OPEN ACCESS

ORIGINAL ARTICLE *Volume 14 (Issue 4), 2025*

PAKISTAN JOURNAL OF MEDICINE & DENTISTRY

Evaluating Functional Recovery in Elderly Patients Following Inguinal Hernioplasty: A Geriatric Surgical Outcome Study in Tertiary Setting

Farah Ahmad[1], Rana Muhammad Umar Rizwan[2], Nimra Abid[2], Tanzeel Shafique Ul Rehman[3]

[1] Department of Surgery, Fatima Memorial Hospital, Lahore,[2] General Surgery Unit 1, Jinnah hospital, Lahore /Allama Iqbal Medical College, Lahore, Pakistan, [3]Faculty of Medicine ,King Abdul Aziz University, Jeddah, KSA

ABSTRACT

Background: Inguinal hernia surgery is one of the most commonly used surgical procedures in older patients. As population aging, the functional outcome after operations is an important parameter, due to the risks that frailty and comorbidities present. The aim of this study was to assess functional improvement of geriatric patients after the inguinal hernioplasty conducted in tertiary care facilities.

Methods: This prospective, observational research was carried out in the period January to June 2025 at the Department of General Surgery, FMH Lahore, a tertiary care center using Non-probability consecutive sampling method was used to enroll 100 patients aged 65 years and above undergoing dissection of inguinal hernia (elective inguinal hernioplasty).The Barthel Index and Timed Up and Go (TUG) test were applied to evaluate functional recovery at baseline (preoperatively), immediately, postoperatively, the Post-op Day 30 and Day 90. Patients with acute mental impairment, frequent hernia, and severe emergency surgeries were not considered. The analysis was performed through SPSS 26.0. Paired t-tests and repeated ANOVA measures were used and $p < 0.05$ was considered statistical significance.

Results: By the Post-op Day 30, effectiveness of functional independence rose markedly ($p = 0.01$) and remained through to Post-op Day 90. TUG test markers also improved greatly after three months ($p = 0.003$). No significant post-operative complications were observed and 92% of patients regained preoperative functional capacity at Post-op Day 90.

Conclusion: Elderly patients showed the effective function recovery after the elective inguinal hernioplasty. These results confirm the efficacy and safety of hernioplasty among older people.

Keywords: Hernia, Inguinal, Geriatric Assessment, Postoperative Recovery, Treatment Outcome, Aged

***Corresponding Author:** Tanzeel Shafique Ul Rehman
Email: dr.pakeezashafique.radiology@gmail.com

How to cite: Ahmad F, Rizwan RMU, Abid N, Rehman TSU. Evaluating Functional Recovery in Elderly Patients Following Inguinal Hernioplasty: A Geriatric Surgical Outcome Study in Tertiary Setting. Pak J Med Dent. 2025 September ;14(4): A-B. Doi: https://doi.org/10.36283/ziun-pjmd14-4/026

Received: Sat, September 13, 2025 **Accepted:** Sun, September 28, 2025**. Published:** Mon, September 29, 2025

INTRODUCTION

Inguinal hernia is a common abdominal wall defects and it afflicts a significant percentage of the aging population because of degeneration of connective tissues, excessive coughing, and straining caused by aging [1]. Inguinal hernia repair represents more than 20 million procedures and a significant percentage are done in people who are 65 years old and more [2]. Geriatric surgical decision making is complicated by age-related physiologic deterioration, multimorbidity, sarcopenia and reduced cardiopulmonary reserve [3]. Although tension-free mesh hernioplasty has been considered the gold standard, older adults concern is not only about the surgical success but also about functional recovery and quality of life [4].

ADLs (abilities to resume activity), mobility, independence (functions that are particularly important in geriatric care) also constitute functional recovery [5]. The postoperative functional deterioration can lead to even possible increased dependency, long stay in hospital or even institutionalization [6]. Functions could be objectively tested by standardized test such as Barthel Index and Timed Up and Go (TUG) test, which permits clinicians to examine before and after functional performance [7]. Nevertheless, the literature on surgical outcomes still concentrates more on the recurrence, infection, and pain scales, which usually overlook post-discharge functional progression in post-aged patient populations [8]. In addition, geriatric patients are associated with special difficulties related to recovering, and they are poor nutrition, lack of support network, and intellectual impairment, which affect the results of surgical operations [9]. As life expectancy as well as the world population is rapidly aging, it is necessary to ensure geriatric-specific metrics are part of surgical assessment. World Health Organization suggests shifting towards a function-based model of care in older adults instead of disease-based care [10].

