

Original Research Article

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Comparison of conventional balloon method and Dulucq method for extraperitoneal access for laparoscopic total extraperitoneal repair of inguinal hernia

Chirag B. Kakadiya*, Dilip B. Choksi, Amul Bhedi, Sushil Damor

Department of General Surgery, Government Medical College Baroda, Vadodara, Gujarat, India

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***Correspondence:**

Dr. Chirag B. Kakadiya,
E-mail: kakadiya1990@gmail.com

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ABSTRACT

Background: Laparoscopic inguinal hernia repair has been shown to be slightly superior to open approaches. The aim of study is to compare advantages and disadvantages between two methods of extra peritoneal access for TEP repair of inguinal hernia using conventional balloon device method and using Dulucq method.

Methods: This is a prospective study. It was conducted from June 2014 to November 2016 at SSG Hospital Vadodara. Total 50 patients of inguinal hernia taken for laparoscopic TEP repair among them patients were divided in two groups by envelop method of randomization, in 25 patients extra peritoneal space was created by balloon method and in 25 patients extra peritoneal space was created by veress needle or Dulucq method.

Results: The mean time taken for extra peritoneal space creation by balloon method was 13.12 minutes and the mean time taken for extra peritoneal space creation by veress needle method was 9.32 minutes. The mean total operative time required for TEP by balloon method was 66.7 minutes and that for, TEP with veress needle method was 53 minutes.

Conclusions: Total time for extraperitoneal space creation by Dulucq method is less as compared to balloon method of extraperitoneal space creation in laparoscopic TEP repair of inguinal hernia.

Keywords: Dulucq method, TEP repair

INTRODUCTION

Laparoscopic inguinal hernia repair has been shown to be slightly superior to open approaches. The totally extra peritoneal procedure (TEP) combines the advantages of tension-free mesh reinforcement of the groin with those of laparoscopic surgery, reduces postoperative pain and shortens recovery time while avoiding the need for a transabdominal approach. The establishment of this technique by Dulucq in Europe may be considered a logical further development of total extra peritoneal hernia repair (TEP).^{1,2} However, there are different method for approach to pre-peritoneal space:

Conventional balloon method and without balloon method with veress needle or Dulucq method.

METHODS

This study was conducted from June 2014 to November 2016 at SSG Hospital Vadodara. Total 50 patients of inguinal hernia taken for laparoscopic TEP repair among them patients were divided in two groups by envelop method of randomization, in 25 patients extra peritoneal space was created by balloon method (Figure 4) and in 25 patients extra peritoneal space was created by veress needle or Dulucq method (Figure 2). All patients of

uncomplicated inguinal hernia undergoing laparoscopic total extra peritoneal inguinal hernia repair with BMI $<30 \text{ kg/m}^2$ were included in study.

The procedure was done under general anesthesia. The patient was catheterized and prophylactic antibiotic was given at the time of induction of anesthesia (Figure 1).

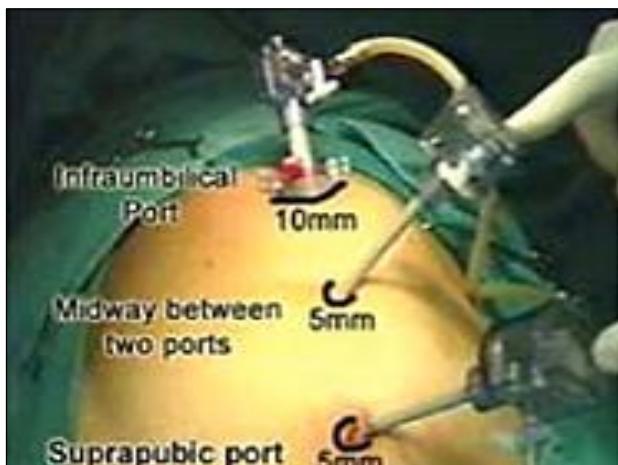


Figure 1: Port position in laparoscopic TEP repair.



Figure 2: Veress needle in Dulucq method.

