

## **RIVES AND LICHTENSTEIN REPAIR IN INGUINAL HERNIA- A COMPARISON OF POSTOPERATIVE COMPLICATIONS TO KNOW WHETHER RIVES REPAIR IS AS SAFE AS THE GOLD STANDARD LICHTENSTEIN REPAIR**

John S. Kurien<sup>1</sup>, Sandeep Abraham Varghese<sup>2</sup>, Aswith Das<sup>3</sup>, Sansho E. U<sup>4</sup>

<sup>1</sup>Professor and HOD, Department of General Surgery, Government Medical College, Kottayam, Kerala, India.

<sup>2</sup>Assistant Professor, Department of General Surgery, Government Medical College, Kottayam, Kerala, India.

<sup>3</sup>Junior Resident, Department of General Surgery, Government Medical College, Kottayam, Kerala, India.

<sup>4</sup>Associate Professor, Department of General Surgery, Government Medical College, Kottayam, Kerala, India.

---

### **ABSTRACT**

---

#### **BACKGROUND**

Hernia repair surgeries underwent a lot of modifications over time. These modifications were an attempt to reduce the recurrence rate and post-operative complications. Current techniques for Inguinal hernia show similar recurrence rate. Therefore, recurrence is no longer the main issue discussed when considering improving the current standards for groin hernia repair. Post-surgical chronic pain presents a major, largely unrecognized clinical problem. Consequently, there is a need to not only decrease an extensive dissection in the inguinal canal but also to minimize the interaction between the mesh and major surrounding structures. As a result, placing a mesh in the preperitoneal space is a viable option. Likewise, studies have shown that return to normal activity and return to work is comparatively quicker in Rives. In this study I am comparing the post op period complications in Rives and Lichtenstein hernia surgeries to know whether Rives is superior to Lichtenstein's repair.

#### **MATERIALS AND METHODS**

After obtaining approval for the study from Institutional Review Board, written informed consent from 100 male patients planning to undergo elective hernia repair surgery at the General Surgery wards in Government Medical College, Kottayam & who were willing to participate in the study were obtained and randomly allocated into two groups, 50 undergoing Rives hernia repair & 50 Lichtenstein hernia repair. The patients were evaluated and followed up according to the protocol. In early postop period, patients were assessed for pain using a numeric rating scale. Complications like haematoma, seroma, wound infection and early recurrence were compared. Chronic inguinal pain/Inguinodynia is a significant, though under reported problem. Moderate to severe pain persisting more than 3 months should be considered pathological. Inguinodynia, if present was assessed using a numerical scale. Another parameter that was assessed was testicular atrophy. For this preoperative and postoperative testicular volumes were measured using an orchidometer and compared. All the patients were followed up for a period of 3 months postoperatively to assess recurrence, testicular atrophy and Inguinodynia.

#### **RESULTS**

Out of the total 100 patients included in the study, 50 patients were in Rives series and 50 in Lichtenstein series. All the patients were males. Average age of the patients was 53.56 in Rives and 55.08 in Lichtenstein series. There were 49 unilateral hernias and 1 bilateral hernia in Rives series and 48 unilateral hernias and 2 bilateral hernias in Lichtenstein group. Among these, 27 were direct and 23 indirect hernias in Rives series, and 18 direct 31 indirect and 1 pantaloon hernia in Lichtenstein series. The mean immediate post-operative pain score was 3.54 in Rives group and 4.26 in Lichtenstein group. The immediate post-operative pain was significantly low in Rives group with a p value of <.001. There were 2 haematoma cases (4%) in Rives group and 6 in Lichtenstein group (12%). All the cases were managed conservatively. Haematoma cases were more in Lichtenstein group which may be due to increased dissection and mesh fixing sutures in the more vascular subaponeurotic plane compared to relatively avascular preperitoneal space. The difference however is not statistically significant (p=0.307). In Lichtenstein cases there were 6 surgical site infections accounting to 12% which required just letting open the skin clips, irrigation and antibiotics. In Rives group, there were 2 surgical site infection cases accounting to 4%. In our study, there is no significant difference in the incidence of surgical site infection (p=0.14). There were no recurrences in both Rives and Lichtenstein repairs during the study period.

#### **CONCLUSION**

Immediate post-operative pain was significantly less in Rives compared to Lichtenstein. There was no significant difference in other post-operative complications like seroma, haematoma, recurrence, surgical site infection or testicular atrophy. Both Rives and Lichtenstein procedures yield excellent results with almost no recurrence, low post-operative complication rates and good long term outcomes.