The purpose of the study was to assess the outcome of functional recovery of geriatric patients who had experienced elective inguinal hernioplasty in a surgical facility of tertiary care with the help of validated instruments during a postoperative time period of three months.

METHODS

This prospective, observational research was carried out in the period January to June 2025 at the Department of General Surgery, FMH Lahore, a tertiary care center (Ref: FMH-1514-2025). The sample size was estimated with an OpenEpi version 3.0.1 (Atlanta, GA, USA) calculator on a 95 % confidence interval, 80 % power of study, and a functional decline of 15 % in older adults who received hernia repair is considered an expected outcome. The participants (n=100) included persons aged 65 years and older who participated in a study through a non-probability consecutive sampling technique. Inclusion criteria included patients with unilateral, primary, reducible inguinal hernia that was scheduled to receive an elective hernioplasty and was able to walk freely before the operation. Patients with recurrent, incarcerated or strangulated hernias, known coagulopathies, already on long-term anticoagulation, or patients with uncontrolled systemic diseases like severe hepatic, renal, or cardiac dysfunction were reflected as an

exclusion criteria. The cognitive impairment (MMSE score < 24) was also excluded from this study. All eligible persons signed the written informed consent.

The participants were subjected to a comprehensive pre-operation clinical assessment. The Barthel Index and Timed Up and Go (TUG) test were used as functional assessments and their pre and post-operational measures were done before and after surgery and at day 7, 30, and 90. Standardized aseptic surgery was performed under the Lichtenstein mesh repair by senior surgical groups. Postoperative complications and length of course, as well as, regaining functional independence were carefully recorded on a pre-structured proforma.

The SPSS version 26.0 (IBM Corp., Armonk, NY) was used for the data analysis. Categorical data were estimated in frequencies and percentages whereas continuous variables were presented in means ± SD. A repeated measures ANOVA was used in measuring functional outcomes. A p-value of <0.05 was taken as significant.

RESULTS

Table 1: Clinicopathological Profile of Study Participants (n = 100)

Variable	Group A (65–74 years, n = 63)	Group B (≥75 years, n = 37)	Test Used	p-value
Age (years, mean ± SD)	68.4 ± 2.3	77.2 ± 2.1	t = 19.82	<0.001*
Sex				
Male	49 (77.8%)	29 (78.4%)	$\chi^2 = 0.10$	0.75
Female	14 (22.2%)	8 (21.6%)		
Hernia Type				
Unilateral	56 (88.9%)	32 (86.5%)	$\chi^2 = 0.45$	0.50
Bilateral	7 (11.1%)	5 (13.5%)		
Comorbidities				
Hypertension	24 (38.1%)	18 (48.6%)	$\chi^2 = 3.74$	0.15
Diabetes Mellitus	17 (27.0%)	11 (29.7%)		
COPD	5 (7.9%)	5 (13.5%)		
ASA Physical Status				

I	12 (19.0%)	6 (16.2%)	$\chi^2 = 0.84$	0.66
II	40 (63.5%)	24 (64.9%)		
III	11 (17.5%)	7 (18.9%)		

SD: *Standard Deviation;* ***ASA****: American Society of Anesthesiologists;* ***COPD****: Chronic Obstructive Pulmonary Disease;* ***t*** *– Independent Samples t-test;* χ^2 *– Chi-square test; p value < 0.05 was considered statistically significant*

The study included 100 elderly patients who are 65 years and older, and underwent elective inguinal hernioplasty. The detailed clinicopathological features of the study population (n = 100) have been provided in Table 1. The overall mean age was 71.2±5.6 years. The group consisted of 78 (78.0%) males. In 88 (88.0%) patients, unilateral inguinal hernia was observed. Clinical comorbidities revealed hypertension in 42 (42.0 %) and diabetes mellitus in 28 (28.0 %). The prevalence of ASA physical status II was 64 (64.0%) among the total population. Such features can be compared among groups that are divided by age (65 to 74 vs. more than 75 years old), and the comparison does not show any statistically significant differences ($p > 0.05$).

