


# State-Anxiety in Geriatric Patients Undergoing Surgical Treatment for Femoral Neck or Intertrochanteric Fractures

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## Abstract

**Introduction:** Geriatric patients with hip fractures often experience unexpected falls and they may have unfamiliar and unpleasant experiences within a brief period. This study aimed to investigate the prevalence and levels of preoperative anxiety in patients undergoing surgical treatment for hip fractures, and to determine the anxiety-related characteristics experienced by patients during the period before and after surgery. **Materials and methods:** We recruited a total of 75 geriatric patients who underwent surgical treatment for hip fractures and returned complete questionnaires. We used the State-Trait Anxiety Inventory (STAI)-X type to measure state-anxiety and defined a total score of 52 or higher as clinically meaningful state-anxiety. And, we investigated main cause of anxiety, moment of the highest level of anxiety, and the most helpful factor in overcoming anxiety before surgery and in reducing anxiety after surgery. **Results:** The mean STAI score was 47.2 points and one-third of the patients experienced various levels of clinically meaningful state-anxiety. The most common cause of preoperative anxiety was the surgery itself and patients experienced the greatest level of anxiety from the night preceding the surgery to the day of the surgery. Further, patients' trust in the medical staff prior to surgery and the surgeon's explanation after the surgery were the most key factors in overcoming anxiety. **Conclusion:** This study investigates the state-anxiety of geriatric patients undergoing surgery for hip fractures and presents important findings which can help in developing evidence-based interventions to improve the experience of patients undergoing hip surgeries.

## Keywords

hip, geriatric, fracture, preoperative, anxiety, state-trait anxiety inventory

## Introduction

Geriatric patients with hip fractures often experience unexpected falls, and their movement is restricted due to severe pain. Additionally, they may have unfamiliar and unpleasant experiences such as traveling in an ambulance to reach a hospital and visiting an emergency room.<sup>1,2</sup> Further, if the primary assessment confirms that a fracture has occurred and determines that surgical treatment is required, the patient undergoes preoperative examination

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for general anesthesia and various preoperative treatments, and the patient is moved to the hospital ward until the date of the surgery.<sup>3</sup> Standard treatment guidelines ensure that these processes are “fast-tracked,” that is, completed within a short period of time. However, this may result in patients receiving insufficient information and explanation about their treatment procedures, leading to anxiety.<sup>4</sup>

Anxiety is defined as an unpleasant emotional state consisting of anticipatory affective, cognitive, and behavioral changes in response to uncertainty about a future threat.<sup>5</sup> Anxiety can be classified as trait-anxiety or state-anxiety. Trait-anxiety reflects an individual’s susceptibility to anxiety, whereas state-anxiety refers to temporary tension or worry caused by a potential threat. Preoperative anxiety falls under state-anxiety.<sup>6</sup> Preoperative anxiety causes a wide range of responses. Physiological responses include tachycardia, hypertension, elevated temperature, sweating, nausea and a heightened sense of touch, smell or hearing.<sup>7</sup> Psychological responses include increased tension, apprehension, nervousness and aggression.<sup>8</sup> Preoperative anxiety negatively affects the patient’s surgical satisfaction, and it is also known to be related to surgical success rate and postoperative complications.<sup>9</sup>

The use of anxiety questionnaires is a valid and reliable method to screen for surgery-related anxiety and it is currently considered the most appropriate method of evaluation for surgery-related anxiety.<sup>10</sup> The State-Trait Anxiety Inventory (STAI),<sup>11</sup> Beck Anxiety Inventory,<sup>12</sup> Zung’s Self-rating Anxiety Scale,<sup>13</sup> and the Hospital Anxiety-Depression Scale (HADS)<sup>14</sup> are representative examples of self-report tools used to evaluate anxiety.

The purpose of this study was to investigate the prevalence and levels of preoperative anxiety in geriatric patients undergoing surgical treatment for hip fractures, and to determine the anxiety-related characteristics experienced by patients during the period before and after surgery.

## Materials and Methods

### Participants

Geriatric patients who underwent general anesthesia and surgical treatment for hip fractures (specifically femoral neck or intertrochanteric fractures) were recruited between June 2020 and May 2021. Bipolar hemiarthroplasty was performed for femoral neck fractures, and open reduction and internal fixation were performed for intertrochanteric fractures. A single surgeon in charge of hip joint surgery performed all the surgeries.

