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Review Article

**COMPARING SPINAL VERSUS GENERAL ANESTHESIA IN
HIP SURGERY: SYSTEMATIC REVIEW**

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Abstract:

Introduction:

Spinal anesthesia rather than general anesthesia has the advantages of lower episodes of deep vein thrombosis (DVT), fewer lethal pulmonary embolisms, less postoperative cognitive dysfunction, fewer postoperative hypoxia and less cases of pneumonia. The aim of the present systematic review is to assess the evidence support use either spinal or general anesthesia in hip surgery.

Method:A search in MEDLINE databased was conducted to identify relevant, in English language, and human studies. These eligible articles were read and only studies comparing the mortality between patients underwent hip surgery under spinal and general anesthesia. The data were extracted from included studies into table and compared among all studies.

Results:Search of the literature identified total of 45 studies, after exclusion of irrelevant, duplicated and review studies, 12 studies were included in the review as they met the inclusion criteria. The mortality rates were reported in all included studies. One study measured the 90 days mortality, while another one measured the mortality after one year. Spinal anesthesia was associated with lower mortality rates than general anesthesia in 8 of the included studies, while three studies reported that general anesthesia was associated with lower mortality rates. Only one study reported no difference in the mortality rate between general and spinal anesthesia.

Conclusion:In hip surgery, spinal anesthesia is associated with better short-term outcomes when compared with general anesthesia.

Keywords: Complications, Operative, Anesthesia, Side effects.

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INTRODUCTION:

Hip fractures is considered an important and major public health problem all over the world [1]. Hip fracture was the second leading cause of hospitalization among geriatrics in 2014 [2]. Near to 1.6 million hip fractures occur globally each year. It is estimated that by the year 2025, about 2.6 million hip fractures will occur worldwide every year [3]. The risk of morbidity and mortality in geriatric patients increase after hip surgery [4]. The outcome after hip surgery may be affected by many factors such as age of the patient and presence of comorbidity or chronic illness [5,6].

Anesthesia in hip surgery most frequently include either spinal or general anesthesia. There is an argument on whether the type of anesthesia in hip surgery has any critical effects especially in elderly [7,8]. Due to this argument many studies were conducted to determine which type of anesthesia is associated with better outcomes.

The institute for healthcare research and quality considered hip fracture mortality as an important quality indicator [9]. In evaluating hospital care, 30-day mortality, the outcome and 30-day readmission rates are considered important outcome indicators [9,10]. Spinal anesthesia rather than general anesthesia has the advantages of lower episodes of deep vein thrombosis (DVT), fewer lethal pulmonary embolisms, less postoperative cognitive dysfunction, fewer postoperative hypoxia and less cases of pneumonia [7,11].

The aim of the present systematic review is to assess all randomized controls trials that compared spinal and general anesthesia in hip surgery to determine which type of anesthesia has better outcome, few associated complications and low mortality rates aiming to improve patients' outcome.

METHODS:

A search in MEDLINE databased was conducted using keywords such as (Hip AND Surg* AND Anesthesia). Investigators identified eligible articles which should be relevant, in English language, and human studies. These eligible articles were read and only studies comparing the mortality between patients underwent hip surgery under spinal and general anesthesia. The data were extracted from included studies into table and compared among all studies.

RESULTS:

Search of the literature identified total of 45 studies, after exclusion of irrelevant, duplicated and review

studies, 12 studies were included in the review as they met the inclusion criteria. The included studies aimed to assess the outcome of spinal anesthesia in hip surgery by comparing it with the general anesthesia.

Out of the 12 included studies, six studies were retrospective cohort, three studies were prospective observational studies and the last of 3 were retrospective observational studies. The total number of patients were 438,177 including both sexes. Only two of the included studies examined the effect of anesthesia in all adults from age 18 and older [9,12], while the rest of 10 studies included only old age and geriatric patients [11,13-21].

