Fig. E-1A

Figs. E-1A, E-1B, and E-1C An illustrative example of the application of the nomogram to a fifty-five-year-old patient. **Fig. E-1A** The anteroposterior pelvic radiograph in the left panel shows a displaced anterior column and a posterior hemitransverse fracture. The middle panel shows achievement of an anatomical reduction with a congruent hip joint through an ilioinguinal approach. The right panel shows the outcome at twenty-four years postoperatively; the patient had a pain-free hip joint without signs of osteoarthritis.

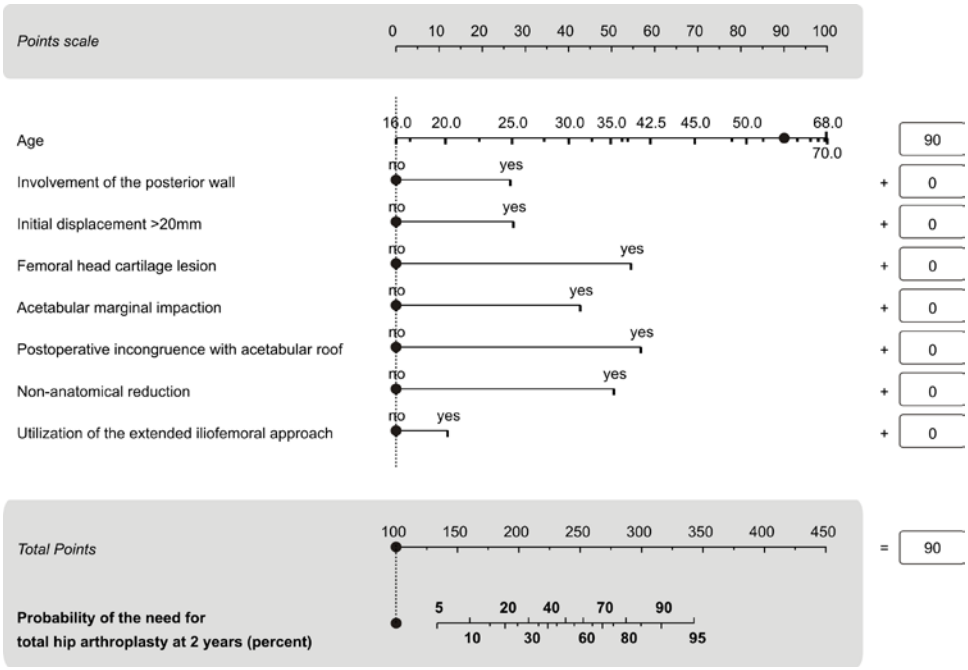

Fig. E-1B

The nomogram for this patient shows the predicted need for a total hip arthroplasty at two years to be <5%. This is equivalent to >95% probability of survival of the hip at two years postoperatively.

