

Does laparoscopic hernia repair affect the vascularity of testis?

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ABSTRACT

Context: Laparoscopic hernia repair, despite its safety and effectivity is related to some drawbacks. Testicular complications are uncommon but serious among them. Testicular atrophy occurs in 0% to 2% of patients after hernioplasty. **Aim:** In this study, we tried to evaluate the effects of laparoscopic total extraperitoneal (TEP) repair on testicular blood flow in Indian population by comparing the testicular perfusion in preoperative and postoperative status. **Settings and Design:** A prospective study. **Subjects and Methods:** A prospective study was conducted among adult male patients having an uncomplicated inguinal hernia. Preoperative and postoperative CDUS evaluation of testicular blood flow was done for each patient. **Statistical Analysis Used:** Data were analyzed using the SPSS (SPSS, Chicago, IL, USA) software program. **Results:** The resistive indexes of testicular, capsular, and intratesticular arteries of the operated and nonoperated side were similar preoperatively and did not differ ominously postoperatively. **Conclusion:** Laparoscopic hernia surgery does not have any significant effect on testicular blood supply and can be advocated safely without any added risk of testicular atrophy.

Keywords: Color Doppler ultrasound, inguinal hernia, laparoscopic TEP, polypropylene mesh, testicular perfusion, TEP repair

Introduction

An inguinal hernia is one of the most common surgical problems encountered by a primary physician. With time, surgery for hernia has evolved from open repair to laparoscopic repair. Primary care physician plays a vital role in motivating the patients for surgery. These physicians must be well aware of the rare but serious complications after the laparoscopic inguinal hernia repair. In 1990, Ger *et al.* introduced, laparoscopic inguinal hernia repair^[1] and since then it is accepted worldwide as a standard of care. It has been modified many times and used extensively in general surgery.^[2] Even with many series signifying its safety and

effectivity,^[3] this approach to inguinal hernia repair still has some drawbacks.^[2,4] Testicular complications related to sexual function is uncommon but serious complication demanding conscientious attention. Primary ischemic orchitis occurs in 0.65% of patients undergoing open hernia surgery.^[5] The chances of ischemic orchitis and testicular infarction increases in case of extensive dissection of the spermatic cord or delivery of the testis during surgery or case of large hernias extending into the scrotum or recurrent hernia.^[5] The Lichtenstein hernia repair (LHR) is the most common open hernia repair technique^[6] and it shares similarities with the extraperitoneal-preperitoneal hernia repair technique.^[7,8] The mesh used in open/laparoscopic tension-free inguinal herniorrhaphy is considered as an inert material, its long-term effects are controversial. All mesh causes an initial and chronic inflammatory response in patients after implantation. One of the possible effects of the inflammation induced by the mesh is ischemic orchitis and/or testicular atrophy in patients.^[8,9] However, testicular atrophy occurs in 0% to 2% of patients after

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hernioplasty.^[10] In laparoscopic hernia surgery, chances of such complications appear theoretically higher because of their steep learning curve, technical challenges, and long operating time.

The use of color duplex ultrasonography (CDUS) to evaluate the spermatic cord structure and scrotal structure is well-established in testicular pathologies and hernias in the preoperative and postoperative period.^[10-12] CDUS is tremendously helpful 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.* concluded that examination of the scrotum with CDUS should include measurement of the intratesticular resistive index (RI) and elevated RI can be suggestive of ischemia.^[13] The literature on the effect of laparoscopic hernia repair on testicular perfusion is not sufficient. In this study, we attempt to evaluate the effects of laparoscopic total extraperitoneal (TEP) repair on testicular blood flow in Indian population by comparing the testicular perfusion in preoperative and postoperative.

Subjects and Methods

The study was started after taking approval from the Institute Ethical Committee and Institute Research Body. From January 2018 to January 2019, patients presented to the Department of Surgery and diagnosed to have an inguinal hernia were included in this prospective study after attaining written informed consent. Male patients of age 18 years and above, fit for general anesthesia were included in the study while those with an undescended testis, recurrent hernia, complicated hernia (irreducible/obstructed/strangulated hernia), complete inguinal hernia, coexistent varicocele, and history of lower abdomen/groin surgery were excluded.

For each patient, detailed history and examination were recorded. Routine preoperative workup was done and anesthesia clearance was taken. Preoperative CDUS evaluation of testicular blood flow was done for each patient using an ultrasound unit with an 8 MHz linear array probe in the department of radio-diagnosis. Patients were scanned in the supine position after 10 min of rest and bilateral testicular, capsular, and intratesticular arterial flow dynamics were measured. Point spectral analysis was done in the testicular artery (1 cm superior to the upper pole of testis), capsular artery, and the intratesticular artery and the parameters evaluated for each artery were PSV, EDV, and RI.

Unilateral or bilateral repair for these cases was performed. Laparoscopic TEP repair was done for each patient using a standard technique by experienced surgeons performing laparoscopic TEP routinely.

