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Short Communication

Surgical Status of Patients with Orthopedic Disease Based on the Estimated Glomerular Filtration Rate

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Abstract

Introduction: We determined the percentage of patients, over 70 years of age and rheumatoid arthritis, with suspected CKD with eGFR < 60 mL/min/1.73 m^2 among orthopedic patients, and compared these patients with those suffering from renal anemia as chosen concurrent controls.

Subjects and Methods: Among 6,508 patients in whom eGFR and Hb values were determined in our Hospital between 2012 and 2016, the possibility of CKD and the number of surgical cases were investigated in (1) 585 patients with RA, (2) 995 orthopedic patients age 70 years or older, and (3) 424 patients receiving erythropoietin therapy for renal anemia.

Results and Discussion: (1) There were 158/585 (27.0%) RA patients with eGFR < 60 mL/min/1.73 m^2, and 88 underwent surgery: preoperative autologous blood donation was used in 31 patients, intraoperative and postoperative blood recovery in 51, and allogeneic blood transfusion in 9 (10.2%). (2) There were 414/995 (41.6%) patients age 70 years or older who showed eGFR < 60 and 193 underwent surgery: preoperative autologous blood donation was used in 54 patients, intraoperative and postoperative blood recovery in 80, and allogeneic blood transfusion in 27 (13.9%). (3) Fifty-one/424 patients (12.0%) underwent surgery: preoperative autologous blood donation was not feasible, intraoperative and postoperative blood recovery was used in 26 patients, and allogeneic blood transfusion in 5 (9.8%).

Conclusion: When the possibility of renal anemia was examined in orthopedic patients who had RA or who were 70 years of age or older.

Keywords: *Chronic kidney disease; Estimated glomerular filtration rate; Rheumatoid arthritis; Erythropoiesis stimulating agent*

Abbreviations

CKD: Chronic kidney disease; eGFR: estimated Glomerular filtration rate; RA: Rheumatoid Arthritis; ESA: Erythropoiesis Stimulating Agent; Hb: Hemoglobin

Introduction

Japan has the highest healthy life expectancy in the world as well as the highest overall average life expectancy. However, the presence of an unhealthy, immobile period of approximately 10 years underscores the importance of taking measures against locomotive

syndrome. Aging leads to renal insufficiency in addition to deterioration of dental, visual and musculoskeletal functions, and numbers of patients with chronic kidney disease (CKD) [1] are thus increasing with aging. If non-steroidal anti-inflammatory drugs [2] are used to treat painful disorders in patients with CKD, exacerbation of CKD may occur, thereby influencing the therapeutic measures. The estimated glomerular filtration rate (eGFR) is a well-known index of CKD that provides a good understanding of CKD severity in 5 grades (stages 1-5). In this study, we determined the percentage of patients, at least 70 years of age [3], with suspected CKD with eGFR < 60 mL/min/1.73 m^2 among orthopedic and rheumatoid arthritis (RA) patients [4,5], and compared these patients with those suffering from renal anemia as chosen concurrent controls [6].

Subjects and Methods

Among 6,508 patients in whom eGFR and hemoglobin (Hb) values were determined in the laboratory of Kindai University Sakai Hospital between August 2012 and May 2016, the possibility of CKD and the number of surgical cases were investigated in (1) 585 patients with RA, (2) 995 orthopedic patients age 70 years or older, and (3) 424 patients receiving erythropoietin (erythropoiesis stimulating agent: ESA) therapy for renal anemia. The Orthopaedic operative procedures and allogenic transfusions were progressed to renal failure [7,8].

Results and Discussion

1. There were 158 RA patients with eGFR < 60 mL/min/1.73 m^2 (43 men and 115 women ranging in age from 41 to 101, with a mean age of 75 years), accounting for 27.0% of all RA patients. Of these 158 patients, 39 also had Hb < 11 g/dL, accounting for 6.7% of all RA patients and 24.8% of CKD patients, and 24 of the 39 patients showed eGFR < 60 mL/min/1.73 m^2 and Hb < 11g/dL persistently at and after 3 months. Among the 585 patients with RA, 88 (15.0%) underwent surgery: artificial joint replacement in 39, spine related surgery in 20, femoral head replacement in 13, and other procedures (fracture surgery, arthroscopy, hand surgery, etc.) in 16 patients. Preoperative autologous blood donation was used in 31 patients, intraoperative and postoperative blood recovery in 51, and allogeneic blood transfusion in 9 (10.2%) during hospitalization for surgery.

2. There were 414 patients age 70 years or older who showed eGFR < 60 mL/min/1.73 m^2 (accounting for 41.6% of all patients in this elderly group; 132 men and 282 women ranging in age from 70-102 years, with a mean age of 80 years). Among these 414, 103 showed Hb < 11 g/dL (10.3% of all patients age 70 years or older, 24.9% of CKD patients), and 62 of the 103 persistently showed eGFR < 60 mL/min/1.73 m^2 and Hb < 11g/dL at and after 3 months. Surgery was performed in 193 (19.4%) of the 995 patients age 70 or older, comprising 65 patients with artificial joint replacement, 35 with spine-related surgery, 34 with femoral head replacement, and 59 with other conditions and procedures (fracture, arthroscopy, hand surgery, etc.). Preoperative autologous blood donation was used in 54 patients, intraoperative and postoperative blood recovery in 80, and allogeneic blood transfusion in 27 (13.9%) during hospitalization for surgery.

3. In patients on ESA therapy for renal anemia, the eGFR values were 3-57 (mean 19.4 ± 15.7), and the Hb values were 7.6-10.8 g/dL (mean 9.4 ± 0.9 g/dL). Fifty-one patients (12.0% of those with renal anemia; 22 men and 29 women ranging in age from 26 to 92 years, with a mean age of 73 years) underwent surgery: femoral head replacement in 16, artificial joint replacement in 11, spine-related surgery in 8, and other procedures (fracture surgery, amputation, arthroscopy, hand surgery, etc.) in 16 patients. Although preoperative autologous blood donation was not feasible, intraoperative and postoperative blood recovery was used in 26 patients, and allogeneic blood transfusion in 5 (9.8%) during hospitalization for surgery. Table 1 shows a comparison among groups (1), (2), and (3) static analysis for Mann-Whitney's U test. The rate of allogeneic blood transfusion was not elevated in patients who were on ESA therapy for renal anemia.

	Rheumatoid Arthritis	Over 70 years' old	Renal Anemia with ESA
Number	585	995	424
eGFR < 60	158 (27.0%)	414 (41.6%)*	424
and Hb < 11g/dl	39 (6.7%)	103 (10.4%)*	424
Renal anemia suspected	24 (4.1%)	62 (6.4%)	424
OP numbers	88 (15.0%)	193 (19.4%)	51 (12.0%)
Autologous blood donation	31/88 (35.2%)	54/193 (28.0%)	0*
Autologous blood recovery	51/88 (58.0%)	80/193 (41.5%)*	26/51 (51.0%)
Allogenic blood transfusion	9 (10.2%)	27 (13.9%)*	5 (9.8%)
		Mann-Whitney's U test	* : $p < 0.05$

Conclusion

When the possibility of renal anemia was examined in orthopedic patients who had RA or who were 70 years of age or older, eGFR < 60 mL/min/1.73 m^2 and Hb < 11g/dL persisting for more than 3 months were found in 24 of 585 patients with RA and 62 of 995 patients age 70 years or older. Thus, it can be anticipated that a certain number of patients would be on ESA therapy in the future. There was no marked difference in the rates of allogeneic blood transfusion among the three groups of patients.

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