory pressure (PEEP)].

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Peak airway pressure = Resistive pressure + Elastic pressure + PEEP.

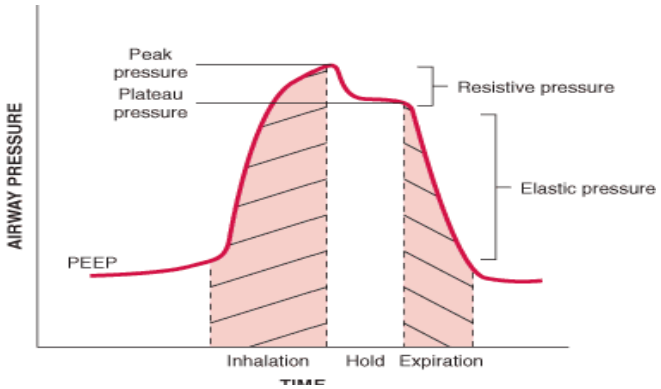


Fig A Peak pressure, Plateau pressure, Resistive pressure and Elastic pressure.

Peak airway pressure increases with any increase in airway resistance. Causes of increased PIP include- increased secretions, bronchospasm, biting down on ventilation tubing and decreased lung compliance. So, we can conclude in simple terminology that, peak airway pressure is the pressure measured by the ventilator in the major airways, and it strongly reflects the airway resistance.

Plateau pressure-It is the pressure applied (in positive pressure ventilation) to the small airways and alveoli.

$$\text{Plateau pressure} = \frac{\text{Tidal volume}}{\text{Compliance}}$$

MATERIAL AND METHODOLGY

Sample size: 90

Sample size justification

Based on the literature, it was found that the patients in whom tenting of abdominal wall is done, cephalad migration of the diaphragm and an increased intra-abdominal pressure (IAP) cause peak and plateau pressures to rise by more than 50%. For our sample size, considering the changes in peak airway pressure after positioning to be 50% in patients in whom tenting of abdominal wall is done and changes in peak airway pressure to be 30% in patients in whom tenting of the abdominal wall is not done. With 80% power and 95% confidence level sample size is 90 patients. Thus total 90 patients will be required for this study (i.e. 45 patients in each study group).

Step wise calculation of sample size

$n = (Z_{\alpha/2}+Z_{\beta})^2 * (p_1(1-p_1)+p_2(1-p_2)) / (p_1-p_2)^2$

n = (1.96+0.84)^2*(0.5*(1-0.5)+(0.3*(1-0.7)) / (0.5-0.3)^2

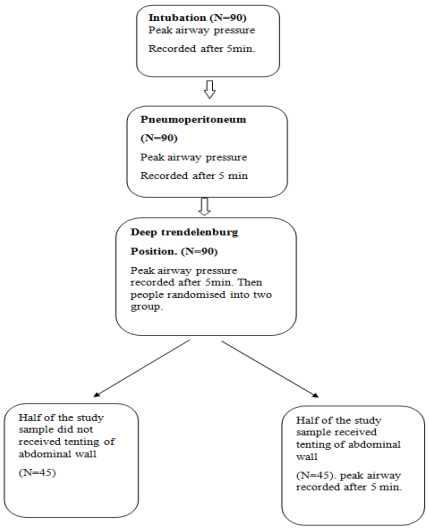
n = 90 (45 patients in each group)

Study design

It is a Randomized prospective study which was conducted between post IEC-A Approval (April 2108) till December 2018 in Kokilaben Dhirubhai Ambani Hospital & Medical Research Institute, Mumbai. After receiving approval from ethical committee, patients which scheduled to undergo elective Robotic Radical Prostatectomy operation, were enrolled for this study.

We recorded the peak airway pressure after 5min of intubation, pneumoperitoneum and deep Trendelenburg position. After deep Trendelenburg position the enrolled patients were randomized into two groups, one group received tenting of abdominal wall and other did not.

Flowchart of Study Design



All patients were visited a day prior to the surgery and a detailed pre-anaesthetic evaluation was done. Along with the standard informed written anaesthesia consent as per hospital protocol, the written informed consent for our study from patients satisfying the eligibility criteria was taken. Patients received the usual and customary care. No personal identifying information regarding the patient or anaesthesia provider was obtained, and therefore, patient and provider anonymity was maintained.

