IOSUD – „Dunărea de Jos" University of Galați
Doctoral School of Biomedical Sciences

UNIVERSITAS
GALATIENSIS

DOCTORAL THESIS

THE OPPORTUNITY FOR SURGICAL INTERVENTION IN PATIENTS WITH DEMENTIA AND HIP FRACTURE

Candidate,
Brădeanu Andrei Vlad

Scientific advisor,
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Seria M Nr.20
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INTRODUCTION

The increased risk of hip fractures is closely associated with age, gender, visual impairments, balance issues, and cognitive deficiencies. In patients with dementia, the most frequent fractures result from falls at the same level, leading to significant disabilities and higher mortality rates. Reduced mobility and sedentary lifestyles further worsen the overall condition, causing muscle atrophy and reduced bone strength. Bone mineral density deficiency is exacerbated by endocrine disorders, such as Cushing's syndrome or diabetes mellitus, and by certain medications (corticosteroids, cyclosporine). Osteoporosis increases the risk of hip fractures in patients with dementia by up to three times, with a mortality rate of 55% within the first six months.

Primary postmenopausal osteoporosis typically appears 10-15 years after menopause, predominantly affecting Caucasian women. Bone density decline starts after age 40 and continues until age 70, leading to a loss of up to 40% of bone mass. A 10% increase in bone mass can reduce fracture risk by 30%. Bone densitometry investigations and early hormonal treatment (estrogen, progesterone) are essential for fracture prevention.

Patients with dementia and hip fractures, especially those over 65, have an increased risk of complications and mortality, which is up to 8 times higher than in patients without dementia. The death rate is highest within the first 3 months but remains significant over the following 10 years. Uncontrolled pain may trigger delirium, a severe complication affecting a third of patients. This condition is influenced by decreased acetylcholine and increased dopamine, exacerbated by hypoxia, hypoglycemia, or infections.

Infection rates in patients with dementia and hip fractures are higher, reaching 33%, compared to patients without dementia, and involve a high mortality risk. Dislocations following hemiarthroplasty are also common, and patients with dementia have a higher rate of unsuccessful orthopedic maneuvers, which increases mortality. Additionally, these patients are at increased risk of deep vein thrombosis and pulmonary embolism due to immobility and comorbidities.

Infection prophylaxis, thromboembolism prevention, and effective management of pain and postoperative risks are essential to reduce complications and improve outcomes in patients with dementia and hip fractures.

Research Aim and Objectives

The purpose and objectives of the research are fundamental to every scientific project, representing the starting point of exploration and discovery. In this study, I aim to provide an in-depth perspective on the complexities involved in managing patients with

both hip fractures and dementia. By clearly defining my aims and objectives, I ensure a systematic and comprehensive approach to addressing this issue.

The primary objective of this research is to evaluate the effectiveness of surgical intervention compared to conservative treatment for patients with hip fractures and dementia.

However, my research extends beyond this primary objective. The secondary objectives include: comparing clinical and functional outcomes based on the chosen treatment type, determining life expectancy in operated and non-operated patients, assessing quality of life in both patient groups, identifying risk factors that may influence surgical outcomes, evaluating the impact of postoperative rehabilitation on long-term recovery, and investigating the safety of surgical procedures.

The identification of predictive factors for surgical outcomes was conducted by analyzing risk factors based on age, comorbidities, and fracture severity. Prognostic factors, including postoperative rehabilitation and mobilization capacity, were evaluated to determine their impact on long-term outcomes. Surgical safety was assessed by investigating postoperative complications (infections, bleeding, anesthesia sequelae) and evaluating the impact of surgery on patients' cognitive and functional status. Quality of life was assessed through indices measuring both physical and cognitive functionality, level of independence, and overall satisfaction.

Materials and Method

The data used in this study comes from two main sources:

1. **Saint Andrew County Clinical Hospital in Galați**: This institution provided detailed information regarding patients admitted to the orthopedics department, focusing on those with hip fractures. The hospital database offered essential information such as fracture type, associated comorbidities, hospitalization duration, treatment costs, and patient progress.
2. **Elena Doamna Psychiatric Hospital in Galați**: This institution provided data related to patients diagnosed with various forms of dementia. These data were crucial for understanding the link between dementia and hip fracture risk, as well as the outcomes of patients with dementia who sustained such fractures.

The data collection period spans three consecutive years, from 2018 to 2020. This period was chosen to provide a temporal perspective on case evolution and to identify possible trends or changes in the management of patients with dementia and hip fractures across the two medical institutions. All 184 patients in the retrospective cohort underwent a mandatory investigation protocol, including anamnesis, general examination, clinical examination, imaging investigations (hip X-ray, brain CT), and laboratory tests. They also underwent the Charlson Comorbidity Index (CCI) test to

assess the risk of mortality. The EQ5D5L and Harris tests were used to measure pain and mobilization capacity. Cognitive decline was assessed using the Mini Mental State Examination (MMSE) and Montreal Cognitive Assessment or The MoCA Test (MoCA).

Data Analysis and Interpretation

To analyze and interpret the collected data, we employed a series of statistical methods that enabled us to extract relevant information and draw solid conclusions based on the results obtained. The statistical methods applied in this study include:

- **Descriptive Statistics**: These include calculating the mean, median, standard deviation, as well as determining minimum and maximum values for continuous variables. For categorical variables, we calculated frequencies and percentages.
- **Chi-square Test (χ^2)**: Used to compare observed and expected frequencies of categorical variables and to determine if there are significant associations between them.
- **Student's t-test**: This test was used to compare the means of two independent groups, such as males and females or operated and non-operated patients.
- **Analysis of Variance (ANOVA)**: Applied to compare the means of three or more groups, such as different types of dementia or fractures.
- **Survival Analysis (Kaplan-Meier)**: Employed to estimate the survival probability of patients based on different variables, such as treatment type or the presence of comorbidities.

All statistical analyses were conducted using a significance level of 0.05. Statistical software, such as SPSS, R, and Python with libraries like numpy, pandas, and matplotlib, was utilized for data processing and analysis. Results were interpreted in the context of relevant literature and clinical experience.

Inclusion and Exclusion Criteria for Patients

To ensure the relevance and accuracy of the data analyzed in this study, we established specific inclusion and exclusion criteria for patients. These criteria were designed to delineate the target patient group and to eliminate potential confounding variables.

Inclusion Criteria:

1. Patients diagnosed with any form of dementia, clinically confirmed and, when applicable, through paraclinical investigations (e.g., brain imaging, neuropsychological tests).
2. Patients who sustained a hip fracture during the analyzed period, regardless of the cause.
3. Patients admitted to either the Saint Andrew County Clinical Hospital in Galați or the Elena Doamna Psychiatric Hospital in Galați between 2018 and 2020.
4. Patients of both genders and all age groups.
5. Patients treated conservatively or surgically through DHS system osteosynthesis, Gamma nail system, blade plate, Austin Moore prosthesis, or bipolar prosthesis.

Exclusion Criteria:

1. Patients with suspected dementia but without a clear diagnosis.
2. Patients with hip fractures prior to the study period or fractures located in areas other than the hip.
3. Patients with other major neurological conditions that could affect the results (e.g., brain tumors, advanced neurodegenerative diseases other than dementia).
4. Patients with incomplete or inaccessible medical records.

By applying these criteria, we ensured that the analysis focused on patients relevant to the research objectives and that the results obtained are representative of the target population.

Results

1. Reporting Dementia Type by Period

Analyzing data on patients with dementia and hip fractures between 2018 and 2020 reveals an interesting dynamic in the evolution of dementia stages. Initially, in 2018, there were 20 cases of mild dementia (33.90%), 23 cases of moderate dementia (38.98%), and 16 cases of severe dementia (27.12%). As time progressed, in 2019, mild dementia cases decreased to 15 (25.00%) and moderate dementia cases to 17 (28.33%), while severe dementia cases significantly increased to 28 (46.67%). This trend continued in 2020, with mild dementia cases declining further to 13 (20.00%),

and moderate and severe dementia cases rising to 21 (32.31%) and 31 (47.69%), respectively.

