SEPTIC ARTHRITIS AFTER TOTAL KNEE REPLACEMENT IN GERIATRICS PATIENT, THE IMPORTANT OF PERIOPERATIVE CARE

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ABSTRACT

Introduction: The geriatric population are the fastest growing segment around the world. The prevalence of multiple comorbidities in geriatric patients requiring special perioperative care. Perioperative management must be done properly, considering that surgical complications on geriatric can cause multiple comorbidities. There are many complications that often occur in geriatrics, one of which is infection.
Case report: A 77-year-old man complained about pain on his right knee 1 – 2 weeks after doing TKR procedure. The pain accompanied with fever, swollen, and redness. Physical examination showed elevated blood pressure (140/90), Fever (37,4^{o}C), obesity grade I (BMI 27.4 kg/m^{2}), swollen and redness on his right knee, pain on palpation with VAS 5, edema (+). Barthel index ADL showed mild dependency, FRAIL score 3, qSOFA score 0. Laboratory result showed elevated leukocyte 14.900/µl.
Conclusion: Geriatric patients are very vulnerable to the risks of surgery, one of which is septic arthritis. So that a good perioperative evaluation can reduce complications, comorbidities and decreased functional status.

Keywords: Perioperative procedure, geriatric, septic arthritis

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INTRODUCTION

Adult age 65 and older are the fastest growing segment of the population around the world. The prevalence of chronic disease such as hypertension, chronic kidney disease, diabetes, heart failure will substantially increase and this change will increase demand for specialized care and demand for specialized surgical care [Wolfe, Wolfe & Rich, 2020].

Perioperative management in geriatrics must be done very well considering the end result of surgery in geriatric patients can cause multiple comorbidities, low functional performance, frailty, reduced homeostatic capacity, and cognitive impairment [Aceto et al., 2020]. Thus geriatric patients need pre operative and post operative evalution to good perioperative evaluation to minimalize surgery complication such as infection and prolonged hospital stay [Schlitzkus et al., 2015].

About 60 of 182 patients (30.8%) died within 1 year after surgery. And the highest cause of death is infection followed by septic shock. And followed by the main complication, namely hydroelectrolyte disorders. As age increases, the odds ratio of death increases to 4% [Barbosa et al., 2019].

There are many complications and risks that can arise in the operative action of geriatric patient. One of the complications that can arise in operative measures is frailty, which is a geriatric syndrome which is shown by a multisystem physiological decline and an increased susceptibility to stressors [Ko, 2019].

CASE REPORT

A 77-year-old man who lives in a nursing home complained about pain on both of his knee since 3 years ago. At first the patient only felt uncomfortable on both of his knee (VAS 2), then the pain gradually increased especially on his right knee. Later on the pain became persistent, get worsed when used for activities (VAS 7) and decreases when resting. He often take painkillers and self medication to reduce the pain, but didn't see any change. He denied any history of fall, injury on his knee and surgery before. He used to work in chemical industry until 65 years old, and he denied any vigorous physical activity. History of smoking, drug abuse and alcoholic consumtion is denied.

He also complaint about urinary problem since 2 years. Every night he frequently went to bathroom around 6 times (from 18.00 pm until 04.00 am). The pee often stop in the middle and he need to strain to start his pee again. The patient complain about urine stream was weaker than before and sometimes dripping on his panties. He denied any history of fever and urinary pain before. He take self herbal medication for his urinary problem, but it didn't help a lot.

He also take several medication such as Amlodipine 5 mg and Candesartan 8 mg for his high blood pressure since around 25 years ago. He had hyperuricemia since 17 years ago, but he didn't routinely take medication. When his uric acid was high, he took Allopurinol 300 mg until his uric acid level was normal. He also diagnosed Diabetes Mellitus since 10 – 12 years ago and routinely consume Metfomin 500 mg. and routinely consumed Simvastatin 40 mg for Dislipidemia since 8 years ago.

A years ago, he went to X's hospital for his knee pain and urinary problem and diagnose by his Internist with Osteoarthritis genu grade 3 – 4 on both of his knee and Benign Prostate Hypertrophy (BPH). Then he revered to Orthopaedic and planned for Total Knee Replacement on his right knee due severe pain on his right knee and given Tamsulosin 0.4 mg and herbal medicine *(Serenoa Respens Fructus)* for his urinary problem. He went for preoperative screening such as laboratory examination, chest and cardiac examination. Four month ago, before his surgery he revered to geriatrician to do some comprehensive geriatric assesment before surgery procedure. The doctor evaluate his cogni-

tive function using Mini Mental Status Examination (MMSE) and Clock Drawing Test (CDT), then he evaluate his sleep quality and screening for any depression posibility using Insomia Severity Index (ISI) and Geriatric Depression Scale (GDS). Finaly the doctor evaluate his functional status using Barthel Index of Activity Daily Living (ADL), frailty posibilities using FRAIL score and other preoperative procedure. Then he revered to cardiologist and pulmonologist to do some preoperative cardio – pulmonary evaluation such as Electrocardiography, Echocardiography, Chest X-ray and Pulmonary function test.