Demographic information (age, sex, weight, Body mass index, UHID), patient's characteristics and history of any medical condition were recorded.

All patient's blood investigations were confirmed and optimised which included complete blood count, renal function test, liver function test, coagulation profile, fasting blood sugar, HIV, HBsAg, and HCV reactivity, chest X□ray, electrocardiogram, and 2D echo (where necessary). On the day of surgery, patients were instructed to take their regular medication for systemic diseases, if any, and tablet Pantoprazole 40 mg with sips of water. All patients were kept nil by mouth for atleast 6 hours prior to surgery.

On the day of surgery

- In the operating room, monitors were attached, and baseline parameters recorded. An appropriate gaugeintravenous line (IV) and appropriate intravenous fluids started. All patients received injection Glycopyrrolate (0.2 mg) and injection Midazolam (1 mg) intravenously 10 min before induction.
- General anaesthesia induction performed with Fentanyl (1.5–2 mcg/kg), Propofol (2–2.5 mg/kg) with Sevoflurane (1%–2%) and O2. Atracurium (0.8–1 mg/kg) was used for endotracheal intubation.
- After induction of anaesthesia, patients were maintained with sevoflurane/desflurane with O2+Air. Minimum alveolar concentration value was adjusted to maintain BIS value of 40–60.
- Infusion of Atracurium (5 mg/ml) at the rate of 5 ml/h and fentanyl (10 mcg/ml) at rate of 3–5 ml/h was used during maintenance. All the patients were monitored for anaesthesia depth using BIS monitoring to maintain BIS value between 40 and 60.
- Peak airway pressure was recorded in one group of patients after induction, after insufflation of CO2, after giving head‑low position around 45^0 (i.e. deep Trendelenburg position).
- In another group of patients, peak airway pressure recorded after induction, after insufflation of CO2 (pneumoperitoneum), after giving head‑low position only. Each pressure was recorded after 5 minutes of achieving above condition.
- So, patients were randomised (odd-even randomisation technique) after giving deep trendelenburg position. One group received tenting and the other group did not.
- Attaching robotic arms to the abdominal robotic ports is commonly referred as "docking." Docking is performed in steep head‑low position (deep Trendelenburg position) which is the final position for surgery. At this point of time, the IAP will be maintained at 15 mm of mercury and peak airway pressure was measured. Once

docking procedure was completed, the abdominal wall was lifted in a manner like "lap lift" as in a gasless laparoscopic surgery, which we are referring as "tenting of the abdominal wall."

- This tenting was done for all the abdominal ports. Then, peak airway pressure was recorded after 5 min.

Inclusion Criteria

1. ASA grade I, II and III male patients undergoing Robotic Radical Prostatectomy (RRP).
2. Age more than 18 years.

Exclusion Criteria

1. Emergency surgery.
2. Hemodynamically unstable patients.
3. Patients converted to open procedure from Robotic Radical Prostatectomy (RRP).

OBSERVATIONS AND RESULTS

It was a Randomised prospective study done to evaluate the changes in peak airway pressure after positioning in a Robotic Radical Prostatectomy and Effect (or usefulness) of tentingof abdominal wall to decrease the peak airway pressure in the above-mentioned elective surgery under general anaesthesia. After obtaining an institutionalEthical Committee clearance, a total of 90 patientswho satisfied the inclusion and exclusion criteria were included in the study after taking a detailed written and informed consent.

Table 1 Descriptive statistics (N=90)

Variables	*Sub-groups*	*N*	*%*
Gender	***Male***	90	100.0
	I	7	7.8
ASA	***II***	82	91.1
	III	1	1.1
Age (Mean ± SD)		66.04 ± 5.924	

Table 1 and Figure 1a shows there are 90 people underwent the study, all of them were male. They were divided by ASA standard grading into three groups. The mean age of the patients was 66.04 years, with a standard deviation of 5.924(Figure 1b).

