Bone & Joint Open

Supplementary Material

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Table i. Univariate analysis.

Variable	p-value	HR	95% CI for HR
Baseline patient epidemiology			
Age	0.003	1.058	1.019 to 1.099
Residence at nursing home	0.050	1.535	1.000 to 2.358
No walking outdoors without external aids	0.000	4.464	2.297 to 8.676
Cognitive impairment (Pfeiffer´s SPMSQ)	0.001	1.159	1.058 to 1.269
CFS	0.000	1.520	1.241 to 1.862
ASA grade	0.000	2.480	1.604 to 3.835
CCI (age-adjusted)	0.000	1.233	1.120 to 1.357
Acenocumarol or NOAC or PAA	0.004	1.816	1.208 to 2.731
Haemoglobin, g/dl	0.000	0.712	0.619 to 0.820
Fracture characteristics			
Segment: distal epiphysis	0.007	3.279	1.378 to 7.801
Type C	0.075	1.768	0.945 to 3.309
Subtype (nail proximal vs plate distal)	0.017	3.006	1.214 to 7.445
Subtype (nail proximal vs nail distal)	0.039	2.073	1.036 to 4.147
FPIF around a plate	0.007	0.407	0.211 to 0.784
Management			
Surgical treatment	0.000	0.150	0.084 to 0.270
Removal of previous implant	0.054	0.619	0.381 to 1.008
Fixation (vs arthroplasty)	0.056	0.377	0.139 to 1.027
Experienced Surgeon (> 20 cases/year)	0.034	0.116	0.016 to 0.847
Geriatrician not involved	0.025	5.186	1.226 to 21.942
Out of bed > 48 hrs	0.000	4.949	2.493 to 9.825
Weightbearing restriction	0.027	1.772	1.068 to 2.939
Discharge to healthcare facility	0.015	6.442	1.442 to 28.783
No osteoporosis treatment at discharge	0.002	2.190	1.337 to 3.586
Follow-up			
No in-hospital medical complications	0.000	0.098	0.039 to 0.248
Medical complications 1 mth	0.000	0.112	0.074 to 0.169
No surgical complications 1 mth	0.000	0.030	0.015 to 0.058
Weightbearing restriction 1 mth	0.038	3.025	1.066 to 8.588
Antiresorptive treatment 1 mth	0.001	0.269	0.125 to 0.582
Calcium + vit. D treatment 1 mth	0.000	0.300	0.182 to 0.496
No surgical complications 6 mths	0.000	0.201	0.132 to 0.308
Antiresorptive treatment 6 mths	0.005	0.037	0.004 to 0.379
Calcium + vit. D treatment 6 mths	0.000	0.030	0.004 to 0.201
Medical complications 6 mths	0.000	3.093	1.780 to 5.375

ASA, American Society of Anesthesiologists; CCI, Charlson Comorbidity Index; CFS, Clinical Frailty Scale; FPIF, femoral peri-implant fracture; HR, hazard ratio; NOAC, new oral anticoagulant; PAA, platelet antiaggregant; Pfeiffer's SPMSQ, Pfeiffer's Short Portable Mental Status Questionnaire.

Data collected from patients presenting with a peri-implant fracture

BLOCK 1. Epidemiology, health status, and in-hospital management variables:

1.1 Date of birth

1.2 Gender

1.3 Pre-fracture place of residence: own home, nursing facility, acute hospital, N/A

1.4 Pre-fracture mobility: (FFN-MCD scale)

1 completely independent gait

2 outdoors independent gait with 1 technical aid

3 outdoors independent gait with 2 technical aids

4 only indoors independent gait w or w/o aids

5 no mobility at all or with the help of 2 other people

6 N/A

1.5 Mental assessment: Pfeiffer´s SPMSQ Pfeiffer´s Short Portable Mental Status Questionnaire. Number of mistakes

1.6 Clinical Frailty Scale (CFS) (2 weeks pre-fracture).

1.7 ASA: I, II, III, IV, V, N/A

1.8 Charlson comorbidity index (CCI): Individualized organ/system punctuations are registered

1.9 Type of fracture: Periprosthetic, Peri-implant

If the bone hosts one prosthesis and one fixation device, choose the type of fracture that most influences on the treatment.

