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Comparison of Long-term Changes in Pain and Depression after Major Elective Surgeries Among Seriously Ill Older Adults

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ABSTRACT

Background: Major elective surgeries are critical interventions that can significantly influence the trajectory of health and quality of life for seriously ill older adults. **Objective:** To evaluate the long-term changes in pain, depression, functional status, and informal caregiving burden in older adults undergoing major elective surgeries. **Methods:** This retrospective observational was conducted at Gomal Medical College, Dera Ismail Khan, Pakistan, from 1st September 2023 to 31st August 2024. Data were collected from 150 patients aged > 55 years. Baseline assessments are conducted before surgery to establish initial measures of pain, depression, functional status, and caregiving burden. Patients and caregivers participate in structured interviews and complete validated questionnaires during these assessments. **Results:** Pain severity decreased significantly from a baseline mean of 6.2 (±1.5) to 3.1 (±1.4) at 12 months, though 20% of patients reported persistent moderate to severe pain. Depression initially worsened but improved by 12 months, with only 15% of patients exhibiting symptoms. Functional independence improved in 80% of patients by 12 months, exceeding baseline levels in 25%. Caregiving burden peaked at 1 month and declined gradually but remained slightly elevated in 20% of cases at 12 months. Higher baseline pain and depression scores were associated with poorer outcomes. **Conclusion:** Major elective surgeries result in significant improvements in pain, depression, and functional status, but persistent challenges necessitate targeted interventions. Supporting both patients and caregivers is crucial to optimizing long-term outcomes.

INTRODUCTION

Major elective surgeries are critical interventions that can significantly influence the trajectory of health and quality of life for seriously ill older adults. Examples are joint replacement operations, cardiovascular procedures, and abdominal operations which are usually done to correct crippling conditions and enhance human mobility [1]. However, as they seek to improve quality of life, these interventions are not without risks, particularly in older patients who frequently have other comorbid conditions, other chronic diseases, and other multiple vulnerabilities [2]. The effects of these surgeries on chronic pain, depression, functional status, and, the burden of care on patients and their families in the long run are unknown, even though, both potential and inherent impacts are phenomenal. Major surgery poses further special demands for the elderly for rehabilitation. Aging and the presence of comorbidities along with the toll that surgery takes on the overall body makes the recovery process longer, while the risk of post-surgical complications remains high. Chronic postoperative pain which is not uncommon poses a hindrance to mobility, and early rehabilitation and may worsen depressive symptoms or even trigger new onset [3]. Depression, in its primary or secondary form, can worsen prognosis because it affects motivation, treatment compliance, and general physical endurance.

Therefore, regarding the post-surgery implications of operation on physical as well as psychological well-being it becomes crucial to develop adequate health management plans. Chronic, life-threatening illness that results in a negative impact on the patient's functional status, and quality of life, or those that are too demanding on caregivers is referred to as serious illnesses While palliative care focuses on the symptomatic care and supportive care, enhancing the quality of life of patients with serious illnesses, as well as their families. Practice parameters proposed by national consensus involve the use of palliative care for patients and their families across the disease trajectory [4].

Other important care considerations after significant voluntary surgeries in elderly patients include functional decline. Even though this kind of treatment is usually performed for elective and reconstructive purposes as much as it could help patients regain or improve their physical abilities, patients frequently exhibit long durations of a sedentary existence [5]. Such may be due to complications, slow healing, or pre-operative co-morbid conditions that surgery to worsen. Losses in FID have not only an impact on the patient's QoL but are also burdensome for informal carers which are usually family members or friends. Hospitals know that caregiving needs tend to escalate in the postoperative period since it takes additional physical, monetary, and emotional effort. This may result in caregiver stress, family relationship stress, and financial stress which act as implications for evaluating the overall welfare of elective surgeries [6]. Bereaved informal caregiving is an essential segment of the recovery process measurement in older adults with serious illnesses. Professional caregivers offer companionship and help in carrying out tasks such as bathing, dressing, organizing medication schedules, and accompanying patients to appointments among other responsibilities. However, the experiences indicate that caregiving demands rise after the surgery since a patient might need more time to heal from pain, immobility, or other related conditions. These additional tasks can make a huge impact on the health, financial, and social status of the caregiver. It is important to consider how and when such procedures change the need for care for patients and their caregivers and therefore when and how these can be designed to meet their needs [7].