Three and a half month ago, after all the preoperative procedure were done, the patient did the Total Knee Replacement procedure on his right knee on X's Hospital. A week after surgery, while patient still on recovering process there were no problem about his condition then the patient were discharged. Around one or two weeks after the patient sent back to nursing home he complain about pain on his the right knee (post operative site).

The pain is felt not only in surgical incision, but also in all of his right knee. The pain is continous, get worsed when used for walks (VAS 5) and decreases when resting. The pain on his right knee is accompanied with fever, swollen, and redness on his right knee. The patient went to Orthopaedic at X's Hospital and given Cefixime 200 mg twice daily, Diclofenac Sodium 25 mg twice daily, Omeprazole 20mg twice daily, Methylprednisolone 8 mg three times daily and some vitamins and asked to cold compress twice a day. According to the Ortopaedist the knee was replaced with iron material, and there may be infection of allergic reaction on his right knee. After the patient taking the medicine the pain diminished gradually but when the medicine runs out, the pain reapper. He tried to take self medication for his pain such as ointment, herbal, accupuncture and oral medicines, but it didn't help a lot. The pain still reappear whenever the medicine runs out. Until now he has limited his physical activity and spend a lot of time on bed or chair because he felt pain whenever he walks.

Physical examination were done at nursing home after surgery complication and showed elevated blood pressure (140/90), Fever (37,4^{o}C), Central obesity (Abdominal circumference 112 cm), obesity grade I (BMI 27.4 kg/m^2), swollen and redness on his right knee, pain on palpation with VAS 5, edema (+), crepitus (-). On rectal touche examination showed enlargement of prostate with hard consistency. International Prostate Symptoms Score (IPSS) value 12, Activity Daily Living Barthel Index value 13 (mild dependency), FRAIL score 3, qSOFA score 0. Other Comprehensive Geriatic Assesment (CGA) within normal limits. Laboratory result showed Leukocyte 14.900/µl, Uric acid 7.3 mg/dL, Fasting Glucose 212 mg/dL, HDL 37 mg/dL, LDL 176 mg/dL, Trigliserida 231 mg/dL. Other laboratory result within normal limits. On ECG showed first degree AV block, on chest X-ray showed cardiomegaly, post operative knee joint X-ray showed post arthroplasty dextra without any soft tissue swelling and Osteoarthritis Genu sinistra Grade 3. So untill now we diagnose this patient as postoperative septic arthritis dextra, Osteoarthritis sinistra grade 3 – 4, BPH, Metabolic syndrome, Hypertension Grade 1 with Hypertensive Hearth Disease, Diabetes mellitus type 2, Hyperuricemia, and dyslipidemia.

DISCUSSION

Physiologic change of aging are inevitable, progressive, and result in increased susceptibility to disease. Aging affect umoerous biologic process in every organ system. At the end is a continously decline in functional reserve, which impairs the body's ability to compensate for physiologic and pathologic stress. In this disscusion we will discuss some of the organ systems that needs attention to perioperative care [Wolfe, Wolfe & Rich, 2020].

Cardiovascular aging increase the risk for hypertension, heart failure, valvu-

lar heart disease, coronary artery disease, and arrhythmias. Simultaneously, these factors increase the risk for perioperative cardiovascular complications in older adults, such as myocardial infarction, acute heart failure, and atrial fibrillation [Wolfe, Wolfe & Rich, 2020]. Pulmonary aging result in loss of pulmonary parenchyma, change in supporting collagen fibers, resulting in decrease recoil and decrease gass exchange. The chest wall become stiffer, diaphragm become flatten due loss of skeletall muscle, thus reducing chest wall compliance and and increasing work of breathing. Diminished of cough reflex and decrease in pharyngeal motor function also causes increasing rate of postoperative complication such as aspiration, pneumonia and prolong mechanical ventilation dependence [Janssens, 2005]. Renal mass aging, especially renal cortext affecting nephrons most important for urine concentration. Sclerotic nephron, functional change in nephron (fat and fibrosis replace some of the remaining functional nephrons), which further reduces the functional capacity of the renal system. Intrarenal vascular change, including 10% reduction of renal blood flow per decadeafter age 50, increasing level of vasodilatory prostaglandin contribute to the roughly 2-fold increase in risk of renal injury associated with NSAID and renal ischemic due to low cardiac output, hypotension and hemmorhage [Anderson & Brenner, 1987]. Major surgery invokes massive surgical stress response and activating the sympathetic nervous system and numerous hormonal pathways, also alterations in hematology and immune function. Frailty syndrome, a physiologic reserve are maximally invoked just to maintain dailly homeostasis is strongly associated with increased postoperative mortality, complication and prolonged hospital stay [Wolfe, Wolfe & Rich, 2020].