Most of the included patients were noted to have a chronic medical conditions such as diabetes, hypertension, chronic obstructive pulmonary disease, hyperlipidemia, heart disease, dementia, previous myocardial infarction, cancer and metastatic cancer, valvular disease, arrhythmia, liver disease paralysis, neurological disorders, chronic pulmonary disease, coagulopathy, electrolyte abnormality, thrombocytopenia, chronic blood-loss anemia, congestive heart failure, stoke hypothyroidism renal disease and patients on dialysis. In addition, some included patients reported alcohol, steroid use and past or current history of smoking.

All of the included studies compared the outcome of the spinal and general anesthesia. The mortality rates were reported in all included studies. One study measured the 90 days mortality [13], while another one measured the mortality after one year [21]. Spinal anesthesia was associated with lower mortality rates than general anesthesia in 8 of the included studies [11-14,16,17,19,21], while three studies reported that general anesthesia was associated with lower mortality rates [15,18,20]. Only one study reported no difference in the mortality rate between general and spinal anesthesia [9].

Eight of the included studies reported important outcomes that occurred after the surgical procedures and compared the outcome between the general anesthesia and spinal anesthesia groups. Surgical site infection, acute respiratory failure, pulmonary embolism, sepsis, septic shock, acute renal failure, acute stroke, transit ischemic stroke, pneumonia, deep vein thrombosis, urinary tract infection, blood transfusion, cardiac arrest, congestive heart failure and acute myocardial infarction were frequent reported outcomes. Some patients experienced postoperative change in mental status, some of them needed postoperative mechanical ventilation and ICU admission [9,11,14,15,18-21].

Regarding the effect of the anesthesia one study reported that spinal anesthesia associated with lower 30-day reoperation and surgical site infection readmission [9]. Other study found that the spinal anesthesia was associated with fewer odds of adverse outcomes than general anesthesia, shorter hospital stay and less cost [14]. It was noted that, surgical procedures that done under spinal anesthesia has shorter duration of operations when compared to those done under general anesthesia [15,18]. Patients who undergone hip surgery under spinal anesthesia were found to have shorter duration of hospital stay in one study [16]. No significant difference in the mortality between spinal and general anesthesia was noted in four studies [9,11,12,17]. Other three studies reported no difference in the outcome between the spinal and general anesthesia [18,20,21].

DISCUSSION:

The present systematic review included studies that compared spinal and general anesthesia in hip surgery. Most of the reviewed studies included large number of patients and reported multiple outcomes.

Hip fractures occur most commonly among elderly who are usually have many other medical conditions, this why most of the reviewed studies included only geriatric patients who undergone hip surgery [11,13-21]. High mortality and poor outcome may be a result of these comorbidities rather than being an outcome of hip fracture treatment or effect of the anesthesia.

Results of this review showed the significant advantage of the spinal anesthesia compared to the general anesthesia regarding the mortality rate after one month, reoperation after one month, surgical site

infection, few adverse outcome, less cost, shorter duration of operation and shorter hospital stay [9,13-16,18,19]. It was also noted that pulmonary complications are less in spinal anesthesia rather than in the general anesthesia [19]. This can be justified by the use of face mask, endotracheal tube and in some times mechanical ventilation in general anesthesia, which play a role in involving these types of complications. Studies that failed to determine which type of anesthesia is superior are few [11,12,17,20]. These included studies found no difference in the outcome between patient's undergone hip surgery under spinal anesthesia and those with general anesthesia. This can be attributed to the age of included patients and the presence of other medical illnesses that can affect the outcome. The difference between spinal and general anesthesia regarding the long-term mortality was reported in one study [21], so it cannot be generalized. This highlight the need for more studied with longer follow up duration.

All types of complications that can occur postoperatively was noted in the two groups (spinal and general anesthesia), but the spinal anesthesia group has a few rates in all documented complications especially in pulmonary complications.

CONCLUSION:

In hip surgery, spinal anesthesia is associated with better short-term outcomes when compared with general anesthesia especially in old patients. Further studies may be needed with longer duration of follow up and more specific criteria.

