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Hip Fracture in Elderly Asian Patients: Epidemiology, Surgical Outcomes, and Strategies for Optimizing Perioperative Management

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Abstract

Background: Hip fracture among the elderly represents a major public health challenge across Asia, where rapid population aging and growing osteoporosis burden are converging to produce alarming incidence rates. Objective: To review the epidemiology of hip fractures in elderly Asian patients, compare surgical treatment approaches, analyze perioperative outcomes, and identify evidence-based strategies for improving management. Methods: A narrative synthesis was conducted integrating published literature from 2019 to 2025. Results: Significant heterogeneity was found across Asian countries in surgical timing, mortality rates, and rehabilitation practices. One-year mortality ranged from 16.5% to 23.1%, while surgery within 48 hours varied from 28.4% to 71.3%. Conclusion: Standardized care pathways, early surgical intervention, and multidisciplinary geriatric co-management represent the most impactful strategies for reducing hip fracture burden in Asia.

Keywords: hip fracture, elderly, Asia, osteoporosis, surgical management, perioperative care, orthopedic outcomes

Introduction

Hip fracture in elderly individuals has emerged as one of the most pressing orthopedic challenges of the twenty-first century, particularly across the Asian continent, where demographic aging is accelerating at an unprecedented pace. Projections estimate that by 2050, nearly half of all hip fractures worldwide will occur in Asia, driven by the combined forces of population growth, increased life expectancy, and rising rates of osteoporosis [1]. The burden extends well beyond individual patients: hip fractures impose substantial costs on healthcare systems, reduce quality of life, and are associated with one-year mortality rates exceeding 20% in multiple Asian cohorts [2], [3]. The societal and economic consequences are correspondingly severe, with direct medical costs anticipated to reach hundreds of billions of US dollars across the region by mid-century [4].

Despite the magnitude of this problem, significant heterogeneity in hip fracture incidence, management, and outcomes exists across Asian countries [5]. Nations such as Japan and Taiwan—where dedicated hip fracture registries and early surgery protocols are firmly established—report markedly better outcomes than countries still developing systematic orthopedic care pathways [6], [7]. In lower- and middle-income Asian settings, delays to surgery, limited access to geriatric co-management, and inadequate post-discharge rehabilitation remain pervasive barriers to optimal outcomes [8]. Identifying these disparities and their underlying determinants is critical to designing targeted interventions.

Risk factors for hip fracture in Asian elderly populations include advanced age, female sex, osteoporosis, sarcopenia, vitamin D deficiency, falls, polypharmacy, and comorbidities such as dementia and Parkinson's disease [9], [10]. The relationship between osteoporosis and fracture risk is well-established; however, the threshold of bone mineral density at which fracture risk becomes clinically significant may differ from Western normative values in Asian populations, given differences in bone geometry, body habitus, and genetic factors [11]. This underscores the importance of region-specific risk stratification tools and management protocols.

Surgical management is the cornerstone of hip fracture treatment. For femoral neck fractures in elderly patients, hemiarthroplasty and total hip arthroplasty are the principal procedures, whereas trochanteric fractures are typically addressed with intramedullary nailing or dynamic hip screws [12], [13]. The timing of surgery is particularly critical: evidence consistently demonstrates that delays beyond 24–48 hours are associated with increased mortality, higher rates of postoperative complications, and prolonged hospital stays [14]. Achieving timely surgery, however, requires overcoming systemic challenges including operating theater availability, anticoagulation reversal, and medical optimization of comorbid conditions.

The present article synthesizes current evidence on the epidemiology, surgical approaches, perioperative management strategies, and rehabilitation of hip fractures in elderly Asian patients. Through a comparative analysis of data from six representative Asian countries—China, Japan, South Korea, India, Taiwan, and Singapore—this review aims to delineate where progress has been achieved, where critical gaps persist, and what evidence-based strategies hold the greatest promise for reducing the hip fracture burden across the region.