The very first step we take is to establish the general life goals of the patient. In geriatric population it's important to do preoperative discussion regarding surgical preferences and expectations from surgery and surgical alternatives. Multiple comorbidities and decreased functional status are associated with worsening of surgical outcomes. As part of these preoperative discussions, it is also important to determine a patient's family and social support systems. Once the priority of the goals has been established, the surgeon should discuss the feasibility of the intervention with their family [Wolfe, Wolfe & Rich, 2020]. Several instruments for evaluating the individualized perioperative risk are available. The American College of Surgeons National Surgery Quality Improvement Program and American Geriatrics Society (ACS NSQIP/AGS) has developed a guideline to identify several area to focus. It includes some geriatric assesment such as cognitive impairement and dementia, depression, postoperative delirium, preoperative cardiac evaluation, preoperative pulmonary evaluation, frailty, functional status and fall risk [Chow et al, 2012].

For patient without a known history of cognitive impairement or dementia, we must perform a cognitive assesment such as Mini-Cog questionaire. Preexisting cognitive impairment strongly predicts postoperative delirium, which is associated with worse surgical outcome such as longer hospital stays, increased risk of perioperative mortality, and postoperative functional decline. Postoperative delirium is a common complication in elderly patients, and associated with higher mortality and complications, greater costs, longer lengths of stay, and impair functional recovery. Postoperative delirium risk can be identified using several component including cognitive and behavioral disorder, disease or illness related, metabolic disorder, functional impairement, drug, age and defecation or urinary problem. All geriatric patient should also be screened for depresion using validated PHQ-2 tools. Preoperative depression has been associated with increased mortality and longer postoperative length of stay after operations. Depression also associated with higher pain perception

and increased postoperative analgesic use [Chow et al, 2012].

In our patient we evaluate cognitived function before surgical procedure were done. We use Mini Mental Status Examination (MMSE) and Clock Drawing Test (CDT) to evaluate cognitive function. The result is no cognitive impairement in this patient (MMSE score 30) and there is no visuospatial impairement in this patient either (CDT 4). We also evaluate postoperative delirium risk and the result we got immobilization, older age ≥70 year, and multiple comorbidities on our patient. That's why we should not given benzodiazepine and antihistamines, except in certain circumstance. We evaluate posibility of depression using Geriatric Depression Scale (GDS). The results are pretty good, our patient has no sign of depression (GDS score 2). We also screen risk of insomnia using insomnia severity index (ISI), and the result is also good. There were no clinical sign of insomnia (ISI score 2).

Older patients are more vulnerable to perioperative cardiac adverse events. All geriatric patients should be evaluated for perioperative cardiac risk according to the American College of Cardiology and American Heart Association (ACC/AHA) algorithm for noncardiac surgery. This including risk of coronary artery disease (CAD), risk of Heart Failure (HF), risk of cardiomiopathy, risk of valvular heart disease and risk of arrhythmias. The Revised Cardiac Risk Index (RCRI) is simple, validated and acepted tool to assess perioperative risk of major adverse cardiac event (MACE) complications. There was 6 predictors of risk for major cardiac complication including creatinin, HF, DM, surgery, history of CVD and ischemic heart disease. In our case the patient didn't have any predictor of risk, therefore our patient would have a low risk of MACE. There was no history of CVD, HF, IHD, Type 1 Diabetes, normal creatinin level and the non vascular surgery procedure [Fleisher et al, 2014].

Assesing patient for risk of developing postoperative pulmonary complication (PPC) is strongly recommended. Risk of PPC divided into patient related factor, surgery related factor and not risk factor. Postoperative pulmonary complications are common and contribute considerably to overall morbidity and mortality. Postoperative pulmonary complication occurred more often than cardiac adverse event and were associated with longer hospitality stay. The geratricians should consider implementing appropriate preoperative strategies to reduce risk of PPC such as optimization of pulmonary function test with patient COPD and asthma, smoking cessation, inspiratory muscle training and chest radiograph and pulmonary function test [Knittel & Wilders, 2016].

