

Appendix

TABLE E-1 Excluded Surgeries

Cause	No.
Foreign citizen	3
Duplicate record in the Danish Fracture Database (DFDB)	25
<8 surgeries performed in the department during the inclusion period	15
Erroneous date of surgery in the database	18
Trochanteric fracture pattern	4
Death prior to postop. radiographic evaluation	10
Missing radiographs	193
Radiographic quality did not allow measurements	2
Previous treatment for fracture of the hip	4
Alternative surgical technique	17
>5 days from surgery to postop. radiographic evaluation	8
New fracture of the hip before postop. radiographic evaluation	5
Bilateral femoral fracture at the time of surgery	1
Maldeveloped femoral head	1
Position of 3 implants in a triangle, with apex superiorly	26
Position of 3 implants in a vertical line	20
Total	352

TABLE E-2 Variables Obtained by Radiographic Evaluation

Measurement	Definition
Primary radiographic measures	
Fracture displacement	Displacement on anteroposterior radiographs, in accordance with the Garden classification ¹⁹ , where Garden I and II were grouped as “nondisplaced” and Garden III and IV, as “displaced.” Garden III was defined as a step-off in the calcar of >2 mm (after adjustment of magnification), measured on the anteroposterior radiograph, or a varus malalignment (ordinal variable, with 2 levels). Measured both preop. and postop.
Posterior tilt of the caput fragment	Measured by the method suggested by Palm et al. ²⁰ on the axial radiographs (quantitative, continuous variable, measured in degrees). Measured for nondisplaced fractures
No. of implants used	(Dichotomous variable, either 2 or 3 implants used)
Posterior distance	The shortest distance from the posterior implant to the posterior cortex of the femoral neck, measured distal to the fracture on the postop. axial radiograph (Fig. 1-B) (quantitative, continuous variable, measured in millimeters to 1 decimal place)
Calcar distance	The shortest distance from the inferior implant to the calcar, measured distal to the fracture on the postop. anteroposterior radiograph (Fig. 1-A) (quantitative, continuous variable, measured in millimeters to 1 decimal place)
Tip-cartilage distance	Distance from the tip of the implants to the surface of the femoral head (measured for the inferior and the posterior implant) (Fig. 1-A) (quantitative, continuous variable, measured in millimeters to 1 decimal place)
Angulation of implants	Angle between the lateral cortex of the femoral shaft and the implants, measured on the anteroposterior radiograph for the posterior and inferior implants (quantitative, continuous variable, measured in degrees) (Fig. 1-C)
Size of the implant	Diameter of the implant on postop. radiographs. For screws, the diameter of the threads was used (quantitative, continuous variable, measured in millimeters)
Implant protrusion	Perforation of either the cortex of the femoral neck or the cartilage surface of the femoral head (dichotomous variable, either an implant protruded or not)
Variables constructed from the radiographic analysis based on the measurements	
Fracture type	Combining preop. fracture displacement and preop. posterior tilt (ordinal variable with the levels “nondisplaced, posterior tilt <20°,” “nondisplaced, posterior tilt ≥20°,” and “displaced”)
Reduction	Combining postop. fracture displacement and postop. posterior tilt (ordinal variable with the levels “nondisplaced, posterior tilt <10°,” “nondisplaced, posterior tilt ≥10°,” and “displaced”)
Tip-caput distance	Summation of the tip-cartilage distance of the posterior and inferior implants (quantitative, continuous variable, measured in millimeters to 1 decimal place)

TABLE E-3 Intraobserver and Interobserver Reliability of Measurements*

	Kappa (CI)	Lin (CI)	MD	SD (MD)	LOA	COV (%)	CI (MD)
Intraobserver: Reviewer 1							
Classification (nondisplaced/displaced)							
Preop.	0.77 (0.58 to 0.96)						
Postop.	0.88 (0.75 to 1)						
Angle of posterior implant		0.98 (0.96 to 0.99)	0.28	1.74	(-3.13 to 3.69)	1.30	(-0.20 to 0.76)
Angle of inferior implant		0.97 (0.95 to 0.98)	0.16	1.84	(-3.46 to 3.78)	1.37	(-0.35 to 0.67)
Posterior tilt preop.		0.89 (0.77 to 0.95)	0.63	3.38	(-7.24 to 5.99)	35.1	(-1.92 to 0.67)
Posterior tilt postop.		0.95 (0.91 to 0.98)	0.081	2.42	(-4.83 to 4.67)	42.2	(-0.92 to 0.76)
Calcar distance		0.97 (0.94 to 0.98)	0.028	0.70	(-1.40 to 1.35)	11.8	(-0.22 to 0.17)
Posterior distance		0.99 (0.99 to 0.99)	-0.049	0.43	(-0.90 to 0.80)	9.50	(-0.17 to 0.071)
TCD posterior implant		0.99 (0.98 to 0.99)	-0.057	0.44	(-0.92 to 0.81)	9.61	(-0.18 to 0.069)
TCD inferior implant		0.97 (0.94 to 0.98)	0.13	0.81	(-1.47 to 1.72)	17.8	(-0.098 to 0.35)
Diameter screw anteroposterior		0.98 (0.97 to 0.99)	0.16	3.40	(-6.82 to 6.50)	14.1	(-0.79 to 1.10)
Diameter screw lateral		0.99 (0.98 to 0.99)	0.54	3.22	(-5.77 to 6.85)	10.1	(-0.36 to 1.43)
Intraobserver: Reviewer 2							
Classification (nondisplaced/displaced)							
Preop.	0.88 (0.74 to 1)						
Postop.	0.75 (0.52 to 0.98)						
Angle of posterior implant		0.99 (0.98 to 0.99)	0.021	1.28	(-2.49 to 2.53)	0.96	(-0.34 to 0.38)
Angle of distal implant		0.99 (0.98 to 0.99)	0.083	1.27	(-2.57 to 2.40)	0.95	(-0.27 to 0.44)
Posterior tilt preop.		0.81 (0.64 to 0.91)	0.77	4.21	(-9.01 to 7.47)	43.0	(-2.33 to 0.79)
Posterior tilt postop.		0.78 (0.63 to 0.88)	0.91	4.85	(-8.61 to 10.42)	106.9	(-0.64 to 2.45)
Calcar distance		0.92 (0.87 to 0.96)	0.28	1.07	(-2.37 to 1.82)	17.6	(-0.019 to 0.57)
Posterior distance		0.99 (0.98 to 0.99)	0.0067	0.53	(-1.05 to 1.04)	11.9	(-0.14 to 0.15)
TCD posterior implant		0.94 (0.90 to 0.97)	0.13	0.83	(-1.51 to 1.77)	17.5	(-0.10 to 0.36)
TCD inferior implant		0.94 (0.90 to 0.97)	0.52	0.98	(-1.41 to 2.45)	19.3	(0.25 to 0.80)
Diameter screw anteroposterior		0.998 (0.996 to 0.999)	0.47	1.14	(-1.76 to 2.70)	4.73	(0.16 to 0.79)
Diameter screw lat.		0.998 (0.996 to 0.999)	0.57	1.56	(-2.48 to 3.62)	4.78	(0.14 to 1.00)
Interobserver (Reviewer 1 vs. 2)							
Classification (nondisplaced/displaced)							
Preop.	0.71 (0.58 to 0.85)						
Postop.	0.66 (0.5 to 0.83)						
Angle of posterior implant		0.98 (0.97 to 0.99)	0.59	1.59	(-2.52 to 3.70)	1.18	(0.27 to 0.90)

