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Feasibility of Total Extraperitoneal Hernia Repair under Regional Anaesthesia

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Abstract

Context: Laparoscopic hernia repair done under regional anaesthesia, making it as an alternative for general anaesthesia.

Subject and Method: The sample size was about 33 subjects having inguinal hernia, posted for elective laparoscopic total extraperitoneal repair (TEP).

All patients aged 18 years and above, giving valid consent were included in study. While patients not giving consent and having contraindication for regional anaesthesia were excluded from study.

Patient was given spinal in sitting position under all aseptic conditions. After that they were made to lie in head down position, till achievement of sensory block till T6 level. An extra step was taken in form of strapping around the chest, is put to avoid complication due to pneumoperitoneum.

All parameters like anaesthesia time, no. of intraoperative complications, rate of conversion of procedure to open or conversion from spinal to general anaesthesia were noted. Vitals were recorded at 5 minutes interval.

Results: In 87.88 %(29 patients), we were able to achieve adequate level of sensory block (T6), without any complication. All patients underwent laproscopic total extraperitoneal repair successfully. None of them were converted to intraperitoneal approach or open hernia repair.

Due to application of strapping around the chest, chances of shoulder tip pain the known complication of pneumoperitoneum could be lessened. Out of total patients, only 5 were converted to general anaesthesia. Post-operative pain measured by visual analogue scale at 1^{st},6^{th},12^{th} and 24 hours was statistically reduced.

Conclusion: If all the safety measures are taken and extra care taken to avoid complication due to pneumoperitoneum, regional anaesthesia is better and safe alternative to general anaesthesia for laparoscopic procedures.

Keywords: Pneumoperitoneum, Spinal anaesthesia, Laparoscopic extraperitoneal repair TEP, Transabdominal preperitoneal approach TAPP.

Introduction

Groin hernias are the most common condition referred to surgery all over the world and over 5 lakh hernias are performed annually[1]. The lifetime risk for men is 27% and for women its 3%[2]. The laparoscopic approach for hernia was first introduced by Ger, who performed high ligation of sac without mesh replacement[3]. The laparoscopic transabdominal peritoneal approach (TAPP) repair was a revolutionary concept in hernia surgery and was introduced by Arregui[4] and Dion[5] in early 1990's. In 1993, the laparoscopic total extra peritoneal approach (TEP) was reported by Mckeran[6]. the TEP approach allows for mesh replacement with in the peri-peritoneal space without entering the peritoneal cavity.

Although, laparoscopic hernia repair continuous to gain acceptance in the surgical forum, it continuous to be hindered by perceived technical concerns not commensurate with the time-tested open hernia repair. The choice of anaesthesia is among one of the concerns. Besides the cost and chances of recurrence, one perceived disadvantage of the total extra peritoneal laparoscopic hernia repair is, the need for general anaesthesia (GA)[7,8,9]. There were however, incidental reports of the use of epidural and local anaesthesia for TEP[10-13]. These methods, have not gained momentum for various reasons, but they are part of the armamentarium for laparoscopic hernia repair.

So, the purpose of this study was to know the feasibility and safety of Laparoscopic total extra peritoneal inguinal hernia repair under regional or spinal anaesthesia.

Lacunae: a very limited date is available on this topic in India

Methodology

A. Sample size: This prospective interventional study was conducted at department of general surgery PGIMER and DR RML hospital, New Delhi. The sample size included 33 patients from 1st November 2014 to 31st December 2015.

B. Patient selection: All the participants were patients having inguinal hernia (both direct and indirect) reported to department of general surgery, DR RML hospital.

The study included, patients aged 18 years and above, giving valid consent. Also, patients of unilateral or bilateral inguinal hernia or recurrent inguinal hernia following open repair. All patients were ASA grade 1 or 2, with normal airway.

We have excluded all the patients who didn't gave consent, were sensitive of local anaesthetic, patients with a BMI >30, having bleeding diathesis and spinal deformities.

