



Research Article

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Abdominal complications after geriatric hip fracture surgery: Epidemiological analysis and identification of risk factors

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Abstract

Abdominal complications, such as postoperative ileus or acute cholecystitis, though not commonly encountered, represent a significant challenge in the management of patients admitted to orthopaedic wards following surgical procedures. Our objective was to assess the prevalence of abdominal postoperative complications following geriatric hip fracture surgery and to identify potential risk factors. Elderly patients with a hip fracture, and operated on by the same surgical team in 2023 were evaluated. Demographic variables such as age and gender, fracture type, and surgical procedures (proximal femoral nail vs. partial prosthesis) were recorded. Abdominal complications that only developed during initial hospitalization were investigated. Of the 97 patients included in the study, the incidence of abdominal complications following geriatric hip fracture surgery was 6.1% (6 patients). The incidence for postoperative ileus, acute cholecystitis, spleen infarction, and rectal bleeding were calculated as 2.1%, 2.1%, 1%, and 1%, respectively. Further analyses demonstrated a weak correlation between the development of abdominal complications and operation type ($p=0.025$, $r=0.259$). No correlation was observed between age, gender and fracture type and the development of abdominal complications. Abdominal complications after geriatric hip fracture surgery are rare, and require a multidisciplinary approach to management. Surgeons should be aware of this potential complication and necessary assessments should be performed before discharge, especially in patients undergoing arthroplasty.

Keywords: arthroplasty, abdominal complication, acute cholecystitis, geriatric hip fracture, partial prosthesis, postoperative ileus

1. Introduction

As the world's elderly population grows, so does the incidence of geriatric health problems. Hip fractures are one of the most common and urgent orthopaedic pathologies in the elderly population (1,2). In contrast to their younger counterparts, hip fractures in the geriatric population typically occur subsequent to low-energy injuries. Female gender, decreased mobility, and low bone density represent risk factors for geriatric hip fractures (3,4). The type of treatment is planned according to the type of fracture, the activity level of the patient, and the accompanying comorbidities (5-7).

One of the most important problems in the treatment of geriatric hip fractures is early postoperative complications and their proper management. The complications that orthopedic surgeons most frequently cite as a cause for concern following a hip fracture include wound site problems, periimplantic

fractures and deep vein thrombosis (7,8). Abdominal complications, such as postoperative ileus or acute cholecystitis, though not commonly encountered, represent a significant challenge in the management of patients admitted to orthopaedic wards following surgical procedures. These complications are usually associated with trauma and prolonged immobilization, and have the potential to impair both patient health and postoperative rehabilitation process (9,10).

The objective of this single-center study was to assess the prevalence of abdominal postoperative complications following geriatric hip fracture surgery and to identify potential risk factors.

2. Materials and Methods

Following approval from the ethics committee (decision no:

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E1-22-2916; date: October 5, 2022), all patients admitted to the study clinic with a hip fracture (intertrochanteric, subtrochanteric, or femoral neck) and operated on by the same surgical team in 2023 were evaluated. The study population comprised all patients aged 65 years or older who were able to mobilize (with or without support) before the fracture and who accepted surgical treatment. Patients who were followed conservatively, who were unable to mobilize prior to the fracture, who had a history of abdominal surgery, who had a pathological fracture, and who had a hip fracture as a result of polytrauma were excluded from the study. Furthermore, patients who were followed up in the postoperative intensive care units (ICU) more than 24-hours were also excluded from the study. These patients were excluded from the study on the grounds that ICU follow-up can be performed as a precautionary measure for the first 24 hours. However, the necessity for such follow-up beyond this period is both associated with a deterioration in the patient's general condition, and has a negative impact on the rehabilitation process. Therefore, these patients were excluded. In accordance with the established inclusion and exclusion criteria, a total of 97 patients who were followed-up prospectively were subjected to a retrospective evaluation.

All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki.

All patients underwent surgery within the initial 72-hour period following their admission to the hospital as an emergency case. Patients who were taking anticoagulants for any reason prior to surgery were discontinued after consultation with the Cardiology or Anesthesia clinics, and were switched to low-molecular-weight heparin (LMWH) prophylaxis. The administration of LMWH was withheld from patients on the night preceding the surgery. All patients received an enema the night before surgery.

All patients underwent surgery with the same surgical team, with arthroplasties performed in the supine position using an anterolateral approach with a modified Watson-Jones incision and internal fixation procedures conducted with a standard nail approach under a traction table.

After surgery, all patients are initially admitted to the post-anesthetic care units (PACU). Following this, they are either transferred to the orthopaedic ward or to the ICU, depending on whether follow-up in the latter is deemed appropriate.

In the postoperative period, LMWH prophylaxis and compression stockings (mechanical prophylaxis) were maintained in all patients. In accordance with the recommendations of the relevant clinic, patients who had used any anticoagulants prior to surgery were restarted on their medication in the postoperative period. No patient was restarted on their medicine without the postoperative recommendation of the relevant clinic and without completing a minimum of 72 hours of postoperative wound site follow-

up. All patients were informed of and initiated into lower extremity isometric exercises on the first postoperative day, and all patients were mobilized to the extent they could tolerate on the first post-operative day.