Prior studies comparing the symptom burden of older and seriously ill adults have reported pain and depression rates ranging between 36%–55% and 5%–30% among community-dwelling older population and nursing home residents respectively. These symptoms have been linked with caregiver burden and greater hospitalization, emergency department presentations, and transfer to a nursing home [8]. In surgical patients, preoperative pain and depression were found to be predictors of poor postoperative outcomes, such as persistent pain, longer hospital stays, and increased complications. Both access to palliative care and some end-of-life interventions have been proven to alleviate pain, lower levels of depression, and decrease caregiver stress. However, these issues remain largely understudied about the long-term implications of elective surgery in LT OA patients, with much emphasis on utilizing quantitative and health outcomes constructs such as mortality or readmission instead of focusing on patient-reported outcomes such as pain, depression, and functional dependence [9]. Likewise, the concerns of caregivers for the patient are often relegated to the background even though these individuals may spend a lot of time with a patient who has undergone an operation [10].

OBJECTIVE

The main objective of the study is to find the comparison of long-term changes in pain and depression after major elective surgeries among seriously ill older adults.

METHODOLOGY

This retrospective observational was conducted at Gomal Medical College, Dera Ismail Khan, Pakistan, 1st September 2023 to 31st August 2024. Data were collected from 150 patients aged >55 years.

Inclusion Criteria

- Age > 55 years.
- Diagnosis of a serious chronic illness such as cardiovascular disease, chronic obstructive pulmonary disease (COPD), or osteoarthritis.
- Scheduled for major elective surgery.
- Availability of an informal caregiver willing to participate in the study.

Exclusion Criteria

- Cognitive impairment that precludes informed consent.
- Emergency or non-elective surgeries.
- Absence of an identified informal caregiver.

Data Collection

Baseline assessments are conducted before surgery to establish initial measures of pain, depression, functional status, and caregiving burden. Patients and caregivers participate in structured interviews and complete validated questionnaires during these assessments. Both patients and their identified informal caregivers are included in the study. Data is collected at baseline (pre-surgery) and at 1 month, 3 months, 6 months, and 12 months post-surgery. Both patients and their informal caregivers provide data, ensuring a comprehensive understanding of postoperative dynamics. The quantitative data collected from the patient has measurements of pain by using the Brief Pain Inventory (BPI), depression by the Geriatric Depression Scale

(GDS), functional status using Katz Index of Independence in Activities of Daily Living (ADL) and the Lawton Instrumental Activities of Daily Living (IADL) scale. Data on caregivers is measured by the Zarit Burden Interview for caregiving burden, the Self-Care Inventory for emotional health, and time logs of the days the caregivers spent caregiving. Screenings are done at baseline prior to surgery to obtain the first values of self-reported pain, depression, function and caregiver load. Visible assessment occurred through proxy observation of patients and other caregivers through structured interviews in addition to administering and scoring standardized questionnaires. Subsequent evaluations are made one month, three months, six months and twelve months after the operation to record the progress made and signs of development.

Data Analysis

Data were analyzed using SPSS v26. Quantitative data were analyzed using descriptive statistics to summarize baseline characteristics and mixed-effects regression models to evaluate changes in pain, depression, functional status, and caregiving burden over time.

RESULTS

Data were collected from 150 patients, with a mean age of 62.8± 6.1 years, predominantly female (58%). Most patients were married (65%) and had a college-level education or higher (60%). Common surgeries performed included joint replacements (45%), cardiovascular procedures (35%), and abdominal surgeries (20%). Hypertension (65%), diabetes (40%), and COPD (25%) were the most prevalent chronic conditions. At baseline, patients reported moderate pain (mean BPI score: 6.2 ± 1.5) and mild to moderate depression (mean GDS score: 8.7 ± 2.3), with only 40% being functionally independent.

Table 1

Baseline Characteristics of Patients and Caregivers

Characteristic	Value
Total Number of Patients	150
Age (Mean ± SD)	62.8 ± 6.1 years
Gender	Male: 42% (63), Female: 58% (87)
Marital Status	Married: 65%, Widowed: 20%, Other: 15%
Education Level	High School or Less: 40%, College or Higher: 60%
Common Surgeries	Joint Replacement: 45%, Cardiovascular: 35%, Abdominal: 20%
Chronic Conditions	Hypertension: 65%, Diabetes: 40%, COPD: 25%
Preoperative Pain Score (BPI, Mean ± SD)	6.2 ± 1.5
Preoperative Depression Score (GDS, Mean ± SD)	8.7 ± 2.3
Functional Status (Independent in ADLs)	40%
Primary Caregiver Relationship	Spouse: 60%, Adult Child: 30%, Other: 10%
Preoperative Caregiving Hours/Week	15.2 hours