Methodology

Total 33 patients having inguinal hernia coming to general surgery department of RML hospital for undergoing elective laparoscopic TEP were considered for study. Patients were fully evaluated pre operatively. TEP repair was performed according to the conventional (3 port) technique under spinal anaesthesia on these patients. Subsequently the duration of surgery, per operative findings, intra operative complications along with reasons for conversion to general anaesthesia, if any was recorded.

Patients were admitted and their detailed history and clinical examination was carried out. Patients were educated about the procedure i.e., laparoscopic TEP under regional anaesthesia. And about the advantage,

disadvantage, types of anaesthesia and approximate cost of procedure. After taking consent, the patients were investigated thoroughly. Apart from routine investigations, pre-operative evaluation of patients for TEP repair included:

a. cardiac evaluation such as 2D echo
b. pulmonary function test
c. USG of abdomen and pelvis, to rule out prostate enlargement

Anaesthetic Management

Pre anaesthetic medication was standardised for all patients. Each patient received Ranitidine 50 mg IV and Ondansetron 4 mg IV. Pre anaesthetic values of heart rate, mean arterial pressure, respiratory rate, and saturation were recorded. Pre-operatively, about 500 ml of ringer lactate solution was infused in all patients except patients with hypertension. Single dose of prophylactic antibiotic, second generation cephalosporin was given during induction. A nasogastric tube and foley's catheter were inserted, if required.

After applying all the standard monitors, regional anaesthesia in form of combined spinal epidural or only spinal were chosen randomly. For spinal anaesthesia patients were placed in sitting position; after that under all the aseptic conditions, the subarachnoid space was punctured between L2-L3 apophyses with 26 G cut bevel or pencil point needle. After confirming with the backflow of CSF, 3-3.5 ml of 0.5% heavy bupivacaine were injected. The patient was made to lie in the head down position (5-10 degree), to achieve the sensory block up to the level of T6. Level of anaesthesia was checked with pin prick sensation method. Patients were kept in this head down position for 3-5 minutes. Any hypotension was managed with extra IV fluid infusion and bolus dose of injection mephentermine. During the procedure, anxiety was treated by 1mg midazolam, and for pain IV fentanyl @1mcg /kg body weight in bolus form was given. Specific proforma was used to note patient related data, per operative findings and post-operative follow up. During operation, pulse rate, blood pressure, respiratory rate, oxygen saturation, shoulder tip pain, bleeding, and any other difficulty was noted in a table format at 5minutes interval.

We encircled the circumference of the body of the patients at the level of xiphisternum over anterior aspect and at the level of T7 at the posterior aspect, with a pressure belt. Which was inflated just after giving the regional anaesthesia, and before sensory level reaches T6. Pressure was given according to patient's comfort. The purpose of using this compression belt was to prevent and minimise the sub cutaneous emphysema, which may cause shoulder discomfort in the intra operative period. Which may further increase the chances of conversion of regional anaesthesia to general anaesthesia.

Statistical Analysis

Categorical variables were presented in number and percentage. And continuous variable was presented as mean +/-SD and median. Qualitative variables were correlated using chi -square /fisher's extact test. A p value of <0.05 was considered significant.

The data was entered in MS EXCEL spread sheet and analysis was done using statistical package for social sciences (SPSS) version 21.0

Observation and Results

All patients were aged between 20-70 years with a mean age of 46.27 years and median age being 47 years. Out of them 96.97% were male and only 3.03% were female.

Table 1: showing sex distribution of patients

Sex

	frequency	Percentage
Female	1	3.03%
Male	32	96.97%
Total	33	100.00%

There was occupational distribution of chances of hernia among the patients, such as 33.33 % were manual labours and 24.24% were businessman and rest were form other profession. Patients profile was mostly normal in 75.76% cases, but 9.0% were found to be COPD and 3.03% were diabetic and 12.12% were hypertensives.

