Outcomes and Complications of Spinal Fusion in Dialysis Patients: A Multi-institute Retrospective Review

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Introduction: Thanks to advancements in healthcare, patients with end-stage renal disease (ESRD) undergoing dialysis are living longer and consequently developing degenerative spine disease, for which spinal fusion is effective. However, many of the concomitant comorbidities of ESRD, including cardiovascular disease, anemia, and immune dysfunction, make surgery, including fusion, risky in this population. Prior studies surrounding surgical outcomes in dialysis patients report acceptable outcomes but elevated postoperative complication rates and mortality. The purpose of this study was to evaluate the outcomes and complications of dialysis patients undergoing fusion in a large health system to guide perioperative management in this high-risk population.
Methods: We conducted a retrospective review of dialysis patients who underwent spinal fusion in our health system from January 2015 through December 2024. Adult patients were included if they had a minimal follow-up period of six months, and excluded if they had a history of spinal fusion prior to index surgery. Variables of interest include patient demographics and operative data, including the indication for fusion, operative time, and follow-up time. Outcomes of interest included length of stay (LOS), discharge location, and mortality. Complications of interest included 30-day major and minor complications, 30-day readmission, and 30-day return to operating room (RTOR). Descriptive statistics, including counts, means, and medians, were used for continuous variables.
Results
A total of 21 dialysis patients met the inclusion criteria, with a male predominance (n=16), and a mean age of 52.24 at the time of surgery. The three most prevalent comorbidities in our cohort were hypertension (n=18), diabetes (n=9), and anemia (n=8). The most common indication for spinal fusion was degenerative disease (n=16), with a total of 47 levels fused; the most commonly operated spine segment was the cervical spine (n=13). Mean estimated blood loss was 255 mL, mean operative time was 166.9 minutes, and the median follow-up time was 12 months. Major complications included acute renal failure (n=2), cardiac arrest (n=1), and a cerebrovascular accident (n=1) (Table 1). One patient required 30-day readmission, and 6 patients required 30-day RTOR (Table 2). Two patients passed within six months of surgery.
Discussion
Our retrospective cohort of 21 patients from a large health system revealed some notable findings. Regarding demographics, the overwhelming majority of patients were male and African American, a known disproportionately ESRD-affected group. Comorbidities in our cohort were consistent with those observed in ESRD, including cardiovascular disease, anemia, and diabetes. Diabetes, in particular, is known to cause immune suppression and poor healing, which may explain more than half of all the complications in our cohort, including surgical site infection and wound dehiscence. Fortunately, all patients who required RTOR were successfully managed. Overall, our study highlights complications observed in dialysis patients postoperatively and suggests an association with known comorbidities of ESRD. Larger comparative studies may help further quantify the associations we observed and allow for direct comparison between dialysis and non-dialysis patients.

Table 1. Complications* (n)

Cardiac Arrest	1
Myocardial Infarction	0
Acute Renal Failure	2
PE	0
CVA	1
Sepsis	0
Wound (Seroma, Hematoma, Dehiscence)	4
SSI	3
Hardware Failure	0
Pneumonia	1
UTI	0
DVT	1

*Some patients had more than one complication

Table 2. Summary of Readmission and Return to OR

30-Day Readmission			
Age	**Gender**	**Reason**	**Outcome**
53	M	SSI	Inpatient Abx
30-Day Return to OR			
Age	**Gender**	**Reason**	**Outcome**
49	F	Wound Dehiscence	Wound successfully closed
57	M	Hematoma causing cord compression	Successful evacuation
56	M	SSI	I&D and IP Abx
57	F	Wound dehiscence	I&D and IP Abx
51	M	SSI	I&D and IP Abx
50	M	Upper Extremity DVT causing AV graft occlusion	Thrombectomy