Cotton and Evans Allograft Wedges

Optimized Strength and Texturing for Deformity Correction

A study demonstrating the benefits of engineered contiguous etched lines on SymALIGN Evans and Cotton osteotomy wedges.
This study compared the forces needed to displace Evans osteotomy wedges with four different surface textures from a cancellous bone substitute test site. The surface textures consisted of a no-textured control, a three-groove pattern, a Z-pattern, a contiguous groove pattern. Non-textured Evans wedges served as control samples, while experimental grafts were created with computer numeric control programs for the geometry and surface texture noted in each of the four groups (Figure 1).

The graft size tested was chosen because it has the highest degree of slope, which represents the minimum condition for static friction among the product line.

All samples were processed using LifeNet Health’s patented Allowash XG® sterilization and Preservon® preservation technologies.

### Preparation

This study compared the forces needed to displace Evans osteotomy wedges with four different surface textures from a cancellous bone substitute test site. The surface textures consisted of a no-textured control, a three-groove pattern, a Z-pattern, and a contiguous groove pattern. Non-textured Evans wedges served as control samples, while experimental grafts were created with computer numeric control programs for the geometry and surface texture noted in each of the four groups (Figure 1).

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### Test Methods

- Instron mechanical tester with a 5000 Newton load cell.
- A calibrated air pressure regulator applied a preload of 27N to achieve sensitivity to the frictional forces. A load was applied tangential to the specimen/jaw interface by the mechanical tester at a rate of 0.4 mm per second (Figure 2). The test terminated after the specimen had been displaced 3 mm. Peak force was recorded for each test.

### Results

#### Resists Migration

Almost 133N more force was needed to move the wedge with contiguous lines (Type 4) compared to the non-textured control wedge (Type 1). See Figure 3.

#### Increases Friction

Results show that despite the grafts being the same size, increasing the surface area from 260 mm² on the non-textured control to 564 mm² on Type 4 increased the force needed for displacement by nearly 50 percent (Figure 4).

#### Biomechanical Strength

Tissue is sourced from the femoral head and condyles, talus and calcaneus – areas where trabecular structure matches those of cancellous implant sites. Results show that SymAlign wedges have the biomechanical strength necessary to support Evans and Cotton osteotomies with average yield loads of 1726N and 1964N.

#### Increases Surface Area

Although these grafts are the same size, the increase in surface area created by the grooves on Type 4 increase friction between the graft and the Sawbones cancellous bone substitute, which increases the force required to displace the graft.

### Study Conclusions

The biomechanical properties, engineered design, and convenient ready-to-use features make LifeNet Health’s Evans and Cotton osteotomy wedges an excellent option for treating Pes Planus deformities.
### Implant Size Offerings

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### References