Table 2: showing co-morbidities of patients

Co-Morbidities

	Frequency	Percentage
COPD	3	9.09%
DM+HTN	1	3.03%
HTN	4	12.12%
N	25	75.76%
Total	33	100.0%

Out of these 33 cases, 11 were given epidural plus spinal and 22 were done under spinal anaesthesia only, by patient's choice. In 87.88% patients (29 patients), we were able to achieve level of sensory block up to T6, and rest 4 patients had little below T6. The operative procedure, TEP was performed in all patients successfully. None of the cases converted to TAPP or open hernioplasty.

Table 3: showing type of regional anaesthesia used

Anaesthesia

	Frequency	Percentage
CSE	11	33.33%
SA	22	66.67%
Total	33	100.00%

Table 4: showing sensory level achieved after regional anaesthesia

Sensory Level Achieved

	Frequency	Percentage
N	4	12.12%
Y	29	87.88%
Total	33	100.00%

Besides pre-operative proper hydration by means of pre loading, 9.09 % cases had hypotensive episode requiring extra infusion of IV fluids or single dose of mephentermine.

Table 5: showing intraoperative hypotension

Hypotension

	Frequency	Percentage
N	30	90.91%
Y	3	9.09%
Total	33	100.00%

Shoulder tip pain which is a known complication of pneumoperitoneum, due to stretching of diaphragm, occurred in 15.15% (5 cases) patients. Out of these 5 patients 3 were converted to general anaesthesia. Rest 2 were managed with mild massage over the shoulder.

Table 6: showing Intraoperative shoulder pain

Shoulder Tip Pain

conversion to general anaesthesia

	N	Y	Total
N	92.86%	7.14%	100.00%
Y	40.00%	60.00%	100.00%
Total	84.85%	15.15%	100.00%

There were 4 patients who developed pneumoperitoneum during the intraoperative period while doing dissection, 2 of them were converted to GA (p value =0.216). Inadequate pre peritoneal space was there in 6 patients out of which 4 cases were converted to GA (p value =0.216). sensory level was below T6 in 5 patients, so they were converted to GA. Over all, out

of 33 patients, 5 cases were converted to GA due to mixed reasons like shoulder tip pain, stretching during dissection, pneumoperitoneum, and low sensory level (below T6).

Post-operative pain was measured on visual analogue scale (VAS) on 1st, 6th, 12th and 24 hours. Maximum no. of patients (6.12%) had post-operative pain after 12 hours. Few had it after 6 hours (5.52%) and 24 hours (4.61%), and very few had within 1st hour (3.21%).

Table 7: Post-Operative Pain Studied On Vas

Post op pain 1 hour	3.21
Post op pain 6 hours	5.52
Post op pain 12 hours	6.12
Post op pain 24 hours	4.61

Nausea, vomiting, postural headache was there in 5 patients, and were treated with extra dose of anti-emetics and good hydration therapy.

Discussion

A study was done by Lal P, Philips P, Saxena KN, Kajla RK, Chander J, Ramteke VK, which says that laparoscopic TEP inguinal hernia repair is a procedure which can be learned with proper training and causes less post-operative pain, better cosmetically and earlier return to work . The one major factor preventing the wide spread acceptance of TEP is the requirement of GA. In contrast, open hernia is performed using local or regional anaesthesia, thereby having the advantage of quicker recovery, decreased post-operative nausea and vomiting, fewer hemodynamic changes, reduced metabolic responses to surgical stress and better muscle relaxation.

Our study was attempted to evaluate whether laparoscopic TEP can be performed under less invasive anaesthesia, such as regional anaesthesia and to determine its feasibility and limitations. Thirty-three patients underwent surgery, the mean operative time was 62.8+/-18(range 40-110 minutes). Around 11 patients were given combined spinal epidural, while 22 patients received spinal anaesthesia only. Five cases were converted to GA due to various reasons. A significant association of success of the procedure was seen with a sensory block till T6 or above or cases with epidural catheter in situ. Prevention and management of pneumoperitoneum and subsequent shoulder tip pain was the key to preventing conversions. There were no significant post-operative complications. Intra op complications were shoulder tip pain, pneumo-peritoneum due to inadequate pre peritoneal space. Here also a significant association of success was found with sensory level T6 and above. Out of 5 converted cases, in 4 sensory level was below T6 (p value =0.0001).

