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Supplementary Document 1

Definitions and Assessment Criteria for Secondary Outcomes:

- **Harris Hip Score (HHS)**

The HHS is a clinician-completed instrument used to evaluate hip surgery outcomes. This scale assesses hip disabilities and return to the physical function. It includes various dimensions such as pain, physical activities (e.g., putting on shoes, difficulty with stairs, sitting, and using public transportation), function (e.g., the use of walking support, limping, and distance walked), deformity (e.g., observing hip flexion, adduction, internal rotation, and extremity length discrepancy), and hip range of motion. Scores range from 0 to 100, with higher scores indicating better physical status (1).

- **Short Musculoskeletal Function Assessment (SMFA)**

The SMFA questionnaire is widely used for assessing orthopedic trauma patients. It has two main sections: the Dysfunction Index (34 items) and the Bother Index (12 items). The Dysfunction Index records participants' functional limitations, while the Bother Index measures the extent to which these limitations are bothersome. The SMFA can also be divided into four subscales: upper extremity dysfunction, lower extremity dysfunction, problems with daily activities, and mental-emotional problems. Each item is scored on a 5-point Likert-type scale. Total scores are calculated and converted into a final score ranging from 0 to 100, with lower scores indicating higher function (2, 3).

- **Delayed Union and Nonunion**

Delayed union is defined as the absence of a bony bridge six months post-injury, while nonunion is characterized by the failure of bone fragments to unite within nine months, with no healing observed in the last three months. Radiographic examinations and physical signs such as local pain and tenderness were used to assess both conditions (4, 5).

- **Fixation Failure**

Fixation failure was defined as the loss of fracture reduction, lag screw cutout, implant breakage at the blade-nail junction, or re-displacement of the fracture within the first three months, assessed through radiographic examinations (6).

- **Unplanned Reoperation**

Reoperation was required for failed or complicated hip fixation due to infection, re-fracture, or implant failure. The revision procedure could involve the exchange or removal of the original implant or conversion to arthroplasty (7, 8).

- **Wound Complications**

Wound complications were evaluated using the Southampton Wound Grading System, a recommended screening tool that assesses factors such as bruising, erythema, hemoserous drainage, pus, deep or severe wound infection, tissue breakdown, and hematoma. Wounds were categorized into four grades: A) normal healing, B) minor complications, C) wound infection, and D) major hematoma (9).

- **Surgical Site Infections (SSI)**

SSI was classified as either superficial or deep. Superficial SSIs affected the skin and subcutaneous tissue within 30 days, while deep SSIs involved fascial and muscular layers within 90 days (10).

- **Pressure Ulcers**

Pressure ulcers were defined as localized injuries to the skin and/or underlying tissue, typically on the buttocks, heels, sacrum, and coccyx, caused by reduced blood supply following hip surgery (11).

- **Pulmonary Infections**

The diagnosis of pulmonary infections implied on evaluating respiratory symptoms and clinical findings. Key symptoms include cough, phlegm, shortness of breath, chest pain, fever (temperature above 38°C), and tachycardia (above 100 per minute). A chest X-ray confirms pulmonary infections when patchy infiltrates or interstitial changes are observed (12, 13).

- **Urinary Tract Infections (UTIs)**

UTIs were diagnosed by evaluating clinical symptoms, urinalysis, and urine culture. Symptoms include burning during urination, frequent urination in small amounts, cloudy or strong-smelling urine, hematuria, and suprapubic pain. If clinical symptoms were present, urine testing was performed, including analysis for white blood cells, red blood cells, bacteria, and nitrites. If an infection was indicated, a urine culture was conducted to identify the specific pathogen (14).

- **Deep Vein Thrombosis (DVT)**

DVT was characterized by the formation of a thrombus in the deep veins of the lower extremities. Diagnosis relied on the assessment of clinical symptoms and venous ultrasound techniques. Typical symptoms include discomfort, swelling, difficulty ambulating, edema, tenderness, and skin discoloration in the affected extremity. Color Doppler ultrasound was employed to evaluate the deep veins of the symptomatic leg at the popliteal and inguinal levels (15, 16).

- **Malnutrition**

Malnutrition was assessed using the Global Leadership Initiative on Malnutrition (GLIM) criteria, which required at least one phenotype and one etiologic criterion. Phenotype criteria include non-volitional weight loss, low BMI, and reduced muscle mass. Etiologic criteria include reduced food intake and disease-related inflammation. Intertrochanteric femur fracture was considered an etiologic criterion due to its impact on inducing an inflammatory response. Weight and BMI were documented from medical records. In the absence of advanced imaging techniques (e.g., DXA, BIA, and CT scans), muscle mass was assessed through mid-arm muscle circumference (MAMC) derived from mid-arm circumference and triceps skinfold thickness measurements (17).

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Supplementary Table 1. Results of *group-by-time interactions*, derived from GEE for RUSH, HHS, and SMFA over 3 months.

Variables	β	SE	Lower	Upper	p-value
RUSH	0.88	0.25	0.37	1.4	0.001
HHS	1.2	0.27	0.72	1.8	<0.001
SMFA					
Dysfunction index	-1.2	0.16	-2.1	-1.5	<0.001
Bother index	-2.4	0.12	-2.7	-2.2	<0.001

GEE, Generalized Estimating Equation; RUSH, Radiographic Union Score for Hip; HHS, Harris Hip Score; SMFA, Short Musculoskeletal Function Assessment.