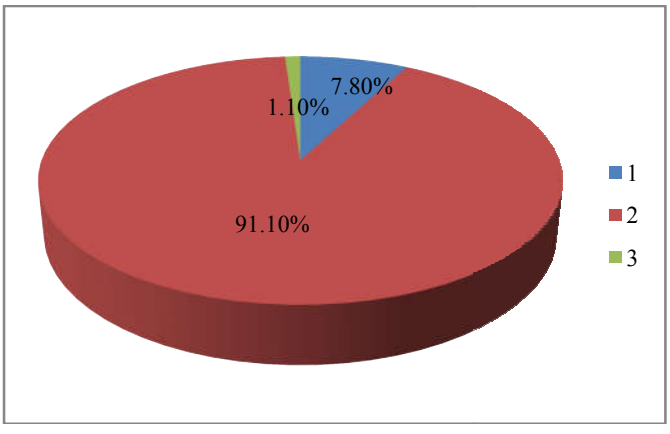


Figure 1a Descriptive statistics (N=90)
ASA (American society of anaesthesiology) Grading.

Figure 1a: shows out of 100%, 91.10% patients were ASA II, 7.80% were ASA I and 1.10% were ASA III.

Table 2 Comparison of the changes in peak airway pressure in terms of {Mean (SD)} at different time intervals using ANOVA test

5 minutes after	*N*	*Mean*	*Std. Deviation*	*F value*	*P value*
Intubation	90	14.69	1.312		
Pneumoperitoneum	90	26.68	2.731		
Deep Trendelenburg Position	90	33.23	2.513	**1120.015**	**<0.001****
After Tenting	45	30.62	2.198		
Total	315	25.69	7.735		

Table 2 and Figure 2a: showing the peak airway pressure recorded 5 min after of intubation, pneumoperitoneum, deep Trendelenburg position and after tenting.

These changes in peak airway pressure during above mentioned conditions in our study showed the significant statistical variation (p<0.001) (Figure 2b).

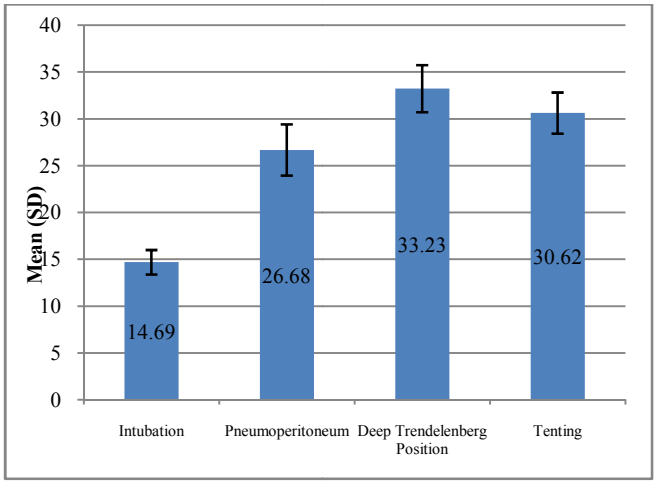


Figure 2a Comparison of the changes in peak airway pressure in terms of {Mean (SD)} at different time intervals using ANOVA test

Table 3 Comparison of the changes in peak airway pressure in terms of {Mean ±(SD)} at different time intervals (After Pneumoperitoneum &Deep Trendelenburg Position) using unpaired t test

5 minutes after	*N*	*Mean*	*Std. Deviation*	*t value*	*P value*
Pneumoperitoneum	90	26.68	2.731	**16.758**	**<0.001****
Deep Trendelenburg Position	90	33.23	2.513		

(p <0.05 - Significant*, p < 0.001 - Highly significant)**

Table 3 Showing comparison of peak airway pressure after pneumoperitoneum and after deep Trendelenburg position with t value of 16.758 and P value of less than 0.001 which signify that, there was significant variation in peak airway pressure after giving a deep Trendelenburg position.