#### **KEYWORDS**

Complications, Hernia, Lichtenstein, Mesh, Rives.

**HOW TO CITE THIS ARTICLE:** Kurien JS, Varghese SA, Das A, et al. Rives and Lichtenstein repair in inguinal hernia-a comparison of postoperative complications to know whether rives repair is as safe as the gold standard Lichtenstein repair. J. Evid. Based Med. Healthc. 2018; 5(8), 682-686. DOI: 10.18410/jebmh/2018/138

## BACKGROUND

Inguinal hernia is one of the most common surgical problems that present to a surgeon in his outpatient department, making hernia repair one of the most common operations performed by general surgeons. In Hernia repair, Mesh repair of inguinal hernia is the most common operation performed. Approximately 20 million groin hernioplasties are performed each year worldwide, over 17,000 operations in Sweden, over 12,000 in Finland, over 80,000 in England and over 800,000 in the USA.<sup>1-3</sup> The inguinal Hernia repair is one the cornerstones of general surgery practice. The word 'Hernia' is derived from a Latin term meaning "a rupture". A hernia is defined as a protrusion of a viscus or a part of viscus through an abnormal opening in the walls of its containing cavity.<sup>4</sup> The concept of avoiding tension by onlay mesh repair was championed by Lichtenstein. Lichtenstein theorized that by using mesh prosthesis to bridge the hernia defect rather than closing it with sutures, tension is avoided, ostensibly resulting in a less painful operation.<sup>5</sup> Now Lichtenstein tension free mesh repair is considered as the gold standard of hernia surgery.<sup>6</sup> The preperitoneal space is used by the Rives repair for repair of an inguinal hernia because of the mechanical advantage gained from prosthesis placement behind the abdominal wall. Rives preperitoneal repair makes use of the abdominal pressure to help fix the prosthetic material against the abdominal wall, adding strength to the repair.<sup>7</sup> The idea of this study is to compare the usefulness of Rives preperitoneal mesh repair with the now gold standard Lichtenstein tension free mesh repair and to assess whether there is any added advantage to this repair over the Lichtenstein tension free mesh repair.

## MATERIALS AND METHODS

This prospective study was carried out in the Department of General Surgery, Government Medical College, Kottayam, Kerala after obtaining ethical committee clearance. 100 male patients undergoing elective hernia repair surgery and giving informed consent were included in the study. The study period was from June 2016 to May 2017 for one year. They were allocated into two groups; 50 undergoing Rives hernia repair & 50 Lichtenstein hernia repair. The patients were evaluated and followed up according to the protocol. In early post op period, patients were assessed for pain using a numeric rating scale. Complications like recurrence, hematoma, seroma and wound infection were compared.

*Financial or Other, Competing Interest: None.*

*Submission 01-02-2018, Peer Review 07-02-2018,*

*Acceptance 14-02-2018, Published 19-02-2018.*

*Corresponding Author:*

*Dr. Sandeep Abraham Varghese,  
Villa No. 47, Skyline Palmspring Villas,  
Vadavathoor P.O., Kottayam- 686010, Kerala, India.*

*E-mail: sandeepavarghese@yahoo.com*

*DOI: 10.18410/jebmh/2018/138*



Chronic inguinal pain/Inguinodynia is a significant, though under reported problem. Moderate to severe pain persisting more than 3 months should be considered pathological. Inguinodynia, if present was assessed using a Numerical scale. Another parameter that was assessed was testicular atrophy. For this preoperative and postoperative testicular volumes were measured using an orchidometer and compared. All the patients were followed up for a period of 3 months postoperatively to assess recurrence, testicular atrophy and Inguinodynia.

## RESULTS

Total subjects studied were 100. The mean age among study subjects were 54.32 years with standard deviation of 9.047 years. Minimum and maximum age were 36 years and 73 years respectively.

Side	Surgery				Chi-Square value
	Rives		Lichtenstein		
	No.	%	No.	%	
Right	41	82.0%	41	82.0%	P=0.819 Not significant
Left	8	16.0%	7	14.0%	
Bilateral	1	2.0%	2	4.0%	
Total	50	100.0%	50	100.0%	

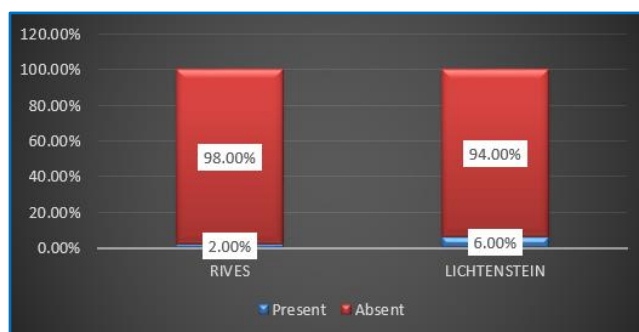
*Table 1. Association between Side and Surgery Type*