In all 50 patients, laparoscopic TEP repair done using balloon and non-balloon method for extra peritoneal space creation. Complication during operation time noted if it was observed. Total time of laparoscopic extra peritoneal space creation was noted in both group and total duration of operation was also noted (Figure 3).

Prophylactic oral antibiotics were given for duration of 5 to 7 days, of which parenteral antibiotics were given for at first 24 hours. Analgesics were given at 12-hour interval for a period of 3 to 5 days, on first POD intravenous analgesics was given then shifted on to oral tablets. Patients were observed for any complications like subcutaneous emphysema, mediastinitis, CO_2 narcosis in

the immediate post-operative period and hematoma, seroma, wound sepsis during their stay in hospital and also assessed for postoperative pain and its severity.

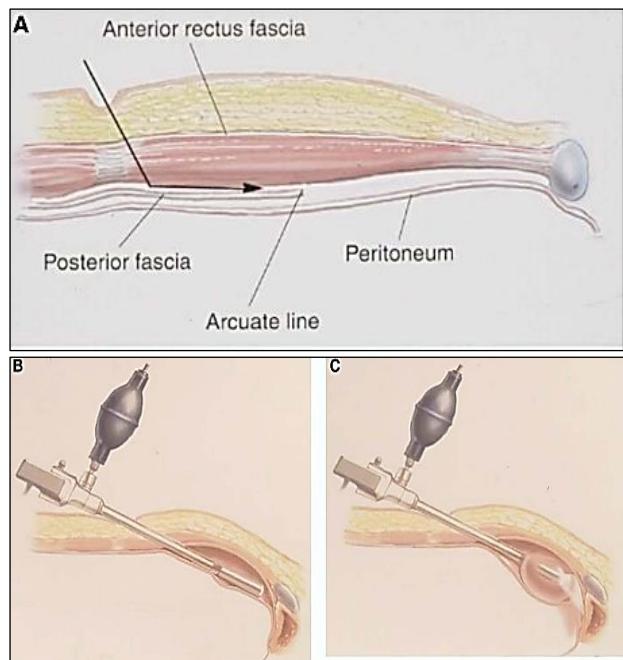


Figure 3: The balloon dissector is placed in the space between rectus muscle and posterior fascia, and directed down to the pubis.



Figure 4: Handmade balloon device.

Patients were discharged once free of complications and once they resumed their activities of daily normal life. Patients were discharged within the next day or within 48 hours. At discharge, they were advised to come for stitch removal after 1 week, (1st follow up), and then after 2 weeks (2nd follow up), and then after 1 month of surgery, (3rd follow up).

RESULTS

A Comparative study with 25 patients undergoing Laparoscopic TEP in which balloon method used for pre-

peritoneal space creation and 25 patients undergoing Laparoscopic TEP repair in which veress needle used for pre peritoneal space creation is undertaken to study the efficacy based on total time taken for pre peritoneal space creation, intraoperative complication, postoperative complication, total duration of operation, post-operative pain. Descriptive statistical analysis has been carried out in the present study.

The mean age of patient in Balloon method group was 43 ± 14.068 years (range from 18-70 years) and Veress needle group was 48.7 ± 14.0004 years (range from 18-90 years). The mean BMI of patients in Balloon method group was 21.51 ± 1.87 kg/m². The mean BMI of patients in veress needle method group was 22 ± 1.93 kg/m². In the Balloon method group, 28% had associated diseases (6 patients with Hypertension, 1 diabetic, 3 BHP). In the Veress needle group, 8% had associated diseases (8 patients with Hypertension, 8 patients with BHP). In Balloon method group patients with direct incomplete inguinal hernia was 56% and indirect incomplete was 36% and both type was present in 8% of cases. In Veress needle group patients with direct incomplete inguinal hernia was 52% and indirect incomplete is 44% and both type was present in 4% cases (Table 1).

Table 1: Type of inguinal hernia.

