

## INFLUENCE OF THE TIMING OF HIP FRACTURE SURGERY ON FINAL TREATMENT OUTCOMES

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### SAŽETAK

**Uvod:** Incidencija preloma kuka pokazuje trend porasta na globalnom nivou, zahvaljujući sve dužem životnom veku. Procenjeno je da će do 2050. godine dostići broj od 6,26 miliona slučajeva godišnje. Cilj našeg preglednog rada jeste analiza dostupne literature o vezi između tajminga operacije preloma kuka i njegovog uticaja na morbiditet i mortalitet.

**Rezultati:** Preko 85% pacijenata koji zadobiju prelom kuka su lica starija od 65 godina sa postojećim komorbiditetima. I sa adekvatnim i optimalnim lečenjem, godine i komorbiditeti ih predisponiraju za lošiju prognozu i veći morbiditet i mortalitet, u odnosu na opštu populaciju. Zvanični stav AAOS-a je da pacijenti operisani unutar 48 h od prijema u bolnicu imaju bolji ishod lečenja. Razloge za odlaganje operativnog lečenja možemo podeliti u medicinske i nemedicinske. Veliki broj objavljenih studija podržava stav da pacijenti koji su operisani 24 h unutar prijema imaju bolji ishod u pogledu razvoja komplikacija i mortaliteta (nakon 30 dana i nakon godinu dana) nego pacijenti koji su operisani kasnije. Sa druge strane, nekoliko retrospektivnih studija i meta-analiza pokazalo je da nema značajne razlike u mortalitetu između pacijenata operisanih 24 h, 36 h i 48 h nakon prijema. Ipak, u navedenim studijama je operativno lečenje u roku od 4 dana od prijema u bolnicu identifikovano kao najznačajniji faktor koji korelira sa smanjenim mortalitetom.

**Zaključak:** Pacijente sa prelomom kuka trebalo bi operisati unutar 24 h od prijema u bolnicu, ukoliko nemaju akutno medicinsko stanje koje onemogućava operaciju. Ukoliko postoji medicinsko stanje koje može biti korigovano, ta granica se podiže na 48 h, ali vreme čekanja na operativno lečenje ne bi trebalo da bude duže od 4 dana.

**Ključne reči:** prelom kuka, mortalitet, komplikacije, ishod lečenja

### ABSTRACT

**Introduction:** Globally, the incidence of hip fractures has had an increasing trend, due to longer life expectancy. It is estimated that, by 2050, it will have reached 6.26 million cases a year. The aim of our review is the analysis of available literature on the relationship between the timing of hip fracture surgery and its impact on morbidity and mortality.

**Results:** Over 85% of patients who suffer hip fracture are individuals older than 65 years with existing comorbidities. Even with adequate and optimal treatment, age and comorbidities predispose these patients to a worse prognosis and higher morbidity and mortality, as compared to the general population. The official position of AAOS is that patients who are operated on within 48 hours of hospital admission have a better treatment outcome. The reasons for delaying surgical treatment can be divided into medical and nonmedical. A large number of published studies support the claim that patients who are operated on 24 hours within hospital admission have a better outcome in terms of complications and mortality (after 30 days and after one year) than patients who are operated on later. On the other hand, several retrospective studies and meta-analyses have shown that there is no significant difference in mortality between patients operated on 24 h, 36 h, and 48 h after admission. However, in these studies, surgical treatment within 4 days of admission has been identified as the most significant factor correlating with reduced mortality.

**Conclusion:** Patients with hip fractures should be operated on within 24 hours of admission unless they have an acute medical condition that prevents surgery. If there is a medical condition that can be corrected, this window is prolonged to 48 hours, but the waiting time for surgical treatment should not be longer than 4 days.

**Key words:** hip fracture, mortality, complications, treatment outcomes

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## UVOD

Incidencija preloma kuka pokazuje trend porasta na globalnom nivou, zahvaljujući sve dužem životnom veku. Procenjeno je da će do 2050. godine dostići broj od 6,26 miliona slučajeva godišnje, što je ogroman porast u odnosu na 1,6 miliona slučajeva godišnje, zabeležen 1990. godine [1]. Procenjeno je da je mortalitet u prvih godinu dana od preloma kuka do 58% [2].

Veza između tajminga operacije i morbiditeta i mortaliteta ostaje donekle kontroverzna. Nedostatak zvaničnih protokola i preporuka predstavlja prepreku u formiranju uniformnog stava o adekvatnom vremenu između prijema pacijenta na bolničko lečenje i sprovođenja operativnog zahvata.