Table (1): the characteristics and findings of the included studies regarding use of spinal and general anesthesia in hip surgery

Article	Study design	Sample size	Age	Common medical conditions reported in the sample	Mortality in general anesthesia	Mortality in spinal anesthesia	Other outcomes in general anesthesia	Other outcomes in spinal anesthesia	Comparing the anesthesia
Tung et al, [9] 2016	A retrospective observational study	17,189	18 years and older	DM, HTN, COPD, hyperlipidemia, heart disease, dementia, and renal disease.	30 days Mortality (1.7%) 30 Days readmission (12%)	30 days mortality (1.7%) 30 Days readmission (12.8%)	Acute myocardial infarction equal in both types	Surgical site infection, sepsis, acute respiratory failure, acute stroke, acute renal failure, deep vein thrombosis, pneumonia, and urinary tract infection	Regional anesthesia was not associated with decreased 30-day all-cause mortality, but associated with lower 30-day all-cause reoperation and surgical site infection readmission
Brox et al, [13] 2016	A retrospective cohort study	7,585	72-85 years old,	Valvular disease, paralysis, neurological disorders, chronic pulmonary disease, hypothyroidism, metastatic cancer, coagulopathy, chronic blood-loss anemia, diabetes,	30 Day mortality was 177 (4%), 90 days mortality 336 (8%), 365-day mortality 661 (16%)	30 Day mortality was 113 (4%), 90 days mortality was 224 (7%), and 365-day mortality was 424 (14%)	Not reported	Not reported	Mortality was marginally lower in patients with spinal/neuroaxial anesthesia
Chu et al, [14] 2015	A postoperative observational study	182,307	median age 80	DM, HTN, COPD, dementia, hyperlipidemia, heart failure, and renal disease,	In-hospital death 2.62% (1,363)	In-hospital death 2.13% (1,107)	Stroke 840 (1.61%), transit ischemic stroke 88 (0.17%), acute myocardial infarction 188 (0.36%), respiratory	Stroke 717 (1.38%), transit ischemic stroke 93 (0.18%), acute myocardial infarction 169 (0.32%), respiratory failure 328 (0.63%), and	Spinal anesthesia was associated with fewer odds of adverse outcomes than GA, Shorter hospital stay And less cost

							failure 868 (1.67%), and ICU admission 5,743 (11.03%)	ICU admission 3,205 (6.16%)	
Field et al, [15] 2015	A postoperati ve obser vatio nal study	6133	65 years or older	HTN, DM, COPD, dyspnoea, dialysis, bleeding disorder, alcohol use, steroid use, and smoking.	30 days mortality 5.84%	30 days mortality 6.67%	Blood transfusions (45.49%), DVT(1.64%), UTI (5.76%), Superficial wound infection (0.83%), Deep wound infection (0.27%), Pneumonia (3.55%), PE (0.89%),	Blood transfusions (39.34%), DVT(0.72%), UTI (8.87%), Superficial wound infection (0.88%), Deep wound infection (0.17%), Pneumonia (3.55%), PE (0.45%),	Patients who underwent hip fracture surgery with spinal anesthesia has lower risk of thirty-day complications and shorter duration of operation.
Neuman et al, [16] 2014	A retrospecti ve cohort study	56 729	66-91	HTN, DM, dementia, prior stroke, congestive heart failure, MI, past cardiac arrhythmia, cardiac valvular disease, chronic lung disease, renal failure, electrolyte and cancer	30 day mortality 629 (5.8%)	30 day mortality 583 (5.4%)	Not reported	Not reported	The use of regional anesthesia compared with general anesthesia was not associated with lower 30-day mortality but was associated with a modestly shorter Length of stay.
Patorno et al, [12] 2014	A retrospecti ve cohort study	73,28 4	years	HTN, DM, COPD, previous MI, chronic heart failure, chronic renal disease, dementia, cancer, and dialysis.	1362 (2.2%)	144 (2.1%)	Not reported	Not reported	Mortality risk did not differ significantly by anesthesia type among patients undergoing hip fracture surgery