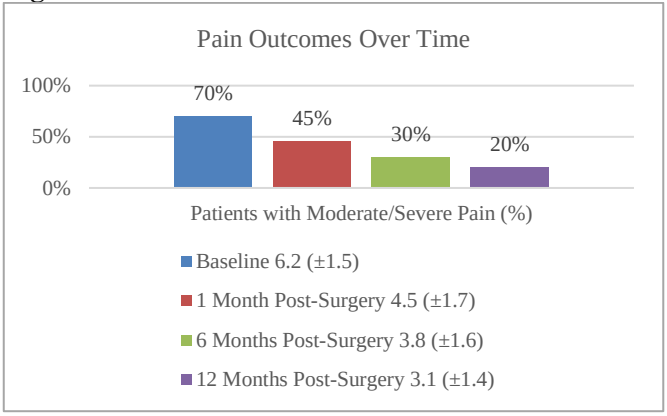
At baseline, the mean pain severity was 6.2 (±1.5), with 70% of patients experiencing moderate to severe pain. One-month post-surgery, pain severity decreased to 4.5 (±1.7), affecting 45% of patients. By 6 months, mean pain severity further declined to 3.8 (±1.6), with only 30% reporting moderate to severe pain. After 12 months, the mean pain severity reached 3.1 (±1.4), with just 20% of patients experiencing moderate to severe pain, indicating sustained improvement.

Table 2

Pain Outcomes Over Time

Time Point	Mean Pain Severity (±SD)	Patients with Moderate/Severe Pain (%)
Baseline	6.2 (±1.5)	70%
1 Month Post-Surgery	4.5 (±1.7)	45%
6 Months Post-Surgery	3.8 (±1.6)	30%
12 Months Post-Surgery	3.1 (±1.4)	20%

Figure 1



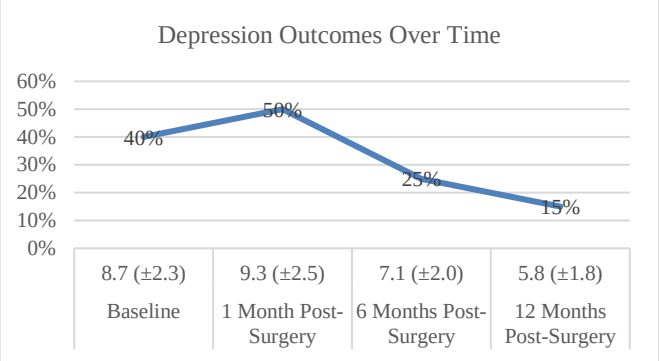
At baseline, the mean GDS score was 8.7 (±2.3), with 40% of patients exhibiting depressive symptoms. At 1-month post-surgery, the mean score slightly increased to 9.3 (±2.5), with 50% of patients affected. By 6 months, the mean score decreased to 7.1 (±2.0), with only 25% experiencing symptoms. At 12 months, the mean GDS score further declined to 5.8 (±1.8), with depressive symptoms reported by just 15% of patients, reflecting long-term psychological improvement.

Table 3

Depression Outcomes Over Time

Time Point	Mean GDS Score (±SD)	Patients with Depressive Symptoms (%)
Baseline	8.7 (±2.3)	40%
1 Month Post-Surgery	9.3 (±2.5)	50%
6 Months Post-Surgery	7.1 (±2.0)	25%
12 Months Post-Surgery	5.8 (±1.8)	15%

Figure 2

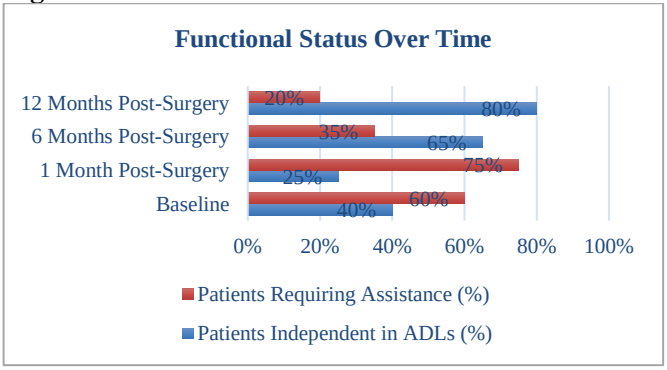


At baseline, only 40% of patients were independent, while 60% required assistance. Independence initially declined to 25% at 1-month post-surgery, with 75% needing assistance. However, significant recovery was observed by 6 months, with 65% of patients regaining independence. By 12 months, 80% of patients were independent in ADLs, indicating a marked recovery and enhanced functional capacity.