The analysis shows a consistent increase in the number of patients with severe dementia presenting with hip fractures, suggesting a correlation between dementia severity and hip fracture risk. This may also indicate improvements in diagnosing and recognizing advanced stages of dementia. On the other hand, the decrease in mild and moderate dementia cases could reflect progress in fracture prevention within these groups or changes in diagnostic and reporting practices.

During 2018-2020, Alzheimer's dementia remained the most frequent type of dementia among hip fracture patients, with a progressive increase in cases: 31 cases in 2018 (52.54%), 33 cases in 2019 (55.00%), and 35 cases in 2020 (53.85%). In contrast, non-specific dementia showed stability in the number of cases, with minor fluctuations: 11 cases in 2018 (18.64%), 9 in 2019 (15.00%), and 11 in 2020 (16.92%), indicating a steady presence of this undefined category. Mixed dementia showed slight variation: 7 cases in 2018 (11.86%), 8 in 2019 (13.33%), and 6 in 2020 (9.23%), marking a decline in 2020. Conversely, vascular dementia showed an upward trend, increasing from 10 cases in 2018 and 2019 (16.95% and 16.67%) to 13 cases in 2020 (20.00%).

2.Readmission of Patients with Dementia and Hip Fracture

The readmission of patients with dementia and hip fractures to the Orthopedics Department between 2018 and 2020 reveals a complex picture of case evolution. The total number of patients readmitted to Orthopedics remained relatively stable, with a slight increase from 60 patients in 2018 to 63 in both 2019 and 2020. However, the number of patients readmitted with hip fractures increased significantly, from 7 in 2018 (11.67%) to 14 in 2019 (22.22%) and 20 in 2020 (31.75%), indicating a rising frequency of these cases requiring readmission. Notably, there was a progressive increase in readmissions for patients with both hip fractures and dementia, from 0 (0.00%) in 2018 to 2 (3.17%) in 2019 and 5 (7.94%) in 2020.

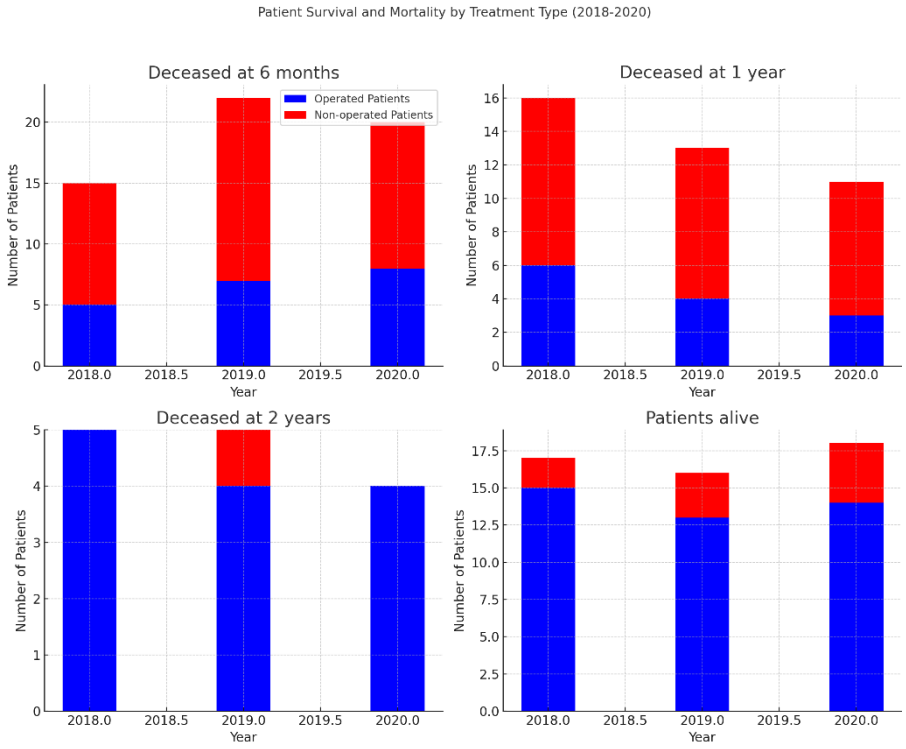
3.Association of Comorbidities

Hypertension (HTN) was the most common comorbidity, with 31 cases in 2018 (51.67% of all patients), 37 cases in 2019 (58.73%), and 33 cases in 2020 (52.38%). Osteoporosis was also highly prevalent, with 27 cases in 2018 (45.00%), 28 in 2019 (44.44%), and 29 in 2020 (46.03%). Diabetes mellitus saw a significant increase in 2019, with 23 cases (36.51%) compared to 13 cases in 2018 (21.67%) and a decrease to 16 cases in 2020 (25.40%). Congestive heart failure remained constant in the first two years, with 20 cases in 2018 (33.33%) and 21 in 2019 (33.33%), followed by a decline to 14 cases in 2020 (22.22%).

4.Gender by Age and Dementia Severity

In the analysis of fracture frequency by age and dementia severity, it was observed that, for mild dementia, the proportion of affected women decreased from 80.95% in 2018 to 50% in 2020, while mild dementia cases declined by 52.38% from 2018 to 2020. For moderate dementia, there was an increase in the number of affected women in 2020 (from 42.86% in 2019 to 85.71% in 2020), and the overall proportion of cases decreased by 16% from 2018 to 2020. A significant increase in severe cases in 2020 (from 16 to 26 cases) indicates a 62.5% increase from 2018, with the proportion of women rising in 2020, from 43.75% in 2018 to 80% in 2020.

5.Comparative Survival and Mortality Analysis by Treatment Type for 2018-2020



This graphic compares operated and non-operated patients from 2018 to 2020 in terms of survival and death rates at 6 months, 1 year, and 2 years. The blue bars represent operated patients, while the red bars represent non-operated patients. Operated patients tend to have a higher number of survivors compared to non-operated patients.

Conclusions:

1. **In-hospital Deaths**:

Non-operated patients have a higher in-hospital mortality rate compared to operated patients across all analyzed years, although their rate decreases progressively from 2018 to 2020.

The Gamma nail system for osteosynthesis of pertrochanteric and subtrochanteric fractures has a much lower mortality rate from 2018 to 2020 compared to the DHS system.

2. **Deaths at 6 Months**:

The death rate for non-operated patients at 6 months is higher than the in-hospital death rate from 2018 to 2020.

An increase in deaths is observed in 2019 and 2020 compared to 2018.

3. **Deaths at 1 Year**:

The death rate of non-operated patients decreases from 5 cases to 1 case from 2018 to 2020.

The number of deaths among patients with pertrochanteric fractures and femoral neck fractures operated on with the DHS system and Austin Moore prosthesis remains constant from 2018 to 2020.

The number of deaths among patients with femoral neck fractures operated on with a bipolar prosthesis decreases from 5 cases to 1 between 2018 and 2020.

In 2019 and 2020, 1-year deaths slightly decreased compared to 2018, suggesting possible improvements in postoperative management.

4. **Deaths at 2 Years**:

The number of deaths at 2 years is relatively low compared to in-hospital and 6-month deaths, suggesting that patients who survive the first year have a higher chance of long-term survival.

The total number of deaths at 2 years remains constant.

The number of deaths among patients with DHS system osteosynthesis decreases from 2 cases to 1 from 2018 to 2020.

The number of deaths among patients with hip hemiarthroplasty with Moore prosthesis decreases from 3 cases to 1 from 2018 to 2020.

