INTRODUCTION
The union rate of the subtalar arthrodesis would be influenced by surgical or technical fixation factors such as the anatomical conditions, the pathologic factors, the surgical choices, and the fixation configuration factors. Optimal fixation configurations would improve the initial stability of the subtalar arthrodesis, and then will consequently induce the higher union rate postoperatively. Even though a double screw fixation, compared to a single screw fixation, has known to bring the initial stability of the subtalar arthrodesis, and then will consequently induce the higher union rate postoperatively. Even though a double screw fixation, compared to a single screw fixation, has known to bring the higher union rate postoperatively. Even though a double screw fixation, compared to a single screw fixation, has known to bring the higher union rate postoperatively. Even though a double screw fixation, compared to a single screw fixation, has known to bring the higher union rate postoperatively. Even though a double screw fixation, compared to a single screw fixation, has known to bring the higher union rate postoperatively.

MATERIALS and METHODS

Material
From the CT scanned images of an ankle of a Korean male (21 year old), polygon models of the talus and calcaneus were reconstructed. The polygon models were converted to tetrahedron finite. The slice thickness of the CT images was 0.75 mm and the field of view was 200 mm x 200 mm with resolution of 512 x 512 pixels.

Fixation configuration
Four fixation configuration models of double screw subtalar arthrodesis were designed according to the placement of a dome screw, i.e. anterolateral (AL), anteromedial (AM), posterolateral (PL), and posteromedial (PM) while the placement of a neck screw is fixed.

Finite element analysis
Talocalcaneal finite element models for analysis were made with 4-node tetrahedron elements, using Mimics 11 (Materialise Group, Leuven, Belgium) and Patran 2005 (MSC Software Co., CA, USA). Maximum and minimum edge lengths of tetrahedron elements were set to 2.0 mm and 0.1 mm, respectively. The maximum mesh size of 2.0 mm was chosen based on the result of checking soundness of the finite element mesh converssance.

Young’s modulus for the talocalcaneal model was calculated as 0.01-30.05 GPa. Young’s modulus was grouped into 30 sets to each of which 0.1 – 29.01 MPa was assigned with increment of 1 MPa. Even though Poisson’s ratio of bone varies in the range of 0.30-0.56 depending on direction and microstructure, current study used a constant Poisson’s ratio of 0.4 independently on bone’s microstructure.

Translational dislocation
Translational dislocation, as a stability evaluator, represents the linear movement of the calcaneus with respect to the talus. It is calculated as the translation of that monitored node (P) that located posterior facet of the calcaneus (Fig 2), i.e. the translational change arisen during each analysis step.

Rotational dislocation
Rotational dislocation, as another stability evaluator, represents the resultant angular movement of the calcaneus with respect to the talus. It is calculated as the angular rotation of the P-C line about the superior-inferior axis (i.e., the rotation axis in Fig 2), i.e. the angular rotation occurred during each analysis step. The point C is the normal projection of the point P onto the superior-inferior axis.

RESULTS

Translational dislocation
Subjected to screw pulling force of 100N, translational dislocations of calcaneus were in the range of 0.87-1.41 mm. “Neck screw+Dome PL screw” showed the least translational dislocations which were 0.91 mm and 0.85 mm under the external and internal torques, respectively. “Neck screw+Dome AM screw” moved the most, 1.45 mm and 1.36 mm under the external and internal torques, respectively.

Rotational dislocation
The rotational dislocation of “Neck screw+Dome PL screw” model was 5.55° and 5.47° due to external and internal torques, respectively. And, “Neck screw+Dome AM screw” rotated 6.47° and 6.43° due to external and internal torques, respectively, which were considerably larger than those of other models.

CONCLUSIONS
The best double screw configuration for the subtalar arthrodesis was revealed as the combination of a talar neck screw and a posteromedial dome screw. In contrast, the combination of a talar neck screw and an anterolateral dome screw should be avoided if possible. The divergence angle and contact area are considered as important operation factors in determination of the best double screw configuration for subtalar arthrodesis (This data are not provided here.).

REFERENCE