Table 4
Functional Status Over Time

Time Point	Patients Independent in ADLs (%)	Patients Requiring Assistance (%)
Baseline	40%	60%
1 Month Post-Surgery	25%	75%
6 Months Post-Surgery	65%	35%
12 Months Post-Surgery	80%	20%

Figure 3

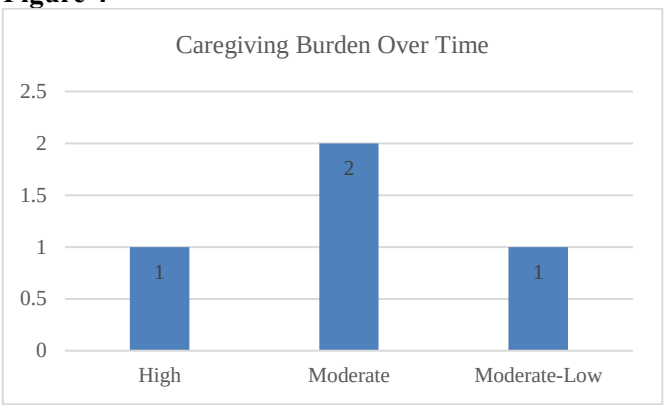


At baseline, the mean Zarit Burden Score was 28.4 (±6.7), indicating a moderate burden. One month post-surgery, the score increased to 35.2 (±7.1), reflecting a high caregiving burden during the early recovery phase. By 6 months, the score decreased to 30.5 (±6.3), returning to a moderate level.

Table 5
Caregiving Burden Over Time

Time Point	Mean Zarit Burden Score (±SD)	Caregiving Burden Level (Description)
Baseline	28.4 (±6.7)	Moderate
1 Month Post-Surgery	35.2 (±7.1)	High
6 Months Post-Surgery	30.5 (±6.3)	Moderate
12 Months Post-Surgery	27.8 (±6.1)	Moderate-Low

Figure 4



DISCUSSION

This study examined the long-term outcomes of pain, depression, functional status, and caregiving burden in seriously ill older adults undergoing major elective surgeries. This work underscores the distinctive and complex role of surgery within patients' and their informal carers' lives and is highly relevant to clinical and policy arenas. Pain after surgery was established to decrease as time progressed with the majority of patients experiencing less pain at 12 months. However, 20% of patients had pain at least moderate in severity that persisted for at least two weeks, with patients having joint replacement surgeries most likely to report pain. Therefore, there is a need to advance specific needs for pain management for hereditary spinal neuropathies in addition to multimodal analgesia and physical therapy [11]. Management of chronic pain is important in a patient's rehabilitation because uncontrolled persistent pain may turn into a chronic pain condition. The study findings provide descriptive information on the longitudinal pattern of depressive symptoms. Baseline depression was 5·2 points higher than the minimum threshold for diagnosis of depression [12]. At the first month after surgery, the total score of depression was slightly higher than on admission, as one can expect in case of postoperative rehabilitation period and fear of cancer recurrence at 6 and 12 months, depression scores were significantly improved as compared to baseline. However, the study revealed that some patients remained depressed even after the six months post surgery most of whom requested to go for counselling or have prescribed medications to help them through the period of recovery [13]. Significantly, the functional status improved over the study period, where 80% of the patients had recovered their ability to perform ADLs at one year. Remarkably, preoperative functional status acknowledged as the better, faster recovery time need for rehabilitation programs. Such programs will increase physical fitness and intensions before surgery with

benefits on the postoperative recovery and overall prognosis. Hypothesized loading to self-care and physical health was maximal at 1-month post-surgery, suggesting augmentation patterns at the period of early recovery [14]. This showed that although the symptom load was gradually tripped over the three years, it rarely returned to baseline. Themes emerging from quantitative data was that caregivers generally found the demands of their caregiving tasks overwhelming when the care was needed most [15]. These results suggest that there should be well-organized caregiver support initiatives such as: teaching about caregiving methods; availability of respite care; and counselling [16]. The work also established relationships between initial characteristics and later/long-term results. Baseline pain and depression scores were shown to predict worse outcomes, while better functional status preoperatively predicted quicker recovery. What these findings indicate is that directed preoperative manipulations – namely, better management of the patient's pain and psychiatric disturbances – may well lead to enhanced enduring outcomes [17]. Furthermore, the categorization of patients determines those patients who are likely to have poor results to be provided with more personalized treatment plans. These results underline the need for more comprehensive postoperative management which includes the patients' physical, psychological, and carers' well-being. Consultative care teams from surgeons, pain professionals, physiotherapists, and members of mental health can go a long way in enhancing patient outcomes [18]. In the case of the caregivers, it is therefore important for the researchers and other stakeholders concerned to offer resources to help in reducing bulk and enrich their capability to support. There are the following limitations in this study. Overall the sample size for 150 patients may be sufficient to identify trends in the data, but it may not be useful in larger population settings. Also, self-reporting methods of pain and depression may be affected by social desirability in responding. Naturally, future research should enroll a larger number of participants and a more heterogeneous one with attention paid to whether they meet strictly diagnostic criteria for the examined condition and involve objective markers of improvement.

CONCLUSION

It is concluded that major elective surgeries in seriously ill older adults lead to significant improvements in pain, depression, and functional independence over time, though a subset of patients experience persistent challenges. Targeted interventions for pain management, mental health support, and caregiver assistance are essential to optimize recovery and enhance long-term outcomes for both patients and caregivers.

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