Perioperativna evaluacija stanja pacijenta, kao i dostupnost operacione sale, jesu najčešći razlozi za odlaganje operacije [3]. Pacijenti sa prelomom kuka su zbog samog preloma i prolongirane nepokretnosti pod povišenim rizikom za razvoj tromboembolijskih komplikacija, urinarnih infekcija, pneumonije i deku-bitalnih rana [4]. Dostupne studije imaju oprečne rezultate, te trauma centri širom sveta sastavljaju interne protokole o lečenju pacijenata sa prelomima kuka.

Cilj našeg preglednog rada jeste analiza dostupne literature o vezi između tajminga operacije preloma kuka i njegovog uticaja na morbiditet i mortalitet.

## KOMPLIKACIJE PRELOMA KUKA

Preko 85% pacijenata koji zadobiju prelom kuka su lica starija od 65 godina sa postojećim komorbiditetima [5]. I sa adekvatnim i optimalnim lečenjem, godine i komorbiditeti ih predisponiraju za lošiju prognozu i veći morbiditet i mortalitet, u odnosu na opštu populaciju.

ASA klasifikacija (American Society of Anesthesiologists Physical Status Classification System) se smatra dobrim sredstvom za procenu perioperativnog rizika [6]. Jedna studija je pokazala da su pacijenti sa ASA 3 skorom imali 3,78 puta veći rizik da razviju perioperativne komplikacije, u odnosu na pacijente sa ASA 2 skorom, dok su pacijenti sa ASA 4 skorom imali 7,39 puta veći rizik od komplikacija u odnosu na pacijente sa ASA 2 skorom [7].

Najčešće perioperativne komplikacije preloma kuka su:

1. Kognitivni i neurološki poremećaji (10%, uglavnom pacijenti stariji od 65 godina, postoperativni delirijum)
2. Kardiopulmonalna dešavanja (infarkt miokarda – IM; duboka venska tromboza – DVT; plućna tromboembolija – PTE; pneumonija)
3. Gastrointestinalni poremećaji (dispepsija, konstipacija)

## INTRODUCTION

Globally, the incidence of hip fractures has had an increasing trend, due to longer life expectancy. It is estimated that, by 2050, it will have reached 6.26 million cases a year, which is an immense increase from 1.6 million cases a year, registered in 1990 [1]. It has been estimated that mortality within the first year after hip fracture can be as high as 58% [2].

The link between surgery timing, on the one hand, and morbidity and mortality, on the other, remains controversial. The lack of official protocols and recommendations represents a significant obstacle to forming a universal view regarding the appropriate time from patient hospital admission to surgical treatment.

Perioperative evaluation of the patient's condition, as well as the availability of an operating theatre, represent the most common reasons for delaying surgery [3]. Due to the fracture itself and prolonged immobility, patients with hip fractures are at increased risk of developing thromboembolic complications, urinary infections, pneumonia, and decubitus ulcers [4]. Available studies show conflicting results, which is why trauma centers all over the world have developed protocols of their own on the treatment of patients with hip fractures.

The aim of our review article is to perform an analysis of available literature related to the link between the timing of hip surgery and its influence on morbidity and mortality.

## HIP FRACTURE COMPLICATIONS

Over 85% of patients who suffer hip fracture are individuals older than 65 years with existing comorbidities [5]. Even with adequate and optimal treatment, age and comorbidities predispose these patients to a worse prognosis and higher morbidity and mortality, as compared to the general population.

The ASA Classification (American Society of Anesthesiologists Physical Status Classification System) is considered a good tool for assessing perioperative risk [6]. One study showed that patients with an ASA 3 score had a 3.78 times higher risk of developing perioperative complications, as compared to patients with an ASA 2 score, while patients with an ASA 4 score had a 7.39 higher risk of complications, as compared to patients with an ASA 2 score [7].

The most common perioperative complications of hip fracture are the following:

1. Cognitive and neurological impairments (10%, mainly patients older than 65 years, postoperative delirium)
2. Cardiopulmonary events (myocardial infarction – MI; deep vein thrombosis – DVT; pulmonary thromboembolism – PTE; pneumonia)

4. Urogenitalne komplikacije (retencija urina, urinarna infekcija – faktor rizika za razvoj delirijuma)
5. Hematološke komplikacije (anemija)
6. Elektrolitni i metabolički disbalans
7. Dekubitalne rane [4].