Evaluation of the patient for frailty syndrome and documentation of his frailty score is recomended. Frailty is a syndrome of decreased physiologic reserve and resistance to stressors, which leaves patient more vulnerable to poor prognostic. Frailty has been shown to independently predict higher rates of postoperative adverse events, such as increased length of stay, assisted living facility in elderly surgical patient. The FRAIL score in our case was 3, so our patient belong to pre-frail group (intermediate frail). Intermediate frail patients have elevated risk for postoperative complications and more than a 2-fold increased risk of becoming frail over 3 years compared with nonfrail patient [Fried et al, 2001].

All patient should also assessed their ability to perform daily activity using ADL instrumental. Any functional limitation should be doocumented and may prompt perioperative interventions and proactive discharge planing. Elderly population with functional dependence was the strongest predictor of postoperative 6-month mortality. Impaired mobility in elderly patients has also been linked to increased risk of postoperative delirium and risk of infection of MRSA in surgical site. More independent preoperative functional

status can strongly predicts postoperative function (in terms of ADLs and instrumental ADLs) and shorter recovery periods after major surgery. In our case, we evaluate functional status using ADL Barthel index, and the result showed that this patient got 13 score (mild dependency). This patient need help for their daily activity because he felt pain whenever he walks and climbing up the stairs, so this patients spend more times doing their daily activity with their caregivers [Chow et al 2012].

Post Operative complications including delirium, falls, poor nutrition, urinary tract infection (UTI), and other iatrogenic infections. Geriatric patients also have higher risk for cardiac and pulmonary complications, venous thromboembolic disease (VTED) and acute kidney injury (AKI). Delirium is an acute decline in cognitive functuon and attention and described as waxing and waning. Delirium is the most common complications in geriatric patients, with 14 – 56% incidence and can be as high as 80% if the operation is requiring mechanical ventilation in intensive care unit settings [Mohanty et al, 2016]. The prevention of this complications such as early mobility, maintenance of normal circardian cycle, using assisting device (hearing aid), and calm environment with family and familiar objects in room, and so on. If patient develop delirium, clinicians should look for and treat possible precipitating conditions (pain, hypoxia, infections, sepsis, electrolyte imbalance, side effects of medications and hypoglycemia). For pharmacologic medications that can induced delirium (Anticholinergics, sedative□hypnotics, corticosteroids, and opioidal) must be avoided during postoperative. Delirium can be assess by daily screening such as Confusion Assesment Method (CAM) and should be considered especially in high – risk patients. Diagnosis of delirium can be made using Diagnostic and Statistical Manual criteria or the CAM Algorithm. Several medications can be used to treat delirium and only used if the non – pharmacologic treatment unsuccessful. The mediations include low dose antipsychotics in short duration if the patients is agitated or distressed [Mohanty et al, 2016, Wirtz & Kohlhof 2019, Oloutu et al,2019].

Fall in Geriatric patients frequently occur in postoperative, with incidence approximately 30%. Fall result in injury about one third of the time. It's important to assess the risk assessment for falls in geriatric patients. There is a toolkit for Universal Fall precautions to minimize falls including familiarizing patients with the hospital environment, maintaining the call light and personal possessions within reach, nonslip footwear, and night lights [ARHQ, 2013, Wirtz & Kohlhof 2019, Sieber & Barnett 2011].

Geriatrics patients also at risk for malnutrition. The incidence nearly 40% and increase the risk of adverse outcomes in hospitalized patients (mortality, re – admissions and prolonged of length stay), so evaluating the intake of food and liquid should be monitored. It is also important to evaluating for aspiration risk, the sign of aspiration include ough or choking with swallowing, drooling, and changes in voice or speech. Oral nutritional supplementation is recommended in older hospitalized patients to treat malnutrition and for those at risk of developing malnutrition, including frail patients, those with dementia, and patients following orthopedic surgery [Oloutu et al 2019].

Urinary tract infections (UTI) postoperatively frequently seen in Geriatric patient, which account up to 40% of all iatrogenic infections. Appropriate use of indewlling catheters, sterile insertion technique, operator's hand hygiene are some of the prevention of this infection prior to surgery and indewlling catheters should be removed as soon as possible [Mohanty et al 2016, Gould et al 2009].