**Graph 1. Association between Side and Surgery Type**

Hematoma or Seroma	Surgery				Chi- Square Value
	Rives		Lichtenstein		
	No.	%	No.	%	
Present	1	2.0%	3	6.0%	1.042 P=0.307 Not significant
Absent	49	98.0%	47	94.0%	
<b>Total</b>	<b>50</b>	<b>100.0%</b>	<b>50</b>	<b>100.0%</b>	

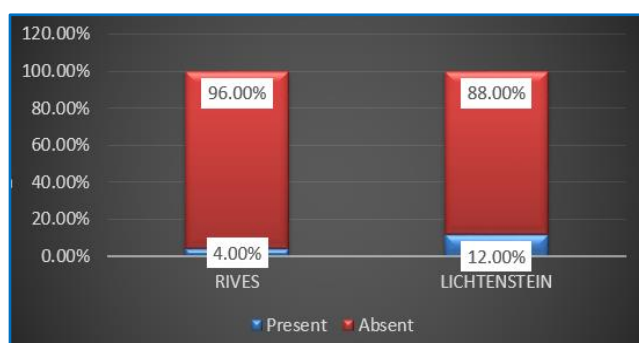
***Table 2. Association between Hematoma /seroma and Surgery Type***



**Graph 2. Association between Hematoma/Seroma and Surgery Type**

Surgical Site Infection	Surgery				Chi-Square Value
	Rives		Lichtenstein		
	No.	%	No.	%	
Present	2	4.0%	6	12.0%	2.174 P=0.14 Not significant
Absent	48	96.0%	44	88.0%	
Total	50	100.0%	50	100.0%	

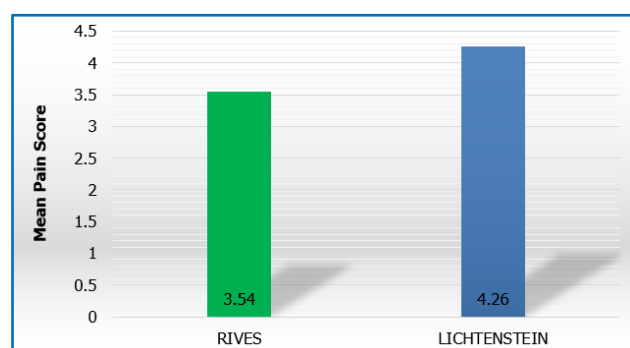
**Table 3. Association between Surgical Site Infection and Surgery Type**



**Graph 3. Association between Surgical Site Infection and Surgery Type**

Variable	Surgery	N	Mean	Std. Deviation	T value
Post-Operative Pain	Rives	50	3.54	.678	-4.385 P<0.001 Significant
	Lichtenstein	50	4.26		

**Table 4. Association between Type of Surgery and Pain Score**



**Graph 4. Association between Type of Surgery and Pain Score**

### Scoring of Post Operative Pain

Numerical scale

0 - No pain

10 - Maximum possible pain.

Severe pain was defined as a score more than 5.

### DISCUSSION

Lichtenstein vs anterior preperitoneal prosthetic mesh placement in open inguinal hernia repair: by R.L Muldoon, K.M Marchant, a prospective randomized trial done in Department of Surgery, Central Arkansas Veterans health care system and University of Arkansas for Medical Sciences, 4301 West Markham, USA showed that both anterior repairs are associated with low post-operative morbidity and recurrence rates, the Lichtenstein repair is technically easier and less time consuming.<sup>8</sup> There is no statistical significant difference in the recurrence rates between the two methods.

As per Simons MP et al, the preperitoneal space is the most suitable site for the insertion of a mesh.<sup>9</sup> because the hydrostatic pressure of the abdominal cavity itself will fix the mesh against the abdominal wall, provided there is sufficient mesh extension (4 cm) around the hernial ring. There is less intra-abdominal pressure on the mesh if it is located in the preperitoneal space due to the smaller radius (Laplace's law). The present study was designed primarily to provide an answer to the question of whether preperitoneal prosthetic placement is better tolerated in primary inguinal herniation than onlay positioning. Secondary end points were other early and late complications. There was no statistical difference between the two study groups in terms of demographics or the type of hernia. Out of the total 100 patients included in the study, 50 patients were in Rives series and 50 in Lichtenstein series. All the patients were males. Average age of the patients was 53.56 in Rives and 55.08 in Lichtenstein series. In the R, L Muldoon study average age of the patients were 60.7 in Read Rives series and 63.3 in Lichtenstein series. There were 49 unilateral hernias and 1 bilateral hernia in Rives series and 48 unilateral hernias and 2 bilateral hernias in Lichtenstein group. Among these 27 were direct and 23 indirect hernias in Rives series and 18 direct 31 indirect and 1 pantaloon hernia in Lichtenstein series.

