

Presentation and Clinical Outcome of Inguinal Hernia in Elderly Adults in 5th Decade or Later: A Prospective Descriptive Study!

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Abstract

Aim: To evaluate the presentation and clinical outcome of inguinal hernias in patients in their fifth decade or later.

Objective: To analyze inguinal hernia in the subset of elderly adults with respect to the type of inguinal hernia, type of surgery, postoperative complications and recurrence.

Material and methods: The present study is a two year prospective descriptive study conducted from July 2015 to Jun 2017. 112 elderly adults in the age group of >50 years of either sex, diagnosed with 'Inguinal Hernia' were included in the study. The patients were initially evaluated in the general surgery outpatient department of a tertiary care hospital and then admitted for surgery. Patients who were <50 years or those who were unwilling for surgery were excluded from the study. Elective surgical treatment was offered in the form of Lichtenstein's tension free mesh hernioplasty or Plug and Patch mesh hernioplasty or laparoscopic TEP (Total Extra-Peritoneal) repair; whereas the patients presenting with direct hernias or both direct and indirect hernia underwent herniorrhaphy also along with mesh hernioplasty. Herniorrhaphy was performed on all complicated inguinal hernias. Polypropylene mesh measuring 15*7.5 cm was employed in tension-free mesh hernioplasty and approximation of conjoint tendon and the inguinal ligament was done with 2-0 polypropylene sutures in herniorrhaphy in order to strengthen the weak posterior wall. The follow-up visits were scheduled at three weeks, six weeks, three months and six months postoperatively.

Results: Maximum number of patients selected in the study belonged to the age group of 61-70 years with a representation of 42 individuals and a share of 37.5% of the included subjects. The oldest patient in the study population was 84 years old. Males constituted 98.2% of subject population with 1.8% female subjects. The most common presenting complaints of the study population were groin swelling (100%) and associated pain over the swelling (54.46%). 48 (42.8%) patients out of the study population had direct inguinal hernia, 53 (47.3%) had indirect inguinal hernia and 11(9.82%) patients harbored both direct and indirect inguinal hernias. 101 (90.18%) patients had unilateral inguinal hernia whereas 11 (9.82%) patients had bilateral hernia. 64 (57.14%) patients with unilateral hernias were on the right side and the rest 37 (33.03%) were on the left side. 8 (7.14%) patients in various age groups had complicated inguinal hernia; whereas 6 (5.35%) patients had evidence of recurrent inguinal hernia. 91 (81.25%) patients suffered from associated co-morbid conditions. 85.71% patients with the diagnosis of uncomplicated inguinal hernia could be operated comfortably under spinal anesthesia. Elective Lichtenstein's tension free mesh hernioplasty was performed on 25 (22.32%) patients, 1 (0.89%) patient with only indirect inguinal hernia underwent Laparoscopic TEP, Plug and patch mesh hernioplasty was performed on 4 (3.57%) patients on elective basis. 74 (66.07%) patients with direct inguinal hernia and both direct+indirect inguinal hernia underwent Herniorrhaphy+Lichtenstein's tension free mesh hernioplasty. 7 (6.25%) patients with irreducible inguinal hernia underwent Herniorrhaphy+Lichtenstein's tension free mesh hernioplasty after reduction of the hernia sac and herniotomy. whereas 1 (0.89%) patient with strangulated inguinal hernia underwent resection of the strangulated bowel segment followed by bowel anastomosis and herniorrhaphy. All recurrent inguinal hernias underwent herniorrhaphy and tension free mesh hernioplasty. The mean hospital stay was 5.57±0.96 days. In the post-operative phase, a total of 23 (20.53%) patients were detected with surgical site infection (SSI), 1 (0.89%) patient with strangulated inguinal hernia and with co-existing COPD had ARDS (Acute Respiratory Distress Syndrome) and SSI. 3 (2.67%) patients in the age group of 61-80 years developed scrotal edema. 3 (2.67%) recurrences were observed and there was no peri/postoperative mortality.

Conclusion: Inguinal hernia is a relatively common surgical ailment in the elderly adults. The challenge of managing this entity becomes complex in the background of multiple associated co-morbid medical conditions. However, an elderly human shall not be denied surgical treatment of his/her inguinal hernia despite presence of a plethora of associated illnesses. The tension free mesh hernioplasty is a feasible, comfortably safe and cost-effective surgical technique for elderly adult population once a comprehensive pre-operative assessment and optimization of co-morbid conditions is done.