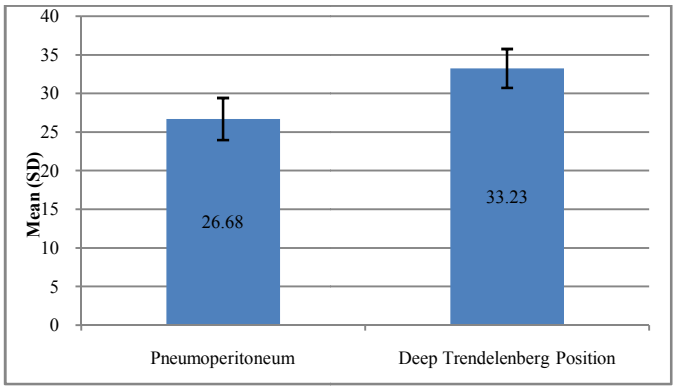


Figure 3a

Table 4 Comparison of the changes in peak airway pressure in terms of {Mean (SD)} at different time intervals (After Deep Trendelenburg Position & after tenting) using unpaired t test.

5 minutes after	*N*	*Mean*	*Std. Deviation*	*t value*	*P value*
Deep Trendelenburg Position	90	33.23	2.513	**5.926**	**<0.001****
Tenting	45	30.62	2.198		

(p <0.05 - Significant*, p < 0.001 - Highly significant)**

Table 4 and Figure 4a: were showing the mean changes in peak airway pressure after deep Trendelenburg position (N=90) and after tenting (that is the lifting of abdominal wall with robot arms) (N=45).

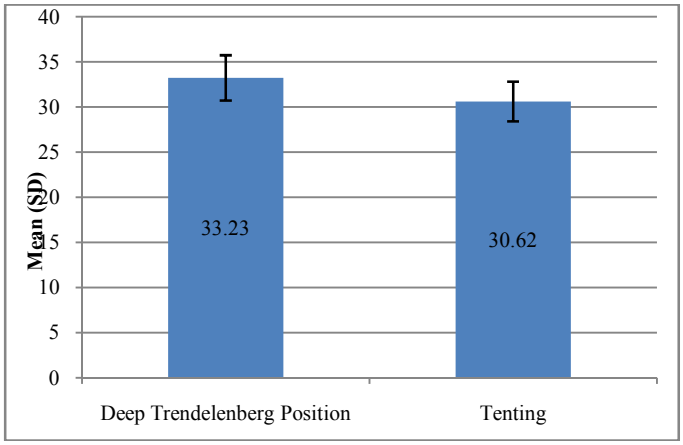


Figure 4a Comparison of the changes in peak airway pressure in terms of {Mean (SD)} at different time intervals (After Deep Trendelenburg Position & after tenting) using unpaired t test

Table 5 Comparison of the changes in peak airway pressure in terms of {Mean (SD)} in those with and without tenting using unpaired t test

5 minutes after	*N*	*Mean*	*Std. Deviation*	*t value*	*P value*
Without tenting	45	33.31	2.704	**5.177**	**<0.001****
With tenting	45	30.62	2.198		

(p <0.05 - Significant*, p < 0.001 - Highly significant**)

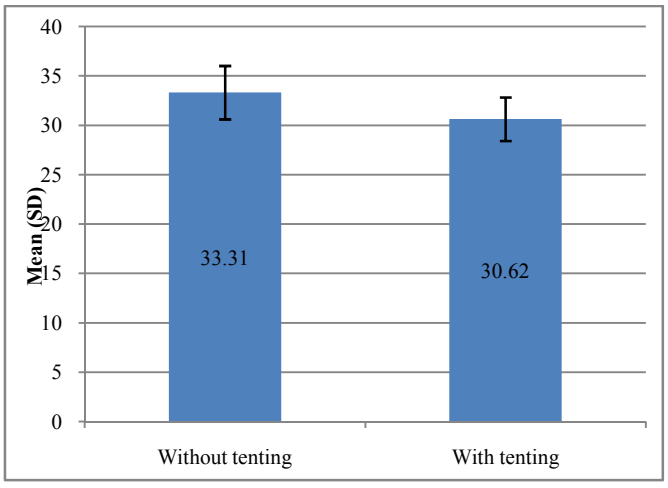


Figure 5a Comparison of the changes in peak airway pressure in terms of {Mean ±(SD)} in those with and without tenting using unpaired t test

After giving deep trendelenburg position, 90 patients were randomised into two group. Half of the patients received tenting and half didn't. Table 5 and Figure 5a shows comparison of peak airway pressure in tenting and non-tenting group.

a. The Mean peak airway pressure without tenting was 33.31 with standard deviation of 2.704
b. The Mean peak airway pressure with tenting was 30.62 with standard deviation of 2.198

Table 5 shows the t value of 5.177 and p value of <0.001 which signifies that there is highly significant difference between above two values. With the help of above statistics, we can conclude that tenting of abdominal wall will help to decrease the peak airway pressure.

