Femoral stem stability in the Vancouver B Periprosthetic Femur Fractures: How good are our preoperative predictions?

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INTRODUCTION:

As the number of total hip arthroplasties (THA) performed annually increases, so are periprosthetic femur fractures. Identifying “well-fixed” vs “loose” femoral implants is challenging. We aimed to review accuracy of determining femoral implant stability for Vancouver B periprosthetic femur fractures.

METHODS:

We conducted a retrospective review of 116 patients between 2004 and 2024 who underwent surgical management of Vancouver B periprosthetic femur fractures. Patient demographics and surgical details were collected. Mean age was 69 years and 55% were female. Our institutional practice is for the on-call trauma and arthroplasty attendings to jointly decide on open reduction internal fixation (ORIF) vs revision total hip arthroplasty (rTHA) based on patient factors and all imaging available.

RESULTS:

Preoperatively, surgeons classified 67 stems as “well-fixed” and 43 stems as “loose”, 6 as “unknown”. Intraoperatively, surgeons classified 68 stems as “well-fixed” and 47 stems as “loose”, 1 as “unknown”. Excluding the “unknown” cases, the sensitivity and specificity of preoperative arthroplasty/trauma review was 100% and 95%, respectively. Positive predictive value and negative predictive value were 97% and 100%, respectively. 4 of 70 (4.7%) fractures treated with ORIF were classified as “loose” intraoperatively, while 2 of 46 (4.3%) fractures treated with rTHA were classified as “well-fixed” intraoperatively.

DISCUSSION AND CONCLUSION: Identifying whether a femoral implant is “well-fixed” or “loose” in periprosthetic fractures remains a challenge in 2025. At our institution, joint discussion between trauma and arthroplasty surgeons has excellent predictability for intraoperative stem stability assessment.

	All Patients		Revised		Fixed		
	N	%	N	%	N	%	P-Value*
Number of Patients	116	100%	46	39.7%	70	60.3%	
Age (years; mean, SD)	69.4	16.8	71.2	15.0	68.3	18.0	0.563
Sex							0.057
Male	52	44.8%	15	32.6%	37	52.9%	
Female	64	55.2%	31	67.4%	33	47.1%	
Pre-Op Ambulatory Status							0.323
Independent ambulator	69	59.5%	27	58.7%	42	60.0%	
Crutches/Cane/Walking Stick	15	12.9%	3	6.5%	12	17.1%	
Walker	27	23.3%	14	30.4%	13	18.6%	
Wheelchair	3	2.6%	1	2.2%	2	2.9%	
Non-Ambulatory/Bed-bound	2	1.7%	1	2.2%	1	1.4%	
Pre-Op Hospital Days (mean, SD)	1.6	1.6	2.1	1.5	1.4	1.6	0.003
Mechanism of Injury							0.058
High-Energy	16	13.8%	3	6.5%	13	18.6%	
Low-Energy	100	86.2%	43	93.5%	57	81.4%	
Concomitant Injuries							
Pelvis Fracture	4	3.4%	1	2.2%	3	4.3%	>0.999
Blunt Chest Trauma	5	4.3%	0	0.0%	5	7.1%	0.155
TBI	5	4.3%	0	0.0%	5	7.1%	0.155
Other orthopedic injuries NOT requiring surgery	13	11.2%	5	10.9%	8	11.4%	>0.999
Other orthopedic injuries requiring surgery	7	6.0%	1	2.2%	6	8.6%	0.241
Other NON-ortho injuries NOT requiring surgery	11	9.5%	3	6.5%	8	11.4%	0.523
Other NON-ortho injuries requiring surgery	2	1.7%	1	2.2%	1	1.4%	>0.999
Surgeon Disipline							<0.0001
Trauma	60	51.7%	8	17.4%	52	74.3%	
Arthroplasty	56	48.3%	38	82.6%	18	25.7%	
Operative Time (minutes; mean, SD)	202	85	222	89	189	97	0.014
Estimated Blood Loss (ml; mean, SD)	687	575	1016	681	462	345	<0.0001
Required Peri-operative Blood Transfusion	73	62.9%	36	78.3%	37	52.9%	0.006
Units of pRBCs Transfused (mean, SD)	3.2	3.1	3.4	2.3	3.1	3.7	0.056
Hardware							
Plate(s)	73	62.9%	13	28.3%	60	85.7%	<0.0001
Cable(s)	100	86.2%	42	91.3%	58	82.9%	0.273
Independent Lag Screw(s)	21	18.1%	1	2.2%	20	28.6%	<0.0001
Any kind of bone graft	7	6.0%	1	2.2%	6	8.6%	0.241
Post-Op Hospital Days (mean, SD)	5.0	4.6	6.3	5.0	5.4	3.5	0.422
Discharge Location							0.026
Home	29	25.0%	12	26.1%	17	24.3%	
Non-Home (SNF, IPR, psych hospital, jail, morgue, etc)	86	74.1%	33	71.7%	53	75.7%	
Post-Op Weight Bearing Restrictions							0.009
Weight Bearing as Tolerated	11	9.5%	8	17.4%	3	4.3%	
Partial Weight Bearing	3	2.6%	2	4.3%	1	1.4%	
Toe-Touch Weight Bearing	54	46.6%	23	50.0%	31	44.3%	
Non-Weight Bearing	45	38.8%	11	23.9%	34	48.6%	
Did the patient ever achieve WBAT?	103	88.8%	39	84.8%	64	91.4%	0.747
Time to WBAT (days; mean, SD)	70	43	60	36	76	45	0.069
Highest Post-Op Ambulatory Status							0.994
Independent ambulator	60	51.7%	24	52.2%	36	51.4%	
Crutches/Cane/Walking Stick	22	19.0%	8	17.4%	14	20.0%	
Walker	23	19.8%	9	19.6%	14	20.0%	
Wheelchair	5	4.3%	2	4.3%	3	4.3%	
Non-Ambulatory/Bed-bound	2	1.7%	1	2.2%	1	1.4%	
Dislocation	7	6.0%	4	8.7%	3	4.3%	0.434
Nerve/Artery Injury	4	3.4%	1	2.2%	3	4.3%	>0.999
Non-Union	4	3.4%	2	4.3%	2	2.9%	>0.999
Non-Revision Reoperation	8	6.9%	4	8.7%	4	5.7%	0.711
Revision Surgery	9	7.8%	4	8.7%	5	7.1%	>0.999