Keywords: Inguinal hernia; Elderly adults; Herniorrhaphy; Mesh hernioplasty

Introduction

The abnormal protrusion of an organ or tissue through the walls that contain it is technically referred to as 'Hernia'. The word 'Hernia' is synonymous with the Latin word for 'rupture' [1]. However, the pathophysiology of hernia doesn't signify rupture in its literal sense; it is basically a push of an internal part of body through a weakness in the muscle or surrounding tissue wall. Various sites of the body can undergo a hernia change but the 'inguinal region' remains the most common site

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affected with hernia [1]. The exact etiology for the common occurrence of inguinal hernia probably lies in the natural weaknesses caused by inadequate muscular strength of the posterior wall of the inguinal canal despite the complex design of the abdominal wall [2]. Inguinal hernias constitute nearly 75% of all abdominal wall hernias and 4% of all hernias amongst the elderly individuals [3].

Hernia and its reparative surgery has always been one of the most fascinating domains amongst the surgeons worldwide. The surgical approaches in hernia from the classical operation of Bassini's repair to the presently practiced Lichtenstein's tension free mesh hernioplasty or the newer laparoscopic repair indicate the fundamental progress in the management of hernia [4]. William S Halstead once said that "there is, perhaps, no operation which, by the profession at large, would be more appreciated than a perfectly safe cure for rupture" [4]. Despite the presence of myriad surgical treatment of inguinal hernia, the concept of tension free prosthetic mesh hernioplasty and laparoscopic repair (Total Extraperitoneal Repair) aptly fit in the paradigm of the ideal treatment of inguinal hernia as it is well defined, least traumatic, least expensive and with minimal morbidity [5].

The use of a prosthetic mesh in all groin hernias irrespective of type, etiology or classification has been the transformational change in the management of inguinal hernia. The Lichtenstein's Tension free mesh hernioplasty as the chosen surgical technique for hernia repair has been acknowledged across the world with favourable results, few recurrences and minimal post-operative morbidity [6]. By introducing prosthetic mesh, Lichtenstein showed that inguinal hernias could be repaired without distortion of the anatomy and, most importantly, without any tension along the suture line. In spite of various ramifications in the surgical techniques over the last two decades, Lichtenstein hernia tension free mesh hernioplasty continues to be the gold standard in the management of inguinal hernia by open technique [7]. Few centers also practice the plug and patch repair method of mesh hernioplasty wherein a polypropylene plug shaped cone is deployed into the internal ring after reduction of an indirect hernia sac.

The use of 'Polypropylene' mesh in hernia surgery has become immensely popular in the present surgical arena. A non-absorbable, nonpolar, hydrophobic, electrostatically neutral polymer, Polypropylene is being widely used as component of mesh due to its high tensile strength, least reactivity with implantation and a low propensity for infection [8,9]. However, if used intraperitoneally, polypropylene meshes can induce adhesions among the viscera [10]. The use of polyesters as the desired material for mesh detected flexibility, high tensile strength and high resistance to stretching, but on the contrary, led to frequent fistula formation, high recurrence, increased postoperative infections and degradation in long-term implantation [11,12]. The use of expanded polytetrafluoroethylene (ePTFE) was introduced to hernia surgery by Sher et al. detected to have considerably reduced adhesions formation but if infected, required expulsion [13,14].

As implicated earlier, the conditions that cause an increase in the intrabdominal pressure and loss of abdominal wall strength in the geriatric population are the major determinants of increased incidence of inguinal hernia in the elderly humans. The old age group, short duration of symptomatology coupled with comorbid diseases is the major risk factors which predict complications in elderly adults with groin hernia. Comorbid illnesses in the elderly population such as chronic constipation, prostatism, COPD lead to an indirect increase in the intrabdominal pressure, whereas the natural morphological changes in collagen in them makes the abdominal wall weak [15,16]. Hernia has long been known as 'collagen disease wherein there exists an inherited imbalance in the types of collagen [2].

With advancing age, the need for surgical services also increase and further unwillingness for surgical treatment of groin hernias

leads to complications at some stage. Various authors worldwide have reflected the many folds increase in the mortality and morbidity when such hernias are operated in emergency in the elderly adults [17,18]. It has been observed that adults with giant hernias who have been denying surgery seek medical advice only when they develop intestinal obstruction or incarceration or strangulation of the hernia sac.