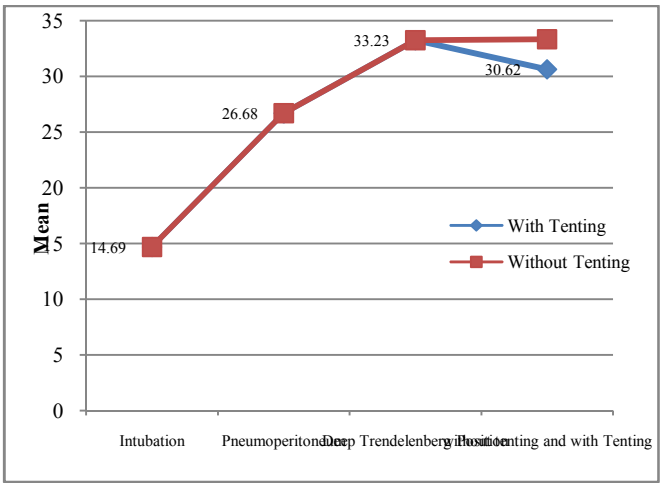


Figure 5b Graphical Comparison of the changes in peak airway pressure without tenting and with tenting group.

Table 6 Comparison of the percentage changes in peak airway pressure in terms of {Mean (SD)} at different time intervals using ANOVA test (Without tenting)

5 minutes after	*N*	*Mean*	*Std. Deviation*	*Mean difference*	*F value*	*P value*
Intubation	90	100	0.0			
Pneumoperitoneum	90	182.261	18.0956	82.261		
Deep Trendelenburg Position	90	227.323	19.8624	127.323	**1143.857**	**<0.001****
Without Tenting	45	226.054	18.3267	126.054		
Total	315	177.889	55.0358			

Table 6 show the percentage of mean peak airway pressure changes after intubation, after pneumoperitoneum, after deep trendelenburg position and without tenting which is as follows

1. There was 82% increase in peak airway pressure after pneumoperitoneum.
2. After giving deep Trendelenburg, there was increase in peak airway pressure by 45.62% [% increase after deep trendelenburg (127.323)- % increase after pneumoperitoneum (82.261)].

Table 7 Comparison of the percentage changes in peak airway pressure in terms of {Mean (SD)} at different time intervals using ANOVA test (With Tenting)

5 minutes after	*N*	*Mean*	*Std. Deviation*	*Mean difference*	*F value*	*P value*
Intubation	90	100	0.0			
Pneumoperitoneum	90	182.261	18.0956	82.261	**1029.973**	**<0.001****
Deep trendelenburg Position	90	227.323	19.8624	127.323		

With Tenting	45	211.150	20.1566	111.150
Total	315	175.759	53.4822	

(p <0.05 - Significant*, p < 0.001 - Highly significant)**

Table 7: shows the percentage of mean peak airway pressure changes after intubation, after pneumoperitoneum, after deep trendelenburg position and with tenting.

After giving tenting, peak airway pressure was decreased by 16.173%. {% change after deep trendelenburg (127.323) - % change after tenting (111.150)}.

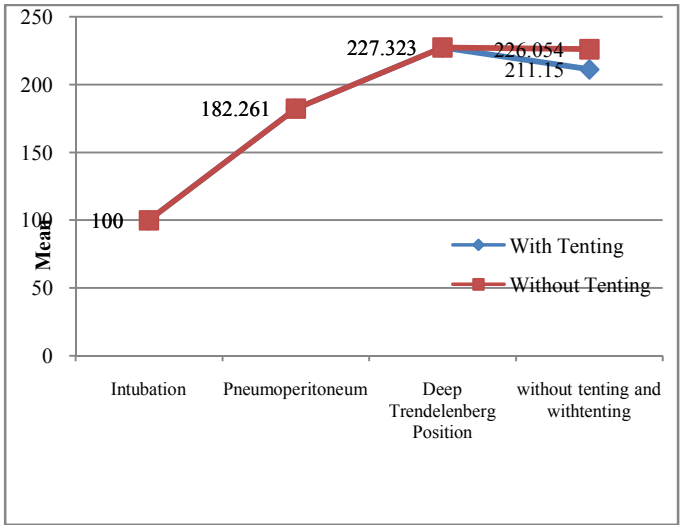


Figure 6 percentage of changes of mean peak airway pressure in both (Combined)