Angle of distal implant		0.97 (0.96 to 0.98)	0.66	1.64	(-2.55 to 3.87)	1.22	(-2.55 to 3.87)
Posterior tilt preop.		0.84 (0.73 to 0.90)	0.23	3.83	(-7.30 to 7.75)	40.7	(-0.83 to 1.28)
Posterior tilt postop.		0.81 (0.71 to 0.88)	0.36	1.00	(-8.22 to 10.2)	87.9	(-0.12 to 2.12)
Calcar distance		0.94 (0.91 to 0.96)	0.12	0.98	(-2.04 to 1.80)	16.3	(-0.81 to 0.071)
Posterior distance		0.99 (0.98 to 0.99)	0.078	0.54	(-0.99 to 1.15)	12.1	(-0.029 to 0.18)
TCD posterior implant		0.91 (0.87 to 0.94)	0.18	1.13	(-2.40 to 2.04)	24.3	(-0.045 to 0.41)
TCD inferior implant		0.92 (0.88 to 0.95)	0.49	1.20	(-2.83 to 1.86)	24.6	(0.25 to 0.73)
Diameter screw anteroposterior		0.99 (0.98 to 0.99)	0.045	2.63	(-5.19 to 5.10)	10.9	(-0.56 to 0.47)
Diameter screw lat.		0.99 (0.99 to 0.99)	0.49	3.07	(-6.52 to 5.53)	9.52	(-0.11 to 1.10)

*CI = 95% confidence interval, Lin = Lin concordance correlation coefficient²¹, MD = mean difference, SD (MD) = standard deviation of the mean difference, LOA = limits of agreement⁴², COV = coefficient of variation (within-subject standard deviation method)^{43,44}, and TCD = tip-cartilage distance.

TABLE E-4 Cox Regression Analysis of Risk of Death

	Hazard Ratio	95% Confidence Interval	P Value
Age	1.058	(1.04-1.07)	<0.000001
Sex			
Female	1		
Male	1.37	(0.995-1.88)	0.0538
ASA score			
1-2	1		
3-4	3.10	(2.32-4.17)	<0.000001
Time to surgery in hr			
0-12	1		
>12-24	0.89	(0.64-1.25)	0.508
>24-36	0.99	(0.64-1.52)	0.949
>36	1.23	(0.79-1.92)	0.359
Test for overall effect of time to surgery			0.520
Fracture displacement			
Nondisplaced, <20°	1		
Displaced	1.21	(0.89-1.66)	0.228
Reduction			
Nondisplaced, <10°	1		
Nondisplaced, ≥10°	1.14	(0.78-1.68)	0.493
Displaced	1.07	(0.75-1.52)	0.722
Test for overall effect			0.787
Number of screws			
2	1		
3	0.83	(0.55-1.24)	0.354
Angle of distal screw			
>125°	1		
≤125°	1.25	(0.71-2.24)	0.438
Angle between screws			
≤3°	1		
>3°	1.00	(0.62-1.62)	0.997
Posterior distance			
1-3 mm	1		
<1 mm	0.77	(0.54-1.11)	0.162
>3 mm	0.84	(0.61-1.17)	0.302
Test for overall effect			0.332
Calcar distance			

0-5 mm	1		
>5 mm	1.01	(0.76-1.33)	0.962
Tip-caput distance			
0-10 mm	1		
Perforating	1.63	(0.75-3.52)	0.216
>10 mm	0.99	(0.58-1.68)	0.963
Test for overall effect			0.509
Further operations			
No further operations	1		
Underwent further surgery	1.49	(0.94-2.36)	0.0934