Kod pacijenata sa višim ASA skorom i pacijenata lečenih konzervativno, studije su pokazale povišen mortalitet, godinu dana nakon povrede/operacije [8–10]. Takođe, jedna studija je pokazala da, kod medicinski nestabilnih pacijenata, odlaganje operativnog lečenja nije smanjilo mortalitet u odnosu na pacijente operisane unutar 4 dana od prijema.

### ODLAGANJE OPERATIVNOG LEČENJA I MORTALITET

Zvaničan stav Američke akademije ortopedskih hirurga (American Academy of Orthopaedic Surgeons – AAOS) jeste da pacijenti operisani unutar 48 h od prijema u bolnicu imaju bolji ishod lečenja [11]. Razloge za odlaganje operativnog lečenja možemo podeliti u medicinske i nemedicinske.

U nemedicinske razloge odlaganja operacije spada nedostupnost operacione sale ili dežurnog ortopedskog hirurga, nedostupnost adekvatnog implantacionog materijala, kao i nepostojanje odeljenja ortopedske hirurgije i traumatologije u pojedinim bolnicama [12]. U tim slučajevima, pacijent, koji je sa medicinske strane spreman za operaciju, mora da čeka da se obezbedi operaciona sala, ortopedski hirurg, implantacioni materijal ili čak da se organizuje transport u drugu bolnicu koja poseduje službu ortopedske hirurgije i traumatologije. Sve navedeno može odložiti operaciju više od jednog dana, a studije pokazuju da i kod pacijenata koji su spremni za operaciju, bez medicinskih stanja koja zahtevaju hitnu korekciju, čekanje duže od 4 dana od prijema u bolnicu i posledična nepokretnost mogu dovesti do teških posledica i porasta mortaliteta [13].

U svojoj studiji, Šin i saradnici su pokazali da pacijente koji su primljeni u bolnice sa manje resursa očekuje duže vreme čekanja od prijema do operacije, zbog nemedicinskih razloga, te da izloženost prolongiranoj imobilizaciji i inflamatornim stanjima može dovesti do fatalnih posledica po pacijenta [12].

U medicinske razloge odlaganja operacije spada preoperativna priprema pacijenta, odnosno stabilizacija pacijenta [14].

Veliki broj objavljenih studija podržava stav da pacijenti koji su operisani 24 h unutar prijema imaju bolji ishod u pogledu razvoja komplikacija i mortaliteta (nakon 30 dana i nakon godinu dana) nego pacijenti koji su operisani kasnije [9,15–20]. U jednoj studiji je navedeno da je pacijentima koji su imali akutno

3. Gastrointestinal disorders (dyspepsia, constipation)
4. Urogenital complications (urine retention, urinary infection – risk factor for the development of delirium)
5. Hematological complications (anemia)
6. Electrolyte and metabolic imbalance
7. Decubitus ulcers [4].

In patients with a high ASA score and patients treated conservatively, studies have shown increased mortality, a year after the injury/surgery [8–10]. Also, another study showed that, in medically unstable patients, postponing surgical treatment did not lower mortality, as compared to patients who were operated on within 4 days of hospital admission.

### POSTPONING SURGICAL TREATMENT AND MORTALITY

The official position of the American Academy of Orthopaedic Surgeons (AAOS) is that patients surgically treated within the first 48 h of hospital admission have a better treatment outcome [11]. The reasons for postponing surgical treatment can be categorized as medical or nonmedical.

Unavailability of an operating theatre or unavailability of an orthopedic surgeon on duty, unavailability of adequate implants, as well as the lack of an orthopedic and traumatology department in some hospitals, are all nonmedical reasons for postponing surgery [12]. In such cases, patients who are, from the medical point of view, ready for surgery, must wait until an operating theatre, or an orthopedic surgeon, or an implant are made available, or even until transport is organized to a different hospital, which has an orthopedic and trauma surgery department. All of the above stated may delay surgery by more than a day, and studies have shown that, even in patients ready for surgery, who suffer no medical conditions that need urgent treatment, a waiting period longer than 4 days of the day of hospital admission and the resulting immobility, may lead to serious consequences and a rise in mortality [13].