The present study evaluates the presentation and clinical outcome of inguinal hernias in patients in their fifth decade or later, so as to analyze this surgical disorder in this subset of elderly adults with respect to the type of inguinal hernia, type of surgery, postoperative complications and recurrence.

Material and Methods

The present study is a two year prospective descriptive study conducted from July 2015 to June 2017. 112 elderly adults in the age group of >50 years of either sex, diagnosed with 'Inguinal Hernia' were included in the study. The patients were initially evaluated in the general surgery outpatient department of a tertiary care hospital and then admitted for surgery. Patients who were <50 years or those who were unwilling for surgery were excluded from the study.

The selected patients underwent the surgical repair of inguinal hernia after thorough clinical and laboratory evaluation. The comorbid illnesses in this subset of patients were thoroughly optimized in both elective and emergency surgeries. Patients who presented with features of complications such as irreducibility, intestinal obstruction, incarceration or strangulation of the hernia sac underwent emergency repair of the hernia after a complete and comprehensive pre-requisite investigations and resuscitation.

The patients undergoing elective surgical management of inguinal hernia underwent a pre-anaesthesia checkup (PAC) in which a suitable ASA grade was allotted to them by the concerned anaesthesiologist. The choice of anaesthesia (general/spinal/regional) was determined by the anaesthesiologist in charge of the patient.

Elective surgical treatment was offered in the form of Lichtenstein's tension free mesh hernioplasty or Plug and Patch mesh hernioplasty or laparoscopic TEP (Total Extra-Peritoneal) repair; whereas the patients presenting with direct hernias or both direct and indirect hernia underwent herniorrhaphy also along with mesh hernioplasty. Herniorrhaphy was performed on all complicated inguinal hernias. Polypropylene mesh measuring 15*7.5 cm was employed in tension-free mesh hernioplasty and approximation of conjoint tendon and the inguinal ligament was done with 2-0 polypropylene sutures in herniorrhaphy in order to strengthen the weak posterior wall. The follow-up visits were scheduled at three weeks, six weeks, three months and six months postoperatively.

All the operated patients were advised to resume light work after the sixth week consultation. The following variables were studied: patient demographics (gender and age), type of inguinal hernia (direct or indirect, complicated or uncomplicated), associated co morbidities, type of surgery, type of anesthesia given, postoperative complications and recurrence.

Results

The surgery for repair of inguinal hernia was performed on 112 patients and the demographic profiles of these patients are as depicted in Table I. Males constituted 98.2% of subject population with 1.8% female subjects.

The age wise presentation of inguinal hernia is depicted in Table II.

As is evident from Table II, maximum number of patients selected in the study belonged to the age group of 61-70 years with a representation of 42 individuals and a share of 37.5% of the included subjects. The oldest patient in the study population was 84 years old.

The professional characteristics of the subject patients revealed 45 (40.17%) individuals as retired military personnel, 38 (33.9%) patients were farmers and the rest 29 (25.89%) patients were manual laborers. These facts reiterate the higher incidence of inguinal hernia among individuals entrusted with physical labor.

The most common presenting complaints of the study population were groin swelling (100%) and associated pain over the swelling (61 patients ~54.46%).

The type of inguinal hernia detected in the study population is as shown in Figure 1. The age wise distribution of direct/indirect/both direct and indirect inguinal hernia/complicated hernia and recurrent hernias depicted in Table III.

A total of 8 (7.14%) patients in various age groups had complicated inguinal hernia; whereas 6 (5.35%) patients had evidence of recurrent inguinal hernia. Maximum complicated hernias and recurrent hernias were observed in the age group of 61-70 years. The nature of complication that occurred in the complicated category was irreducibility (7) and strangulation (1). 48 (42.8%) patients out of the study population had direct inguinal hernia, 53 (47.3%) had indirect inguinal hernia and 11 (9.82%) patients harbored both direct and indirect inguinal hernias. 101 (90.18%) patients had unilateral inguinal hernia whereas 11 (9.82%) patients had bilateral hernia (Figure 2). 64 (57.14%) patients with unilateral hernias were on the right side and the rest 37 (33.03%) were on the left side.