The number of deaths among patients with hip hemiarthroplasty with a bipolar prosthesis remains constant at 1 case from 2018 to 2020.

5. **Patients Alive**:

The number of patients remaining alive doubled from 10 to 20 from 2018 to 2020.

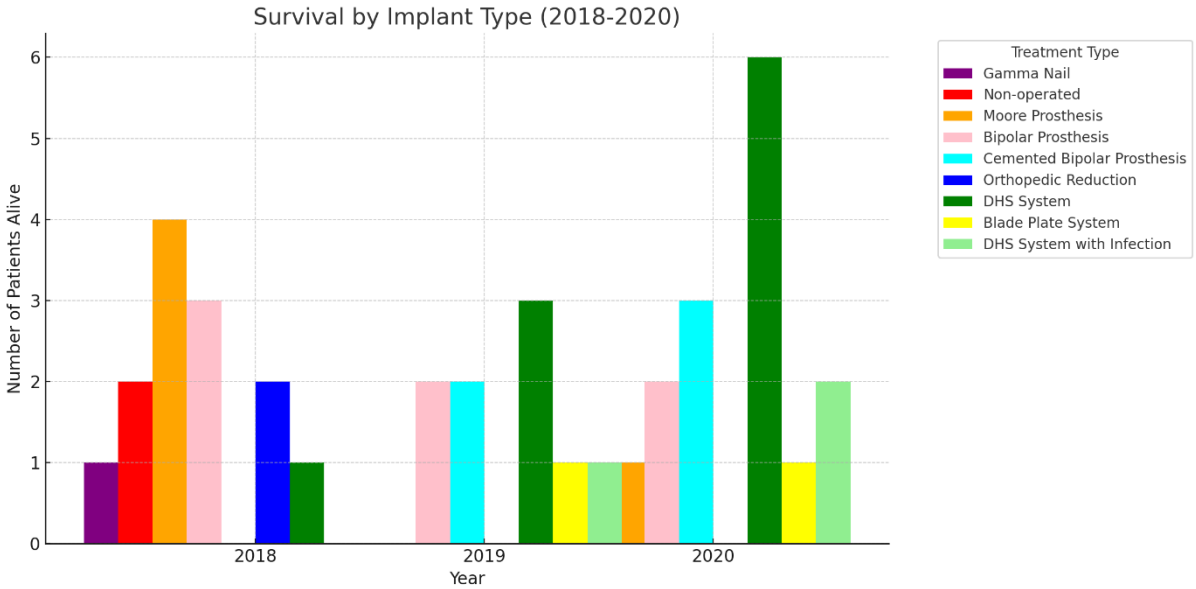
The number of patients operated on with the DHS and Gamma systems tripled from 3 to 12 between 2018 and 2020.

The number of patients operated on with hip hemiarthroplasty increased from 6 to 7 from 2018 to 2020.

In 2019, 0 non-operated patients remained alive, while in 2018 and 2020, only 1 patient survived.

6. **Survival Rate by Implant Type from 2018 to 2020**

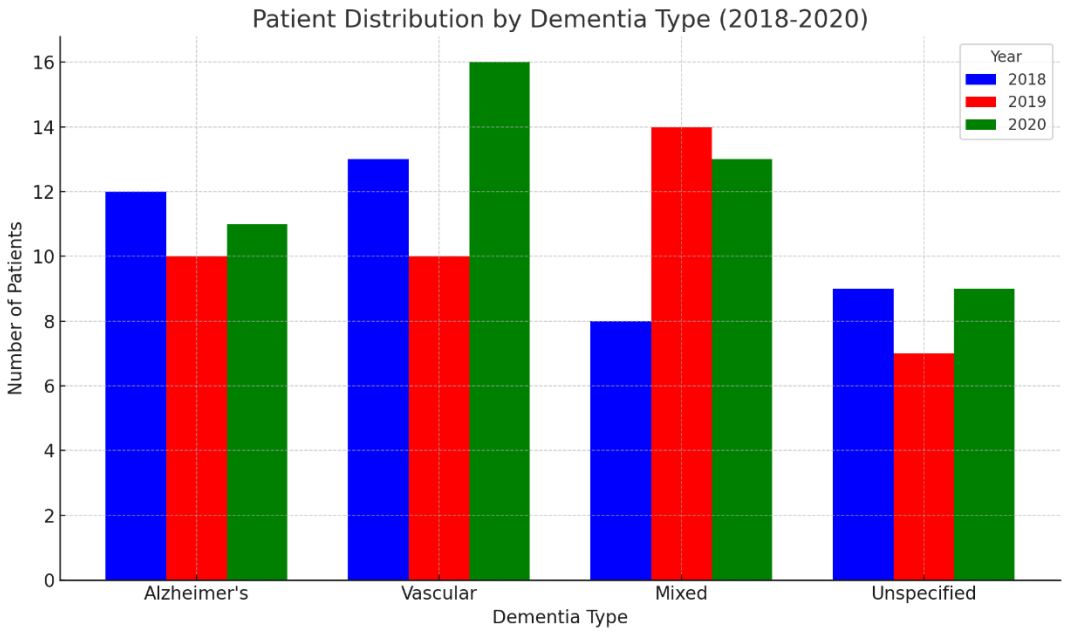
The analysis of average hospitalization duration for patients with hip fractures and different types of dementia, who underwent surgery from 2018 to 2020, highlights variations by dementia type. In 2018, patients with Alzheimer's and vascular dementia had an average hospital stay of 12.5 days, while those with mixed and unspecified dementia had average stays of 9.25 and 10.57 days, respectively. In 2019, the average duration decreased for all dementia types, being lowest for unspecified dementia patients (7.5 days) and highest for those with mixed dementia (14.33 days). In 2020, an increase in the average hospitalization duration was observed for vascular dementia patients (16.33 days), while patients with Alzheimer's, mixed, and unspecified dementia had average durations of 11.18, 12.8, and 10.2 days, respectively.



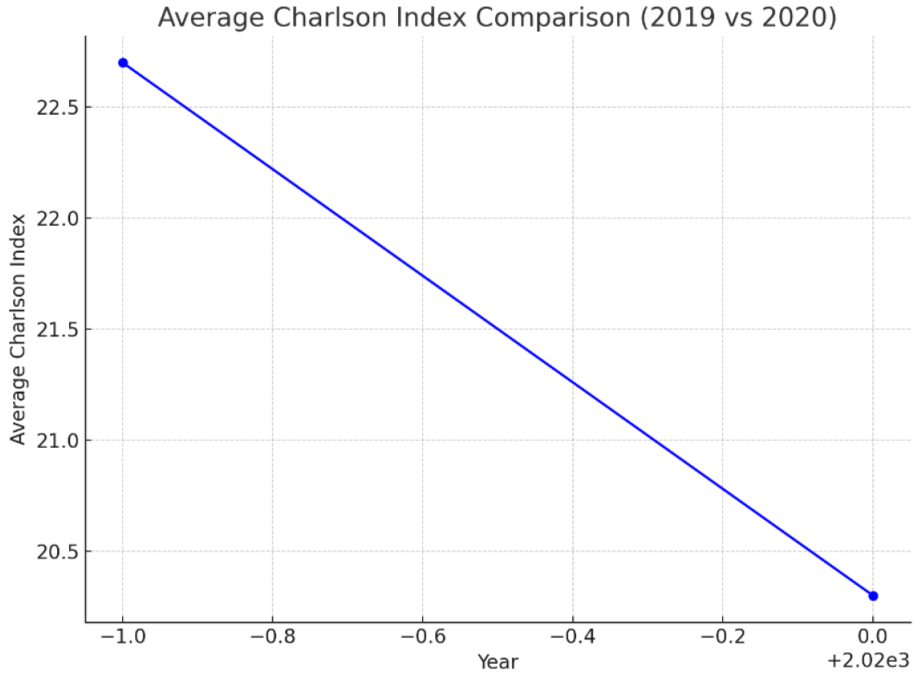
The above graphic illustrates patient survival by implant type over the years 2018, 2019, and 2020. Each bar represents the number of surviving patients based on the type of treatment or implant used.