The data set was analyzed in order to ascertain the correlation between abdominal complications and age, gender, and operation performed. In order to investigate the impact of advanced age and fragility, patients were grouped according to age, with those above and below 80 years of age. The surgical procedures performed were classified as internal fixation (proximal femoral nail-PFN) or arthroplasty (partial prosthesis-PP).

The complications were analyzed retrospectively by means of a review of the notes in the patient files, clinical archives and the hospital information record system. In order to ensure that only surgery-related complications were evaluated, complications that only developed during initial hospitalization after hip fracture (before discharge) were included in the evaluation. Surgical complications such as wound site problems, nerve damage and thromboembolism were not evaluated in detail, as they are not the focus of this study.

The IBM® SPSS® Statistics for Windows, version 26.0 (IBM SPSS Corp.; Armonk, NY, USA) software was used to perform the statistical analyses. The terms frequency and percentiles were used to describe the descriptive statistics of categorical data. The mean $\pm$ standard deviation and minimum-maximum values were used to define the parameter "age." Bivariate correlation analysis was conducted using Kendall's tau-b (for non-parametric variables) and Pearson (parametric variable) as correlation coefficients. At $P < .05$, statistical significance was taken into consideration.

3. Results

Of the 97 patients included in the study, 43 (44.3%) underwent internal fixation and 54 (55.7%) underwent partial prosthesis. In the present study, the incidence of abdominal complications following geriatric hip fracture surgery was 6.1% (6 patients). The incidence for postoperative ileus, acute cholecystitis, spleen infarction, and rectal bleeding were calculated as 2.1%, 2.1%, 1%, and 1%, respectively. Table 1 presents a detailed distribution of patient and surgical characteristics, and detailed incidences of separate abdominal complications.

Further analyses demonstrated a weak correlation between the development of abdominal complications and operation type ($p=0.025$, $r=0.259$). No correlation was observed between age, gender and fracture type and the development of abdominal complications ($p>0.05$ for each).

All patients who developed abdominal complications were referred to the General Surgery clinic in the early period, and their follow-up and treatment were undertaken by our team. Conservative treatment was preferred for all patients and no patient required secondary acute surgery.

Table 1. Detailed distribution of patient and surgery characteristics

		Geriatric Hip Fractures (n=97)	Frequency – Percentage (%)
Age (years)		81.86 ± 7.846 (Range: 65-99)	
Age	Under 80-years	33	34%
	Over 80-years	64	66%
Gender	Female	75	77.3%
	Male	22	22.7%
Operation	PFN	43	44.3%
	PP	54	55.7%
Abdominal Complication	None	91	93.8%
	Yes	6	6.2%
Abdominal Complication	None	91	93.8%
	Ileus	2	2.1%
	Acute cholecystitis	2	2.1%
	Spleen Infarct	1	1%
	Rectal Bleeding	1	1%

N: number of patients, PFN: proximal femoral nailing, PP: partial prosthesis

Table 2. Correlation analysis of variables related to the abdominal complications

		Patients With Abdominal Complications (n=6)	Patients Without Abdominal Complications (n=91)	P
Age		80.83 ± 5.879 (72-88)	81.92 ± 7.979 (65-99)	0.744
Age	Under 80-years	2 (6.1%)	31 (93.9%)	0.971
	Over 80-years	4 (6.3%)	60 (93.8%)	
Gender	Female	3 (4%)	72 (96%)	0.101
	Male	3 (13.6%)	19 (86.4%)	
Operation	PFN	0	43 (100%)	0.025 r=0.259
	PP	6 (11.1%)	48 (88.9%)	

N: number of patients, P: statistical significance value, PFN: proximal femoral nailing, PP: partial prosthesis, r: correlation efficiency value

4. Discussion

Hip fractures represent a significant health concern among the elderly, being one of the most prevalent types of fractures in this demographic (8,11). The incidence of geriatric hip fractures is rising in parallel with the ageing of the population and the increased level of activity among elder patients in the daily routine. The annual incidence of geriatric hip fractures is estimated to be between 1-3%, with the prevalence in 2050 projected to reach 6.3 million cases per year (12). As with other geriatric patients, the management of geriatric hip fractures should be conducted in a multidisciplinary manner. The usual recommendations after hip surgery, such as mobilization as soon as possible, assume even greater importance in the geriatric population, given that these patients are at increased risk not only of complications that orthopaedic surgeons are accustomed to, but also of abdominal pathologies. The objective of this study was to ascertain the prevalence of abdominal complications following hip fracture surgery in the elderly and to identify any associated risk factors. The incidence of abdominal complications following geriatric hip fracture surgery was found to be 6.1% in our study. Further analysis revealed that only the type of surgery performed was found to be correlated to the abdominal complications.

