Traction Table Assisted Lateral Decubitus Patient Positioning in Cephalomedullary Nailing

Albert William Peters, Drew T Sanders, Garrett Sohn, Dustin Rinehart, Timothy Harris

INTRODUCTION:

Cephalomedullary nail fixation of geriatric intertrochanteric femur fractures is, and will continue to be, performed by most orthopaedic surgeons. The influence of technical factors on outcome is clear, and it is imperative that orthopaedic surgeons use contemporary strategies to achieve adequate reduction and fixation. We believe that lateral patient position on a traction table confers several advantages which surgeons can employ to achieve quality outcomes even in patients who have challenging body morphology and/or fracture anatomy. It is our belief that by training surgeons in lateral nailing we can deliver a reproducible strategy for reduction and fixation in straightforward and complex cases.

METHODS:

Geriatric intertrochanteric femur fractures treated with cephalomedullary nailing from June 2009 to April 2022 were compiled into a database (n=1,119). All cases were performed in hospitals served by one university's orthopaedic surgery department: a county-based Level 1 trauma center, a university-based tertiary referral hospital, and an orthopaedic specialty hospital. After exclusion criteria there were 452 patients, with 319 supine cases (70.6%) and 133 lateral cases (29.4%). Medical records were reviewed to obtain the following for each patient: age, sex, BMI, primary surgeon and surgeon training, hospital, date of last follow up, return to the operating room, and surgical positioning (accessed at the end of the study to prevent bias). Preoperative images were used to determine AO/OTA fracture classification, with only 31A1.1, 31A1.2, and 31A1.3 considered stable fracture patterns[1,2]. Intraoperative images were analyzed with image editing software to determine both tip-apex distance and reduction grade[2].

RESULTS:

When evaluating the full group of 452 surgical patients the lateral cohort had a significantly larger proportion of unstable fractures (42.9%) than in the supine cohort (31.3%) (p=0.023). No significant difference in reduction grade or tip-apex distance was noted between the groups, suggesting that both positions allow for similar technical performances. Nailing with a lateral patient position was associated with an increased rate of screw placement in the middle third of the femoral head, as well as a decreased rate of placement in the extreme anterior or posterior regions (p=0.002, p=0.011). There was also a statistically significant higher proportion of obese BMI patients in the lateral group as compared to the supine group (p=0.011).

Patient characteristics, fracture types, and surgical details are presented and compared in Table 2. Supine and lateral cohorts in this subgroup showed a few key differences that both reached statistical significance: a larger proportion of the lateral nailings were performed by trauma trained surgeons (p=0.0002), and a higher proportion of lag screws were placed centrally with lateral patient positioning (p=0.027). Twenty patients, including the 6 that did not meet the 12-week follow-up minimum, required a return to the operating room in the follow-up period (Table 3). Reasons for returning were as follows: infection (8), cutout (6), nonunion (3), symptomatic implant (2), and periprosthetic fracture (1). No significant differences were found between supine and lateral cohorts regarding rates of all cause reoperation, non-infectious reoperation, and cutout of lag screw.

DISCUSSION AND CONCLUSION:

Surgical management of geriatric intertrochanteric femur fractures will be faced by almost every orthopaedic surgeon in practice. The contribution of reduction quality and fixation strategies to a successful outcome are well defined. We believe that lateral positioning on a traction table creates a reproducible method by which surgeons can achieve these aims, and for that reason we have focused this paper on the technical aspects of the procedure.

Our series shows that both supine and lateral cephalomedullary nailing procedures may be performed safely and proficiently, there are several worthwhile points that may be taken away from the data. It appears that trauma trained surgeons took care of the more complex fracture patterns and more frequently opted for lateral patient position. All surgeons placed screws in the center of the femoral head at a higher rate in lateral position as compared to supine, and avoided peripheral screw placement more frequently in the lateral position. Similarly, more of the obese BMI patients were treated in the lateral position.

The influence of technical factors on outcome is clear and it is imperative that orthopaedic surgeons use contemporary strategies to achieve adequate reduction and fixation. Cephalomedullary nailing in both supine and lateral patient positions were comparably effective in treating geriatric intertrochanteric fractures in our case series. We believe that lateral patient position on a traction table confers advantages which surgeons can employ to achieve good reductions and well placed fixation even in patients who are obese or have complex fracture patterns.