Enrique J. Grau-Talens et al carried out a prospective study on Rives technique performed on 943 patients (1000 repairs). The mean operative time was 31.8 min. Pain assessment after 24 h gave two patients with intense pain and four patients who thought their state was bad. Surgical wound complications were below 1%, and urinary retention was 1.2% mostly associated with spinal anaesthesia and, in one case, bladder perforation. There was spermatic cord and testicular oedema with some degree of orchitis in 17 patients. The clinical follow-up of 849 repairs (86.4%), mean (range) 30.0 (12–192) months, gave five recurrences (0.6%), three cases (0.4%) of testicular atrophy, and 37 (4.3%) of post-operative chronic pain.<sup>10</sup>

The mean immediate post-operative pain score in our study was 3.54 in Read Rives group and 4.26 in Lichtenstein group. The immediate post-operative pain was significantly lower in Rives group with a p value of <.001. The increased post-operative pain in Lichtenstein group can be attributed to the more dissection and sutures in the subaponeurotic neurovascular plane. These results were comparable to a study conducted in Iran, at Baqiyatallah University in 2010 by Jamal Akhavan Moghaddam et al.<sup>11</sup> who arrived at the

result that post-operative pain was significantly lower in Rives group. In this prospective randomized control trial 126 patients with inguinal hernia were studied with 62 each in Rives and Lichtenstein group.

In our study, there were 2 haematoma cases (4%) in Read Rives group and 6 in Lichtenstein group (12%). All the cases were managed conservatively. Haematoma cases were more in Lichtenstein group which may be due to increased dissection and mesh fixing sutures in the more vascular onlay plane compared to relatively avascular preperitoneal space. The difference however is not statistically significant ( $p=0.307$ ). In the R.L Muldoon study and Jamal Akhavan Moghaddam study there was no significant difference in the incidence of haematoma in the two methods. No cases of chronic groin pain were reported in either study groups. In the R.L Muldoon study and another study published in May 2012 by Wouter Willaert et al.<sup>12</sup> of Department of public health, Ghent university, Belgium, showed less acute and chronic pain in preperitoneal group compared to Lichtenstein group. The increased incidence of chronic pain in Lichtenstein group may be due to increased dissection in onlay neurovascular plane and also due to the constant contact and impingement of the nerves with the foreign body (polypropylene mesh). Erhan et al noted similar incidence of chronic pain in preperitoneal repair and Lichtenstein repair. The incidence rates of chronic pain after Lichtenstein and preperitoneal repair were 6% and 4%, respectively.<sup>13</sup> Sajid et al carried out a meta-analysis of twelve randomized trials evaluating 1437 patients. There were 714 patients in the transinguinal preperitoneal repair group and 723 patients in the Lichtenstein group. Preperitoneal repair was associated with a reduced risk of developing chronic groin pain ( $P<0.02$ ). Incidence of hernia recurrence, postoperative complications and moderate-to-severe postoperative pain was similar in both groups.<sup>14</sup>

Another interesting finding in our study was a comparison of surgical site infection between the two procedures. In Lichtenstein cases, there were 6 surgical site infections accounting to 12%, which required just letting open the skin clips irrigation and antibiotics. In Rives group there were 2 surgical site infection cases accounting to 4%. However, there was no significant difference in the incidence of surgical site infection ( $p=0.14$ ), which may warrant further studies in future.

Koning et al carried out a study comparing preperitoneal mesh repair and Lichtenstein repair. The complications in preperitoneal repair were recurrence ( $n = 1$ ), bleeding (and re-operation) ( $n= 4$ ); 10 patients (4.4%) experienced chronic pain. Persisting sensation loss occurred in 0.9%. Lichtenstein group had recurrence ( $n = 3$ ), bleeding (and re-operation) ( $n=3$ ); 11 Lichtenstein patients (4.1%) experienced chronic pain. Persisting sensation loss occurred in 2.2%. Both groups were comparable with regard to outcomes.<sup>15</sup> There were no recurrences in either Lichtenstein or Rives repair in our study, at least no early recurrences. A long term followup study may be required to know the incidence of recurrence in either of the two groups.