In their study, Sheehan et al. demonstrated that patients admitted to hospitals with lesser resources are faced with a longer waiting period from hospital admission to surgery, for nonmedical reasons, and that their consequent exposure to prolonged immobilization and inflammatory conditions may lead to fatal consequences for the patient [12].

Preoperative patient preparation, i.e., patient stabilization, is a medical reason for delaying surgery [14].

A large number of published studies support the position that patients who are operated on within the first 24 h of hospital admission have a better outcome with regards to the development of complications and

medicinsko stanje koje može biti brzo korigovano, bilo opravdano produžiti čekanje na operaciju do 48 h nakon prijema, ali da pacijentima sa hroničnim stanjima koja nisu mogla biti korigovana unutar 48 h, odlaganje operativnog lečenja nije smanjilo mortalitet, u odnosu na pacijente iz iste ASA kategorije koji su operisani unutar 48 h [20].

U retrospektivnoj studiji, koja je uključivala 116 starijih pacijenata sa prelomom kuka, Mutlu i saradnici su zaključili da, kod pacijenata sa prelomom kuka, nepotrebni kardiološki testovi dovode do odlaganja operacije, što može dovesti do razvoja komplikacija, a neće dovesti do značajnih promena u perioperativnoj kardiološkoj terapiji [21].

U meta-analizi 35 nezavisnih studija, koja je brojala 191.873 učesnika i u kojoj je zabeleženo 34.448 smrtnih ishoda, Moja i saradnici su dokazali da rana operacija (unutar 24 h ili najkasnije unutar 48 h od prijema) dovodi do smanjenog rizika od smrtnog ishoda ( $p < 0,001$ ) i nastanka dekubitalnih rana ( $p < 0,001$ ), te zaključili da ortopedski hirurzi moraju težiti tome da većina pacijenata sa prelomom kuka bude operisana unutar 24 h do 48 h od prijema u bolnicu [22].

Simunovic i saradnici su, u meta-analizi koja je uključivala 4.208 pacijenata sa 721 smrtnim ishodom, zaključili da rana operacija (do 72 h od prijema u bolnicu) dovodi do značajnog smanjenja mortaliteta ( $p = 0,01$ ), smanjuje rizik od nastanka pneumonije ( $p = 0,02$ ), te dovodi do smanjenja rizika od nastanka dekubitalnih rana ( $p < 0,001$ ) [23].

Sa druge strane, nekoliko retrospektivnih studija i meta-analiza pokazalo je da nema značajne razlike u mortalitetu između pacijenata operisanih 24 h, 36 h i 48 h nakon prijema u bolnicu [13,24,25]. Ipak, u navedenim studijama, operativno lečenje u roku od 4 dana od prijema u bolnicu je identifikovano kao najznačajniji faktor koji korelira sa smanjenim mortalitetom [13].

Zbog svega navedenog, pojedine zemlje donose nacionalne smernice o opravdanom odlaganju operativnog lečenja, kako bi se poboljšao krajnji ishod lečenja. Tako je Nacionalni institut za zdravlje i kliničku izvrsnost Ujedinjenog Kraljevstva (UK National Institute for Health and Care Excellence) predložio da pacijentima sa sledećim medicinskim stanjima može opravdano biti odloženo operativno lečenje, do korekcije istih: anemija  $< 8$  g/dl, korektibilne koagulopatije, hipovolemija, elektrolitni disbalans, nekontrolisani dijabetes, nekontrolisano popuštanje srca, akutna srčana aritmija ili ishemija, akutna infekcija grudnog koša ili egzacerbacija hronične infekcije grudnog koša [12].

mortality (after 30 days and after a year) than patients who are operated on later [9,15–20]. One study showed that it was justified to delay surgery up to 48 h of hospital admission in patients suffering from an acute medical condition that could be dealt with quickly, but that, in case of patients who suffered from a chronic condition that could not be remedied within 48 h of admission, delaying surgery did not decrease mortality, as compared to patients from the same ASA category which were operated on within 48 of admission [20].

In a retrospective study, which involved 116 older patients with hip fracture, Mutlu et al. concluded that, in patients with hip fracture, unnecessary cardiological tests led to surgery delay, thus potentially leading to the development of complications, while, at the same time, leading to no significant changes in perioperative cardiological therapy [21].

In a meta-analysis comprising 35 independent studies, involving 191,873 participants and registering 34,448 lethal outcomes, Moja et al. proved that early surgery (within 24 h of admission or 48 h of admission, at the latest) led to a decrease in the risk of a lethal outcome ( $p < 0.001$ ) and in the risk of decubitus sores ( $p < 0.001$ ), concluding, therefore, that orthopedic surgeons must strive towards performing surgery on most patients with hip fracture within 24 h to 48 h of hospital admission [22].

