

Evaluation of the Stripping Torque  
and Pull-out Strength of the  
PERI-LOC VLP Osteopenia Bone Screw\*

## Introduction

Conventional cancellous screws have proven purchase in healthy bone, but may be prone to loosening in osteoporotic bone. Locking screws have become a popular choice to combat loosening. A new screw design has optimized thread form to gain better purchase into poor quality bone. The purpose of this study was to evaluate the maximum stripping torque and pull-out strength of the PERI-LOC<sup>®</sup> VLP 5.0mm Osteopenia Bone Screw using an osteopenic sawbones (10pcf foam) model.

## Methods

### Stripping Torque

PERI-LOC VLP 5.0mm Osteopenia Bone Screws were inserted through a One-Third Tubular VLP into a pre-drilled pilot hole to a depth of 20mm. Rotational loading was applied manually using a hex driver until torque reached a peak value. The maximum torque value due to screw head contact with the plate was measured using a torque meter and denoted as the stripping torque. This same procedure was used for TC-100<sup>®</sup> 4.0mm Cancellous Bone Screws, which were inserted through a TC-100 Standard Tubular Plate.

### Pull-Out Strength

PERI-LOC VLP 5.0mm Osteopenia Bone Screws were inserted to a depth of 20mm into an osteopenic model. Axial pull-out was then conducted on a MTS testing frame by applying a tensile load along its longitudinal axis at a rate of 0.2 in/min. The maximum pull-out force was recorded. This same procedure was used for TC-100 4.0mm Cancellous Bone Screws. The test set-up is shown in Figure 1.



Figure 1a

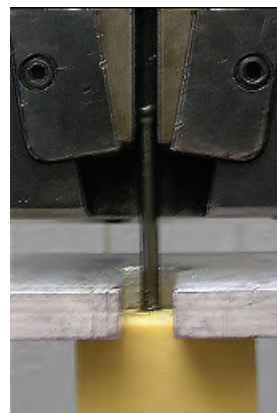


Figure 1b

**Figure 1** Experimental test set-up depicting stripping torque [Figure 1a] and pull-out testing [Figure 1b].

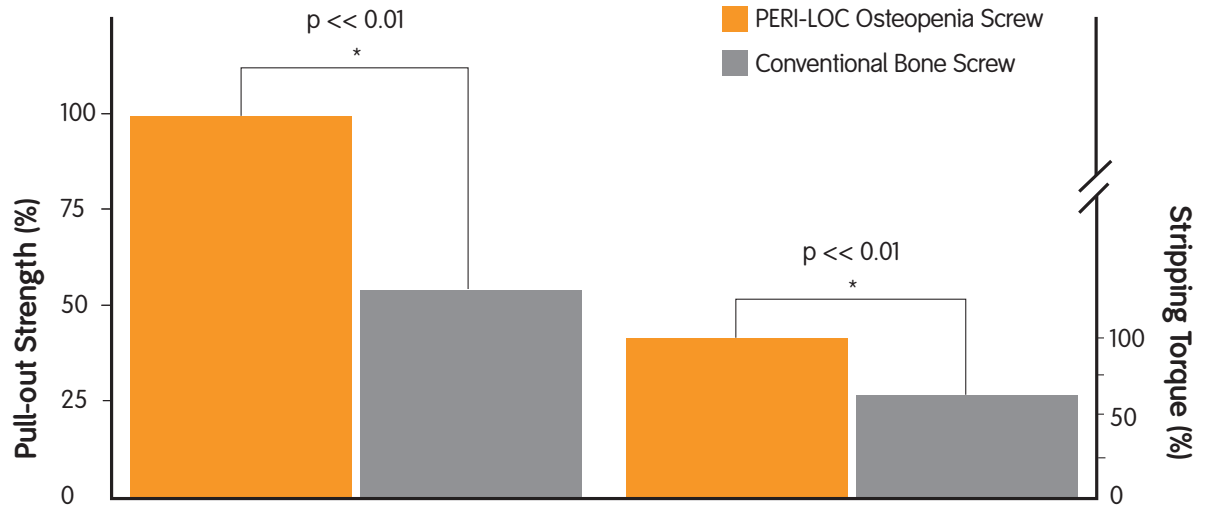


Figure 2 Test results

### Results

The PERI-LOC<sup>®</sup> VLP 5.0mm Osteopenia Bone Screws showed a 34% increase in stripping torque and a 40% increase in pull-out strength ( $p \ll 0.01$  at  $\alpha = 0.05$  in both instances) as compared to clinically successful bone screws [Figure 2].

### Conclusions

When tested in an osteopenic bone model, the PERI-LOC VLP 5.0mm Osteopenia Bone Screw provided superior stripping torque and pull-out strength as compared to 4.0mm cancellous bone screws. The increased torque generation during insertion of PERI-LOC VLP 5.0mm Osteopenia Bone Screws provides better fracture reduction, as compared to conventional screws. These findings indicate that the use of the improved thread design is advantageous in poor quality bone.



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