Reid I et al published a series of ten cases of testicular atrophy occurring after hernia repair in nine patients. Identifiable risk factors were found in eight patients.<sup>16</sup> Previous groin or scrotal surgery are a risk factor for testicular atrophy and when indicated, warn the patient before surgery of the increased risk of testicular atrophy. Overzealous dissection of a distal hernia sac, dislocation of the testis from the scrotum into the wound and concomitant scrotal surgery should all be avoided as these are found to be contributing to testicular atrophy and not the type of hernia repair. There is no statistically significant difference in previous studies between Rives and Lichtenstein methods in causing testicular atrophy. There were no cases of testicular atrophy reported in either of my study groups.

## CONCLUSION

Immediate post-operative pain was significantly less in Rives compared to Lichtenstein. There did not appear any significant difference in other post-operative complications like seroma, hematoma, surgical site infection or testicular atrophy. Both Rives and Lichtenstein procedure yield excellent results with no recurrence, low post-operative complication rates and good long term outcomes. Thus, Rives repair for inguinal hernia can be considered as safe as Lichtenstein repair and even superior to it in certain aspects such as postoperative pain.

## REFERENCES

- [1] Heikkinen TJ, Haukipuro K, Hulkko A. A cost and outcome comparison between laparoscopic and Lichtenstein hernia operations in a day-case unit. A randomized prospective study. *Surg Endosc* 1998;12(10):1199-1203.
- [2] Cheek CM, Black NA, Devlin HB. Groin hernia surgery: a systematic review. *Ann R Coll Surg Engl* 1998;80 Suppl 1:S1-S80.
- [3] Rutkow IM. Demographic and socioeconomic aspects of hernia repair in the United States in 2003. *Surg Clin North Am* 2003;83(5):1045-1051.
- [4] Townsend C, Beauchamp RD, Evers BM, et al. Sabiston textbook of surgery: the biological basis of modern surgical practice. 20<sup>th</sup> edn. Philadelphia: Elsevier 2017: p. 1092.
- [5] Lichtenstein IL, Shulman AG, Amid PK, et al. The tension free hernioplasty. *Am J Surg* 1989;157(2):188-193.
- [6] Forte A, D'Urso A, Palumbo P, et al. Inguinal hernioplasty: the gold standard of hernia repair. *Hernia* 2003;7(1):35-38.
- [7] Read RC, Barone GW, Hauer-Jensen M, et al. Properitoneal prosthetic placement through the groin. The anterior (Mahorner-Goss, Rives-Stoppa) approach. *Surg Clin North Am* 1993;73(3):545-555.
- [8] Muldoon RL, Marchant K, Johnson DD, et al. Lichtenstein vs anterior preperitoneal prosthetic mesh placement in open inguinal hernia repair: a prospective, randomized trial. *Hernia* 2004;8(2):98-103.

- [9] Simons MP, Aufenacker T, Bay-Nielsen M, et al. European Hernia society guidelines on the treatment of inguinal hernia in adult patients. *Hernia*. 2009;13(4):343-403.
- [10] Grau-Talens EJ, Ibáñez CD, Motos-Micó J, et al. Rives technique for the primary larger inguinal hernia repair: a prospective study of 1000 repairs. *World Journal of Surgery* 2017;41(10):2480-2487.
- [11] Moghaddam JA, Mehrvarz S, Mohebbi HA, et al. Comparison of "Read-Rives" and "Lichtenstein" repair for treatment of unilateral inguinal hernia. *Koomesh* 2011;13(1):57-61.
- [12] Willaert W, De Baquer D, Rogiers X, et al. Open preperitoneal techniques versus Lichtenstein repair for elective inguinal hernias. *Cochrane Database Syst Rev* 2012;(7):CD008034.
- [13] Erhan Y, Erhan E, Aydede H, et al. Chronic pain after Lichtenstein and preperitoneal (posterior) hernia repair. *Can J Surgery* 2008;51(5):383-387.
- [14] Sajid MS, Craciunas L, Singh KK, et al. Open transinguinal preperitoneal mesh repair of inguinal hernia: a targeted systematic review and meta-analysis of published randomized controlled trials. *Gastroenterology Report* 2013;1(2):127-137.
- [15] Koning GG, Koole D, de Jongh MA, et al. The transinguinal preperitoneal hernia correction vs. Lichtenstein's technique; is TIPP top? *Hernia* 2011;15(1):19-22.
- [16] Reid I, Devlin HB. Testicular atrophy as a consequence of inguinal hernia repair. *Br J Surg* 1994;81(1):91-93.