An explanation of the need for surgical treatment was given to all patients in the emergency room, and an explanation of the risks of general anesthesia and complications of surgery was given after admission. Before

surgery, routine blood tests, electrocardiogram, and chest X-ray were performed for all patients.

To be included in the study, patients who were 65 years of age or older and could complete the questionnaire. Patients with multiple fractures, emergent hip surgery precluding recruitment and investigations, a history of surgery for spine or extremities fractures, a history of a psychiatric disorder, and those who refused participation were excluded from the study. The coronavirus disease 2019 (COVID-19) polymerase chain reaction test was routinely performed in all patients who were hospitalized for surgical treatment, and all patients were confirmed to be negative. In addition, it was confirmed that there was no history of COVID-19 infection prior to the occurrence of the fracture.

### State-Anxiety Assessment

The STAI-X type was used to measure state-anxiety, and STAI-X consisted of a total of 20 questions.<sup>11</sup> Participants responded to each item on a Likert scale ranging from 1 to 4. The score of each item was added to give the total score, which could range from 20–80 points. A higher score indicated a higher level of anxiety. A total score of 52 or higher was defined as “clinically meaningful state-anxiety”. And state-anxiety with a score of 52 or higher was classified as a slightly high level of state-anxiety (52–56 points), a high level of state-anxiety (57–61 points), and a very high level of state-anxiety (62 points or higher), respectively.

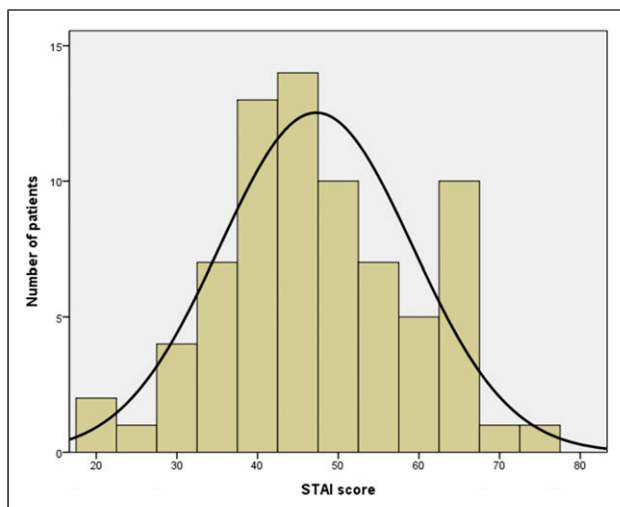
### Questions Related to Anxiety About Hip Surgery

The authors designed a questionnaire to assess anxiety related to hip surgery based on previous studies of preoperative anxiety. The questionnaire was divided into 4 areas, that is, (1) main cause of anxiety, (2) the most helpful factor in overcoming anxiety before surgery, (3) the most helpful factor in reducing anxiety after surgery, and (4) The most anxious moment during the whole process.

The questionnaire was distributed to all patients who were diagnosed with a hip fracture and hospitalized for surgical treatment, and the patient were asked to complete the questionnaire immediately before discharge.

**Table 1.** Demographic for entire study population (N = 75).

Variables	N (%)
Mean age in years (range)	80.2 (65–93)
Sex	
Female	46 (61.3)
Male	29 (38.7)
Fracture site	
Femur neck	32 (42.7)
Intertrochanter	43 (57.3)



**Figure 1.** Levels of geriatric patient's state-anxiety about hip surgery.

A total of 75 patients were included in the final sample (Table 1). Of the total 75 patients, 61.3% ( $n = 46$ ) were female, and the average age was 80.2 years (range = 65–93 y). The fracture sites were femoral neck in 42.7% ( $n = 32$ ) of the cases and intertrochanteric in 57.3% ( $n = 43$ ) of the cases.

### Ethics Approval

An institutional review board approved the study. All patients provided informed consent.

### Results

The mean STAI score was 47.2 points (range = 20–75 points, Figure 1(a)) clinically meaningful anxiety state (STAI score more than 51) was identified in 25 of the 75 patients (33.3%). Eight patients had a slightly high level of state-anxiety (52–56 points), four patients had a high level of state-anxiety (57–61 points), and 13 patients had a very high level of state-anxiety (62 points or higher).