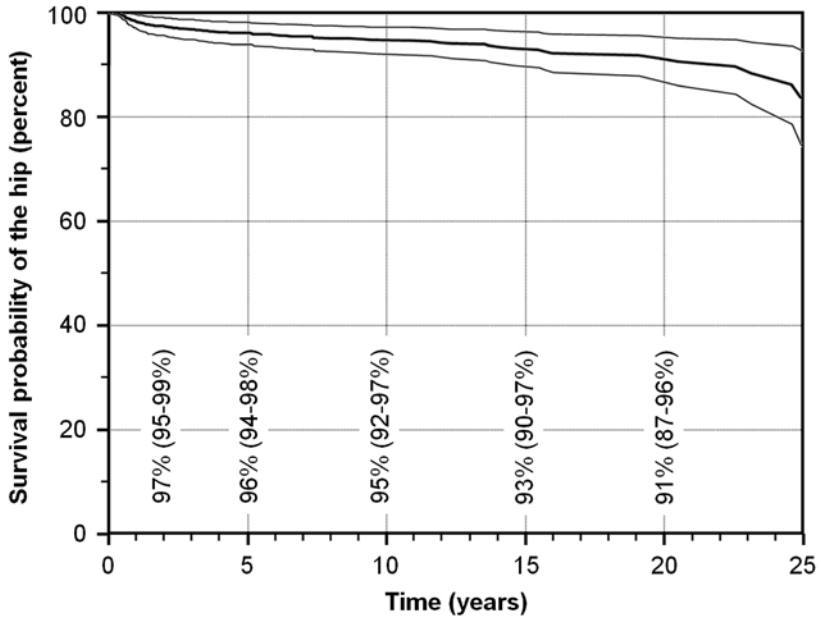

Fig. E-1C

The long-term prognosis (including 95% confidence interval) for this patient was calculated on the basis of the Cox regression analysis. Values stated within the figure are given as the predicted survivorship with the 95% confidence interval in parentheses. The twenty-year survivorship probability was predicted to be 91%, consistent with the results observed at twenty-four years postoperatively (see Figure E-1A, right panel).

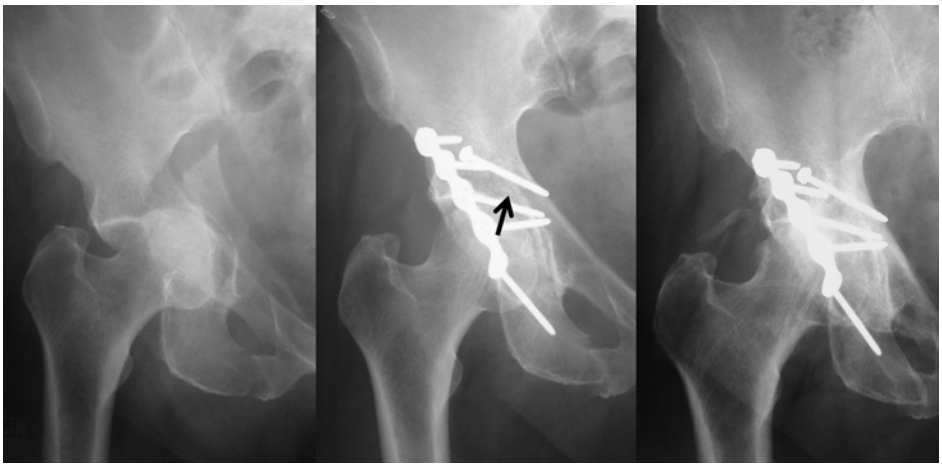

Fig. E-2A

Figs. E-2A, E-2B, and E-2C A seventy-four-year-old patient with a T-shaped acetabular fracture. **Fig. E-2A** The left panel shows the preoperative anteroposterior radiograph. The middle panel shows that the postoperative reduction was nonanatomical, with incongruence of the acetabular roof (arrow), and substantial damage to the femoral head cartilage was observed intraoperatively. The right panel shows the early development of secondary osteoarthritis.