1.10 Are there more implants in the same bone? No, Prosthesis, Nail, Plate, Isolated screw.

1.11 Total number of fractures supported in the injured bone (including the actual fracture)?

1.12 Osteoprotective treatment: Anti-resorptive, Bone-forming, Calcium, Vitamin D, none.

1.13 Antiaggregant or anticoagulant medication:

1 NO,

2 Acenocumarol, NOAC, PAA (Clopidogrel / Ticlo / AAS 300) NOAC: New Oral Anti-Coagulant, PAA: Platelet Anti-Aggregant

3 Double

1.14 Date of Fracture

1.15 Date and time the patient is admitted in emergency

1.16 Does the patient receive surgical treatment? Yes or No

Date and time of surgical treatment

1.17 Haemoglobin level (g/dL): At admission and 1st day post-op

1.18 Medical Complications during hospital stay: (which may need treatment)

Cardiac, respiratory, Pulmonary thromboembolism, Urinary infection, Renal, Brain, delirium, Gastro-intestinal, in-hospital fractures, None

(Multiple answers are possible except none)

1.19 Co-management with other specialties: (apart from traumatology and anaesthesia): Geriatrics, Internal Medicine, other specialties, Geriatrics and Other specialties, None

1.20 ¿Did the patient sit down during the first day post-op? If the patient was managed non-surgically, did the patient sit the day after the decision? Yes or No

1.21 Was full weight bearing allowed?

No restrictions or with external aids in elderly patients

Only for transferences

Complete restriction (wheelchair in elderly patients or two crutches in young patients)

1.22 Was the patient walking at hospital discharge? Yes or No (either with or without weight bearing restrictions)

1.23 In-hospital Mortality: Alive, dies before surgical treatment, dies in the operation room, dies post-operatively

1.24 Hospital discharge: Date and Time

1.25 Destination at hospital discharge:

Own home

Healthcare institution

Acute hospital

N/A

1.26 Osteoprotective treatment at hospital discharge: Anti-resorptive, Bone-forming, Calcium, Vitamin D, none. (Multiple answers are possible except none)

BLOCK 2. DIAGNOSIS variables

2A Periprosthetic fractures diagnosis

2B Peri-Implant fractures diagnosis

2B.1 Adaptation of the Broggi Classification:

2B.1.1 Bone:

Humerus Scapula Forearm Pelvis Femur Tibia Patella

2B.1.2 Segment:

A (Proximal Epiphysis/metaphyisis) B (Diaphysis) C (Distal Epiphysis/metaphyisis)

2B.1.3 Type:

A: At the Tip of the Implant and in the proximal or distal epiphysis/metaphysis

B: At the Tip of the Implant and in the Diaphysis, usually a transverse or short oblique fracture

C: Distant to the implant and in the Diaphysis, usually a spiral or long oblique fracture

D: Metaphyseal fracture after screws

E: Fracture through a well implanted implant

I: Inter-implant PIF, fracture between two implants (one can be a prosthesis)

2B.1.4 Sub-type:

NP (Nail Proximal) ND (Nail Distal) PP (Plate Proximal)

PD (Plate Distal) SP (Screw Proximal) SD (Screw Distal)

EN (Type E through nail) EP (Type E through plate)

ES (Type E through screw)

2B.2 Date of the primary fixation

2B.3 Was the primary fracture healed? Yes or No
2B.4 Previous Infection? Yes or No
2B.5 Were there signs of osteolysis or loosening previously? Yes or No
2B.6 Was the implant displaced with the fracture? Yes or No
2B.7 Does the bone host a hip arthroplasty? No Yes, stem prosthesis Yes, stemless prosthesis

2B.8 Does the bone host a knee arthroplasty? No Yes, stem prosthesis Yes, stemless prosthesis

BLOCK 3. TREATMENT variables

3A Periprosthetic Fracture Treatment

3B Peri-Implant Fracture Treatment

3B.1 Approach: Percutaneous MIS-Hypo-invasive Open

(Percutaneous: as for a small incision for a nail; Hypo-invasive: several incisions of the minimum size needed)

3B.2 Was a cerclage used as a reduction tool? Yes or No

3B.3 Was the primary implant removed? Yes or No

3B.4 Was a prosthesis part of the treatment? Yes or No

3B.5 Was fixation the treatment option? No Yes, 1 Plate Yes, 2 Plates Yes, Nail

Yes, definitive external fixator Yes, cerclage Yes, isolated screws (Multiple answers option)

3B.6 Is there overlapping between implants? And length in millimetres

Overlap + Kissing 0 Gap – ___ mm

3B.7 Interlocking? Yes or No

3B.8 Was bone graft used? No Yes, Strut Yes, cancellous/reaming product

3B.9 Surgeon experience? >20 arthroplasty revisions in the last 12 months >20 MIPO surgeries in the last 12 months None of the previous (multiple answers are possible except none)

3B.10 Anaesthesia? General Neuro-axial Regional Different form previous

BLOCK 4. 30 DAYS FOLLOW-UP (from surgical treatment or from diagnosis if non-surgical treatment)

4A.1 Alive at 30 days follow-up? Yes or no

4A.1.2 Date of death

4A.2 Is weight bearing allowed?