Literature also support spinal anaesthesia as a better alternative to GA (Sinha R, Gurwara AK, Gupta SC). They had comparative control subjects who received GA for TEP.

In our study, hypotension requiring support in 9.09% (3 cases), shoulder tip pain in 15.15% (5 cases), pneumoperitoneum in 12.12% (4 cases), intra operative straining in 18.18% (9 cases), and inadequate pre peritoneal space in18.18% (9 cases). In post-operative period nausea, vomiting noted in 15.15% cases. Sedation was not required in any case. postural headache was seen in 15.15% cases (5 cases).

According to the study by Bruce M, Molinelli MD, Alfonso,30 cases were done under regional anaesthesia with average time of about 17 minutes. None of the patient required foley's catheterisation. There was no patient with spinal headache or transient neurological symptoms. All the patients were satisfied with their anaesthesia technique and pain management.

To date, the literature on TEP performed under spinal anaesthesia remain scarce. The study done by Lau H, Wong C, Chu K and Patil N G, included only 4 patients who were medically unfit for GA. Conversion to open was required in 2 cases, one because of uncooperative movement and other had inadequate neural blockade. Patients were stable in terms of cardiorespiratory issues. Concluded that successful performance of TEP under regional anaesthesia requires the combined efforts of an experienced anaesthetist and a skilled surgeon and also a cooperative patient.

Our experience was different as we didn't have any laparoscopic converted to open, also have not faced any non-cooperation from patients, as they were fully explained about the procedure pre-operatively. There was no block failure, but inadequate level of sensory block was one of the reasons to convert to GA.

Another study done by Chowbey PK, Sood J, Vashishtha A, Sharma A, Khuller R, Baijal M. They performed TEP under epidural anaesthesia in selected patients considered to be high risk or unfit fit GA. Out of their 36 patients ,33 were successfully operated under epidural anaesthesia .In remaining 3 patients , the procedure had to be converted to Lichtenstein's repair due to shoulder discomfort experienced by patient which happened because of pneumoperitoneum created by incidental peritoneal tear . Intra-operative, one patient had bleeding from the inferior epigastric artery, which was controlled with clipping. All the patients who had epidural catheter in place, received a top up dose at the end of surgery for post-operative analgesia. On discharge, mean pain score was 1.2 (+/-0.8), measured by visual analogue scale (VAS). Their 7 patients developed cord induration and scrotal swelling, which was managed conservatively only.

In our study, due to accidental peritoneal tear there was pneumo-peritoneum, causing shoulder pain. We had converted from regional anaesthesia to general anaesthesia. Epidural top up was given in one patient out of 11 cases. That was case, which later converted to GA. The mean pain score in 1st 24 hours was 4.61+/-1.69 on VAS. None of the patient developed cord oedema or scrotal swelling.

Conclusion

In our study, we evaluated the feasibility and safety of laparoscopic TEP of inguinal hernia under regional anaesthesia i.e., spinal or combined spinal epidural on the basis of duration of surgery, intraoperative and post-operative complications, post-operative hospital stay, time taken to resume normal activity and recurrence. From the present study, it is clear that TEP is possible under regional anaesthesia provided a minimal sensory level of T6 is achieved .To achieve that level , an appropriate higher site for epidural catheter insertion and/or adequate intra epidural catheter length needs specific attention .Pneumoperitoneum ,shoulder tip pain, intraoperative straining , and inadequate preperitoneal space are factors whose interplay leads to conversion to GA . We discussed the feasibility of spinal anaesthesia as an option for analgesia in a totally extraperitoneal laparoscopic hernia repair. Regional anaesthesia is not meant to replace general anaesthesia for TEP, but can be used as another tool in the armamentarium of anaesthetic choices. At our institution, GA is the preferred method for TEP. TEP under regional anaesthesia was under learning phase.

The purpose of this study is to demonstrate that laparoscopic hernia repair extra peritoneally can safely and effectively be performed under regional anaesthesia, allowing surgeon and patient a full

complement of analgesia for laparoscopic hernia repairs.

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