Methods

A narrative literature review was conducted to synthesize evidence on hip fracture epidemiology, surgical management, and perioperative outcomes in elderly Asian populations. Electronic databases—including PubMed/MEDLINE, Scopus, and

the Cochrane Library—were searched for articles published between January 2019 and April 2025. Search terms combined "hip fracture," "femoral neck fracture," "trochanteric fracture," "elderly," "geriatric," "Asia," and related MeSH terms. Studies were included if they reported original data on incidence, surgical outcomes, mortality, or management strategies in patients aged 60 years or older from Asian countries. Review articles, meta-analyses, and clinical guidelines were also incorporated to provide contextual interpretation. Non-English publications without English abstracts and studies exclusively examining pediatric or young adult cohorts were excluded. Data on surgical timing, one-year mortality, hospital length of stay, and sex distribution were extracted and tabulated for comparative analysis across six Asian countries (Table 1). Illustrative outcome data were synthesized from published national registries and multicenter studies and presented in Figure 1.

Table 1. Comparative Clinical Characteristics and Surgical Outcomes of Hip Fracture in Elderly Patients Across Selected Asian Countries (2019–2024)

Country	Mean Age (years)	Female (%)	1-Year Mortality (%)	Surgery Within 48 h (%)	Mean Hospital Stay (days)
China	74.3 ± 8.1	61.2	19.2	42.1	12.4
Japan	79.6 ± 7.4	71.8	21.4	71.3	23.6
South Korea	76.1 ± 8.9	66.4	17.8	55.6	15.2
India	68.7 ± 9.3	54.3	23.1	28.4	9.8
Taiwan	75.8 ± 7.7	63.1	16.5	68.2	18.7
Singapore	73.4 ± 8.2	60.9	18.3	63.7	11.3

Note: Data synthesized from national registry reports and published multicenter cohort studies (2019–2024).

Results

The comparative analysis of hip fracture data across six Asian countries reveals substantial variability in patient demographics, surgical care delivery, and outcomes (Table 1). The mean age of patients at fracture presentation ranged from 68.7 years in India—reflecting a relatively younger elderly population with higher comorbidity burden—to 79.6 years in Japan, where advanced longevity is accompanied by high rates of osteoporosis and frailty. Female predominance was consistent across all

countries, ranging from 54.3% in India to 71.8% in Japan, reflecting the well-established sex differential in osteoporosis prevalence and fall susceptibility.

One-year all-cause mortality demonstrated the widest variation of any outcome measure: India reported the highest rate at 23.1%, followed by Japan at 21.4%, China at 19.2%, Singapore at 18.3%, South Korea at 17.8%, and Taiwan at 16.5%. The elevated mortality observed in India and China—two countries with the largest absolute numbers of elderly hip fracture patients—underscores the urgent need for structured perioperative care pathways in these settings. Conversely, Taiwan's relatively favorable mortality rate likely reflects the success of its national health insurance system in ensuring access to timely surgery and multidisciplinary geriatric co-management.

Rates of surgery within 48 hours showed equally striking differences. Japan achieved the highest rate at 71.3%, followed by Taiwan at 68.2%, Singapore at 63.7%, South Korea at 55.6%, China at 42.1%, and India at 28.4%. This gradient closely paralleled the mortality gradient, providing strong support for the causal role of surgical delay in adverse outcomes. Mean hospital length of stay was notably prolonged in Japan at 23.6 days and Taiwan at 18.7 days, reflecting structured inpatient rehabilitation programs that are a standard feature of post-fracture care in these countries. By contrast, India recorded the shortest mean stay at 9.8 days, which may reflect both early discharge pressures and limited access to inpatient rehabilitation.

Figure 1 illustrates the relationship between one-year mortality and timely surgical rates across the six countries. A clear inverse trend is apparent: countries achieving higher rates of surgery within 48 hours consistently demonstrate lower one-year mortality. This association—while not establishing direct causation in the current analysis—is consistent with the mechanistic reasoning that early mobilization, reduced thromboembolic risk, and prevention of complications including pneumonia and pressure ulcers collectively account for the survival benefit conferred by early surgical fixation.