A total of 91 (81.25%) patients suffered from associated co-morbid conditions. The age group of 61-70 and 71-80 years represented the age with maximum co-morbid illnesses. The various co-morbid illnesses that were detected in the subject population of elderly adults are shown in Table IV.

All patients undergoing elective surgery for inguinal hernia underwent a Pre-Anaesthesia Checkup (PAC) by a designated Anaesthesiologist. Patients with co-existing illnesses were thoroughly evaluated and optimized w.r.t the co-morbid conditions prior to the surgery. All patients with complicated inguinal hernia were resuscitated and optimized before the emergency surgery was performed upon them. The type of anesthesia given to the patients undergoing surgery for inguinal hernia is depicted in Table V. 96 (85.71%) patients with the diagnosis of uncomplicated inguinal hernia could be operated comfortably under spinal anesthesia. In the complicated inguinal hernia group, general anesthesia was preferred in 3 (2.67%) patients while the rest 5 (4.46%) were administered spinal anesthesia for surgery.

With respect to the surgical treatment offered to the subject population, elective Lichtenstein's tension free mesh hernioplasty was performed on 25 (22.32%) patients, 1 (0.89%) patient with only indirect inguinal hernia underwent Laparoscopic TEP, Plug and patch mesh hernioplasty was performed on 4 (3.57%) patients on elective basis. 74 (66.07%) patients with direct inguinal hernia and both direct+indirect inguinal hernia underwent Herniorrhaphy+Lichtenstein's tension free mesh hernioplasty. 7 (6.25%) patients with irreducible inguinal hernia underwent Herniorrhaphy+Lichtenstein's tension free mesh hernioplasty after reduction of the hernia sac and herniotomy. whereas 1 (0.89%) patient with strangulated inguinal hernia underwent resection of the strangulated bowel segment followed by bowel anastomosis and herniorrhaphy (Figure 3). All recurrent inguinal hernias underwent Herniorrhaphy and tension free mesh hernioplasty.

In the immediate post-operative phase (<48 hours of surgery), the patients were assessed for presence of pain over the operated site, hemorrhage from the operated site, urinary retention. The pain at the operated site was assessed by VAS (Visual Analogue Scale). A VAS score of >3 was considered as pain that required administration of analgesia. Hemorrhage at the operated site was assessed by direct visualization of

Table I: Demographic profile.

Demographic characteristics	Variables
Age	>50 years
Number of patients	112
Gender: Male	110
Gender: Female	2
Elective surgical repair	104
Emergency surgical repair	8
Recurrent hernias	6

Table II: Age wise presentation of inguinal hernia (n=112).

Age Group (>50 years)	Frequency	Percentage (%)
51-60 years	38	33.93
61-70 years	42	37.5
71-80 years	31	27.68
>81 years	01	0.89

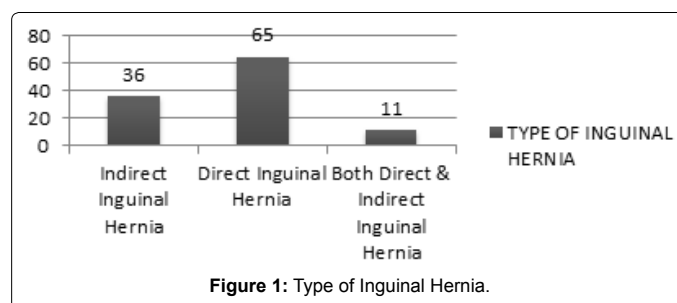


Figure 1: Type of Inguinal Hernia.

soakage of operated site dressings and the patient was diagnosed with urinary retention if he/she could not pass urine spontaneously even after 6 hours of surgery.

The age wise occurrence of pain at the operated site, hemorrhage from the operated site and urinary retention is as shown in Table VI. Patients in the age group of 61-70 and 71-80 years had uncomfortable pain maximally; only 1 patient in the age group of 71-80 years had active hemorrhage from the operated site whereas a total of 12 patients suffered from urinary retention in the immediate post-operative phase.

In the post-operative phase prior to discharge from the hospital, the following variables were assessed: surgical site infection, aggravation of co-morbid illness, scrotal edema. There were a total of 23 (20.53%) patients who were detected with surgical site infection (SSI), 1 (0.89%) patient with strangulated inguinal hernia and with co-existing COPD had ARDS (Acute Respiratory Distress Syndrome) and SSI in the post-operative phase. 3 (2.67%) patients in the age group of 61-80 years developed scrotal edema. The surgical site infections were graded based on Southampton's grading of SSI, wound swab were sent for culture and daily saline dressings were done. Patients detected to have a microbial growth on culture were administered requisite antibiotics and kept on serial follow up.