This variation highlights the importance of proper monitoring and management of patients with dementia and hip fractures, considering the different care needs and resources required to optimize recovery and reduce hospitalization time. We also observe a trend toward improved care efficiency in 2019, suggested by the general decrease in the average hospitalization duration across all types of dementia, before the increase observed in 2020 for patients with vascular dementia. These trends

underscore the need for a personalized approach tailored to the specific needs of each patient to maximize care efficiency and improve clinical outcomes.

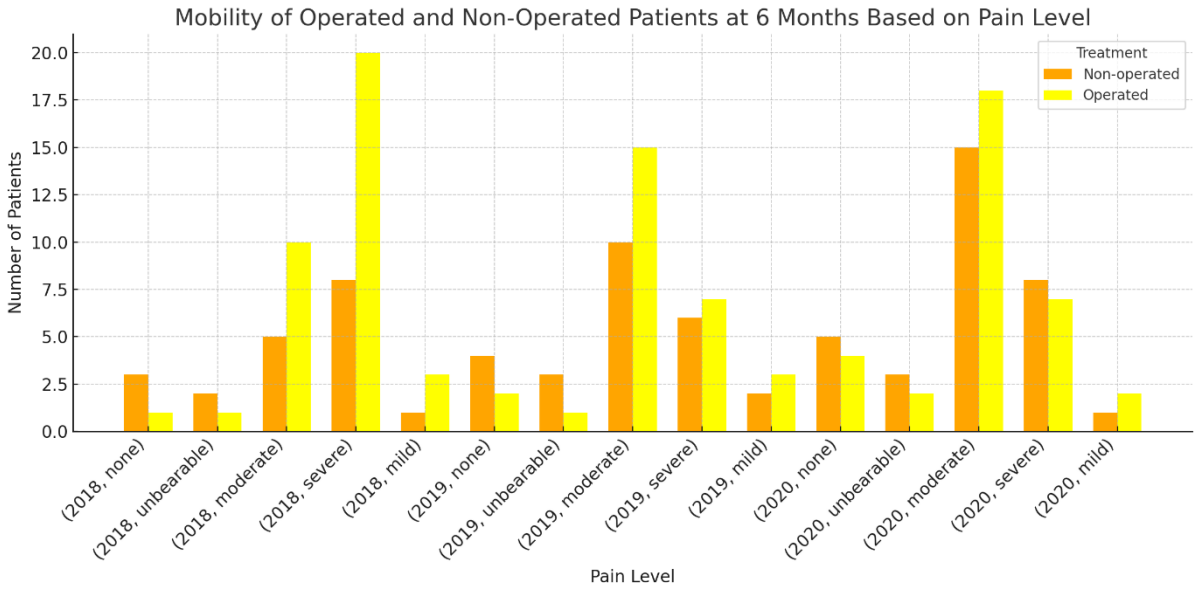


The average and minimum hospitalization duration was observed in patients with Alzheimer's, vascular, and unspecified dementia who underwent surgery in 2019, while for patients with mixed dementia, it was observed in 2018.



The line chart shows the evolution of the average Charlson Index between 2019 and 2020. The average Charlson Index was 22.68 in 2019 and slightly decreased to 20.37 in 2020, representing a reduction of approximately 10.15%. Although the initial expectations were to see an increase, the data indicate a slight decrease in the Charlson Index in 2020.

7. Mobility of Operated and Non-Operated Patients at 6 Months Based on Pain Level

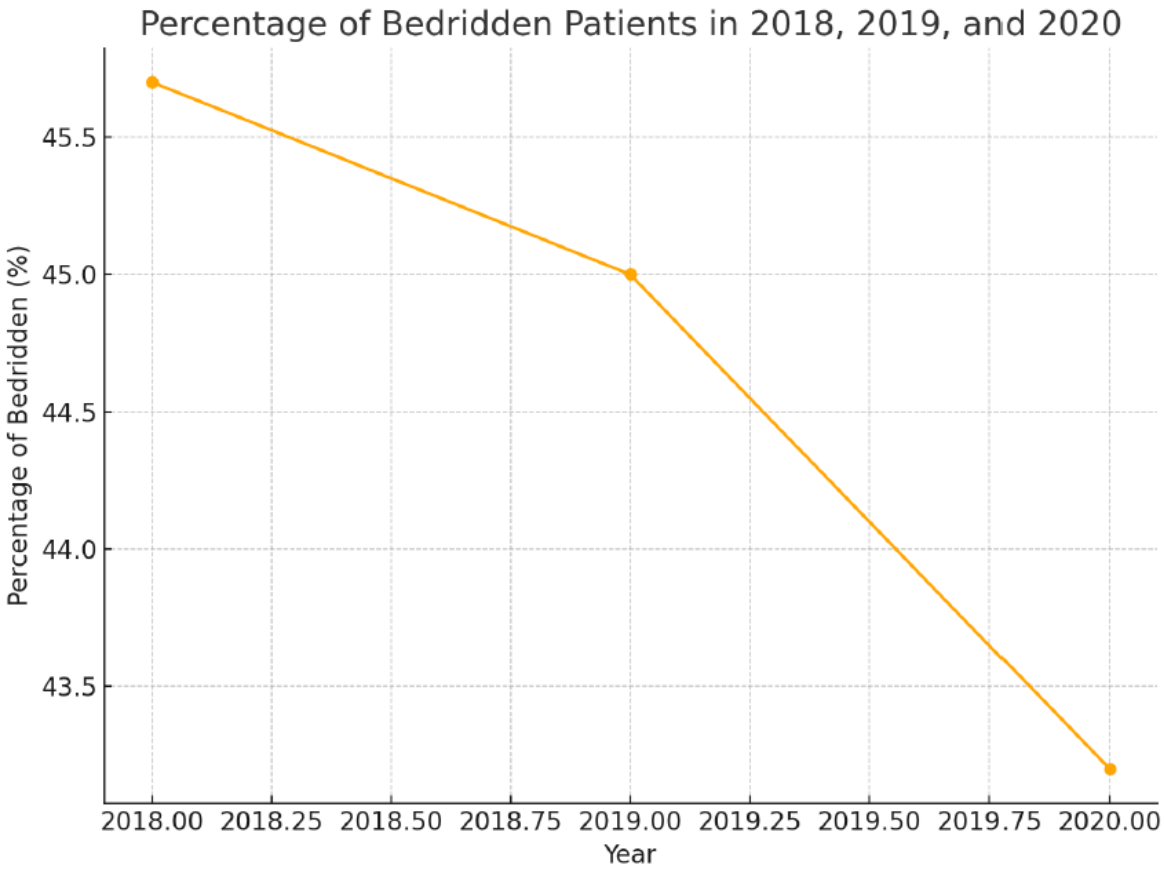


In 2018, 64.7% of patients with moderate pain and 85.7% of those with severe pain were non-operated, suggesting significant mobility challenges for these patients. In 2019, 75% of patients with severe pain and 30% of those with moderate pain were non-operated. In 2020, non-operated patients had a lower presence across all categories, with 50% of patients experiencing unbearable pain and only 7.7% experiencing severe pain.