Type of Hernia	Balloon method (n=25)		Veress needle (n=25)	
	No.	%	No.	%
Direct incomplete	14	56	13	52
Indirect incomplete	9	36	11	44
Direct + indirect	2	8	1	4

Table 2: Comparison of intraoperative complications.

Complications	Balloon method (n=25)		Veress needle method (n=25)	
	No.	%	No.	%
Intraperitoneal CO ₂ leak	4	16	7	28
Visible peritoneal tear	2	8	5	20
Subcutaneous emphysema	2	8	4	16
Other complication	1	4	0	0
Inference	Incidence of intraperitoneal CO ₂ leak, visible and invisible peritoneal tear and Subcutaneous emphysema like complications were more in Veress method group but not statistically significant with p=0.472			

In Balloon method group, there were 11 (44%) right sided inguinal hernias, 6 (24%) left side inguinal hernias,

8 (32%) bilateral inguinal hernias. In Veress needle group there were 7 (28%) right sided inguinal hernias, 12 (48%) left sided inguinal hernias, 6 (24%) bilateral inguinal hernias. In TEP with balloon method intra peritoneal CO₂ leak was in 4 patients (16%), while in TEP with Veress needle method intra peritoneal CO₂ leak was in 7 patients (28%) (Table 2).

Table 3: Comparison of post-operative complication.

Complications	Balloon method (n=25)		Veress needle method (n=25)	
	No.	%	No.	%
Subcutaneous emphysema	2	8	4	28
Seroma	2	8	0	20
Portsite infection	2	8	4	16
Other complication	0	0	0	0
Inference	Incidence postoperative complications were not statistically significant with p=0.211			

Table 4: Comparison of time taken for extraperitoneal space creation (minutes) between the balloon method and veress needle group.

Duration (in min)	Balloon method (n=25)		Veress needle method (n=25)	
	No	%	No	%
5-10	4	16	20	80
11-15	16	64	5	20
16-20	5	20	0	0
Mean \pm SD	13.12 \pm 3.19		9.32 \pm 2.57	
Operative time	Balloon method (n=25)		Veress needle (n=25)	
Average duration	13.12 \pm 3.19		9.32 \pm 2.57	
Inference	Time for extra peritoneal space creation by veress needle method is significantly less with statistical significance of t = -7.291; p=<0.0001**			

Table 5: Comparison of total operative time (minutes) between the balloon and veress needle group.

Operative time	Balloon method (n=25)	Veress method (n=25)
Average duration	66.7 \pm 20.27	53.1 \pm 17.14
Inference	Total operative time is note statistically significant between two methods with t= -2.795 and p = 0.0075	

In TEP with balloon method visible peritoneal tear was in 2 patients (8%), while in TEP with Veress needle method visible peritoneal tear was in 5 patients (20%). In TEP

with balloon method subcutaneous emphysema was in 2 patients (8%), while in TEP with Veress needle method visible peritoneal tear was in 4 patients (16%). Incidence postoperative complications were not statistically significant with $p=0.211$ (Table 3).

Time for extra peritoneal space creation by veress needle method was significantly less with statistical significance of $t=-7.291$; $p=<0.0001^{**}$

DISCUSSION

In the present study, we used a homemade balloon, and a veress needle to create the extra peritoneal space. Both methods are not cost increasing method. The following study was undertaken in an effort to identify the better of the two methods of extra peritoneal space creation in laparoscopic TEP repair of inguinal hernia. This was also done to identify the difference between two methods in terms of time taken for the extra peritoneal space creation, intra operative complications and postoperative complications.³

A comparative study with regard to following parameters were made: duration for extra peritoneal space creation, total duration of operation, conversion rates to open method, postoperative pain, complications of each procedure. The observations and calculated means were subjected to statistical analysis. The statistical analysis used was, Chi-square test and independent t test.