Postoperative ileus (POI) is a feared postoperative

complication, particularly following abdominal surgery. In particular, a lack of postoperative mobility and disturbances in magnesium and other electrolyte values are significant risk factors for the development of ileus. The occurrence of POI following major orthopaedic surgery is a topic of contention, largely due to the traumatic nature of the procedure and the subsequent limitations of mobilization. While the incidence of POI after all major operations is reported to be between 10-14% (13-15), the prevalence of POI following total joint arthroplasties has been documented to range between 0.3-4% (9,10,16). In the present study, the incidence of POI was calculated to be 2.1% after geriatric hip fracture surgery, in line with the literature.

In the existing literature, the incidence of acute cholecystitis in patients aged 70 years and above is reported to range between 13-50% (17-19). Conversely, the available literature on the incidence of acute cholecystitis in geriatric hip fractures is notably scarce. In 2023, Yuan et al. reported the incidence of acute cholecystitis following geriatric hip fracture surgery as 0.13% (17), based on a sample of 7,746 patients. In a meta-analysis of 15,210 geriatric hip fractures, the incidence of acute cholecystitis following geriatric hip fracture surgery was reported as 0.24% (20). In our study, the incidence of acute cholecystitis following a geriatric hip fracture was determined

to be 2.1%. The incidence rates observed in our study are considerably higher than those reported in the literature. The fact that our study was single-centered and the number of patients was relatively limited may have contributed to this discrepancy. It is important to consider that a number of factors, including gender distribution, body mass index and social predispositions, may also influence the development of acute cholecystitis.

The remaining two abdominal complications identified in our study, splenic infarction and rectal bleeding, are both potential complications that can be attributed to alterations and irregularities in anticoagulant utilization (21,22). In 2012, Boland et al. presented a case of rectal bleeding following total hip arthroplasty in a geriatric patient with preoperative oral anticoagulant use (22). Similarly, in the course of our study, we observed that the patient who had rectal bleeding had been taking an oral anticoagulant prior to the surgical procedure, had switched to LMWH prophylaxis following the fracture, and had resumed taking the oral anticoagulant in the postoperative period. Our study found the incidence of both complications to be 1%, and larger cohort studies may provide more objective incidences.

In accordance with the literature, a correlation was identified between the development of abdominal complications and arthroplasty procedures ($p=0.025$, $r=0.259$). On the other hand, age and gender were not found to be correlated with the development of abdominal complications ($p>0.05$). The existing literature on this subject contains a number of conflicting reports. Klasanet al. described the risk factors for POI after total joint arthroplasty as previous abdominal surgery, chronic renal failure, myocardial infarction, and hip arthroplasty, and they stated that age and gender were not found to be effective in the development of POI (9). Murphy et al., investigated the independent risk factors of POI and concluded that older age, male gender and open operative approach are important risk factors (13). Gender has been identified as a significant risk factor in the development of cholecystitis, with a higher incidence of the condition reported in women (23,24). Due to the limited sample size of our cohort, subgroup analyses based on each complication were not feasible. Consequently, risk factor analyses of abdominal complications were conducted as a unified whole. Despite the controversial results in the literature, the findings of our study indicate that age and gender are not associated with the development of abdominal complications in geriatric hip fractures. Statistical analysis revealed that only the type of surgery performed was found to be a significant predictor of the development of abdominal complications ($p=0.025$, $r=0.259$). When considering the underlying mechanisms, it is plausible that the supine position during arthroplasty, with assistants leaning on the patient's abdomen and the patient's fractured side's upper limb folded and placed on the abdomen, may contribute to this relationship.

It should be noted that our study is not without limitations. Our study was conducted at a single center with a relatively small number of patients. While the inclusion of operations performed by a single surgeon and the avoidance of surgical technique and time discrepancies as variables are advantageous, the limited number of patients precludes the possibility of subgroup analysis. Additionally, this retrospective study is limited by the lack of analyses of comorbidity, opioid use and length of hospitalization. The inclusion of data from multiple centers with a larger number of patients may provide more objective data and a more accurate representation of complication incidences.

Abdominal complications after geriatric hip fracture surgery are rare, and require a multidisciplinary approach to management. In this single-center study of geriatric hip fractures operated on by a single surgeon, the incidence of perioperative abdominal complications was calculated to be 6.1%. Surgeons should be aware of this potential complication and necessary assessments should be performed before discharge, especially in patients undergoing arthroplasty.

Conflict of interest

The authors have no conflicts of interest to declare that are relevant to the content of this article.

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Authors' contributions

Concept: E.N.G., B.G., S.E., Design: E.N.G., B.G., T.S., S.E., Data Collection or Processing: E.N.G., T.S., B.G., Analysis or Interpretation: E.N.G., B.G., T.S., S.E., Ö.D., Literature Search: E.N.G., B.G., Writing: E.N.G., T.S., B.G.

Ethical statement

This study was approved by the local ethics committee (decision no: E1-22-2916; date: October 5, 2022).

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