Clinical Outcomes of Vancouver B2 Periprosthetic Fractures: Open Reduction Internal Fixation versus Revision Arthroplasty

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INTRODUCTION:

Periprosthetic fractures around total hip arthroplasty implants are challenging injuries to manage and there remains controversy regarding the best treatment. The standard treatment for Vancouver B2 periprosthetic femur fractures (VB2 PPFs) is revision arthroplasty (RA). However, some studies suggest that it might be reasonable to perform open reduction and internal fixation (ORIF) in select patients. This primary purpose of this study is to compare the clinical outcomes of patients with Vancouver B2 PPFs treated with either ORIF or RA.

METHODS:

A retrospective review of patients, 18 years of age or older, with VB2 PPFs, as defined in the primary surgeon operative note, who were treated with either ORIF or RA at a large tertiary institution between January 1, 2005, and April 1, 2022, was conducted. Patients with pathologic fractures, periprosthetic joint infection, or insufficient follow up were excluded. In cases of ORIF, an attempt was made to achieve an anatomic reduction with compression, utilizing cerclage wires. In cases of RA, revision to a modular diaphyseal engaging press-fit stem was typically utilized.

RESULTS:

Ninety-eight patients underwent either ORIF or RA for VB2 PPFs. Twenty-six patients underwent ORIF, while 72 patients received RA. Patient demographics between the ORIF and RA groups (Table 1) showed no significant differences in age (p=0.40), CCI (p=0.22), BMI (p=0.44), gender (p=0.52), and smoking status (p=0.43), race (p=0.21).

ORIF was associated with a shorter median time from injury to surgery in the ORIF group (p=0.02), less estimated blood loss (p=0.004), and operative time (p=0.08). However, there was no difference in transfusion rates (p=0.74), volume transfused (p=0.43), or length of stay (p=0.38). Total complication rates were similar between the ORIF and RA groups (23.1% vs.18.1%, p=0.58). There were no significant differences in 30-day and 1-year mortality (3.9% vs. 4.2%, p=0.94; 11.5% vs. 8.3%, p=0.63) or readmission rate (26.9% vs. 19.4%, p=0.43) between the ORIF and RA groups.

DISCUSSION AND CONCLUSION:

While ORIF compared to RA was associated with shorter surgery and less blood loss, our study found no significant differences in mortality or overall complication rate. These findings suggest that both surgical strategies may be effectively used for managing VB2 PPFs. The choice of surgical strategy should be individualized, taking into account factors such as the patient's overall health status, fracture pattern, bone quality, and the surgeon's expertise.

Independent Variable	*Total (n = 98)*	*ORIF (n = 26)*	*revTHA (n = 72)*	*p-value*
Age (years)	75 (±14)	74 (±20)	75 (±11)	0.40
CCI (mean ±SD)	4.5 (±2.3)	4.8 (±2.2)	4.4 (±2.3)	0.22
BMI (mean ±SD)	26.7 (±5.1)	26.6 (±5.5)	26.8 (±5.0)	0.44
Gender				0.52
Male	43	10	33	
Female	55	16	39	
Smoking Status				0.43
Current	7	1	6	
Former	37	10	27	
Never	49	15	34	
Unknown	5	0	5	
Race				0.21
White	95	25	70	
African American	1	0	1	
Unknown	2	1	1	
Insurance				0.66
Private	16	3	13	
Medicare	76	21	55	
Other public health insurance	2	0	2	
No health insurance	2	1	1	
Other	2	1	1	
Discharge Disposition				0.44
Custodial care facility	1	1	0	
Expired	1	0	1	
Home with services	20	6	14	
Home without services	3	0	3	
Rehabilitation facility	49	14	35	
Skilled nursing facility	24	5	19	

Table 1: Patient Cohort Demographics. ORIF = Open Reduction and Internal Fixation; revTHA = Revision Total Hip Arthroplasty; CCI = Charlson Comorbidity Index. SD = Standard Deviation; BMI = Body Mass Index

	Total (n = 98)	*ORIF (n = 26)*	*revTHA (n = 72)*	*p-value*
Median days from injury to surgery (IQR)	3 (1 to 4)	1.5 (1 to 3)	3 (2 to 4)	*0.02*
Mean operative time (minutes) (±SD)	165 (±65)	148 (±74)	171 (±60)	0.08
Bleeding Risks				
Mean EBL (mL) (±SD)	847 (±547)	613 (±481)	931 (±548)	*0.004*
Patients requiring transfusion (n)	74 (75.5%)	19 (73.1%)	55 (76.4%)	0.74
Mean volume transfused (mL) (±SD)	672 (±454)	658 (±404)	677 (±474)	0.43
Mean length of stay (days) (±SD)	7.0 (±3.1)	7.2 (±4.5)	6.9 (±2.5)	0.38
Total Complications (n)	19 (19.4%)	6 (23.1%)	13 (18.1%)	0.58
Infection	5 (5.1%)	1 (3.9%)	4 (5.6%)	0.73
Dislocation	6 (6.1%)	0	6 (8.3%)	0.13
Periprosthetic Fracture	1 (1%)	0	1 (1.4%)	0.55
Reoperation	4 (4.1%)	3 (11.5%)	1 (1.4%)	*0.25*
Readmission within 90 days (n)	21 (21.4%)	7 (26.9%)	14 (19.4%)	0.43
Mortality (n)				
Within 30 days	4 (4.1%)	1 (3.9%)	3 (4.2%)	0.94
Within 1 year	9 (9.2%)	3 (11.5%)	6 (8.3%)	0.63

Table 2. Patient Outcomes by Fracture Fixation. ORIF = Open Reduction and Internal Fixation; revTHA = Revision Total Hip Arthroplasty; SD = Standard Deviation; EBL = Estimated Blood Loss