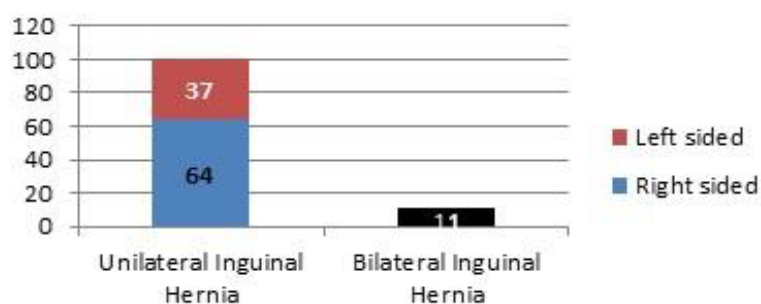
A large number of patients in the study population were discharged from the hospital on the 4th day post-surgery. Hospital stay ranged from 2-7 days, with a mean hospital stay of 5.57±0.96 days. Follow-up visits were scheduled for one week, six weeks, three months and six months postoperatively. There were a total of 3 (2.67%) recurrences of inguinal hernia which was noted at 6 months and 8 months post-surgery. These recurrent inguinal hernias were subsequently evaluated for surgery. None of the patients presented with chronic inguinodynia or testicular hypoesthesia in the long term follow up.

Discussion

Inguinal hernia repair in elderly adults is one of the most commonly performed and least morbid surgeries across the world that is associated

Table III: Age wise distribution: direct/indirect/both direct and indirect inguinal hernia.

Age Group (>50 years)	Number of patients	Indirect inguinal hernia	Direct inguinal hernia	Both direct and indirect inguinal hernia	Complicated hernia	Recurrent hernia
51-60 years	38	27	9	2	2	0
61-70 years	42	17	19	6	5	5
71-80 years	31	9	19	3	1	1
>81 years	01	0	1	0	0	0

**Figure 2:** Laterality of Inguinal Hernia presentation.**Table IV:** Associated co-morbid illnesses.

Co-morbidities	Number of patients	Percentage
Benign prostatic hyperplasia	43	38.39%
Pulmonary ailments		
1. Chronic obstructive pulmonary disease	9	8.03%
2. Bronchial asthma	5	4.46%
Diabetes mellitus	19	16.96%
Cardiac illness		
1. Coronary artery disease	7	6.25%
2. Atrial fibrillation	2	1.78%
Prolapse of intervertebral disc	3	2.68%
Chronic constipation	3	2.68%

Table V: Type of Anesthesia.

Type of inguinal hernia	Type of anesthesia	Number of patients	Percentage (%)
Uncomplicated inguinal hernia	Spinal anesthesia	96	85.71
	Regional anesthesia	4	3.5
	Local anesthesia with sedation	2	1.78
	General anesthesia	2	1.78
Complicated inguinal hernia			
Irreducible inguinal hernia	Spinal anesthesia	5	4.46
	General anesthesia	2	1.78
Strangulated inguinal hernia	General anesthesia	1	0.89

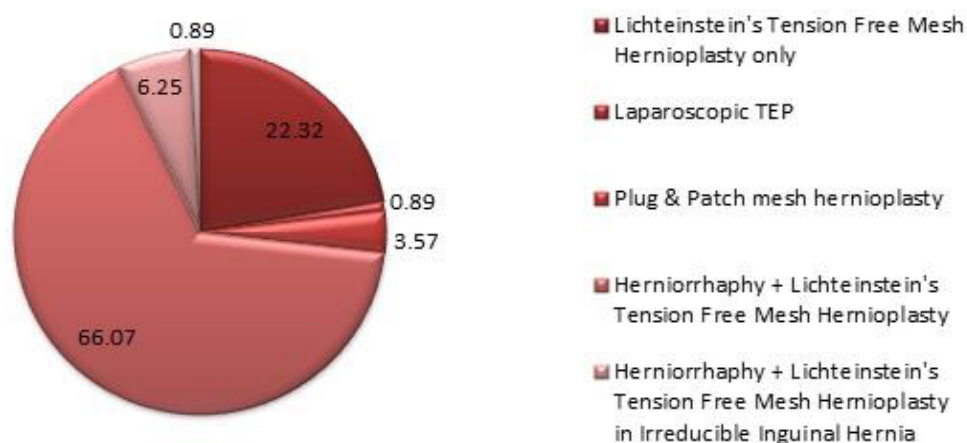
**Figure 3:** Surgeries performed on various categories of inguinal hernia presentation.