In a meta-analysis involving 4,208 patients, with 721 lethal outcomes, Simunovic et al. concluded that early surgery (up to 72 h of admission) led to a significant decrease in mortality ( $p = 0.01$ ), decreased the risk of pneumonia ( $p = 0.02$ ), and led to a decreased risk of the development of decubitus sores ( $p < 0.001$ ) [23].

On the other hand, several retrospective studies and meta-analyses showed that there was no significant difference in mortality between patients surgically treated 24 h, 36 h, and 48 h after hospital admission [13,24,25]. However, in the said studies, surgical treatment within 4 days of hospital admission was identified as the most significant factor correlating with reduced mortality [13].

Due to all that has been stated above, individual countries adopt national guidelines on justified surgical treatment delay, in order to improve the final treatment outcome. Thus, the UK National Institute for Health and Care Excellence has proposed that surgical treatment may be postponed in patients with the following medical conditions: anemia  $< 8$  g/dl, correctable coagulopathies, hypovolemia, electrolyte imbalance, uncontrolled diabetes, uncontrolled heart failure, acute cardiac arrhythmia or ischemia, acute chest infection, or exacerbation of chronic chest infection, until a time that these are remedied [12].

## HIRURŠKO LEČENJE I BOLNIČKI DANI

Pacijenti koji su ranije operisani, kraće borave u bolnici, ranije se vertikalizuju u odnosu na dan prijema, kod njih je funkcionalni oporavak efikasniji, a troškovi lečenja su manji [26].

U prospektivnoj studiji, koja je uključivala 850 pacijenata, Al-Ani i saradnici su utvrdili da je, kod pacijenata koji su operisani u roku od 24 h, 36 h ili 48 h nakon prijema, smanjen broj dana provedenih u bolnici, i to: za grupu pacijenata operisanih unutar 24 h od prijema – 14 dana naspram 18 dana kod kasnije operisanih pacijenata; za grupu pacijenata operisanih unutar 36 h od prijema – 15 dana u odnosu na 19 dana kod kasnije operisanih pacijenata; i za grupu pacijenata operisanih unutar 48 h od prijema – 15 dana u odnosu na 21 dan kod kasnije operisanih pacijenata ( $p < 0,001$ ) [27].

Takođe u korelaciji sa prethodno navedenom studijom su i rezultati studije koju su sproveli Lefevr i saradnici, gde je dokazano da čekanje na operaciju duže od 48 h predstavlja značajno veći rizik za razvoj ozbiljnih medicinskih komplikacija i prolongiranje boravka u bolnici [26].

U svom sistematskom preglednom radu, koji je uključivao 52 studije i 291.413 pacijenata, Kan i saradnici su identifikovali 25 studija koje su u obzir uzimale i broj bolničkih dana, te su zaključili da postoji značajna korelacija između ranije operacije i kraćeg boravka u bolnici [18].

Analizom dostupne literature uočeno je da se, kao jedan od glavnih faktora za odlaganje hirurškog lečenja, navodi nedostatak dostupne operacione sale i osoblja [28]. Rešavanjem nemedicinskih razloga za odlaganje operativnog lečenja možemo očekivati poboljšanje ishoda lečenja.

## RANI FUNKCIONALNI OPORAVAK

Rana rehabilitacija i vertikalizacija pacijenta znači i raniji funkcionalni oporavak, te brže sticanje samostalnosti [29].

Oldmedou i saradnici su pokazali da je ranija rehabilitacija kod operisanih pacijenata sa prelomom kuka bila povezana sa ranijim otpustom kući, kao i da je ubrzavala funkcionalni oporavak [30].

Kon i saradnici su, u svom istraživanju, pokazali da su pacijenti koji su operisani više od 48 h nakon prijema imali lošiji funkcionalni oporavak [29].

S obzirom na to da je svrha operativnog lečenja preloma kuka obezbojavanje pacijenta, te odgovarajuća rekonstrukcija zgloba kuka, u zavisnosti od vrste preloma, i na kraju povratak pacijenta istom nivou aktivnosti koji je imao pre preloma kuka, u tom smislu, funkcionalni oporavak ostaje jedan od najvažnijih ciljeva lečenja ovih pacijenata. Potrebne su dodatne

## SURGICAL TREATMENT AND LENGTH OF HOSPITAL STAY

Patients operated on earlier spend less time in hospital; they are verticalized sooner in relation to the day of admission; their functional recovery is more efficient, while treatment costs are smaller [26].