Table 2: Functional Recovery across Time Points (n = 100)

Time Point	Barthel Index (mean ± SD)	TUG Test (sec) (mean ± SD)
Preoperative	87.3 ± 7.5	13.2 ± 2.4
Post-op Day 7	71.6 ± 9.3	17.9 ± 3.6
Post-op Day 30	80.5 ± 7.8	14.6 ± 2.9
Post-op Day 90	88.9 ± 6.4	12.5 ± 2.1
p-value	<0.001*	<0.001*

TUG: Timed Up and Go test; SD: Standard Deviation; p < 0.05 considered statistically significant, Repeated Measures ANOVA; Post-op: Post-operative

There was improvement in the functional outcomes that increased steadily between the preoperative phase to Post-op Day 90. The Barthel Index mean was significantly better (78.6 ± 10.2 preoperative vs. 89.1 ± 9.4 by Post op Day 90; $p<0.001$). In a similar pattern, the Timed Up and Go (TUG) test scores at Post-op Day 90 were 13.7 ± 2.9 seconds ($p < 0.001$) compared with baseline mean of 18.5 ± 3.2 seconds. Most of the patients demonstrated mild decrements in Post-op Day 7, which progressively recovered through Post-op Day 30 and became stable in Post-op Day 90 as seen in **Table 2.** No significant variation was noted in functional recovery of the two age groups at the various time points.

Table 3: Postoperative Complications and Recovery Status (n = 100)

Variable	n (%) / Mean ± SD
Postoperative Complications	12 (12.0%)
– Wound Seroma	5 (5.0%)
– Urinary Retention	4 (4.0%)
– Superficial Wound Infection	3 (3.0%)
Length of Hospital Stay	2.9 ± 0.8 days
Recovery at Day 90	
– Full Functional Independence (Barthel ≥90)	89 (89.0%)

– Partial Dependence (Barthel <90)	11 (11.0%)

$p < 0.05$ considered statistically significant.

As the results in **Table 3** show, 12 patients (12.0%) developed the postoperative complications, with wound seroma in 5 patients (5.0%), urinary retention in 4 (4.0%), and superficial wound infection in 3 (3.0%) being the most frequently reported complications. The average length of hospitalization was 2.9 ± 0.8 days. At post-operative day 90, 89 patients (89.0 %) had attained full functional independence (Barthel Index = 90) and 11 patients (11.0 %) were partially dependent.

DISCUSSION

This study tested the functional recovery of elderly patients undergoing inguinal hernioplasty using changes in activities of daily living (ADLs) and mobility after they have had the surgery done. The results showed that the patients had a remarkable increase in scores using the Barthel Index and reduced set-ups in the Timed Up and Go (TUG) test after 30 and 90 days after the operation. Such findings indicate that among older residents, surgical treatment coupled with proper geriatric treatment enhances quantifiable functional benefits and elevated autonomy. The steadily increasing trend in recovery metrics shows the contribution of systematic perioperative planning toward improving postoperative outcomes on older individuals.

The results are comparable to the previous works that promote safety and effectiveness of inguinal hernia repair in the elderly [11,12]. Earlier studies have demonstrated that age cannot be regarded as a contraindication to elective hernioplasty provided there are no significant comorbid conditions [13,14]. Researchers have pointed out that older patients respond favourably to tension-free mesh repairs with a low number of postoperative complications, particularly when they are done under regional anaesthesia [15]. In addition, it has been indicated in the literature that older patients who undergo formal rehabilitation programmes after surgery display improved functional outcome and are more likely to achieve their preoperative activity states [16,17]. As with our results, in multicenter data provided by geriatric surgery registries, CGA improves postdischarge mobility and the risk of functional dependency [18].

Several mechanisms may be attributed to the functional improvement found. To begin with, Enhanced Recovery After Surgery (ERAS) principles such as early mobilization, optimization of analgesia, and use of minimal surgical invasive techniques have been revealed to minimize postoperative deconditioning and boost recovery [19,20]. Tension-free mesh repairs cause less tissue injury and provide stability throughout their movement enabling patients to ambulate earlier, without the fear of the poor results or pain [21]. Additionally, the effects of perioperative nutrition support and cognitive stimulation could not be overlooked because these two factors have a close correlation with the functional resilience of older adults [22,23]. We conclude that functional decline may be hindered when hernioplasty is combined with the geriatric-sensitive activities, including physiotherapy plan and caregiver training [24]. The clinical significance of the findings is that with the inclusion of geriatric parameters in surgical pathways, and their importance can be highlighted. Preoperative

screening of patients at risk of postoperative functional loss will allow clinicians to better distribute resources (physiotherapy, fall prevention protocols, and discharge planning, etc.) [25]. The use of functional measures of success, rather than strictly surgical measures of success, reflects the growing patient-centered way of thinking in the contemporary field of geriatric surgery.