Table VI: Post-operative assessment.

Age Group	Number of patients	Pain at operated site (VAS >3)	Hemorrhage from the operated site	Urinary retention
51-60 years	38	11	0	1
61-70 years	42	16	0	4
71-80 years	31	12	1	6
>81 years	01	01	0	1

with good results and minimal morbidity. With the increase in life expectancy, there occurs a parallel increase in the incidence of inguinal hernia in the elderly adult population. In the present era, elective repair of inguinal hernias is being practiced as a low risk surgery, which can be safely performed under general/regional/local anesthesia with minimal complications and low mortality rates [19].

Inguinal hernia account for 75% of all abdominal wall hernias with and has a lifetime risk of 27% in men and 3% in women [3,20]. On analysis of the OPD footfalls in most of the general surgery clinics worldwide, it has been observed that 95% of patients diagnosed with inguinal hernia who present to a surgical clinic are males. There has been a rising trend in the incidence of inguinal hernias in men from 11 per 10000 person years aged 16-24 years to 200 person years aged 75 years or above [21]. The present study also affirms the above facts with 98.21% patients being male and the cumulative incidence of 66.07% in the age group of 61 years and above. In a study by Primatesta and Goldacre [22] on 'Inguinal Hernia Repair: the incidence of elective and emergency surgery', it was detected a 90% surgery rate on men with inguinal hernia. Dabbas et al. [23] reported that surgeries for inguinal hernia were 15 times more common in males than in females.

It is pertinent to realize that even though there is an increased incidence of inguinal hernia in higher age groups; age has got no bearing in elective management of a diagnosed inguinal hernia. Thus the surgical treatment of elective inguinal hernia should be executed promptly once the diagnosis is confirmed following adequate preparation, even in elderly males at extremes of age. Adult population symptomatic with inguinal hernia along with co-morbid illnesses shall also be offered the definite surgery following optimization of the co-existing diseases [24]. The results of this study support with conviction the above mentioned facts.

The presence of co-existing medical conditions in the elderly adults diagnosed with inguinal hernia demands a swift approach in the evaluation of these patients and minimum delay shall be observed before the elective surgical repair is done. It is imperative to realize that such subset of patients need an aggressive optimization of their co-morbid illnesses and necessitate prompt surgical treatment [25]. It is reiterated that patients with inguinal hernia planned for an elective surgical repair shall undergo a comprehensive pre-anesthesia checkup by a designated anesthesiologist and shall be accepted in appropriate ASA (American Society of Anesthesiologists) grade; all patients with complicated inguinal hernia must be optimized and resuscitation. In our study, most of our patients have co-existing co-morbid medical conditions (Table II) which were adequately optimized prior to operation.

A study conducted by Jin and Chung on 'minimizing perioperative adverse effects in the elderly' in states that elderly patients still have the highest postoperative morbidity and mortality in the adult surgical population [25]. The postoperative adverse effects on the cardiac, pulmonary, cerebral systems and on the cognitive function are the main concerns for elderly surgical patients which in turn label them as high risk candidates for surgery. Various studies have defined a strong association between the co-existing medical condition, type of inguinal hernia surgery (elective or emergency), clinical type of inguinal hernia (uncomplicated or complicated) and outcome of surgery for hernias in elderly adults. A study conducted by Arshad et al. on 'Factors influencing mortality and morbidity in elderly population undergoing inguinal

hernia surgery' detected low mortality rates in simple, uncomplicated hernias operated electively compared to delayed, complicated hernias in unfit geriatric population [26]. Inguinal hernia as is evident by its location may occur on left side, right side or both (bilateral). Russel et al. [27] in their chapter on inguinal hernias in Bailey and Love Short practice of surgery 23rd edition have quoted the incidence of right sided inguinal hernia at 55%. Dabbas et al. [23] reflected an incidence of 51% of right sided inguinal hernia in their study. Charles et al. [28] observed that 61.6% of the total inguinal hernias were right sided, 36.8% were left sided and 1.5% patients had bilateral inguinal hernia. The present study also observed a right sided predominance of inguinal hernia with an incidence of 57.14%.