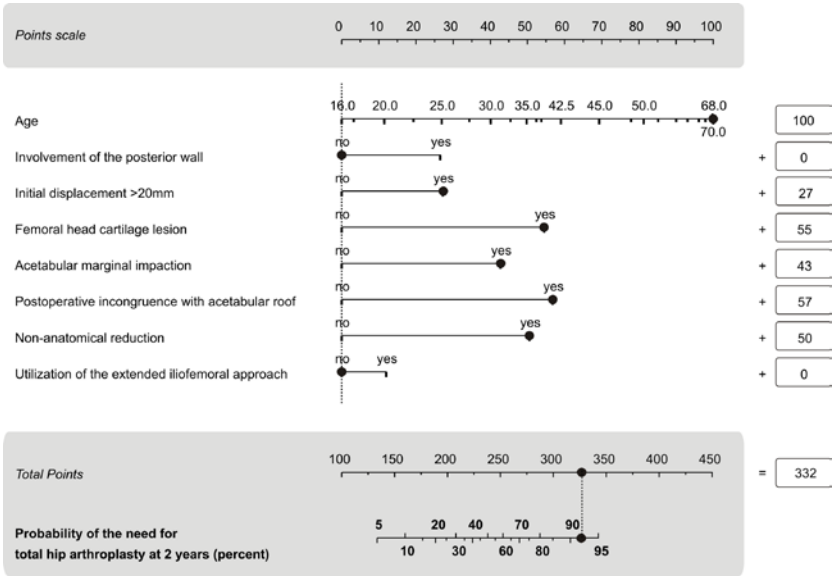

Fig. E-2B

The nomogram for this patient shows the predicted need for a total hip arthroplasty at two years to be 92% because of the presence of several negative predictive factors.

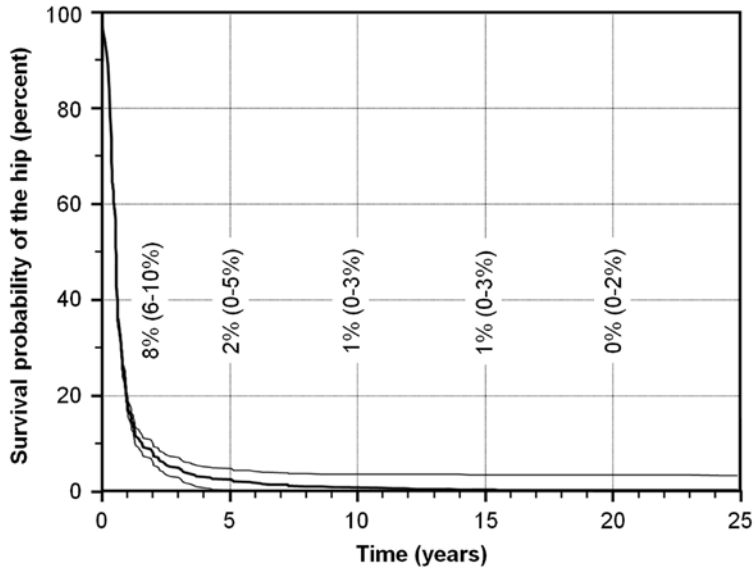

Fig. E-2C

The long-term prognosis (including 95% confidence interval) for this patient was calculated on the basis of the Cox regression analysis. Values stated within the figure are given as the predicted survivorship with the 95% confidence interval in parentheses. The two-year survivorship probability was predicted to be 8%, consistent with the early postoperative results (see Figure E-2A, right panel). The patient underwent total hip arthroplasty at seventeen months postoperatively. On the basis of the nomogram results, this patient could have been a candidate for primary total hip arthroplasty.

TABLE E-1 Demographics of the 810 Patients with 816 Acetabular Fractures Available for Analysis

Parameter	Value
No. of patients (no. of hips)	810 (816)
No. of bilateral hips	6 (0.7%)
No. of hips in male patients	556 (68%)
No. of right hips	364 (45%)
Age* *(yr)*	43.3 ± 17.7 (11-89.6)
No. of hips with reconstruction delayed ≥21 d	86 (11%)
Duration of hospitalization* *(d)*	13 ± 9 (2-90)
No. of fractures with associated injuries	359 (44%)
Head	97 (12%)
Abdomen	46 6%)
Chest	105 (13%)
Genitourinary tract	21 (3%)
Extremities	242 (30%)
Spine	29 (4%)
Injury mechanism	
Motor vehicle	417 (51%)
Fall	183 (22%)
Pedestrian	66 (8%)
Motorcycle	50 (6%)
Bicycle	32 (4%)
Sport	24 (3%)
Other or unknown	44 (5%)
Additional pelvic fracture or injury	74 (9%)
Symphysis dislocation	30 (4%)
Sacroiliac joint dislocation	29 (4%)
Sacroiliac joint fracture-dislocation	10 (1%)
Sacrum fracture	23 (3%)
Preoperative nerve palsy	86 (11%)
Sciatic nerve	78 (10%)
Femoral nerve	4 (1%)
Superior gluteal nerve	4 (1%)
Type of fixation	
Plate and screws	721 (88%)
Screws only	95 (12%)

*Values are given as the mean and the standard deviation, with the range in parentheses.