A polypropylene mesh of suitable size was used in each case. Routine postoperative care was provided to these patients. CDUS (as described above) was done postoperatively on 1st post-op day. All the results are expressed as mean \pm standard deviation. Data were analyzed using the SPSS (SPSS, Chicago, IL, USA)

software program. A comparison of the results between groups was performed using the paired *t*-test. A *P* value of less than 0.05 was considered significant. The postoperative RI of the abovementioned arteries of the operated side was compared to preoperative (*P*) values (paired *t*-test) and the two sides of a bilateral repair were evaluated independently. For unilateral repairs, the RI of the operated side was compared with the nonoperated side, both pre and postoperatively.

Results

A total of 100 sides were operated in 80 patients. The average age of these patients was 50.2 ± 13.3 years (range 24–72 years). Nearly 60 of these patients were clinically diagnosed to have a unilateral hernia (40 right-sided and 20 left-sided, 36 indirect, and 24 direct hernias) and 20 to have a bilateral hernia (36 direct and 4 indirect) (distribution of hernia [laterality] and type of hernia). Eventually, 60 patients underwent a unilateral repair and 20 patients underwent bilateral repair. Four patients were diabetic, 12 were hypertensive, and 44 were smokers/tobacco chewers. None of them had any history of cardiac disease, pelvic trauma, orchitis, or retractile testis.

In cases of clinically diagnosed unilateral hernia ($n = 60$), the RI (testicular artery) of the hernia side preoperatively was 0.65 ± 0.12 and that of the clinically normal side was 0.71 ± 0.09 . No statistically significant difference was seen between the RIs of the two sides ($P = 0.43$; paired *t*-test).

The average operative time taken for a unilateral and bilateral repair was 97.75 and 144.62 min, respectively. A 15*13 cm sized prolene mesh was used in all cases. The peritoneal breach occurred in eight cases and there was one urinary bladder injury that was detected on 1st postoperative day when the patient did not void after removal of the catheter, on CT scan a 3 mm rent was diagnosed on the anterolateral aspect, the patient was managed conservatively by reinserting 20 fr. size Foley catheter for 21 days. One patient had inferior epigastric artery injury which was managed intraoperatively by monopolar coagulation. No instance of spermatic cord injury.

The average duration of stay in the hospital was 2 days (range 1–5 days). Postoperatively, four patients had pneumo-scrotum (which resolved within 48 h), two patients had seroma (which resolved within 4 weeks), and one patient had urinary retention (required recatheterization).

The average RI (mean \pm SD) of the operated side both preoperatively and postoperatively (VE, E and I) are described in Table 1.

Besides, in cases of unilateral repair ($n = 60$), see Table 2, the preoperative and postoperative RIs of the three arteries of the operated side was compared with their corresponding values on the nonoperated side using paired *t*-test. The RIs of testicular, capsular, and intratesticular arteries of the operated

Table 1: The average RI (mean±SD) of the operated side both preoperatively and postoperatively (VE, E, and L)

Timing of CDUS measurement	Resistive indexes [Mean±SD]		
	Testicular artery (TA)	Capsular artery (CA)	Intratesticular artery (ITA)
Preoperative (P)	0.65±0.12	0.69±0.08	0.63±0.11
Early postoperative (E)	0.59±0.10	0.62±0.09	0.62±0.12

Table 2: The preoperative and postoperative resistive indexes of the three arteries of the operated side compared with their corresponding values on the nonoperated side.

Timing of CDUS measurement	Preoperative			Postoperative		
	Operated	Nonoperated	P	Operated	Nonoperated	P
Capsular A.	0.63±0.11	0.62±0.10	0.885	0.60±0.11	0.63±0.08	0.333
Testicular A.	0.68±0.06	0.71±0.09	0.434	0.63±0.09	0.68±0.10	0.217
Intratesticular A.	0.62±0.06	0.60±0.08	0.527	0.66±0.12	0.65±0.13	0.772

and nonoperated side were similar preoperatively and did not differ significantly postoperatively.

Discussion

Laparoscopic total extraperitoneal repair is a preferred procedure with similar results to open surgery and appears to be the standard of care in the future.^[14-16] CDUS is an objective method to assess the measurement of the RI of testicular vessels.^[17]

Neto *et al.*, Ramadan *et al.*, and Lal *et al.* did not find any statistically noteworthy elevation in RIs, which is in conjugation with our study^[18-20] where no significant difference between the RI of any artery in their preoperative and early postoperative period was noted. Roos *et al.* also reported no statistically significant differences in measurements of testicular blood flow parameters or testicular volume.^[21] Elwan *et al.* in their work concluded no significant affection of testicular perfusion, postoperatively.^[22]

Contrasting to our result, Aydede *et al.* established a significant increase in RI of testicular vessels in the early postoperative period.^[23] Besides, Stula *et al.* demonstrated a statistically significant increase in RI of ITA at day 2 postoperatively.^[24]

Conclusion

TEP repair is a safe procedure in an experienced hand, it does not hamper the vascularity of the testes, and care should be taken during a dissection of the hernia sac from the cord structure. Further studies with a bigger sample size and longer follow-up are required to evaluate the long-term effect.

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Conflicts of interest

There are no conflicts of interest.

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