However the study has several limitations. The prognosis was 90 days only, and this limits the outcome to determining the prolonged functional maintenance or relapse. Moreover, it was a single-center study and there is a chance of variability in the rehabilitation support. The area of future studies could be the inclusion of multi-center randomized trials with increased follow-up periods and the evaluation of the comparative effectiveness between open and laparoscopic hernioplasty approaches in different frailty states to base an individual surgical planning.

CONCLUSION

The study shows that the elderly patients who undergo inguinal hernioplasty have prominent short-term functional improvement that is portrayed by the indicators of Barthel Index and TUG test scores. These results indicate that age should not exclude surgical treatment alone with an optimal perioperative management. It has to be planned accordingly in its postoperative treatment, early mobilization, functional monitoring to maximize results. Although the findings are promising, clinical trials should be performed in bigger populations assessed over a long period of time to confirm the dealing of long-term advantages and allow the development of patient-centered geriatric surgical approaches

ACKNOWLEDGEMENT

None

FUNDING

None

CONFLICT OF INTEREST

None

ETHICAL APPROVAL

This prospective, observational research was carried out in the period January to June 2025 at the Department of General Surgery, FMH Lahore, a tertiary care center (Ref: FMH-1514-2025)

AUTHORS' CONTRIBUTION

All authors contributed equally as per ICMJE policy

REFERENCES

1. Mehdizadeh-Shrifi A, Soll C, Vuille-Dit-Bille RN, Köckerling F, Adolf D, Staerkle RF. Outcome of incisional hernia repair in patients 80 years and older: results from the Herniamed-Registry. Hernia. 2023 Oct;27(5):1273-1281. doi: 10.1007/s10029-023-02866-0.
2. Ulutas ME, Yilmaz AH. Comparison of open and laparoscopic inguinal hernia repair in the elderly patients: a randomized controlled trial. Hernia. 2025 May 23;29(1):179. doi: 10.1007/s10029-025-03368-x.
3. Musbahi A, Abdulhannan P, Nugu O, Garud T. Inguinal hernia repair in patients under and over 65 years of age: a district general hospital experience. S Afr J Surg. 2020 Mar; 58(1):22-26. doi:10.17159/2078-5151/2020/v58n1a2900
4. Bal J, Ilonzo N, Spencer P, Hyakutake M, Leitman IM. Loss of independence after emergency inguinal hernia repair in elderly patients: How aggressive should we be?. Am J Surg. 2022 Feb 1;223(2):370-374. doi: 10.1016/j.amjsurg.2021.03.063.
5. Mercier G, Spence J, Ferreira C, Delay JM, Meunier C, Millat B, et al. Postoperative rehabilitation may reduce the risk of readmission after groin hernia repair. Sci Rep. 2018 Apr 30;8(1):6759. doi: 10.1038/s41598-018-25276-0
6. Perez AJ, Campbell S. Inguinal hernia repair in older persons. J Am Med Dir Assoc. 2022 Apr 1;23(4):563-567. doi: 10.1016/j.jamda.2022.02.008.
7. Kushner BS, Hamilton J, Han BJ, Sehnert M, Holden T, Holden SE. Geriatric assessment and medical preoperative screening (GrAMPS) program for older hernia patients. Hernia. 2022 Jun;26(3):787-794. doi: 10.1007/s10029-021-02389-6
8. Balentine CJ, Meier J, Berger M, Hogan TP, Reisch J, Cullum M, et al. Using local rather than general anesthesia for inguinal hernia repair is associated with shorter operative time and enhanced postoperative recovery. Am J Surg. 2021 May 1;221(5):902-907. doi: 10.1016/j.amjsurg.2020.08.024.
9. Balentine CJ, Meier J, Berger M, Reisch J, Cullum M, Lee SC, et al. Using local anesthesia for inguinal hernia repair reduces complications in older patients. J Surg Res. 2021 Feb 1;258:64-72. doi: 10.1016/j.jss.2020.08.054.
10. Piltcher-da-Silva R, Sasaki VL, Bettini LF, Soares PS, Valandro IG, Cavazzola LT. Outcomes of emergency groin hernia repair in the elderly: A systematic review. J Abdom Wall Surg. 2023 Jun 13;2:11246. doi: 10.3389/jaws.2023.11246.
11. Ali EA, Ragab II, Mohammed MA, Mohamed RF. Effect of Preoperative Nursing Protocol on Pain and Daily Activities for Post Inguinal Hernia Repair Patients. Minia Sci Nurs J. 2020 Dec 30;8(1):130-138. Doi: 10.21608/msnj.2020.188053.