TABLE E-2 Univariate and Multivariate Regression Analysis to Identify Independent Predictive Factors of Poor Outcome*

Parameter	Crude Hazard Ratio†	P Value	Adjusted Hazard Ratio†	P Value	Median Time to Failure *(yr)*
Anterior dislocation	2.0 (1.3-2.7)	0.032	4.7 (3.3-6.2)	0.035	10.9
Nonanatomical reduction	3.3 (3.1-3.5)	<0.001	2.9 (2.5 -3.3)	<0.001	1.3
Incongruence of the acetabular roof	5.0 (4.8-5.2)	<0.001	2.8 (2.4-3.3)	<0.001	1.0
Age >40 yr	2.9 (2.8-3.2)	<0.001	2.7 (2.2-3.1)	<0.001	1.2
Femoral head cartilage lesion	3.0 (2.9-3.2)	<0.001	2.3 (1.9-2.8)	<0.001	1.6
Involvement posterior wall	1.6 (1.4-1.8)	0.008	1.7 (1.3-2.1)	0.013	1.3
Extended iliofemoral approach	1.5 (1.3-1.7)	0.042	1.7 (1.2-2.1)	0.026	2.2
Acetabular impaction	3.0 (2.8-3.2)	<0.001	1.6 (1.2-2.0)	0.032	1.2
Initial displacement ≥20 mm	1.9 (1.7-2.1)	<0.001	1.5 (1.2-1.9)	0.020	1.4
Previous surgery	6.4 (5.8-6.9)	0.001	NA	NA	NA
Anterior wall fracture pattern	3.8 (3.3-4.2)	0.003	NA	NA	NA
Reconstruction delayed ≥21 d	1.8 (1.6-2.0)	0.013	NA	NA	NA
Relocation of dislocation >6 hr	1.6 (1.4-1.8)	0.031	NA	NA	NA
Posterior dislocation	1.6 (1.4-1.8)	0.015	NA	NA	NA
T-type fracture pattern	1.6 (1.3-1.8)	0.048	NA	NA	NA
Free intra-articular fragments	1.5 (1.3-1.7)	0.031	NA	NA	NA
Ilioinguinal approach	0.6 (0.4-0.8)	0.008	NA	NA	NA
Both-column fracture pattern	0.5 (0.3-0.7)	0.002	NA	NA	NA
Delay of surgery *(per day)*	1.1 (1.1-1.1)	<0.001	NA	NA	NA

*NA = not applicable. The parameters analyzed were sex, age of more than forty years, reconstruction delayed more than twenty-one days, previous surgery, associated injuries of other body regions, additional pelvic fracture, nerve palsy, anterior dislocation, posterior dislocation, fracture pattern, involvement of the posterior wall, initial displacement of ≥20 mm, approach, femoral head lesion, acetabular margin impaction, free intra-articular fragments, postoperative congruency of the acetabular roof, and accuracy of reduction. †Values are given as the hazard ratio, with the 95% confidence interval in parentheses.