In a prospective study, involving 850 patients, Al-Ani et al. found that, in patients who were operated on within 24 h, 36 h, or 48 h of hospital admission, the length of hospital stay was shortened in the following manner: for the group of patients surgically treated within 24 h of hospital admission – 14 days vs. 18 days for those operated on later; for the group of patients operated on within 36 h of hospital admission – 15 days vs. 19 days for those operated on later; and for the group of patients operated on within 48 h of hospital admission – 15 days vs. 21 days in patients operated on later ( $p < 0.001$ ) [27].

Also in correlation with the previous study are the results of the study carried out by Lefevre et al., wherein it was proven that waiting for an operation for longer than 48 h represented a significantly greater risk for the development of serious medical complications and the lengthening of hospital stay [26].

In their systematic review paper, which included 52 studies and 291,413 patients, Khan et al. identified 25 studies which also took into consideration the length of hospital stay. They concluded that there was significant correlation between earlier surgical treatment and shorter hospital stay [18].

Analysis of available literature determined that the lack of an available operating theatre and the lack of staff were being stated amongst the main factors responsible for delaying surgical treatment [28]. By resolving nonmedical reasons for delaying surgical treatment, we can expect an improvement in treatment outcomes.

## EARLY FUNCTIONAL RECOVERY

Early rehabilitation and verticalization of patients also mean earlier functional recovery and quicker regaining of independence [29].

Oldmeadow et al. showed that earlier rehabilitation in surgically treated patients with hip fracture was linked to earlier discharge from hospital, and that it accelerated functional recovery [30].

In their study, Kohn et al. showed that patients who were operated on longer than 48 h after hospital admission had poorer functional recovery [29].

Bearing in mind that the aim of surgical treatment of hip fracture is pain elimination for the patient, appropriate hip joint reconstruction, depending on the type of fracture, and ultimately the return of the patient to the full level of activity that they had prior to

studije, koje sagledavaju sve faktore koji utiču na brzinu i uspeh dostizanja adekvatnih rezultata, a koje će biti važne odrednice u formiranju smernica za lečenje pacijenata sa prelomom kuka.

## ZAKLJUČAK

Pacijente sa prelomom kuka trebalo bi operisati unutar 24 h od prijema u bolnicu, ukoliko nemaju akutno medicinsko stanje koje onemogućava operaciju. Ukoliko postoji medicinsko stanje koje može biti korigovano, ta granica se podiže na 48 h, ali vreme čekanja na operativno lečenje ne bi trebalo da bude duže od 4 dana.

Treba imati u vidu i nemedicinske razloge za odlaganje operacije, te raditi na minimalizovanju njihovog uticaja na planiranje operativnog lečenja.

Multidisciplinarni pristup (ortoped, anesteziolog, odgovarajući specijalisti) treba da obezbedi realizaciju operacije u prvih 48 h, ili izuzetno u prvih 4 dana, od prijema, kako bi se minimalizovao rizik od nastanka komplikacija kao i porast već visokog mortaliteta u prvih 30 dana i prvih godinu dana od operativnog lečenja.