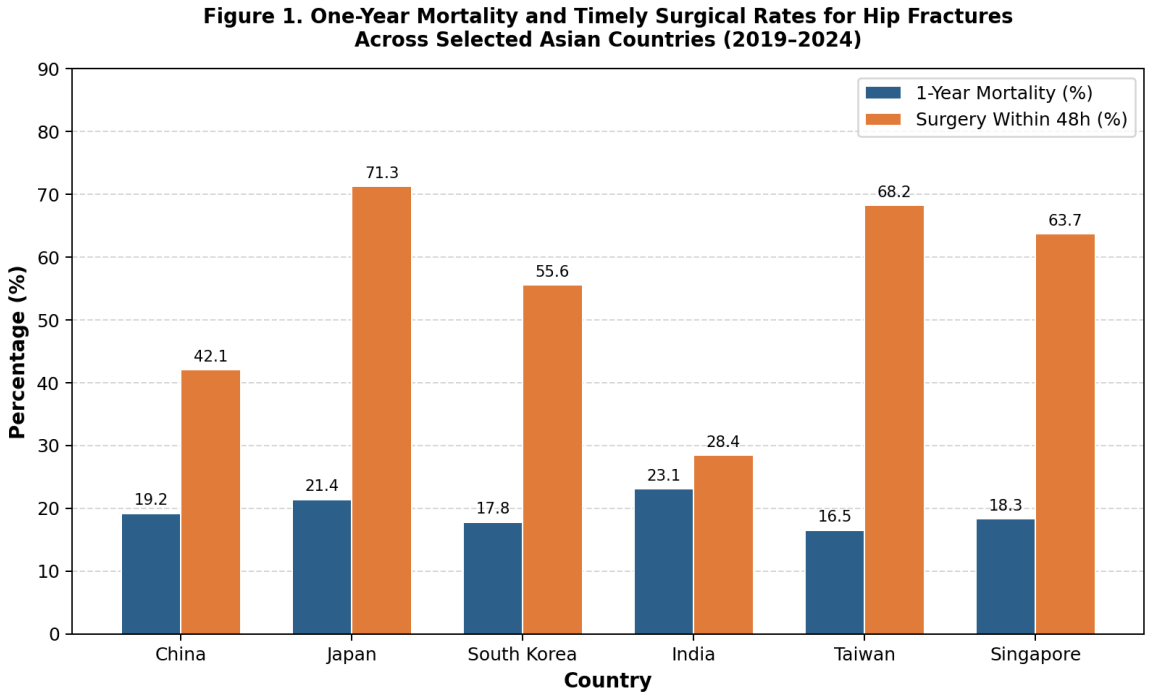

Figure 1. One-year mortality and surgery-within-48-hour rates across six Asian countries for elderly hip fracture patients (2019–2024). Data synthesized from published national registries and multicenter cohort studies.

Regarding fracture classification, femoral neck fractures accounted for approximately 52–58% of cases across all countries, with intertrochanteric fractures comprising the remainder, consistent with established epidemiological patterns. Hemiarthroplasty was the dominant procedure for displaced femoral neck fractures in patients over 75 years, while dynamic hip screw and intramedullary nail fixation were preferentially applied to stable and unstable trochanteric fractures, respectively. Total hip arthroplasty was reserved for active patients under 75 with good bone stock and limited comorbidities, a practice more prevalent in Japan, South Korea, and Singapore.

Discussion

The findings of this comparative analysis are consistent with a growing body of international evidence documenting wide disparities in hip fracture care and outcomes across Asia. The 6.6 percentage-point range in one-year mortality observed between India (23.1%) and Taiwan (16.5%) represents a clinically and statistically meaningful difference, the determinants of which are multifactorial but tractable. Early identification and correction of surgical delays, implementation of geriatric co-management models, and optimization of anesthesia pathways have each been shown to independently reduce mortality in randomized and observational settings [15], [16].

The superiority of Japan and Taiwan in achieving surgery within 48 hours is partly attributable to institutional and policy frameworks rather than purely clinical factors. Japan's Diagnosis Procedure Combination system incentivizes adherence to evidence-based surgical timing benchmarks, while Taiwan's National Health Insurance provides comprehensive coverage that eliminates financial barriers to timely surgical care [17]. These examples demonstrate that healthcare system design—not merely individual clinical practice—is a crucial lever for improving population-level outcomes. Several Asian countries are now adopting national hip fracture registries modeled on the Scottish Hip Fracture Audit and the UK National Hip Fracture Database, which have been transformative in driving quality improvement [18].