The distribution of inguinal hernia to direct and indirect has been detected to have an 'indirect' preponderance in various studies [29]. Shams et al. [30] observed in his study that 'Indirect inguinal hernias' accounted for 60.3% of all inguinal hernia cases. In our study, the core subject population belongs to elderly adults above 50 years of age. Considering the defined age group of the study population, we detected that 48 (42.8%) patients out of the study population had direct inguinal hernia, 53 (47.3%) had indirect inguinal hernia and 11 (9.82%) patients harbored both direct and indirect inguinal hernias. It is a known fact that incidence of direct inguinal hernia rises with the increase in age. Thus 34.8% patients who were detected with direct inguinal hernia belonged to the age group of 60 years and above.

The development of inguinal hernias among active manual workers is a major occupational problem. In our study, the subject population who developed inguinal hernia was mostly manual laborers/farmers. Kang et al. [31] observed that the rate ratios for hernias (mostly groin hernias) vary considerably within industries and occupations involving manual labor.

Any abdominal wall hernia surgery is prone to have a recurrence and inguinal hernia repair is no exception to this rule. It is estimated that recurrent inguinal hernia form 20% of groin hernia repairs [32]. Jakob et al. [33] observed that the average recurrence rate for inguinal hernia was 3.8% which when subdivided into indirect and direct inguinal hernia, the recurrence rates were 2.7% and 5.2%, respectively. It was also detected in the above study that out of all the commonly occurring hernias, inguinal hernias had 93% reoperations rate. Vincent and Singh [4] observed that recurrence after an inguinal hernia repair may vary from 1% at specialized centers to ~30% in general surveys, which are mostly detected within two to three years of the primary surgery. Failure on the part of surgery leads to an 'early recurrence' of inguinal hernia whereas the late recurrences may sometimes be attributable to tissue failure. In our study, 5.35% of the clientele underwent surgery with primary diagnosis of recurrent inguinal hernia. Out of the total number of surgeries performed, 2.67% patients were observed to have recurrence, which is consistent with above studies.

The surgical technique for an inguinal hernia repair has to be a standardized and simple with minimal dissection. With a plethora of surgical maneuvers now known to a surgeon, the choice of technique may be individualistic. The Lichtenstein's Tension free mesh hernioplasty as the chosen surgical technique for hernia repair has been acknowledged across the world with favorable results, few recurrences and minimal post-operative morbidity [6]. Despite the presence of myriad surgical treatment of inguinal hernia, the concept of tension free prosthetic mesh hernioplasty and laparoscopic repair

(Total Extraperitoneal Repair) aptly fit in the paradigm of the ideal treatment of inguinal hernia as it is well defined, least traumatic, least expensive and with minimal morbidity [5]. There have been several debates on the choice of surgical technique for inguinal hernia repair; open vs. laparoscopic. Literature reviews [34] suggest a relatively lower risk of recurrence (~30-50%) of inguinal hernias, lower degree of post-operative pain and numbness following laparoscopic approach. However laparoscopic approach is associated with longer operation times and higher risk of visceral and vascular injuries. The plug and patch mesh hernioplasty is also one of the widely accepted surgical technique with satisfactory post-operative outcomes and minimal recurrences. In our descriptive study, the inguinal hernia repairs were performed through mostly Lichtenstein's tension free mesh hernioplasty/Herniorrhaphy with tension free mesh hernioplasty. In the present study, elective Lichtenstein's tension free mesh hernioplasty was performed on 22.32% patients, one patient with only indirect inguinal hernia underwent Laparoscopic TEP, Plug and patch mesh hernioplasty was performed on 3.57% patients on an elective basis. 66.07% patients with direct inguinal hernia and both direct+indirect inguinal hernia underwent Herniorrhaphy+Lichtenstein's tension free mesh hernioplasty. 6.25% patients with irreducible inguinal hernia underwent Herniorrhaphy+Lichtenstein's tension free mesh hernioplasty after reduction of the hernia sac and herniotomy. Whereas one patient with strangulated inguinal hernia underwent resection of the strangulated bowel segment followed by bowel anastomosis and herniorrhaphy. Our experience with tension free mesh hernioplasty denotes it as a feasible, comfortably safe and cost-effective surgical technique for elderly adult population.