Figure 6 : It is a combination graph showing percentages of mean peak airway pressure changes in tenting and non-tenting population. This graph shows significant decrease in mean peak airway pressure after tenting of abdominal wall compaired to non-tenting group. So, tenting that is lifting of abdominal wall after deep trendelenburg position will help to decrease the peak airway pressure.

RESULTS

We measured peak airway pressure after 5min of intubation, pneumoperitoneum, deep trendelenburg position and tenting. The salient features of our results are as follows-

1. There were 90 male patients undergoing robotic radical prostatectomy enrolled in the study.
2. The mean age of the patients was 66.04 ± 5.924 years.
3. 91.10% patients were ASA II grade, 7.80% were ASA I grade and 1.10% were ASA III grade.
4. Mean of peak airway pressure
   a. After intubation was 14.69,with a standard deviation of 1.312
   b. After pneumoperitoneum, it was 26.68 with a standard deviation of 2.731
   c. After deep Trendelenburg position, it was 33.23 with a standard deviation of 2.531.
5. After deep trendelenburg position patients were randomised into two group. One group received tenting of abdominal wall and one group didn't.
6. Mean peak airway pressure in the group who didn't received tenting was 33.31 with standard deviation of 2.704.
7. Mean peak airway pressure in the group who received tenting was 30.62 with standard deviation of 2.198.
8. There was 82% increase in peak airway pressure after intubation.
9. After giving deep trendelenburg there was increase in peak airway pressure by 45.62%.
10. After giving tenting, peak airway pressure was decreased by 16.173%.

DISCUSSION

Robotic radical prostatectomy is known for its requirement of pneumoperitoneum and deep Trendelenburg position. Such requirement comes with increased IAP, decreased FRC, reduced pulmonary compliance and significant V/Q mismatch with hemodynamic instability. Deep Trendelenburg position causes cephalad shift of diaphragm leading to increased intra-thorasic pressure which is reflected on peak airway pressure in positive pressure ventilation.

Peak airway pressure is the maximal pressure generated during inspiration. Thats why it is also commonly called peak inspiratory pressure or maximal inspiratory pressure. During pneumoperitoneum and deep Trendelenburg position, there is a significant increase in peak airway pressure, which is a reflection of altered lung dynamics. Considering above, it is easier to monitor the peak airway pressure during positive pressure ventilation rather than monitoring (altered) lung volumes and capacity intraoperatively.

In the present study, we noted the peak airway pressure after intubation, pneumoperitoneum, deep Trendelenburg position and after tenting. Each time this pressure was recorded after 5 min of achieving above mentioned conditions. As recording and maintaining peak airway pressure is a routine practice in our institute, in astudy conducted by us, we examined the changes in peak airway pressure and usefulness of tenting of abdominal wall to decrease peak airway pressure in patients undergoing Robotic Radical Prostatectomy under general anaesthesia.

CONCLUSION

From our present study we conclude that

1. There was a significant increase in the peak airway pressure, from pneumoperitoneum to deep Trendelenburg position.
2. Tenting of abdominal wall can be used to decrease the peak airway pressure, providedthere should be continuous monitoring of peak airway pressure.
3. Tenting of abdominal wall was not associated with any significant side effects in our study.

Fig 7 Robotic console.

Fig 8 Robot With Four Arms.

Fig 9 Deep (Steep) Trendelenbreg Position In Robotic Radical Prostatectomy.

