



PROSPECTIVE STUDY OF ALTERATION IN TESTICULAR PERFUSION AND VOLUME IN LAPAROSCOPIC TOTALLY EXTRAPERITONEAL HERNIA REPAIR

Dr Sajad Hussain Malik	Resident, Department of Surgery Govt. Medical College Srinagar Jammu & Kashmir, India
Dr Ferkhand Mohi Ud Din	Resident, Department of Surgery Govt. Medical College Srinagar Jammu & Kashmir, India
Dr Hanief Mohammad Dar	Consultant, Department of Surgery Govt. Medical College Srinagar Jammu & Kashmir, India
Dr Irshad Ahmad Kumar*	Resident, Department of Surgery Govt. Medical College Srinagar Jammu & Kashmir, India. *Corresponding Author

ABSTRACT

PURPOSE:- The objective of this study was to assess the effect of Totally extra-peritoneal inguinal hernia repair on testicular perfusion and testicular volume.

METHODS:- After obtaining ethical clearance from institutional ethical committee, the present Prospective study was conducted on 48 male patients with unilateral inguinal hernia in a tertiary care hospital.

RESULTS:- The study was conducted on 48 patients over a period of 2 years from August 2017 to August 2019 after meeting inclusion and exclusion criteria. Their mean age was 45.70 years (range 21-72 years). In our study comparison of preoperative and postoperative values at third and sixth month in the patients did not show any statistically significant alteration in the variables studied like testicular volume (p-0.987) and blood flow perfusion parameters Peak systolic velocity (p-0.591); End Diastolic velocity (p-0.526); Resistance index (p-0.415).

CONCLUSION:- No alteration in testicular volume and arterial flow over a six-month period was observed among patients who underwent laparoscopic extra-peritoneal surgical correction using polypropylene prosthesis for inguinal hernia

KEYWORDS : Inguinal hernia, TEP, Testicular Volume, Testicular Perfusion

INTRODUCTION:-

About 10% of people develop some type of hernia during their lifetime. In the USA, more than 750,000 hernia operations are performed each year. Hernias are seven times more common in males than in females [1]. It has been reported that the overall current risk for a male to have an inguinal hernia was 18%. [2] Inguinal hernia repair is one of the most common interventions in general surgery in the Western world. Worldwide over 20 million inguinal hernia repairs are performed annually [3]

Testicular damage (atrophy and/or dysfunction) can be one of the most dreaded sequels of inguinal hernioplasty. However, literature findings show that testicular atrophy occurred in 0% to 2% of patients after hernioplasty [4]. The laparoscopic totally extraperitoneal hernia repair (TEP) technique which is based on the concept of tension-free high ligation of the sac, has become widely popular in surgical practice [5]

The preoperative and postoperative use of color duplex ultrasonography (CDUS) to evaluate the spermatic cord structure and scrotal structure has been well documented in testicular pathologies and hernias [4]. CDUS is extremely helpful in all cases to investigate extra testicular vascularization and testicular perfusion, with parameters optimized to display low flow velocities including peak systolic velocity (PSV), end diastolic velocity (EDV). Lefort et al. showed that examination of the scrotum with CDUS should include measurement of intratesticular resistive index (RI) and the elevated RI can be suggestive of ischemia [6].

The main objective of this study was to describe and assess the effect of Totally extra-peritoneal (TEP) inguinal hernia repair in male patients at third and sixth month after repair on: Testicular volume and testicular perfusion (Blood flow parameters of the spermatic artery noted as: Peak systolic velocity (PSV), End diastolic velocity (EDV), Calculated resistive index (RI))

MATERIAL AND METHODS:-

After obtaining ethical clearance from institutional ethical committee (Approval No. 118/ETH/GMC), the present Prospective study was conducted on 48 male patients with unilateral inguinal hernia. These patients underwent surgical correction with implantation of a polypropylene prosthesis by means of the Laparoscopic Totally extra-peritoneal (TEP) repair of inguinal hernia in Department of General Surgery, Govt. Medical College Srinagar. Male patients more than 18 years with primary reducible inguinal hernia were included while as patients with recurrent and incarcerated hernias or with any previous pelvic intervention were excluded from the study. After obtaining informed and written consent from the patients, a detailed & meticulous history was taken. Complete physical examination and all routine baseline investigations like Hemogram, KFT, LFT, ECG etc. were done. The patients were also evaluated by means of Color Doppler ultrasonography of inguino-scrotal region. The examinations were performed with the patient in supine position, at three times: before the operation and then selectively at third and sixth months after the operation. The variables studied were the testicular volume, Peak systolic velocity (PSV), End diastolic velocity (EDV), Resistance index (RI). Data was obtained and the statistical method utilized was the model of analysis of variance between repeated measurements using SPSS version 22.0.