White et al, [17] 2014	A retrospective observational study	65535	50 years or older	Not reported	Five-day mortality (2.8%), 30-day mortality (7.0%)	Five-day mortality (2.8%), 30-day mortality (7.5%)	Not reported	Not reported	There is no difference in 30-day mortality between general and spinal anesthesia after hip fracture surgery
Rashid et al, [18] 2013	A retrospective observational study	194	18 years and more	Not reported	4%	5%	Wound Infection (2), UTI (3), DVT (0)	Wound Infection (2), UTI (5), DVT (1)	Regional anesthesia was positively correlated with shorter operative duration,
Le wending et al, [11] 2011	A retrospective cohort study	308	72-92 years	DM, COPD, Cardiovascular disease, Chronic renal disease, Cancer, Dementia,	9 (3.83%)	2 (2.74%)	Postoperative ICU 53 (23%), Postoperative mechanical ventilation 17 (6%),	Postoperative ICU 11 (15%), Postoperative mechanical ventilation 1 (1%),	There is no difference in postoperative morbidity, rates of hospitalization, inpatient mortality or hospitalization costs
Neuman et al, [19] 2012	A retrospective cohort study	18,158	Mean = 82	DM, COPD, Congestive heart failure, Valvular disease, Prior MI, Arrhythmia, Stroke, Dementia, Electrolyte disorder, Renal dysfunction, Liver disease, Malignancy	325 (2.5%)	110 (2.1%)	Pulmonary complications 1,040 [8.1%], Congestive heart failure 230 (1.8%) Acute MI 266 (2.1%), Cardiac arrest 410 (3.2%),	Pulmonary complications (359 [6.8%]) Congestive heart failure 93 (1.8%), Acute MI 97 (1.9%), Cardiac arrest 142 (2.7%),	Regional anesthesia is associated with a lower odds of inpatient mortality and pulmonary complications among all hip fracture patients compared with general anesthesia

Ohara et al, [20] 2000	A retrospective cohort study	9425	Not reported	HTN, COPD, cardiovascular disease, valvular disease, and stroke	The 30-day mortality 272 (4.4%), 7-day mortality 82 (1.3%)	The 30-day mortality 174 (5.4%), 7-day mortality 53 (1.6%)	Myocardial infarction 122 (2%), congestive heart failure 288 (4.6%), Pneumonia 174 (2.8%), postoperative change in mental status 1,565 (25%).	Myocardial infarction 61 (1.9%), congestive heart failure 133 (4.1%), Pneumonia 84 (2.6%), postoperative change in mental status 1,114 (34%).	There is no difference in the outcome between general and spinal anesthesia
Sutcliffe et al, [21] 1994	A prospective observational study.	1330	65-80	Not reported	30-day mortality 4.5%, One-year mortality 32.6%,	30-day mortality 2.4%, One-year mortality 36.9%,	DVT (1.7%), PE (2%),	DVT (3.1%), PE (2.6%),	There is no difference in the outcome between general and spinal anesthesia

DM: Diabetes mellitus, HTN: Hypertension, COPD: Chronic obstructive pulmonary disease, DVT: Deep vein thrombosis, PE: Pulmonary embolism.

REFERENCES:

- Sahota O, Morgan N, Moran C. The direct cost of acute hip fracture care in care home residents in the UK. *Osteoporosis International* 2012;23(3):917-20.
- Qu B, Ma Y, Yan M, Wu H-H, Fan L, Liao D-F et al. The economic burden of fracture patients with osteoporosis in western China. *Osteoporosis International* 2014;25(7):1853-60.
- Gullberg B, Johnell O, Kanis J. World-wide projections for hip fracture. *Osteoporosis international* 1997;7(5):407-13.
- Duclos A, Couray-Targe S, Randrianasolo M, Hedoux S, Couris C, Colin C et al. Burden of hip fracture on inpatient care: a before and after population-based study. *Osteoporosis international* 2010;21(9):1493-501.
- Hu F, Jiang C, Shen J, Tang P, Wang Y. Preoperative predictors for mortality following hip fracture surgery: a systematic review and meta-analysis. *Injury* 2012;43(6):676-85.
- Ho C-A, Li C-Y, Hsieh K-S, Chen H-F. Factors determining the 1-year survival after operated hip fracture: a hospital-based analysis. *Journal of Orthopaedic Science* 2010;15(1):30-7.
- Luger T, Kammerlander C, Gosch M, Luger M, Kammerlander-Knauer U, Roth T et al. Neuroaxial versus general anaesthesia in geriatric patients for hip fracture surgery: does it matter? *Osteoporosis international* 2010;21(4):555-72.
- Urwin S, Parker M, Griffiths R. General versus regional anaesthesia for hip fracture surgery: a meta-analysis of randomized trials. *British journal of anaesthesia* 2000;84(4):450-5.
- Tung Y-C, Hsu Y-H, Chang G-M. The effect of anesthetic type on outcomes of hip fracture surgery: a nationwide population-based study. *Medicine* 2016;95(14)
- Cox ZL, Lai P, Lewis CM, Lenihan DJ. Centers for Medicare and Medicaid Services' readmission reports inaccurately describe an institution's decompensated heart failure admissions. *Clinical cardiology* 2017;40(9):620-5.
- Le-Wendling L, Bihorac A, Baslanti TO, Lucas S, Sadasivan K, Wendling A et al. Regional anesthesia as compared with general anesthesia for surgery in geriatric patients with hip fracture: does it decrease morbidity, mortality, and health care costs? Results of a single-centered study. *Pain Medicine* 2012;13(7):948-56.

12. Paterno E, Neuman MD, Schneeweiss S, Mogun H, Bateman BT. Comparative safety of anesthetic type for hip fracture surgery in adults: retrospective cohort study. *BMJ* 2014;348:g4022.
13. Brox WT, Chan PH, Cafri G, Inacio MC. Similar mortality with general or regional anesthesia in elderly hip fracture patients. *Acta orthopaedica* 2016;87(2):152-7.
14. Chu C-C, Weng S-F, Chen K-T, Chien C-C, Shieh J-P, Chen J-Y et al. Propensity Score-matched Comparison of Postoperative Adverse Outcomes between Geriatric Patients Given a General or a Neuraxial Anesthetic for Hip Surgery: A Population-based Study. *Anesthesiology: The Journal of the American Society of Anesthesiologists* 2015;123(1):136-47.
15. Fields AC, Dieterich JD, Buterbaugh K, Moucha CS. Short-term complications in hip fracture surgery using spinal versus general anaesthesia. *Injury* 2015;46(4):719-23.
16. Neuman MD, Rosenbaum PR, Ludwig JM, Zubizarreta JR, Silber JH. Anesthesia technique, mortality, and length of stay after hip fracture surgery. *Jama* 2014;311(24):2508-17.
17. White S, Moppett I, Griffiths R. Outcome by mode of anaesthesia for hip fracture surgery. An observational audit of 65 535 patients in a national dataset. *Anaesthesia* 2014;69(3):224-30.
18. Rashid RH, Shah AA, Shakoor A, Noordin S. Hip fracture surgery: does type of anesthesia matter? *BioMed research international* 2013;2013
19. Neuman MD, Silber JH, Elkassabany NM, Ludwig JM, Fleisher LA. Comparative effectiveness of regional versus general anesthesia for hip fracture surgery in adults. *Anesthesiology: The Journal of the American Society of Anesthesiologists* 2012;117(1):72-92.
20. O'hara DA, Duff A, Berlin JA, Poses RM, Lawrence VA, Huber EC et al. The effect of anesthetic technique on postoperative outcomes in hip fracture repair. *Anesthesiology: The Journal of the American Society of Anesthesiologists* 2000;92(4):947-57.
21. Sutcliffe A, Parker M. Mortality after spinal and general anaesthesia for surgical fixation of hip fractures. *Anaesthesia* 1994;49(3):237-40.