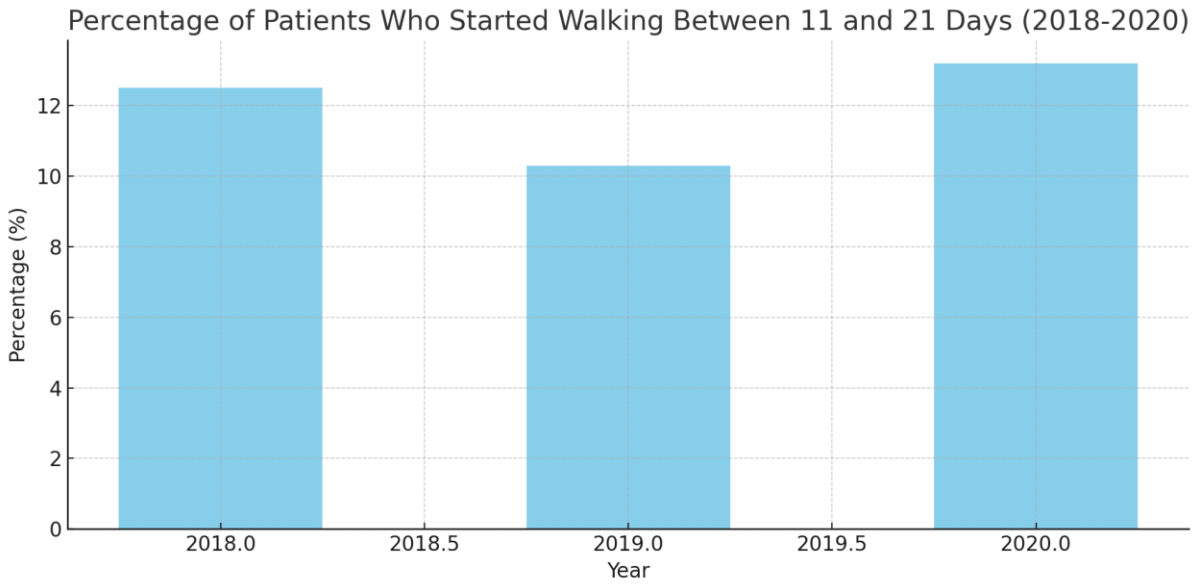
In all three periods, operated patients dominated the mild and moderate pain categories:

- **2018**: 100% of patients with mild pain and 35.3% of those with moderate pain were operated.
- **2019**: 100% of patients with mild pain and 70% of those with moderate pain were operated.
- **2020**: 100% of patients with mild pain and 95.6% of those with moderate pain were operated.

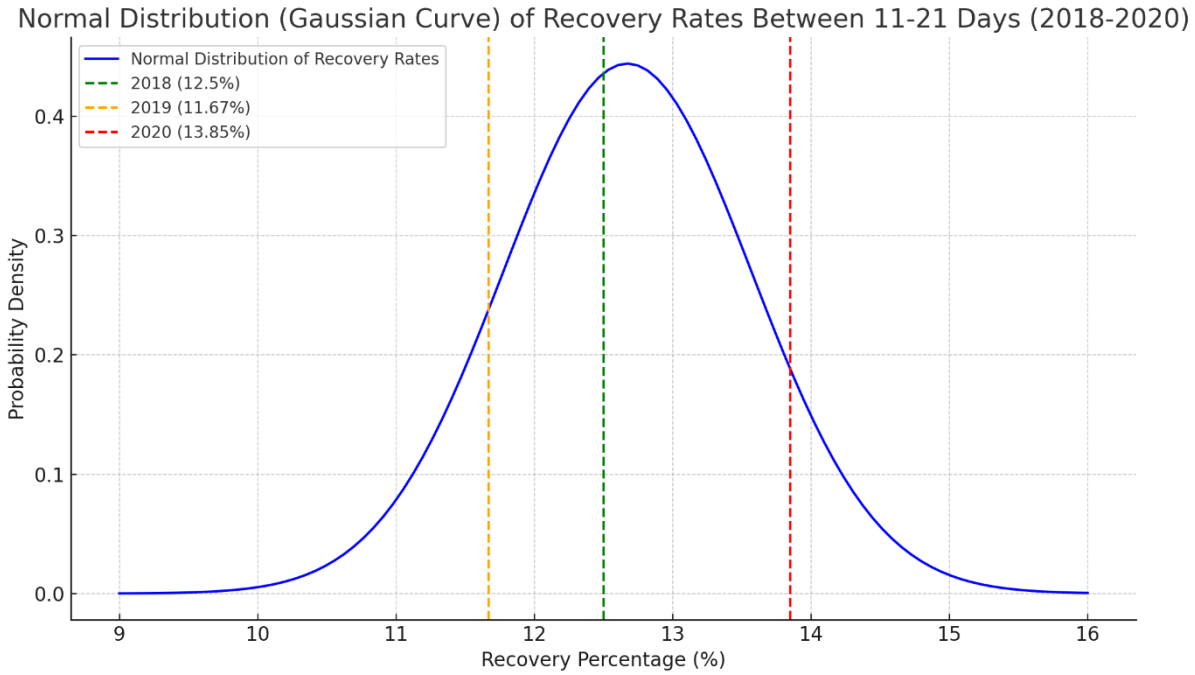
Overall, operated patients had much better mobility at 6 months, especially in cases of mild and moderate pain, where they accounted for between 70% and 100% of all patients. Non-operated patients encountered more difficulties with moderate and severe pain, representing up to 85.7% of the total in 2018 and 75% in 2019.



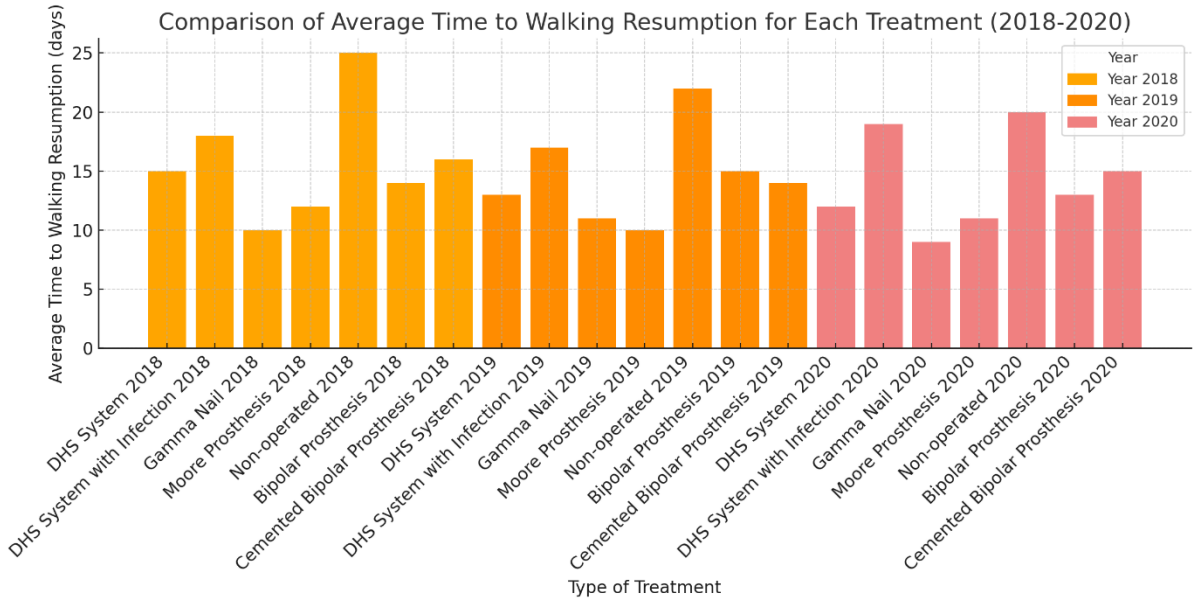
A slight decrease in the percentage of bedridden patients is observed over the three years, from 45.83% in 2018 to 43.08% in 2020. The percentages of patients who began walking within the first 10 days were 15.28% in 2018, 18.33% in 2019, and 25.85% in 2020. The percentages of patients who started walking after more than 30 days were 11.11% in 2018, 5.0% in 2019, and 6.15% in 2020.