Pressure Ulcers will develop in Geriatric patient whom immobilized postoperatively. Aging cause decreased of

skin elasticity and loss of subcutaneous tissue. If the ongoing pressure ulcers doesn't get appropriate treatment, the ulcers can lead to secondary infections and prolonged hospital stay. Risk factor for pressure ulcers include abnormal positioning due to contracture, edema, chronic moisture, incontinence, limited mobility, and loss of sensation. Prevention should be initiated after postoperatively including repositioning patients every 1 – 2 hours for 15 – 30 minutes, adequate nutrition and daily skin inspection. If pressure ulcers already develop, treatment include wound care and debridement of nerotic tissue [Mohanty et al 2016].

Older adults are also at risk of cardiac, pulmonary, thromboembolic and renal postoperative complications. History of heart failure is a significant predictor of perioperative cardiovascular risk, those geriatrics whom have history of decompensated heart failure, the rate of postoperative mortality is high and the surgery must be undergo when volume and hemodynamic status have been optimized. Postoperative atrial fibrillation (AF) is common and the strongest risk factor for this event is increasing age. Management include correction of precipitating factors (hypoxia, inadequate pain control, electrolyte imbalances, etc.), AV□nodal blocking agents, and anticoagulant (if not contraindicated) to prevent thrombus formation. Postoperative pulmonary complications that can develop include atelectasis, hospital – aquired pneumonia, and respiratory failure. Optimizing of respiratory status postoperatively should be achieve. Geriatrics patients also at higher risk for developing of venous thromboembolism (VTE). Prophylaxis with subcutaneous heparin or enoxaparin should be implemented unless contraindicated [Wolfe, Wolfe & Rich 2020, Sieber & Barnett 2011].

Long term complications of postoperatively geriatric include functional decline. More than 30% of older hospitalized adults develop a new disability that impairs their ADLs. Interventions to prevent functional decline include early mobilization, early physical and occupational therapy evaluation, nutritional support, promotion of family participation in recovery, and comprehensive discharge planning [Wolfe, Wolfe & Rich 2020].

Geriatric patients are at higher risk for all of these complications, so the postoperative care planning must be planned prior to surgey. If this planning not planned appropriately, patients can be at higher risk for emergency room visit, readmission, and functional decline. Inpatient team must be assess patient's social support and need for postacute care including inpatient rehabilitation, skilled nursing facilities, or home health. Prior to discharge, older adults should undergo assessment of nutrition, cognition, ambulation, functional status, and the presence of delirium [Olouto et al 2019].

This patient came with worsening of the pain in his right knee with suspection to septic arthritis with history of Total Knee Replacement (TKR) since 4 month ago. Septic arhrtitis after TKR is the most challenging complication and occurs in 1 – 2 % of primary TKR. Its sign and symptons included of inflamation sign (persistent pain, swelling, erythema, local warmth), thus, septic arthritis has significant morbidity and mortality [Kalore, Gloe & Singh, 2011]. Persistent pain leads to immobility to the patient. The complications of the immobility are degenerative process and occur in all of organ system, in musculoskeletal can occur osteoporosis, reduced bone mass, atrophy of the muscle and so on. Immobility can cause venous congestion because of the altered gravity pressure, this congestion will inhibit clearance and dilution of activated coagulation factor that can induced embolism which can be fatal if the embolism occur in pulmonary (pulmonary embolism). Venous congestion can be manifested as deep vein thrombosis Lasmi et al 2008]. Pressure ulcer (decubitus ulcer) also frequently occur as the most

complications in immobility patients due to prolonged compression on bony prominence. The cause of immobility in this patient is postoperatie problem. We should identify the exact cause of pain on this patient. On this patient showed elevated temperature (37,4^{o}C) and elevated leukocyte (14.900/µl) so we treated this patient as septic arthtritis until further evaluation is needed. This patien should be given intravenous antibiotic (Vancomycin), but this patient only take oral antibiotics (Cefixime) because of their economic condition. After this patient given antibiotics, we should evaluate the response, if there's no good response after antibiotics admision, we should stop the antibiotics and look for another cause. We should sugest this patient do skin patch test, leukocyte migration inhibition test (LMIT), and lymphocyte transformation test (LTT), to suspect any posibilities of Metal hypersensitivity post TKR on this patient. Because of limitation economic status, the patient can't afford to do other testing. So we only give this patient analgetics and steroid as imune supression, but only for short period. We also give this patient physiotherapy and gradual mobility exercise to prevent complication such as venous thromboembolism, infection, pressure ulcer and so on.

CONCLUSION

Geriatric patients are very vulnerable to the risks of surgery, one of which is septic arthritis. So that a good perioperative evaluation can reduce complications such as delirium, falls, poor nutrition, infections, cardiac and pulmonary complications, venous thromboembolic disease (VTED) and acute kidney injury (AKI), comorbidities and decreased functional status.

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