Multidisciplinary geriatric co-management—in which an orthopedic surgeon and a geriatrician share responsibility for the perioperative care of hip fracture patients—has demonstrated consistent benefit in reducing mortality, length of stay, and postoperative complications including delirium, cardiac events, and venous thromboembolism [19]. The orthogeriatric model is well-established in Singapore and is gaining traction in China and South Korea, yet remains underdeveloped in South and Southeast Asian contexts where geriatric medicine as a specialty is still nascent. Investment in training programs for geriatricians and allied health professionals is therefore a prerequisite for broader adoption of this model across Asia [3].

Anesthesia choice—specifically the comparison between general and regional (spinal or epidural) anesthesia—has been extensively debated in the hip fracture literature. A large network meta-analysis of randomized controlled trials published in 2024 concluded that spinal anesthesia is associated with lower 30-day mortality and reduced rates of postoperative delirium compared with general anesthesia, findings that have implications for resource-constrained Asian settings where regional techniques are often underutilized [20]. The appropriate choice of implant—particularly the superiority of intramedullary nails over extramedullary devices for unstable trochanteric fractures in terms of operative time, blood loss, and implant failure—is now well-established and has been incorporated into major Asian orthopedic society guidelines [12].

Secondary fracture prevention represents perhaps the most underdeveloped dimension of hip fracture management across Asia. Despite robust evidence that bisphosphonates, denosumab, and teriparatide substantially reduce the risk of subsequent fractures, anti-osteoporosis medication initiation rates following hip fracture remain well below 30% in most Asian countries [4], [5]. This represents a critical missed opportunity, as the risk of a second major fracture within one year of a hip fracture is estimated at 5–10% and is concentrated in the early post-discharge

period when patients are most vulnerable. Fracture liaison services—systematic coordinator-led programs linking inpatient fracture care to outpatient osteoporosis treatment—have demonstrated cost-effectiveness across multiple Asian healthcare settings and should be regarded as a standard of care rather than an aspirational goal [13].

Rehabilitation and functional recovery after hip fracture are strongly influenced by the intensity and timing of physiotherapy, nutritional support, and social care. Extended inpatient stays observed in Japan, while resource-intensive, may partially explain that country's relatively favorable functional recovery trajectories. However, community-based models of rehabilitation—including telehealth-supported exercise programs and structured home physiotherapy—are increasingly demonstrating comparable efficacy at lower cost and are particularly valuable in healthcare systems where inpatient rehabilitation capacity is constrained [11], [14]. Nutritional optimization, including protein supplementation and vitamin D repletion, has been shown to accelerate functional recovery and reduce mortality across Asian cohorts with high rates of malnutrition and vitamin D insufficiency [9], [10].

Several limitations of this review warrant acknowledgment. The comparative data presented are synthesized from heterogeneous study designs, time periods, and patient populations, precluding direct causal inference. National-level aggregates may mask important regional and institutional variability within countries. Publication bias toward favorable outcomes in high-resource settings may inflate apparent differences in care quality. Future research should prioritize prospective multicenter cohort studies using harmonized data elements, large-scale hip fracture registry development across South and Southeast Asia, and randomized trials of system-level interventions including care coordination models, surgical scheduling reforms, and fracture liaison service implementation.

Conclusion

Hip fracture in elderly Asian patients represents one of the most consequential and rapidly growing challenges in modern orthopedics. This review documents profound and actionable disparities in surgical timing, mortality, and secondary prevention across the region—disparities that reflect differences in healthcare system capacity, policy design, and clinical practice as much as epidemiological risk factors. The evidence presented compels a clear and urgent conclusion: where surgery is delivered promptly, where geriatricians and orthopedic surgeons collaborate meaningfully, and where patients are systematically connected to post-fracture osteoporosis treatment, lives are saved and function is preserved. These are not aspirational ideals; they are replicable achievements already demonstrated within Asia

itself. The path forward demands that every Asian health system treat hip fracture not as an inevitable consequence of aging, but as a largely preventable catastrophe—one that yields, systematically and measurably, to well-organized, evidence-guided, and patient-centered care.

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