Table 2 shows the characteristics of patient anxiety about hip surgery. The most common cause of preoperative anxiety was the surgery itself (42.7%), followed by postoperative pain (38.7%), risk of anesthesia (8.0%), separation from home and work (6.7%), and postoperative rehabilitation (4.0%). The most helpful factor in overcoming preoperative anxiety was trust in the medical staff (57.3%), followed by family support (38.7%), other factors (4.0%), and religion (0%). The most helpful factor in reducing postoperative anxiety was the surgeon's explanation of the surgery (61.3%), improvement of symptoms (22.7%), the fact that the surgery itself was completed (12.0%), and others (4.0%). The most anxious moments

**Table 2.** Characteristics of patient anxiety about hip surgery.

Characteristics of patient anxiety	N (%)
<b>The main cause of anxiety</b>	
Surgery itself	32 (42.7)
Postoperative pain	29 (38.7)
Risk of anesthesia	6 (8.0)
Separation from home and work	5 (6.7)
Postoperative rehabilitation	3 (4.0)
<b>The most helpful factor in overcoming anxiety before surgery</b>	
Trust in the medical staff	43 (57.3)
Family support	29 (38.7)
Others	3 (4.0)
Religion	0 (0)
<b>The most helpful factor in reducing postoperative anxiety</b>	
The surgeon's explanation of the surgery	46 (61.3)
Improvement of symptoms	17 (22.7)
The fact that the surgery itself was completed	9 (12.0)
Others	3 (4.0)

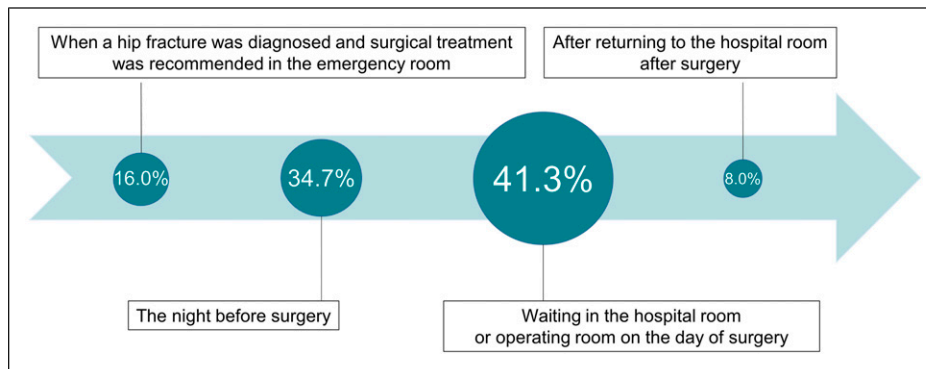
during the whole process were reported to be waiting in the hospital room or operating room on the day of surgery (41.3%), the night before surgery (34.7%), the moment when a hip fracture was diagnosed and admission was recommended for surgical treatment in the emergency room (16.0%), and after returning to the hospital room after surgery (8.0%) (Figure 2).

### Discussion

This study showed that 33.3% of geriatric patients who underwent surgery for hip fractures experienced clinically significant anxiety. The biggest cause of anxiety before surgery was the operation itself, and 41% of patients reported that they experienced the greatest level of anxiety while waiting for their surgery on the scheduled day. In addition, it was confirmed that trust in the medical staff before surgery and explanation by the surgeon after surgery helped in overcoming anxiety in 57–61% of the patients.

There is no previous study which has investigated whether patients' anxiety increases before and after orthopedic surgery. However, the prevalence of psychiatric disorders such as anxiety and depression in orthopedic trauma patients was reported to be about 3.8%,<sup>9</sup> and newly developed anxiety in patients who underwent spinal fusion was reported to be about 11.2%.<sup>15</sup> Thus, there is a possibility that patient anxiety may increase before and after orthopedic surgery.

There seems to be no universal criteria to define anxiety, and previous studies have used various criteria to determine the presence or absence of anxiety. Beleckas et al. defined clinically significant anxiety as a score of 62 or higher on the Patient-Reported Outcomes Measurement Information System (PROMIS) Anxiety Scale,<sup>16</sup> and Nixon et al. defined a PROMIS Anxiety score of 59.4 or



**Figure 2.** The most anxious moment during the whole process.

higher as anxiety.<sup>17</sup> Lee et al. evaluated level of anxiety using a visual analog scale of anxiety (VAS-anxiety) and defined preoperative anxiety as a score of 1 or higher on the VAS-anxiety Scale.<sup>18</sup> Hampton et al. classified the HADS-Anxiety subscale (HADS-A) scores of 8 to 10 as borderline abnormal and scores of 11 to 21 as abnormal.<sup>19</sup> In this study, STAI-X was used to evaluate the level of state-anxiety. A score of 52 or higher was defined as clinically meaningful state-anxiety, and this anxiety was interpreted as “slightly high,” “fairly high,” and “very high.”