The percentage of patients who started walking between 11 and 21 days during the period 2018-2020 was 12.5%, 11.67%, and 13.85%, respectively.



The chart illustrates the normal distribution of recovery rates between 11 and 21 days for patients from the years 2018, 2019, and 2020. The overall mean of these recovery rates is 12.67%, with a standard deviation of approximately 1.1%. Within this range, the following values are observed for each analyzed year: 12.5%, marked by the orange dashed line (2018); 11.67%, marked by the green dashed line (2019); and 13.85%, marked by the red dashed line (2020). Each of these values is represented on the graph relative to the normal distribution curve, indicating consistency across the analyzed years and suggesting a low variation in patient recovery within this time frame. This integration of the Gaussian curve highlights that the recovery rates were close to the overall mean, with no statistically significant differences between the studied years, suggesting stability in the treatment and recovery methods applied.



8. Comparison Between Distance Covered by Operated and Non-Operated Patients from 2018-2020

1. **Year 2018:**

DHS System: The average time to walking resumption is 15.04 days, with 76.9% of patients able to walk.

DHS System with Infection: Despite an average time of 17.33 days to walking, all patients (100%) were able to walk.

Both implant types (Gamma Nail and Moore Prosthesis) had a low average time (12.72 and 12.50 days), with 100% of patients able to walk.

Non-operated patients had one of the longest average times to walking resumption at around 28.2 days, with only 32.25% able to walk.

Patients with **bipolar prosthesis and cemented bipolar prosthesis** showed excellent results, with short average times (11.10 and 5.67 days), and 100% of them able to walk.

2. **Year 2019:**

Patients with **DHS system and bipolar prosthesis** showed a reduction in average time to walking resumption (between 10 and 12.38 days), though the percentage of patients able to walk was lower for those treated with DHS (52.9%).

Gamma Nail and Moore Prosthesis implants maintained a low average time for walking resumption (10.5 and 11.83 days) and a high percentage of patients able to walk (100%).

Non-operated patients had an average time of 31.2 days, with only 10.71% able to walk, indicating a significant decrease in mobility compared to 2018.

Patients with **cemented bipolar prosthesis** had a short average time (6.6 days), with 100% able to walk.

3. **Year 2020:**

Patients operated with **DHS system** showed a reduced average time to walking resumption of 9.66 days, with an increased percentage of 80% able to walk, while those with **cemented bipolar prosthesis** resumed walking in 4.72 days.

Gamma Nail and Moore Prosthesis continued to be effective, with average times of 11.19 and 10.4 days, and 100% of patients able to walk.

Non-operated patients had a high time to walking resumption (29.36 days), but the percentage able to walk increased to 40%, showing improvement compared to 2019.

DHS System with Infection had a longer average time (16.92 days), but all patients were able to walk (100%).

Conclusions:

1. Patients operated with **uncemented and cemented bipolar prosthesis** showed excellent performance in all three years, maintaining a short average time for walking resumption and 100% able to walk.
2. Those operated with **Gamma Nail and Moore Prosthesis** showed good results, with short times and high success rates.
3. **Non-operated patients** had the worst outcome, with long times to walking resumption and a high number of patients remaining bedridden.
4. **DHS System** showed significant improvement in 2020, both in reducing time to walking resumption and increasing the percentage of patients able to walk.

9. Distance Covered Over Time Expressed in Meters

Descriptive Analysis:

1. **Operated Patients**:

Distance covered at 3 months ranges between 4.42 and 7.15 meters.

Distance covered at 6 months ranges between 12.84 and 15.46 meters.

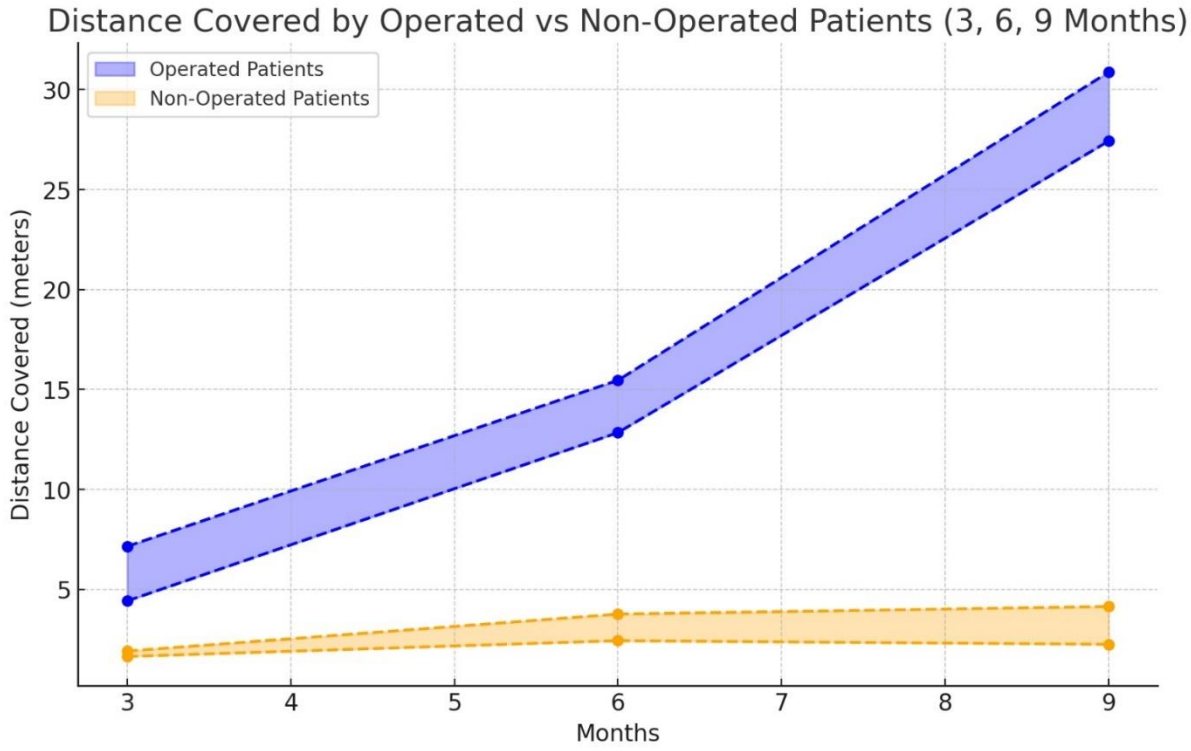
Distance covered at 9 months ranges between 27.43 and 30.88 meters.

2. **Non-Operated Patients**:

Distance covered at 3 months ranges between 1.64 and 1.91 meters.

Distance covered at 6 months ranges between 2.43 and 3.76 meters.

Distance covered at 9 months ranges between 2.25 and 4.14 meters.



10. Therapeutic Approach Based on Walking Resumption and Survival Duration

Conclusions for 2018:

1. **Mild Dementia**:

Patients with **bipolar prosthesis** had the fastest recovery time, with an average of 5.50 days and a survival duration of 25.57 months.

DHS System patients took 9.15 days to resume walking, a 66.3% increase in recovery time compared to bipolar prosthesis.

The **infected DHS system** required 17.33 days (215.5% increase), and non-operated patients resumed partial walking with assistance after 17.71 days, a 221.8% increase.

2. **Moderate Dementia**:

Patients with **bipolar (8.32 days) and cemented bipolar prostheses (5.67 days)** had the quickest recoveries, with relatively good survival durations.

Patients treated with **DHS system** took 16.64 days to resume walking, a 99.9% increase compared to the bipolar prosthesis.

Non-operated patients took 32.48 days to recover, representing a 290% increase compared to bipolar prosthesis patients.