The choice of anesthesia used for an inguinal hernia repair has a bearing on the outcome post-surgery especially in elderly patients. A multitude of anesthetic techniques are available in the present era. Nehme [35] observed that local anesthesia shall be preferred as the type of anesthesia in elderly patients undergoing an elective inguinal hernia repair. However, despite local anesthesia being associated with least sequela of complications, hypotension and bradycardia have still been reported with it [36]. Van Veen et al. [37] observed no specific benefits with the regional anesthesia techniques in the form of spinal/epidural or combined spinal epidural anesthesia. Instead the incidences of urinary retention and overnight admissions were observed to be high in comparison to local anesthesia. Spinal anesthesia being an invasive technique does carry a low risk of rare neurological side effects [38]. General anesthesia for an inguinal hernia repair is justified and mostly preferred when given in an emergency indication but is associated with longer stay, prolonged post-operative recovery, high risk of cardiopulmonary complications, paralytic ileus and urinary retention [39]. Sanjay and Woodward [40] observed a higher day case rates of inguinal hernia repair with local anesthesia compared to general anesthesia. The author concluded that use of local anesthesia techniques results in augmentation of day case rates of inguinal hernia repairs, has minimal postoperative analgesia needs and is associated with fewer urinary complications. In our study, 85.71% patients with the diagnosis of uncomplicated inguinal hernia could be operated comfortably under spinal anesthesia. In the complicated inguinal hernia group, general anesthesia was preferred in 2.67% patients while the rest 4.46% were administered spinal anesthesia for surgery. Local anesthesia was administered only to 1.78% patients with uncomplicated inguinal hernia. No patient with a complicated inguinal hernia was administered local anesthesia. Higher incidences of large hernias and increased intra-operative pain were the primary reasons for avoidance of local anesthesia in the present study.

Occurrence of pain, neuralgia or surgical site infections in the post-operative phase of an inguinal hernia repair may sometimes have deleterious effects on the overall patient's outcome. Hawn et al. [41] concluded that neuralgia affected all the patient related outcomes

patients with recurrence after open primary inguinal hernia repair had more pain when compared to recurrences after a laparoscopic repair. Inaba et al. [42] observed that 14.7% patients reported pain following surgery for inguinal hernia. However, the frequency of pain was rare in these patients and none had continuous pain. The author [42] concluded that the frequency and intensity of persistent pain or chronic inguinodynia after inguinal hernia repair was neither high nor severe. Taylor et al. [43] observed that 5.3% patients who could be surveyed at 30 day post-operative periods were affected with surgical site infections. Gomathi Shankar et al. [44] observed an overall surgical site infection rate of 8.7% which generally occurred between 7th to 12th post-operative days. In our study, 77.6% patients had an uneventful recovery; 35.7% patients reported 'uncomfortable' pain in the immediate post-operative phase. There was no case of chronic inguinodynia in our study. 20.53% patients were detected with surgical site infection (SSI), one patient with strangulated inguinal hernia and with co-existing COPD had ARDS (Acute Respiratory Distress Syndrome) and SSI in the post-operative phase. 2.67% patients in the age group of 61-80 years developed scrotal edema.

Conclusion

Inguinal hernia is a relatively common surgical ailment in the elderly adults. The challenge of managing this entity becomes complex in the background of multiple associated co-morbid medical conditions. However, an elderly human shall not be denied surgical treatment of his/her inguinal hernia despite presence of a plethora of associated illnesses. It is pertinent to carefully assess such sensitive subset of patients in the pre-operative phase so as to achieve an uneventful recovery in the post-operative phase. The choice of anesthesia must be chosen with a critical view of safety as these elderly adults in their 5th decade or later are quite vulnerable to the side effects of intra operative anesthesia. Elderly patients without major co-existing illnesses are able to bear the stress of surgery, but a serious compromise in the health may occur in the presence of serious concomitant diseases by an acute exacerbation of the disease or an unwarranted complication, which may prolong hospitalization. The tension free mesh hernioplasty is a feasible, comfortably safe and cost-effective surgical technique for elderly adult population once a comprehensive pre-operative assessment and optimization of co-morbid conditions is done. Hence, a holistic approach is advisable and appreciable in the management of inguinal hernia in elderly adults.

Conflict of interest

The authors declare no conflict of interest.

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