**Sukob interesa:** Nije prijavljen.

## LITERATURA / REFERENCES

- Kannus P, Parkkari J, Sievänen H, Heinonen A, Vuori I, Järvinen M. Epidemiology of hip fractures. *Bone*. 1996 Jan;18(1 Suppl):575-635. doi: 10.1016/8756-3282(95)00381-9.
- Bingham KW, Kates SL. The 1-year mortality of patients treated in a hip fracture program for elders. *Geriatr Orthop Surg Rehabil*. 2010 Sep;1(1):6-14. doi: 10.1177/2151458510378105.
- Simunovic N, Devereaux PJ, Bhandari M. Surgery for hip fractures: Does surgical delay affect outcomes? *Indian J Orthop*. 2011 Jan;45(1):27-32. doi: 10.4103/0019-5413.73660.
- Carpintero P, Caeiro JR, Carpintero R, Morales A, Silva S, Mesa M. Complications of hip fractures: A review. *World J Orthop*. 2014 Sep 18;5(4):402-11. doi: 10.5312/wjo.v5.i4.402.
- Amarilla-Donoso FJ, López-Espuela F, Roncero-Martín R, Leal-Hernandez O, Puerto-Parejo LM, Aliaga-Vera I, et al. Quality of life in elderly people after a hip fracture: a prospective study. *Health Qual Life Outcomes*. 2020 Mar 14;18(1):71. doi: 10.1186/s12955-020-01314-2.
- Daabiss M. American Society of Anaesthesiologists physical status classification. *Indian J Anaesth*. 2011 Mar;55(2):111-5. doi: 10.4103/0019-5049.79879.
- Donegan DJ, Gay AN, Baldwin K, Morales EE, Esterhai JL Jr, Mehta S. Use of medical comorbidities to predict complications after hip fracture surgery in the elderly. *J Bone Joint Surg Am*. 2010 Apr;92(4):807-13. doi: 10.2106/JBJS.I.00571.
- Tay E. Hip fractures in the elderly: operative versus nonoperative management. *Singapore Med J*. 2016 Apr;57(4):178-81. doi: 10.11622/smedj.2016071.
- van de Ree CLP, De Jongh MAC, Peeters CMM, de Munter L, Roukema JA, Gossens T. Hip Fractures in Elderly People: Surgery or No Surgery? A Systematic Review and Meta-Analysis. *Geriatr Orthop Surg Rehabil*. 2017 Sep;8(3):173-80. doi: 10.1177/2151458517713821.
- Amrayev S, AbuJazar U, Stucinskas J, Smaily A, Tarasevicius S. Outcomes and mortality after hip fractures treated in Kazakhstan. *Hip Int*. 2018 Mar;28(2):205-9. doi: 10.1177/1120700018773395.
- Management of Hip Fractures in the Elderly: Timing of Surgical Intervention [Internet]. *Aaos.org*. 2018 [cited 16 January 2022]. Available from: <https://www.aaos.org/globalassets/quality-and-practice-resources/hip-fractures-in-the-elderly/hip-fx-timing-measure-technical-report.pdf>.
- Sheehan KJ, Sobolev B, Villán Villán YF, Guy P. Patient and system factors of time to surgery after hip fracture: a scoping review. *BMJ Open*. 2017 Aug 21;7(8):e016939. doi: 10.1136/bmjopen-2017-016939.
- Moran CG, Wenn RT, Sikand M, Taylor AM. Early mortality after hip fracture: is delay before surgery important? *J Bone Joint Surg Am*. 2005 Mar;87(3):483-9. doi: 10.2106/JBJS.D.01796.
- Klestil T, Röder C, Stotter C, Winkler B, Nehrer S, Lutz M, et al. Impact of timing of surgery in elderly hip fracture patients: a systematic review and meta-analysis. *Sci Rep*. 2018 Sep 17;8(1):13933. doi: 10.1038/s41598-018-32098-7.
- Maheshwari K, Planchard J, You J, Sakr WA, George J, Higuera-Rueda CA, et al. Early Surgery Confers 1-Year Mortality Benefit in Hip-Fracture Patients. *J Orthop Trauma*. 2018 Mar;32(3):105-110. doi: 10.1097/BOT.0000000000001043.

hip fracture, functional recovery remains one of the most important goals of treatment in these patients. It is necessary to carry out additional studies that would identify all factors affecting how quickly and successfully adequate results are achieved, which would be important determinants in forming guidelines for treating patients with hip fracture.

## CONCLUSION

Patients with hip fracture should be operated on within 24 h of hospital admission, unless there is an acute medical condition that is preventing the surgery. If there is a medical condition which can be remedied, the threshold is raised to 48 h, but the waiting period should not be longer than 4 days.

Nonmedical reasons for delaying surgery should also be taken into consideration, and efforts should be made to minimize their effect on surgical treatment planning.

A multidisciplinary approach (orthopedic surgeon, anesthesiologist, appropriate specialists) should provide for the realization of the surgery within the first 48 h or, exceptionally, within the first 4 days of admission, in order to minimize the risk of the development of complications as well as reduce the increase in already high mortality, in the first 30 days and the first year after surgical treatment.