No restrictions or with external aids in the elderly

Only for transferences

Weight bearing is forbidden (wheelchair in the elderly or crutches in young patients)

4A.3 Mobility at 30 days follow up: (FFN-MCD scale)

1 completely independent gait

2 outdoors independent gait with 1 technical aid

3 outdoors independent gait with 2 technical aids

4 only indoors independent gait w or w/o aids

5 no mobility at all or with the help of 2 other people

6 N/A

4A.4 Any medical complication needing hospital admission within 30 days post-op?

☐NO ☐Heart ☐Respiratory ☐Pulmonary thromboembolism ☐Renal ☐Cerebral ☐Gastro-intestinal ☐Any other

(Multiple answers are possible except none)

4A.5 Surgical complications at 30 days follow up:

☐NO ☐Fracture in the same bone ☐Fixation failure ☐Dislocation

☐Loosen prosthesis ☐Infection (Multiple answers are possible except none)

4A.6 Place of residence at 30 days follow up: own home, nursing facility, acute hospital, N/A

4A.7 Osteoprotective treatment at 30 days follow up: Anti-resorptive, Bone-forming, Calcium, Vitamin D, none. (Multiple answers are possible except none)

BLOCK 5. 6 MONTHS FOLLOW-UP (from surgical treatment or from diagnosis if non-surgical treatment)

5A.1 Alive at 6 months follow-up? Yes or no

5A.1.2 Date of death

5A.2 Quality of Life questionnaire EQ5D:

5A.2.1 Mobility:

5A.2.2 Personal care:

5A.2.3 Household chores:

5A.2.4 Pain/ discomfort:

5A.2.5 Anxiety/Depression:

5A.3 Mobility at 6 months follow up: (FFN-MCD scale)

1 completely independent gait

2 outdoors independent gait with 1 technical aid

3 outdoors independent gait with 2 technical aids

4 only indoors independent gait w or w/o aids

5 no mobility at all or with the help of 2 other people

6 N/A

5A.4 Clinical Frailty Scale (CFS)

5A. Any medical complication needing hospital admission within 6 months post-op?

☐NO ☐Heart ☐Respiratory ☐Pulmonary thromboembolism ☐Renal ☐Cerebral ☐Gastro-intestinal ☐Any other

(Multiple answers are possible except none)

5A.6 Surgical complications at 30 days follow up:

☐NO ☐Fracture in the same bone ☐Fixation failure ☐Dislocation

☐Loosen prosthesis ☐Infection (Multiple answers are possible except none)

5A.7 Is the fracture healed? Yes No Non-applicable (treated with a prosthesis)

5A.8 Place of residence at 6 months follow up: own home, nursing facility, acute hospital, N/A

5A.9 Osteoprotective treatment at 30 days follow up: Anti-resorptive, Bone-forming, Calcium, Vitamin D, none. (Multiple answers are possible except none)

BLOCK 6. 12 MONTHS FOLLOW-UP (from surgical treatment or from diagnosis if non-surgical treatment)

6A.1 Alive at 12 months follow-up? Yes or no

6A.1.2 Date of death

6A.2 Quality of Life questionnaire EQ5D:

6A.2.1 Mobility:

6A.2.2 Personal care:

6A.2.3 Household chores:

6A.2.4 Pain/ discomfort:

6A.2.5 Anxiety/Depression

6A.3 Mental assessment: Pfeiffer´s SPMSQ Pfeiffer´s Short Portable Mental Status Questionnaire. Number of mistakes

6A.4 Mobility at 12 months follow up: (FFN-MCD scale)

1 completely independent gait

2 outdoors independent gait with 1 technical aid

3 outdoors independent gait with 2 technical aids

4 only indoors independent gait w or w/o aids

5 no mobility at all or with the help of 2 other people

6 N/A

6A.5 Clinical Frailty Scale (CFS)

6A.6 Any medical complication needing hospital admission within 6 months post-op?

☐NO ☐Heart ☐Respiratory ☐Pulmonary thromboembolism ☐Renal ☐Cerebral ☐Gastro-intestinal ☐Any other

(Multiple answers are possible except none)

6A.7 Surgical complications at 30 days follow up:

☐NO ☐Fracture in the same bone ☐Fixation failure ☐Dislocation

☐Loosen prosthesis ☐Infection (Multiple answers are possible except none)

6A.8 Is the fracture healed? Yes No Non-applicable (treated with a prosthesis)

6A.9 Place of residence at 12 months follow up: own home, nursing facility, acute hospital, N/A

6A.10 Osteoprotective treatment at 12 months follow up: Anti-resorptive, Bone-forming, Calcium, Vitamin D, none. (Multiple answers are possible except none)

ASA, American Society of Anesthesiologists; CFS: clinical frailty scale; Hb, haemoglobin; N/A, not available, NOAC, new oral anticoagulant; PAA, platelet anti-aggregant.