3. **Severe Dementia**:

DHS system patients had an average walking resumption time of 19.33 days, while non-operated patients took much longer (34.43 days), a 78.1% increase.

Patients treated with **blade plate** had the longest recovery duration (63.29 days), a 227% increase over the DHS system.

Conclusions for 2019:

1. **Mild Dementia**:

Bipolar and DHS treatments showed similar recovery times (6.62 and 6.25 days), but **Gamma Nail** patients had a longer time (10.51 days), a 68% increase over DHS.

Survival duration for Gamma Nail patients was much higher (25.52 months) compared to **Moore treatment** (6.76 months), a 277.5% increase.

2. **Moderate Dementia**:

Bipolar prosthesis patients had a recovery time of 7.67 days, while **DHS** patients took 16.85 days, a 119.7% increase.

Non-operated patients had the longest recovery time (30.53 days), a 298.1% increase compared to bipolar prosthesis patients.

3. **Severe Dementia**:

Cemented bipolar prosthesis patients had a recovery time of 6.67 days, while DHS patients required 20.64 days, a 209.5% increase.

Non-operated patients had the longest recovery time (31.88 days), a 377% increase over cemented bipolar prosthesis.

Conclusions for 2020:

1. **Mild Dementia**:

Bipolar prosthesis patients had the fastest recovery time (2.34 days), a 64.7% improvement over 2019.

Non-operated patients took 19.91 days to recover, a 750% increase compared to bipolar prosthesis patients.

2. **Moderate Dementia**:

Patients treated with **Moore prosthesis** took 8.66 days to recover, while DHS patients required 13.82 days, a 59.6% increase.

Non-operated patients again had the longest recovery time (34.42 days), a 297.6% increase compared to bipolar prosthesis patients.

3. **Severe Dementia**:

Cemented bipolar prosthesis patients had the quickest recovery time (4.72 days), while non-operated patients took the longest (33.76 days), a 615.3% increase over cemented bipolar prosthesis.

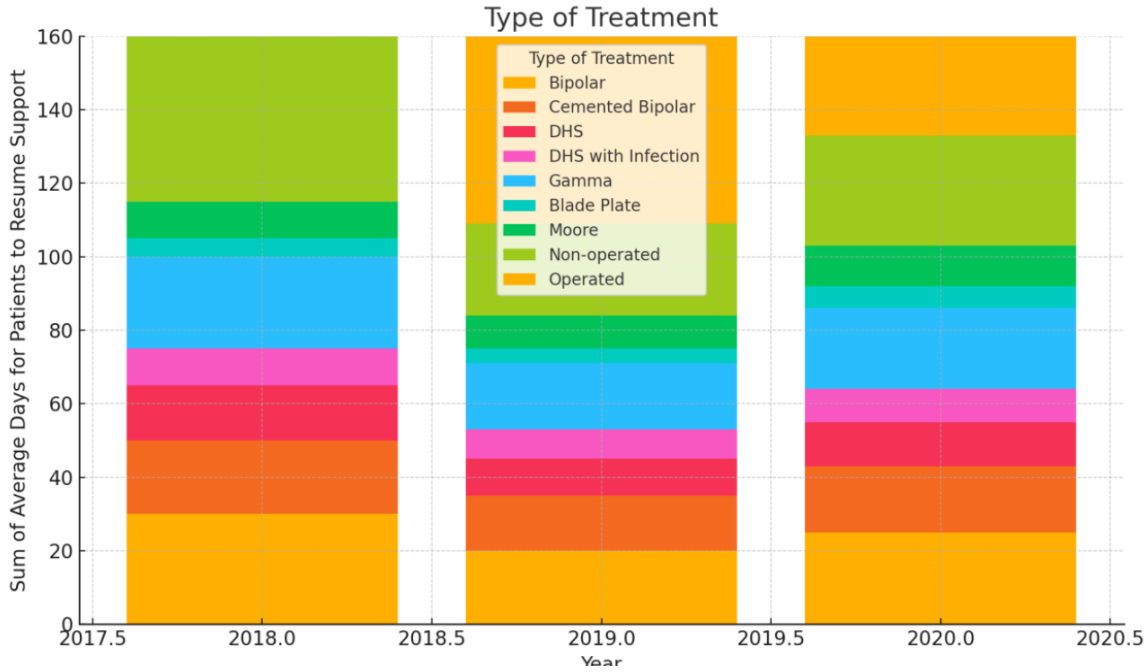
General Conclusions:

1. **Progressive Decrease in Recovery Time**:

There has been a general improvement in walking resumption times for patients with mild and moderate dementia, especially with bipolar prosthesis treatment, which showed significant reductions in recovery time from 2018 to 2020.

2. **Non-Operated Patients**:

Non-operated patients consistently had the longest recovery times across all cases, with large gaps compared to operated patients, many of whom remained bedridden. Surgical treatment should be considered essential.



Conclusions

In this final section, we summarize the main findings of our study and highlight the clinical implications and recommendations for improving the care of patients with hip fractures and dementia. The results provide valuable insights into optimizing the treatment and management of these vulnerable patients, emphasizing the importance of a multidisciplinary and integrated approach.

Key Findings:

1. The percentage of patients with hip fractures and dementia remained relatively constant at around 11.4-11.5% between 2018 and 2020.
2. In all three years analyzed, female patients with hip fractures and dementia represented the majority, constituting between 65% and 70.8% of all patients. The number of female patients increased consistently, particularly in 2020.
3. The total number of patients admitted with hip fractures gradually increased from 2018 to 2020, with a 9% increase from 2019 to 2020.
4. Rural areas were predominant in 2018 and 2019, representing most patients (over 52%), but this trend reversed in 2020, with urban patients accounting for 50.77% of cases.
5. Patients with severe dementia and hip fractures showed a constant increase over the three years, from 27.1% in 2018 to nearly 47.69% in 2020.
6. Alzheimer's dementia was the most common form of dementia across all three years, with a steady increase, reaching 35 cases in 2020, a total increase of 12.9%.
7. The proportion of patients readmitted with hip fractures increased consistently, reaching 31.75% in 2020, reflecting a high risk of re-injury or complications in this category.
8. Although the total number of patients with orthopedic conditions admitted to ICU increased significantly, the proportion of hip fracture patients with dementia in this category gradually declined from 33.33% in 2018 to 20% in 2020, suggesting that other types of orthopedic conditions became more frequent or critical in recent years.
9. In 2020, the average age continued to increase slightly to 85.2 years, representing a 0.2% increase from 2019 and a 0.7% increase from 2018.
10. Femoral neck fractures saw the greatest improvement, with a reduction of over 33% in the average hospital stay from 2018 to 2020, decreasing from 14.58 to 9.77 days.
11. The distribution of female patients with severe dementia continued to be higher than that of males across all age ranges between 2018 and 2020, especially in patients over 85 years, reflecting greater female longevity.
12. Patients treated with cemented bipolar prostheses and uncemented bipolar prostheses had the shortest average time to regain walking ability (4.18-6.6 days).

13. Non-operated patients had a considerably longer time to resume walking, ranging from 28.2-31.2 days in 2018 and 2019, and 29.36 days in 2020.

14. The percentage of non-operated patients who were able to walk increased from only 10.71% in 2019 to 40% in 2020.

15. The ability to regain locomotion among operated patients was 90.9% in 2018, 81% in 2019, and 82.5% in 2020, while for non-operated patients, it was 19.2% in 2018, 13% in 2019, and 16% in 2020.

16. At the 3-month mark, 33.89% of operated patients in 2018, 35% in 2019, and 35.38% in 2020 were able to walk 3 meters unaided, although they used walking aids or crutches. For non-operated patients, only 8.47% in 2018, 1.66% in 2019, and 1.53% in 2020 could move independently.