	Supine (n=319)		Lateral (n=133)		P
Mean age, y. (S.D.)	79.2 (9.1)		77.5 (9.7)		0.079
Sex					
Male	110	34.5%	38	28.6%	0.229
Female	209	65.5%	95	71.4%	
Mean BMI (S.D.)	24.5 (5.0)		26.0 (5.9)		**0.011**
Surgeon Subspecialty					
Trauma	187	58.6%	117	88.0%	**<0.00001**
Non-Trauma	132	41.4%	16	12.0%	
AO/OTA Fracture Classification					
31A1.1	0	0.0%	1	0.8%	
31A1.2	119	37.3%	36	27.1%	
31A1.3	100	31.3%	39	29.3%	
31A2.2	32	10.0%	18	13.5%	
31A2.3	41	12.9%	23	17.3%	
31A3.1	6	1.9%	4	3.0%	
31A3.2	4	1.3%	3	2.3%	
31A3.3	17	5.3%	9	6.8%	
Stable	219	68.7%	76	57.1%	**0.023**
Unstable	100	31.3%	57	42.9%	
Reduction Grade					
Good	222	69.6%	96	72.2%	
Acceptable	75	23.5%	33	24.8%	
Poor	22	6.9%	4	3.0%	
Good	222	69.6%	96	72.2%	0.652
Not Good	97	30.4%	37	27.8%	
Mean Tip-Apex Distance (S.D.)	21.4 (6.8)		22.0 (7.3)		0.362
Lateral Thirds					
Middle	240	75%	117	88%	
Anterior	14	4%	1	1%	
Junction Anterior-Middle	36	11%	10	8%	
Junction Posterior-Middle	24	8%	5	4%	
Posterior	5	2%	0	0%	
Middle	240	75%	117	88%	**0.002**
Not Middle	79	25%	16	12%	
Extreme (Anterior/Posterior)	19	6%	1	1%	**0.011**
Not Extreme	300	94%	132	99%	

	Supine (n=179)		Lateral (n=71)		P
Re-operations	17	9.8%	3	4.2%	0.203
Noninfection re-operations	9	5.2%	3	4.2%	1.000
Cutout	5	2.9%	1	1.4%	0.678
Mean Age, y. (S.D.)	78.0 (8.7)		77.5 (9.5%)		0.650
Sex					
Male	54	30.2%	20	28.2%	0.878
Female	125	69.8%	51	71.8%	
Mean BMI (S.D.)	25.2 (5.0)		26.1 (4.8)		0.229
Surgeon Subspecialty					
Trauma	112	62.6%	61	85.9%	**0.0002**
Non-Trauma	67	37.4%	10	14.1%	
AO/OTA Fracture Classification					
31A1.1	0	0.0%	0	0.0%	
31A1.2	66	36.9%	23	32.4%	
31A1.3	55	30.7%	20	28.2%	
31A2.2	20	11.2%	9	12.7%	
31A2.3	22	12.3%	9	12.7%	
31A3.1	4	2.2%	2	2.8%	
31A3.2	3	1.7%	2	2.8%	
31A3.3	9	5.0%	6	8.5%	
Stable	121	67.6%	43	60.6%	0.304
Unstable	58	32.4%	28	39.4%	
Reduction Grade					
Good	126	70.4%	52	73.2%	
Acceptable	41	22.9%	16	22.5%	
Poor	12	6.7%	3	4.2%	
Good	126	70.4%	52	73.2%	0.757
Not Good	53	29.6%	19	26.8%	
Mean Tip-Apex Distance (S.D.)	21.6 (7.2)		21.5 (6.9)		0.885
Lateral Thirds					
Middle	133	74.3%	62	87.3%	
Anterior	10	5.6%	1	1.4%	
Junction Anterior-Middle	15	8.4%	6	8.5%	
Junction Posterior-Middle	18	10.1%	2	2.8%	
Posterior	3	1.7%	0	0.0%	
Middle	133	74.3%	62	87.3%	**0.027**
Not Middle	46	25.7%	9	12.7%	
Extreme (Anterior/Posterior)	13	7.3%	1	1.4%	0.122
Not Extreme	166	92.7%	70	98.6%	