TABLE E-3 Independent Negative Predictive Factors According to Fracture Type

Fracture Type	Anterior Dislocation	Nonanatomical Reduction (>1 mm)	Incongruence of the Acetabular Roof	Femoral Head Cartilage Lesion	Age >40 Yr	Involvement of Posterior Wall	Initial Displacement ≥20 mm	Acetabular Impaction	Extended Iliofemoral Approach
Entire series (n = 816)	6 (1%)	200 (25%)	76 (9%)	190 (23%)	430 (53%)	316 (39%)	226 (28%)	163 (20%)	129 (16%)
Simple fracture type (n = 241)	5 (2%)*	40 (17%)†	21 (9%)	76 (32%)*	130 (54%)	107 (44%)*	49 (20%)†	54 (22%)	11 (5%)†
Anterior wall (n = 12)	1 (8%)*	6 (50%)*	1 (8%)	3 (25%)	10 (83%)*	—	5 (42%)	8 (67%)*	1 (8%)
Anterior column (n = 80)	3 (4%)*	15 (19%)	8 (10%)	7 (9%)†	54 (68%)*	—	11 (14%)†	15 (19%)	3 (4%)†
Posterior wall (n = 107)	1 (1%)	9 (8%)†	6 (6%)	58 (54%)*	54 (50%)	107 (100%)*	30 (28%)	29 (27%)*	3 (3%)†
Posterior column (n = 14)	—	3 (21%)	—	2 (14%)	5 (36%)	—	1 (7%)	—	—
Transverse (n = 28)	—	7 (25%)	6 (21%)*	6 (21%)	7 (25%)†	—	2 (7%)†	2 (7%)	4 (14%)
Associated fracture type (n = 575)	1 (0%)†	159 (28%)*	55 (10%)	114 (20%)	300 (52%)	209 (36%)†	177 (31%)*	109 (19%)	118 (21%)*
Posterior column, posterior wall (n = 26)	—	2 (8%)†	1 (4%)	9 (35%)	17 (65%)	26 (100%)*	7 (27%)	13 (50%)	—
Transverse, posterior wall (n = 143)	1 (1%)	29 (20%)	12 (8%)	54 (38%)*	60 (42%)†	143 (100%)*	35 (24%)	36 (25%)	19 (13%)
T-shaped (n = 96)	—	29 (30%)	14 (15%)	24 (25%)	45 (47%)	40 (42%)	33 (34%)	16 (17%)	21 (22%)
Anterior column, posterior hemitransverse (n = 76)	—	24 (33%)	10 (13%)	10 (13%)	57 (75%)*	—	13 (17%)†	24 (32%)*	3 (4%)†
Both columns (n = 234)	—	75 (32%)*	18 (8%)	17 (7%)	121 (52%)	—	89 (38%)*	20 (9%)†	75 (32%)*

*Significantly higher compared with hips without the specific criterion. †Significantly lower compared with hips without the specific criterion.