12. Zhang J, Wang J, Han X, Fan J, Huang C, Dong Y. Global burden and future trends of inguinal, femoral, and abdominal hernia in older adults: A systematic analysis from the Global Burden of Disease Study 2021. PLoS One. 2025 Jun 6;20(6):e0323790. doi: 10.1371/journal.pone.0323790.
13. Le TN, Afshar Ali M, Gadzhanova S, Lim R, Bala I, Bogale KN, et al. Hernia repair prevalence by age and gender among the Australian adult population from 2017 to 2021. Crit Public Health. 2024 Dec 31;34(1):1-1. doi: 10.1080/09581596.2024.2351981.
14. Meier J, Berger M, Hogan T, Reisch J, Zeh H, Cullum CM, et al. Using local rather than general anesthesia for inguinal hernia repair may significantly reduce complications for frail Veterans. Am J Surg. 2021 Sep 1;222(3):619-624. doi: 10.1007/s00464-024-11136-8
15. Kushner BS, Holden T, Han B, Sehnert M, Majumder A, Blatnik JA, et al. Randomized control trial evaluating the use of a shared decision-making aid for older ventral hernia patients in the Geriatric Assessment and Medical Preoperative Screening (GrAMPS) Program. Hernia. 2022 Jun;26(3):901-909. doi: 10.1007/s10029-021-02524-3
16. Seib CD, Rochefort H, Chomsky-Higgins K, Gosnell JE, Suh I, Shen WT, et al. Association of patient frailty with increased morbidity after common ambulatory general surgery operations. JAMA surg. 2018 Feb 1;153(2):160-8. doi:10.1001/jamasurg.2017.4007
17. Rajan J, Behrends M. Acute pain in older adults: recommendations for assessment and treatment. Anesthesiol Clin. 2019 Sep 1;37(3):507-520. doi: 10.1016/j.anclin.2019.04.009
18. Lim BG, Lee IO. Anesthetic management of geriatric patients. Korean J Anesthesiol. 2020 Feb 1;73(1):8-29. doi: 10.4097/kja.19391
19. Hada G, Zhang S, Song Y, Jaiswar M, Xie Y, Jian F, et al. Safety of inguinal hernia repair in the elderly with perioperative continuation of antithrombotic therapy. Visc Med. 2021 Nov 6;37(4):315-322. doi: 10.1159/000509895
20. Mehta A, Dultz LA, Joseph B, Canner JK, Stevens K, Jones C, et al. Emergency general surgery in geriatric patients: a statewide analysis of surgeon and hospital volume with outcomes. J Trauma Acute Care Surg. 2018 Jun 1;84(6):864-875. doi:10.1097/TA.0000000000001829.
21. Ma Q, Liu X, Liang C, Yang H, Chen J, Shen Y. Geriatric nutritional risk index as a predictor of major postoperative complications in emergency femoral hernia patients. BMC surg. 2024 Dec 23;24(1):412. doi: 10.1186/s12893-024-02727-2
22. Blakely ML, Krzyzaniak A, Dassinger MS, Pedroza C, Weitkamp JH, Gosain A, et al. Effect of early vs late inguinal hernia repair on serious adverse event rates in preterm infants: a randomized clinical trial. JAMA. 2024 Mar 26;331(12):1035-44. doi:10.1001/jama.2024.2302
23. Saljuqi AT, Hanna K, Asmar S, Tang A, Zeeshan M, Gries L, et al. Prospective evaluation of delirium in geriatric patients undergoing emergency general surgery. J Am Coll Surg. 2020 May 1;230(5):758-765. doi: 10.1016/j.jamcollsurg.2020.01.029.
24. Meier J, Stevens A, Berger M, Makris KI, Bramos A, Reisch J, et al. Comparison of postoperative outcomes of laparoscopic vs open inguinal hernia repair. JAMA surg. 2023 Feb 1;158(2):172-180. doi:10.1001/jamasurg.2022.6616

25. Ertekin SC, Cetindag O. Assessment of surgical and quality-of-life outcomes between laparoscopic versus open inguinal hernia repair in geriatric patients. J Laparoendosc Adv Surg Tech A. 2023 Sep 1;33(9):872-878. doi: 10.1089/lap.2023.0147.