17. At 6 months, 38.9% of operated patients in 2018, 41.6% in 2019, and 40% in 2020 were able to walk 3 meters without external assistance. Among non-operated patients who used walking aids, a decrease was observed from 7% in 2018 to 3% in 2020.

18. At 9 months, 50.8% of operated patients in 2018, 50% in 2019, and 49.23% in 2020 managed to walk independently. The proportion of non-operated patients using external support was 15.25% in 2018, 5% in 2019, and 6.15% in 2020.

19. The number of patients with mild dementia and moderate education decreased from 28 in 2018 to 11 in 2020. Patients with moderate dementia and moderate education fell from 19 in 2018 to 18 in 2020, while patients with moderate education and severe dementia increased from 12 in 2018 to 28 in 2020.

20. Throughout the study, the average number of days until surgical intervention decreased from 10.45 in 2018, 10.14 in 2019, and to 3.97 in 2020, due to an additional operating room in the Orthopedics and Traumatology Department at the "Sfântul Apostol Andrei" Clinical Hospital.

21. We found that a higher number of comorbidities was associated with an increased mortality rate and reduced quality of life for patients with hip fractures and dementia. Effective comorbidity management is essential for improving clinical outcomes, with the most frequent comorbidities being hypertension, osteoporosis, diabetes, and heart failure.

22. Moderate pain was most common, increasing from 39.5% in 2018 to 52% in 2020. Unbearable pain was rare in all three datasets, remaining below 7% of total patients.

23. Operated patients reported better mobility outcomes throughout the three years. In 2020, 100% of operated patients reported mild postoperative pain.

24. In 2020, patients operated with a Moore prosthesis had the best long-term survival rates, with 33.33% at two years, while those with a bipolar prosthesis had a 14.29% survival rate. Patients operated with a Gamma system had a two-year survival rate of 20%, though it was used for a smaller number of patients.

25. Patients with vascular dementia required longer hospital stays in 2020, showing a 42% increase compared to 2019 and a 30.6% increase compared to 2018.

26. The DHS osteosynthesis system was the most frequently used implant in 2018, accounting for 22.03% of all treatments. It was primarily used for patients with Alzheimer's (38.46%) and vascular dementia (23.08%), with a higher use proportion among Alzheimer's patients.

27. The DHS osteosynthesis system was the most commonly used implant, especially in patients with Alzheimer’s, representing 56.25% of those treated with this implant.

28. Recovery of mobility among operated patients improved consistently over the three years. In 2018, 88.46% of operated patients resumed walking, in 2019, it was 81.08%, and in 2020, it reached 82.5%.

29. There was a general improvement in walking resumption time for patients with mild and moderate dementia, particularly with bipolar prostheses, where walking resumption time significantly decreased from 2018 to 2020.

30. Non-operated patients continued to have the longest time to resume walking, with significant differences compared to operated patients; many of these patients remained bedbound.

31. Patients operated on within 24-48 hours of fracture had a faster recovery and a significant reduction in postoperative mortality and complications.

32. The walking distance achieved by operated patients within the first 3 months was 4.42 meters in 2018, 5.19 meters in 2019, and 7.15 meters in 2020.

33. Within the first 6 months, the walking distance for operated patients was 12.84 meters in 2018, 14.05 meters in 2019, and 15.46 meters in 2020.

34. For the first 9 months, the walking distance for operated patients was 27.43 meters in 2018, 29.32 meters in 2019, and 30.88 meters in 2020.

35. The walking distance for non-operated patients with external aids was 1.64 meters in 2018, 1.16 meters in 2019, and 1.91 meters in 2020 at 3 months; at 9 months, it was 2.25 meters in 2018, 4.14 meters in 2019, and 4.06 meters in 2020.

36. Customized rehabilitation programs tailored to the individual needs of dementia patients demonstrated significant improvements in motor activity resumption

time, walking distance, and quality of life. Implementing these programs is recommended to maximize recovery.

37. Operated patients showed progressive improvements over three years, with a 61.8% increase in distance walked at 3 months, and more moderate improvements of 20.4% and 12.6% at 6 and 9 months, respectively.

38. Moore prosthesis patients showed the best long-term survival, with 50% survival at two years in 2018.

39. In 2019, only 4.35% of non-operated patients survived for one and two years, despite a high six-month survival rate (60.87%).

40. In 2020, patients operated on with a Moore prosthesis had the best long-term survival rates, with 33.33% surviving at two years, while patients operated on with a bipolar prosthesis had a survival rate of 14.29%. Patients operated on with the Gamma system had a two-year survival rate of 20%, although it was used for a small number of patients.

List of Publications

1. **Andrei Vlad Bradeanu**, Iulian Bounegru, Loredana Sabina Pascu , Anamaria Ciubara. *The Impact of Dementia on Patients with Hip Fracture.* Discoveries. 2024; 12(2):e188; **DOI**: 10.15190/d.2024.07, PMID: 39323738, **Pubmed**
https://discoveriesjournals.org/discoveries/D.2024.02.OA.Bradeanu.pdf
2. **Andrei Vlad Brădeanu,** Iulian Bounegru, Loredana Sabina Pascu, Anamaria Ciubară, Tudor Adrian Balseanu. *Assessment of Surgical and Non-surgical Outcomes in Patients with Dementia and Hip Fracture.* Current Health Sciences Journal. 2024; 50(3):381-391; **DOI**: 10.12865/CHSJ.50.03.05, **Pubmed**
https://www.chsjournal.org/CHSJ/papers/CHSJ.50.03.05.pdf
3. Pascu Loredana Sabina, Sarbu, Nicolae**, Bradeanu Andrei Vlad**, Jicman Stan Daniela, Matei Madalina Nicoleta, Sarbu Mihaela Ionela, Voinescu Doina Carina, Nechita Aurel, Tatu Alin Laurentiu. *MRI Findings in Axial Psoriatic Spondylarthritis.* Diagnostics. 2023; 13(7):1342; **DOI**: 10.3390/diagnostics13071342, **WOS**:000973112500001, **IF 3.0**
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http://journal-archiveuromedica.eu/archiv-euromedica-sp-ro/8-Complications-of-Hip-Hemiarthroplasty-in-Patients-with-Dementia.html
5. Florentina Năstase,Diana Sabina Radaschin, Elena Niculeț, **Andrei Vlad Brădeanu**, Mădălina Codruța Verenca, Aurel Nechita, Valentin Chioncel, Lawrence Chukwudi Nwabudike, Liliana Baroiu, Eduard Drima Polea, Silvia Fotea, Lucretia Anghel, Alexandru Nechifor, Alin Laurenţiu Tatu. *Orthopaedic manifestations of neurofibromatosis type 1: A case report.* Experimental and Therapeutic Medicine. 2021; 23(2):135, **DOI**: 10.3892/etm.2021.11058, PMCID: PMC8756425, **Pubmed**, **IF 2.751**
https://www.spandidos-publications.com/10.3892/etm.2021.11058
6. **Andrei Vlad Brădeanu**, Alexandru Bogdan Ciubară, Ștefan Lucian Burlea, Anamaria Ciubară. *The Socio-Economic Impact Produced by Patients with Dementia and Hip Fractures.* BRAIN. Broad Research in Artificial Intelligence and Neuroscience. 2020; 11(1):1-7, **DOI:** 10.18662/brain/11.1Sup1/24 **WOS:**000526944800001
https://brain.edusoft.ro/index.php/brain/article/view/999
7. **Andrei Vlad Brădeanu,** Cristina Kantor, Laura Rebegea, Loredana Sabina Pascu, Ginel Baciu, Diana Iliescu, Lucreția Anghel, Anamaria Ciubară. *Indications and Contraindications in Traumatic Pathology in Patients with Dementia*. Medical Surgical Journal – Revista Medico-Chirurgicala, 2019; 123(1):22-26, **WOS**:000463715000004
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