The prevalence of anxiety related to orthopedic surgery has been reported in various studies. A study using the PROMIS Anxiety evaluation tool among patients treated for various diseases of the upper extremities reported that the prevalence of anxiety was 16.6%<sup>16</sup> and a study using the same evaluation tool in patients who underwent foot and ankle joint surgery reported that 28.8% of all patients showed anxiety.<sup>17</sup> A study using the VAS-anxiety evaluation tool in patients who underwent lumbar surgery reported that preoperative anxiety (point 0 or higher) was observed in 87% of all patients.<sup>18</sup> In a study evaluating the level of anxiety in patients with hip joint disease, it was reported that 4.3–43.8% of patients showed an abnormal level of anxiety depending on the disease, and 13.1% of patients showed an abnormal level of anxiety overall.<sup>19</sup> In this study which used the STAI evaluation tool among geriatric patients undergoing surgical treatment for hip fractures, 33.3% of patients exhibited state-anxiety. Unlike the previous study,<sup>19</sup> which examined the prevalence of anxiety in chronic hip disorders, we assumed that the relatively high prevalence of anxiety in geriatric patients with acute hip fractures was due to sudden movement restrictions accompanied by extreme pain and medical process in which the diagnosis and surgery were determined within a brief period.

When PROMIS Anxiety (out of 100), VAS-anxiety (out of 10), HADS-A (out of 21), and STAI (out of 80) were all converted into a scale of 100 to evaluate the level of anxiety, the average of anxiety scores ranged from 28.3 to

53.9 in previous studies. This study showed an average anxiety level of 47 points, which when converted into a scale of 100, converted to 58.8 points. This is higher than the anxiety level observed in previous studies. It is possible that the high level of anxiety observed in participants of this study was due to the acuteness of their condition, beginning with the unexpected diagnosis of a fracture followed by a recommendation for surgery soon. In the previous studies, however, participants had chronic conditions, meaning that they were aware of their diagnosis and had more time to decide whether they would undergo surgery.

A previous study examined the factors which were helpful in overcoming surgery-related anxiety in patients with spinal disease and reported that trust in the medical staff before surgery and the surgeon’s explanation after surgery were the most helpful.<sup>18</sup> Similarly, in this study, many geriatric patients responded that trust in the medical staff (57.5%), and the surgeon’s explanation of the surgery (61.3%) were the most helpful factor in overcoming anxiety.

In patients undergoing a total knee arthroplasty, a total of 3 sessions of nursing intervention were conducted during the six-week period prior to surgery, and anxiety scores were significantly reduced compared to controls.<sup>20</sup> In this study, 76.0% of all patients reported experiencing the greatest level of anxiety from the night before surgery to the day of surgery. Thus, intensive intervention to reduce anxiety during this time could help relieve anxiety in geriatric patients.

The present study provides useful information using data from patients in a clinical setting. However, there are certain limitations to this study. First, the number of patients is small because only geriatric patients who underwent surgery for hip fractures at a single research institution recruited. However, this proved to be an advantage in that all participants received uniform care, since the surgery was performed on the same fracture site, under the same surgeon’s treatment plan, and following

the same standard treatment guidelines. Second, because of we excluded patients with a psychiatric history, such as anxiety or depression from this study, we could not analyze the prevalence of psychiatric history or newly developed anxiety in patients with hip fractures. Third, although the factors which were helpful in overcoming anxiety before and after surgery were investigated, it was not possible to specifically evaluate how much anxiety was reduced at each point. Fourth, the most anxious moment was not defined in terms of time, but rather in terms of related treatment procedures which the patients underwent. However, due to the design of the study in which patients responded to the questions themselves, we were forced to compose questions around major events in the treatment procedure that are would be easy for patients to remember. This study examined time during which most patients experienced the greatest level of anxiety based on major events in the treatment process. We believe that the results of this study will be useful for follow-up studies investigating the timing and effectiveness of interventions to reduce surgical anxiety.

## Conclusions

Medical staff should be aware of the levels of anxiety, the causes of anxiety and the factors which help geriatric patients overcome anxiety when undergoing surgery for hip fractures and should try to reduce patient's anxiety by implementing appropriate interventions during the most severe period of anxiety. Further research on the effects of interventions for geriatric patient anxiety is needed.

## Declaration of Conflicting Interests

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