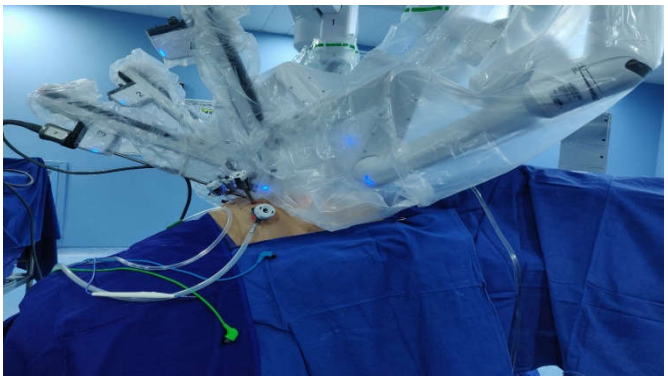


Fig 10 Abdomen without tenting of abdominal wall

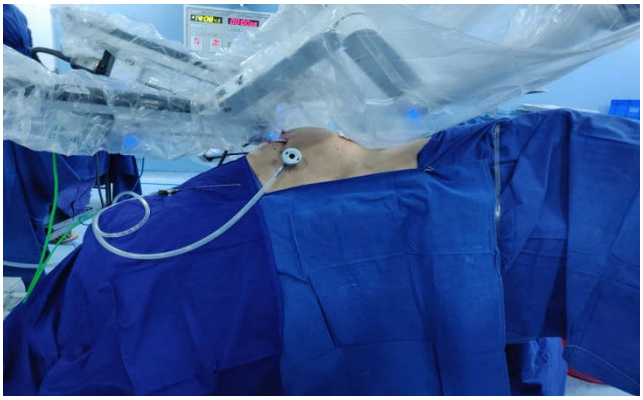


Fig 11 Abdomen After tenting of abdominal wall.

References

1. Michael J. Danic, Matthew Chow, and Morris Brown. Anesthesia considerations for robotic-assisted laparoscopic prostatectomy: a review of 1,500 cases.2007.
2. Hee Jong Lee, Kyo Sang Kim, and Eun Sun Cho. positive end-expiratory pressure during robot-assisted laparoscopic radical prostatectomy Optimal. Korean J Anesthesiology. 2013 Sep; 65(3): 244–250.
3. Bhandari A, McIntire L, Kaul SA, Hemal AK, Peabody JO, Menon M. Perioperative complications of robotic radical prostatectomy after the learning curve J Urol 2005;174:915‑8.
4. Raboy A, Ferzli G, Albert P. Initial experience with extraperitoneal endoscopic radical retropubic prostatectomy. Urology 1997; 50:849‑53.
5. Pruthi RS, Nielsen ME, Nix J, Smith A, Schultz H, Wallen EM. Robotic radical cystectomy for bladder cancer: Surgical and pathological outcomes in 100 consecutive cases. J Urol 2010; 183:510‑4.
6. Cunningham AJ, Brull SJ. Laparoscopic cholecystectomy: Anesthetic implications. Anesth Analg 1993; 76:1120‑33. 5. Goodale RL, Beebe DS, McNevin MP, Boyle M, Letourneau JG, Abrams JH, *et al*. Hemodynamic, respiratory, and metabolic effects of laparoscopic cholecystectomy. Am J Surg 1993; 166:533‑7.
7. Lindgren L, Koivusalo AM, Kellokumpu I. Conventional pneumoperitoneum compared with abdominal wall lift for laparoscopic cholecystectomy. Br J Anaesth. 1995; 75:567–72.
8. Menon M, Hemal AK. Vattikuti Institute prostatectomy: a technique of robotic radical prostatectomy: experience in more than 1000 cases. J Endourol. 2004; 18:611–619.
9. Casati A, Valentini G, Ferrari S, Senatove R, Zangrillo A, Torri G. Cardio respiratory changes during gynecological laparoscopy by abdominal wall elevation: Comparison with carbon dioxide pneumoperitoneum. Br J Anaesth. 1997; 78:51–4.
10. Guillonneau B, Vallancien G:Laparoscopic radical prostatectomy: the Montsouris technique.J Urol. 2000 Jun;163(6):1643-9.