RESULTS AND OBSERVATIONS:-

This was an observational prospective study of 48 patients with unilateral inguinal hernia who met the study criteria. Their mean age was 45.70 years (range 21-72 years). The study was conducted over a period of 2 years from August 2017 to August 2019. Most of our patients were falling in age group of 40-49 yrs. (27.08%) followed by 30-39 yrs. as shown in Table 1. 56.25% (27 patients) of our patients had Right sided while as 43.75% (21 patients) had Left sided hernia. Majority of our patients 45.83% (22 patients) were falling in Type III B of Nyhus Classification as shown in table 2.

The mean Testicular Volume preoperatively, at Postoperative 3rd and 6th month were 11.57±2.13 (cm)³, 11.51±2.12 (cm)³, and 11.57±2.10 (cm)³ respectively. This was statistically insignificant (p Value 0.987). The Peak Systolic Velocity (PSV) was also statistically insignificant (p Value 0.591) with mean PSV at preoperatively, Postoperative 3rd and 6th month as 12.57±2.81 cm/s, 12.83±2.88 cm/s and 13.16±2.79 cm/s respectively. The mean End Diastolic velocity (EDV) at preoperatively, at postoperative 3rd and 6th month were 4.0523±1.02 cm/s, 4.28±1.04 cm/s and 4.23±0.99 cm/s respectively. This was statistically insignificant with p Value of 0.526. The Resistance index was also statistically insignificant (p Value 0.415) with parameters at preoperatively, postoperative 3rd and 6th month as 0.675±0.047, 0.665±0.044 and 0.66±0.049 respectively. These parameters are shown in Table 3.

DISCUSSION

Testicular volume is an important outcome measure for testicular atrophy following corrective surgical operations on patients with inguinal hernias. Wantz described testicular atrophy as a consequence of ischemic orchitis that could occur in patients who underwent operations with or without prostheses [7]. Both histological and volumetric alterations in the testicles had been seen in an experimental study involving rats with intraoperative simple manipulation of spermatic funiculus [8].

There are many factors which lead to decrease and/ or interruption of the testicular perfusion [9]. In some reports, inguinal hernia may impair testicular blood flow, which may be attributable to an intermittent mechanical compression effect on the funiculus spermaticus in the inguinal canal [10]. Testicular artery and vein injuries, thrombosis of spermatic vein plexus, testicular torsion are major factors influencing the testicular perfusion. Furthermore, the implantation of a non-absorbable polypropylene mesh during hernia repair causes chronic foreign body reaction involving the surrounding tissue. In case of inguinal hernia repair using different mesh techniques the spermatic cord structures is potentially affected by this chronic inflammatory tissue remodeling [11].

Testicular perfusion following hernioplasty can be easily monitored and evaluated with duplex ultrasonography. The flow in the spermatic artery and testicular artery and its branches is of low resistance, with a broad systolic and holodiastolic flow. CDUS enables a definitive diagnosis of ischemia and decreased testicular circulation. Testicular and epididymal swelling along with a slightly decreased echogenicity occur later, so that examining the testis 3 and 6 months after operation seems to be more rational as was performed in our study [12]

The blood flow parameters studied during CDUS include Peak systolic velocity, End diastolic velocity, Resistance index of testicular artery. Zwiebel and Pellerito took the expected values for peak systolic velocity in the testicular artery to be 4 cm/s to 19 cm/s. The end diastolic velocity an important parameter for diagnosing severe arterial occlusions. Increase in diastolic velocity is associated with reduction of vessel diameter of more than 70% however in case of complete arterial occlusion diastolic velocity drops to zero [13]. The expected values in the distal testicular artery were described for the resistance index (0.6 to 1.0) [14]. An increasing RI implies an increase in vascular impedance. A decrease in diastolic blood flow with an increase in RI identifies testicular ischemia [15]. Over the observation period, the patients underwent their operations and prostheses were implanted, and two factors together did not cause alterations in testicular blood flow, as seen in the tests performed in the third and sixth months.

Aydede et al. observed a decreased mean value for pulsatility index and increased resistance index in a test done on the third postoperative day. This difference had disappeared by the time of the subsequent examination (sixth month), and this

was attributed to the trauma of the operation and to tissue edema [16].

In our study involving 48 patients, their mean age was 45.70 years (range 21-72 years). No statistically significant difference in terms of testicular volume (p=0.591), EDV (P=0.526), RI (P=0.415), were observed who underwent laparoscopic repair (TEP) of inguinal hernia have been seen over a 6-month postoperative period.