TABLE E-4 Comparison of Patients with Insufficient and Sufficient Follow-up

Parameter	Insufficient or No Follow-up (N = 402)	Sufficient Follow-up (N = 816)	P Value
Male (n = 855 hips)	299 (74%)	556 (68%)	0.025
Age in yr*	37 ± 15 (14-86)	43 ± 18 (11-90)	<0.001
<40 (n = 628)	242 (60%)	386 (47%)	<0.001
40-65 (n = 450)	132 (33%)	318 (39%)	0.036
>65 (n = 140)	28 (7%)	112 (14%)	<0.001
Right side (n = 567)	203 (50%)	364 (45%)	0.052
No. of fractures with associated injuries (n = 539)	180 (45%)	359 (44%)	0.796
Preoperative nerve palsy (n = 114)	28 (7%)	86 (11%)	0.030
Sciatic nerve (n = 102)	24 (6%)	78 (10%)	0.033
Femoral nerve (n = 7)	3 (1%)	4 (0%)	0.578
Superior gluteal nerve (n = 5)	1 (0%)	4 (0%)	0.535
Dislocation (n = 304)	101 (25%)	203 (25%)	0.769
Anterior (n = 11)	5 (1%)	6 (1%)	0.883
Posterior (n = 293)	96 (24%)	197 (24%)	0.920
Simple fracture type (n = 369)	128 (32%)	241 (30%)	0.410
Anterior wall (n = 13)	1 (0%)	12 (1%)	0.051
Anterior column (n = 107)	27 (7%)	80 (10%)	0.073
Posterior wall (n = 178)	71 (18%)	107 (13%)	0.034
Posterior column (n = 27)	13 (3%)	14 (2%)	0.091
Transverse (n = 44)	16 (4%)	28 (3%)	0.629
Associated fracture type (n = 849)	274 (68%)	575 (70%)	0.410
Posterior column, posterior wall (n = 39)	13 (3%)	26 (3%)	0.964
Transverse, posterior wall (n = 206)	63 (16%)	143 (18%)	0.417
T-shaped (n = 152)	56 (14%)	96 (12%)	0.282
Anterior column, posterior hemitransverse (n = 111)	35 (9%)	76 (9%)	0.729
Both columns (n = 341)	107 (27%)	234 (29%)	0.451
Initial displacement ≥20 mm (n = 316)	90 (22%)	226 (28%)	0.046
Treatment delayed ≥21 d (n = 116)	30 (7%)	86 (11%)	0.085
Previous surgery (n = 9)	4 (1%)	5 (1%)	0.463
Nonanatomical reduction (n = 262)	66 (16%)	200 (25%)	0.002
Incongruence of acetabular roof (n = 96)	20 (5%)	76 (9%)	0.008
Femoral head cartilage lesion (n = 277)	87 (22%)	190 (23%)	0.520
Involvement of posterior wall (n = 485)	169 (42%)	316 (39%)	0.266
Acetabular impaction (n = 256)	93 (23%)	163 (20%)	0.203

*Values in this row are given as the mean and the standard deviation, with the range in parentheses.

TABLE E-5 Secular Trends Over the Treatment Period from 1981 to 2006*

Parameter	Interpretation	Simple Linear Regression Equation	R^2
Male sex	Decreasing	$y = -0.0026x + 5.7825$	0.0436
Age >60 yr	Increasing	$y = 0.0102x - 20.011$	0.4627
Additional pelvic fracture	Decreasing	$y = -0.0008x + 1.7337$	0.017
Initial displacement ≥20 mm	Increasing	$y = 0.002x - 3.7668$	0.0231
Acetabular marginal impaction	Increasing	$y = 0.0014x - 2.6048$	0.0167
Free intra-articular fragments	Decreasing	$y = -0.0013x + 2.8644$	0.0237
Anterior dislocation	Constant	$y = -10^{-5}x + 0.1844$	0.0014
Posterior dislocation	Decreasing	$y = -0.0053x + 10.876$	0.1925
Femoral head cartilage lesion	Increasing	$y = 0.0037x - 7.1142$	0.0768
Involvement of posterior wall	Increasing	$y = 0.0059x - 11.417$	0.2928
Treatment delayed ≥21 d	Decreasing	$y = -0.0034x + 6.8889$	0.2186
Simple fracture pattern	Increasing	$y = 0.0093x - 18.144$	0.4056
Anterior wall	Decreasing	$y = -0.0003x + 0.6404$	0.007
Anterior column	Increasing	$y = 0.0028x - 5.4067$	0.1679
Posterior wall	Increasing	$y = 0.0086x - 16.946$	0.6017
Posterior column	Decreasing	$y = -0.0021x + 4.1945$	0.3196
Transverse	Constant	$y = -0.0003x + 0.5686$	0.0021
Associated fracture pattern	Decreasing	$y = -0.0095x + 19.742$	0.4247
Posterior column, posterior wall	Constant	$y = 0.0005x - 0.8378$	0.0081
Transverse, posterior wall	Decreasing	$y = -0.0033x + 6.8807$	0.0913
T-shaped	Decreasing	$y = -0.0039x + 7.956$	0.232
Anterior column, posterior hemitransverse	Increasing	$y = 0.0027x - 5.2599$	0.1627
Both columns	Decreasing	$y = -0.006x + 12.199$	0.2922

*The equation reflects the result of the simple linear regression analysis. R^2 reflects the corresponding coefficient of determination.