11. Lestar M, Gunnarsson L, Lagerstrand L, Wiklund P, Odeberg-Wernerman S. Hemodynamic perturbations during robot-assisted laparoscopic radical prostatectomy in 45° Trendelenburg position. Anesth Analg. 2011; 113:1069–1075.
12. Sharma K, Brandstetter R, Brensilver J, *et al*. Cardiopulmonary physiology and pathophysiology as a consequence of laparoscopic surgery. Chest. 1996; 110:810–815.
13. Kalmar AF, Foubert L, Hendrickx JF , Absalom A, Mortier EP, Strups MM, *et al*. Influence of steep Trendelenburg position and CO2 pneumoperitoneum on cardiovascular, cerebrovascular, and respiratory homeostasis during robotic prostatectomy. Br J Anaesth 2010; 104:433‑9.
14. Phong SV, Koh LK. Anaesthesia for robotic‑assisted radical prostatectomy: Considerations for laparoscopy in the Trendelenburg position. Anaesth Intensive Care 2007; 35:281‑5. 8. Paolucci V, Gutt CN, Schaeff B, Encke A. Gasless laparoscopy in abdominal surgery. SurgEndosc 1995; 9:497‑500.
15. .Deepshikha C Tripathi, Komal S Shah, Santosh R Dubey, Shilpa M Doshi, and Punit V Raval Hemodynamic stress response during laparoscopic cholecystectomy: Effect of two different doses of intravenous clonidine premedication 2011 Oct-Dec; 27(4): 475–480.
16. .Joris JL, Chiche JD, Canivet JL, Jacquet NJ, Legros JJ, Lamy ML. Hemodynamic changes induced by laparoscopy and their endocrine correlates: Effect of clonidine. J Am CollCardiol. 1998; 32:1389–96.
17. Goodale RL, Beebe DS, McNevin MP, Boyle M, Letourneau JG, Abrams JH, Cerra FB. Hemodynamic, respiratory, and metabolic effects of laparoscopic cholecystectomy. Am J Surg. 1993 Nov;166(5):533-7.
18. Min Kyo Suh, Kyu Wan Seong, Sung Hwan Jung, Seong Su Kim; The effect of pneumoperitoneum and Trendelenburg position on respiratory mechanics during pelviscopic surgery Korean J Anesthesiol. 2010 Nov; 59(5): 329–334.
19. Robert Rauh, Thomas M Hemmerling, Max Rist, Klaus E Jacobi Influence of pneumoperitoneum and patient positioning on respiratory system compliance Journal of Clinical Anesthesia.2001;13:361-365
20. John H. Nguyen, Pedro P. Tanaka; Anesthesia for Laparoscopic Surgery society lap surgeon 3rd ed March 2010, 10-58
21. Arati Srivastava, Ashutosh Niranjan Secrets of safe laparoscopic surgery: Anaesthetic and surgical considerations J Minim Access Surg. 2010 Oct-Dec; 6(4): 91–94. doi: 10.4103/0972-9941.72593.
22. Banting S, Shimi S, van der Velpen G, Cuschieri A; Abdominal wall lifting: low-pressure pneumoperitoneum laparoscopic surgery. SurgEndosc 1993; 7:57–59.
23. Paolucci V., Gutt C.N., Bank W, Hohenberger P., Conlon K; Technical Aspects of Pneumoperitoneum and Gasless Laparoscopy. In Staging Laparoscopy. Springer, Berlin, Heidelberg pp 2002; 3-18
24. Hao Ren, Yao Tong, Xi-Bing Ding, Xin Wang, Shu-Qing Jin, Xiao-Yin Niu, Xiang Zhao, Quan LiInt J Abdominal wall-lifting versus CO_2 pneumoperitoneum in laparoscopy: a review and meta-analysis Clin Exp Med. 2014; 7(6): 1558–1568.
25. Ismail Cinel, Smith JeanR. Phillip DellingerPrinciples of Diagnosis and Management in adult critical care medicine 2008 (3) 153-175.
26. Diederik Gommers, Burkhard Lachmann, Peak inspiratory pressure in Critical Care Medicine (Third Edition), 2008,139-140.
27. Paul Hayden, Sarah Cowman; Anaesthesia for laparoscopic surgery, Continuing Education in Anaesthesia Critical Care & Pain, October 2011, Volume 11(5); 177–180.

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