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16. Siegmeth AW, Gurusamy K, Parker MJ. Delay to surgery prolongs hospital stay in patients with fractures of the proximal femur. *J Bone Joint Surg Br.* 2005 Aug;87(8):1123-6. doi: 10.1302/0301-620X.87B8.16357.
17. Öztürk B, Johnsen SP, Röck ND, Pedersen L, Pedersen AB. Impact of comorbidity on the association between surgery delay and mortality in hip fracture patients: A Danish nationwide cohort study. *Injury.* 2019 Feb;50(2):424-31. doi: 10.1016/j.injury.2018.12.032.
18. Khan SK, Kalra S, Khanna A, Thiruvengada MM, Parker MJ. Timing of surgery for hip fractures: a systematic review of 52 published studies involving 291,413 patients. *Injury.* 2009 Jul;40(7):692-7. doi: 10.1016/j.injury.2009.01.010.
19. Shiga T, Wajima Z, Ohe Y. Is operative delay associated with increased mortality of hip fracture patients? Systematic review, meta-analysis, and meta-regression. *Can J Anaesth.* 2008 Mar;55(3):146-54. doi: 10.1007/BF03016088.
20. Seong YJ, Shin WC, Moon NH, Suh KT. Timing of Hip-fracture Surgery in Elderly Patients: Literature Review and Recommendations. *Hip Pelvis.* 2020 Mar;32(1):11-6. doi: 10.5371/hp.2020.32.1.11.
21. Mutlu H, Bilgili F, Mutlu S, Karaman O, Cakal B, Ozkaya U. The effects of preoperative non-invasive cardiac tests on delay to surgery and subsequent mortality in elderly patients with hip fracture. *J Back Musculoskelet Rehabil.* 2016;29(1):49-54. doi: 10.3233/BMR-150595.
22. Moja L, Piatti A, Pecoraro V, Ricci C, Virgili G, Salanti G, et al. Timing matters in hip fracture surgery: patients operated within 48 hours have better outcomes. A meta-analysis and meta-regression of over 190,000 patients. *PLoS One.* 2012;7(10):e46175. doi: 10.1371/journal.pone.0046175.
23. Simunovic N, Devereaux PJ, Sprague S, Guyatt GH, Schemitsch E, Debeer J, et al. Effect of early surgery after hip fracture on mortality and complications: systematic review and meta-analysis. *CMAJ.* 2010 Oct 19;182(15):1609-16. doi: 10.1503/cmaj.092220.
24. Rae HC, Harris IA, McEvoy L, Todorova T. Delay to surgery and mortality after hip fracture. *ANZ J Surg.* 2007 Oct;77(10):889-91. doi: 10.1111/j.1445-2197.2007.04267.x.
25. Lizaur-Utrilla A, Gonzalez-Navarro B, Vizcaya-Moreno MF, Miralles Muñoz FA, Gonzalez-Parreño S, Lopez-Prats FA. Reasons for delaying surgery following hip fractures and its impact on one year mortality. *Int Orthop.* 2019 Feb;43(2):441-8. doi: 10.1007/s00264-018-3936-5.
26. Lafaire KA, Macadam SA, Davidson DJ, Gandhi R, Chan H, Broekhuysen HM. Length of stay, mortality, morbidity and delay to surgery in hip fractures. *J Bone Joint Surg Br.* 2009 Jul;91(7):922-7. doi: 10.1302/0301-620X.91B7.22446.
27. Al-Ani AN, Samuelsson B, Tidermark J, Norling A, Ekström W, Cederholm T, et al. Early operation on patients with a hip fracture improved the ability to return to independent living. A prospective study of 850 patients. *J Bone Joint Surg Am.* 2008 Jul;90(7):1436-42. doi: 10.2106/JBJS.G.00890.
28. Sheehan KJ, Sobolev B, Guy P. Mortality by Timing of Hip Fracture Surgery: Factors and Relationships at Play. *J Bone Joint Surg Am.* 2017 Oct 18;99(20):e106. doi: 10.2106/JBJS.17.00069.
29. Cohn MR, Cong GT, Nwachukwu BU, Patt ML, Desai P, Zambrana L, et al. Factors Associated With Early Functional Outcome After Hip Fracture Surgery. *Geriatr Orthop Surg Rehabil.* 2016 Mar;7(1):3-8. doi: 10.1177/2151458515615916.
30. Oldmeadow LB, Edwards ER, Kimmel LA, Kippen E, Robertson VJ, Bailey MJ. No rest for the wounded: early ambulation after hip surgery accelerates recovery. *ANZ J Surg.* 2006 Jul;76(7):607-11. doi: 10.1111/j.1445-2197.2006.03786.x.