Our study has similar outcome results as were observed by Bansal 2017 study with 80 patients in TEP and 80 in TAPP. The mean age was 40.5±12.4(range 18-60). The follow up time was 3 months and 6 months. There was no significant difference in testicular volume (p>0.05), and LH (p>0.05) testicular resistivity index (p>0.05), FSH (p>0.05), testosterone level (p>0.05), and LH (p>0.05) between two groups at the 3 month and 6 months follow up [17],

Another study with similar results is Skawran 2011 study with total of 59 patients with age range (18-60) years who underwent a bilateral TEP repair. In the prospectively (light mesh) group, there were 21 patients, the pre-operative values were compared with post-operative values and follow up time was 3 months. It showed that there was no statistical difference between pre-operative and post-operative in testicular volume, testicular perfusion, FSH, LH, testosterone, and testicular function (p >0.05) and there were 38 patients in retrospective (heavy mesh) group where the follow-up was determined at ≥3 months. Again, there was no significant difference between the prospective group and retrospective group in terms of Testicular volume, Testicular perfusion, FSH, LH and Ejaculate volume (p=0.01), decrease in testicular volume was seen but in LAP group no such difference (P=0.3) was seen. Also, statistical difference was seen in terms of Resistance index in open group in comparison with LAP group. [19].

Koksai et (2010) have observed no statistically significant alteration in arterial blood flow parameter between preoperative and postoperative measurements in terms of RI (P≥0.05) both Lichtenstein and TEP group over a follow up of 1day, 3 day, 6-month after operation period [20].

Lal et al. indicated that laparoscopic TEP operations do not alter testicular flow dynamics at 24h, 1 week, or 3 months postoperative.[21]

The various studies discussed here lead to a common point: preservation of testicular function in men with laparoscopic repair of inguinal hernias.

CONCLUSION

No alteration in testicular volume and arterial flow over a six-month period was observed among patients who underwent laparoscopic extra-peritoneal surgical correction using polypropylene prosthesis for inguinal hernia.

Table 1: Age Distribution of Patients

S No.	Age Group	No. of patients	Percentage
1	<20	0	0
2	20-29	6	12.5
3	30-39	11	22.91
4	40-49	13	27.08
5	50-59	10	20.83
6	60-69	5	10.41
7	>70	3	6.25
RANGE 21-72 YEAR			

Table 2: Type of Hernia (Nyhuss classification) with respective percentage

TYPE	NO OF PATIENTS	PERCENTAGE
I	0	0

II	15	31.25
IIIA	11	22.92
IIIB	22	45.83
IIIC	0	0
IV	0	0

Table 3: Comparison of variables with respective p-values.

	Preoperative	Post op 3rd month	Post op 6th month	p-value
Testicular volume(cm)3	11.57±2.13	11.51±2.12	11.57±2.10	0.987
PSV (cm/s)	12.57±2.81	12.83±2.88	13.16±2.79	0.591
EDV(cm/s)	4.0523±1.02	4.28±1.04	4.23±0.99	0.526
Resistance index	0.675±0.047	0.665±0.044	0.66±0.049	0.415

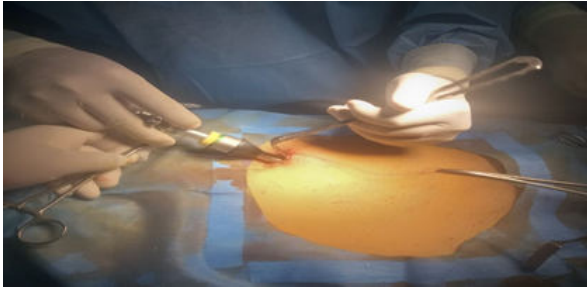


Figure 1: Hasson Trocar Placement in preperitoneal space



Figure 2: Ultrasonographic measurement of testicular volume

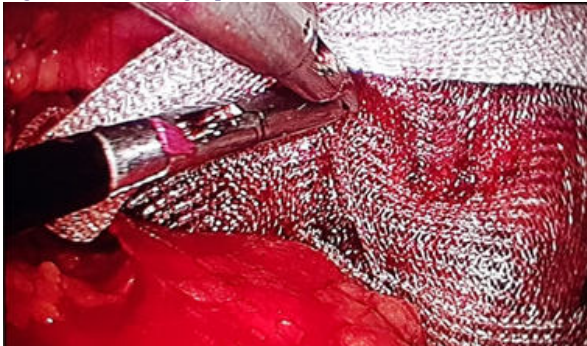


Figure 3: Mesh placement in preperitoneal space by TEP repair

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