All the patients in our study were males. It suggests that inguinal hernia is less common in female in general population. In our study mean age of patients in Balloon method group was 45.91 years and in Veress needle group it was 49.64 years. It suggests that most patients in our study group was between age group of 40-70 years. We excluded patients with $BMI <18 \text{ kg/m}^2$ and $>30 \text{ kg/m}^2$. In our study, in Balloon method group patients with direct incomplete inguinal hernia was 56% and indirect incomplete was 36% and both type was present in 8% of cases. In Veress needle group patients with direct incomplete inguinal hernia was 52% and indirect incomplete was 44% and both type was present in 4% cases.

In the present study, the mean time for extra peritoneal space creation in laparoscopic TEP repair by balloon method was 13.12 minutes. The mean time for extra peritoneal space creation in laparoscopic TEP repair by Veress needle method was 9.32 minutes. Hence the overall mean time for extra peritoneal space creation in laparoscopic TEP repair with veress needle method was significantly less than balloon method.

The mean total operative time taken in laparoscopic TEP repair with balloon method was 66.7 minute. The mean total operative time taken in laparoscopic TEP repair with veress needle method was 53.1 minute. There was no statistical difference in total operative time between

laparoscopic TEP repair with balloon method and veress needle method.

A randomized prospective multicenter study, done by Bringman S et al, the mean operation time was 55 minutes in the group with the balloon (total 161 patients) and 63 minutes in the group without the balloon ($p=0.004$) (total 161 patients).⁴

In a study done by Kang AY, Lee SR, et al, Sungkyunkwan University School of Medicine, Seoul, Korea, a retrospective analysis of a consecutive series of inguinal hernia repairs performed by a single surgeon in hospital between April 2008 and April 2012. Of the 128 patients, whose full-length video recordings were available, 57 were in the balloon dissection group and 71 were in the plain dissection group. Mean operation time was shorter in the plain dissection group (57.7 versus 45.6 minutes, $p <0.001$).⁵

In a study done by Jaspal DP, et al Department of Surgery, M.M.I.M.S.R, Mullana, Ambala, India, between January 2014 and September 2015, consecutive 50 cases of totally extra-peritoneal repair (TEP) were done using a homemade balloon for creating the extra peritoneal space the mean total operation time was 50 minutes.⁶

In TEP with balloon method Intra peritoneal CO_2 leak was in 4 patients (16%), while in TEP with Veress needle method intra peritoneal CO_2 leak was in 7 patients (28%). In TEP with balloon method visible peritoneal tear was in 2 patients (8%), while in TEP with Veress needle method visible peritoneal tear was in 5 patients (20%). In TEP with balloon method subcutaneous emphysema was in 2 patients (8%), while in TEP with Veress needle method visible peritoneal tear was in 4 patients (16%).^{7,8}

Incidence of intra peritoneal CO_2 leak, visible and invisible peritoneal tear and subcutaneous emphysema like complications were more in Veress method group but not statistically significant with $p = 0.472$. The complications observed in our study were as follows: surgical emphysema, port site infection and seroma. Surgical emphysema regressed by 2nd postoperative day, without surgical intervention. Two cases of port site infection were treated with extended oral antibiotics and within 5 days wound normal. We had three cases of seroma. This patient was administered extended course of oral antibiotics and the seroma subsided itself. In balloon method group in 1 case Laparoscopic TEP converted to open hernioplasty due to vascular injury. In veress needle method group in 1 case Laparoscopic TEP converted to open hernioplasty due to large hernia sac and difficult to separate the hernia sac from the cord structure.⁹⁻¹¹

CONCLUSION

As in our study veress needle also can be used for extra peritoneal space creation in laparoscopic TEP repair of inguinal hernia, incidence of intraperitoneal CO_2 leak,

visible and invisible peritoneal tear and subcutaneous emphysema like complications were more in Veress method group. Time for extra peritoneal space creation by veress needle method is significantly less as compare with balloon method for laparoscopic TEP repair of inguinal hernia. There is no statistical difference in total operation time between two methods for extra peritoneal space creation. So, it can be concluded that balloon method and veress needle both can be used for extra peritoneal space creation in TEP repair of inguinal hernia, both are equally effective.

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Conflict of interest: None declared

Ethical approval: The study was approved by the institutional ethics committee

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