WOUNDED WARRIORS AND STANCE CONTROL ORTHOSES
APPLICATION IN TWO CASES FROM AFGHANISTAN
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INTRODUCTION
Operation Enduring Freedom – Afghanistan (OEF-A) has been the longest running combat operation in the history of the United States. There have been 18,590 casualties since the inception of the war on October 7, 2001. The military defines casualties as anyone who is lost to military duties, which includes fatalities, missing in action and wounded. The number of wounded from the OEF-A conflict is 16,687.

 improvised Explosive Devices (IED) have produced the majority of injuries unlike any previous war except the occupation of Iraq. The wounds from these high velocity blasts result in multiple injuries. Polytrauma is the term used when two or more severe injuries occur in different parts of the body. In the two cases presented, one was the result of polytrauma and one was the result of a gunshot wound. The polytrauma case involved an Army MP on patrol in a Humvee, which ran over an IED. The second case involved a Marine who was in a field action when he sustained the pelvic gunshot wound.

METHOD
The two cases were both classified as ambulatory acute with less than 18 months since injury and offered the prognosis of continued lower extremity neuromuscular rehabilitation. Each case assessment included a detailed history, lower limb manual muscle and ROM testing as well as a physical trial with an immediate fit stance control orthosis (IF-SCO). The minimum physical capacity that must be demonstrated by the patient to be accepted for an IF-SCO evaluation is stance phase hip stability on the affected side. A patient may present with generalized hip strength of less than 3/5, but must demonstrate hip stability through co-contraction as the compensation strategy.

The primary biomechanical purpose of a SCO (stance control orthosis) is improved gait kinematics through the provision of knee and ankle/foot orthotic control. The physical limitation to clinical success of a SCO often hinges on residual hip stability. In the rehab setting it is rare for a patient to demonstrate isolated knee instability through a quadriceps muscle deficit. The typical clinical presentation includes various levels of instability in all of the lower extremity joints as was evident in these two cases.

Case #1: The soldier was an in-patient at a VA polytrauma center. The PT department requested an IF-SCO evaluation as a means to upgrade from a static drop lock KAFO. The soldier satisfied the IF-SCO physical trial, and was subsequently provided a custom SCO. The custom SCO incorporated a pneumatic spring to biomimic quadriceps function in swing phase. This feature is often utilized when hip flexor strength is less than 3/5. The spring overcomes the lack of muscular control to improve the swing phase dynamics of the lower limb. The soldier also utilized a contralateral lateral ACL style knee orthosis due to the bilateral polytrauma to the lower extremities, which also included arachnoiditis of the cauda equina.

Case #2: The Marine presented a lumbar radiculopathy not unlike a femoral mononeuropathy with trace lower limb pathology as well. The Marine was fitted with two SCOs to offer back up duplication for continuous duty. One of SCOs was a new four bar knee joint design while the other orthosis incorporated an internal locking pendulum in the knee joint.

RESULTS
The IF-SCO physical trial in both cases demonstrated improved gait kinematics to coincide with the continuing acute locomotive therapy to capitalize on the propensity of neuroplasticity recovery. Patients were able to establish hip stability in stance phase through the use of hip muscular co-contraction. Each case was subsequently provided a custom SCO. The soldier that had pathohabituated in the short term to the static KAFO with hip hiking and circumduction to gain toe clearance in swing phase quickly reduced that compensation strategy with gait training in the IF-SCO to meet the physical therapy team goals of normalized gait kinematics.

DISCUSSION
In both cases, the lack of chronic comorbidities from other debilitating conditions improved the adaptation to a SCO. The only physical deficits present were attributed to war wounds and not long-term chronic conditions. Both patients, being of military duty age and physical conditioning prior to their injuries presented as excellent SCO candidates and realized the benefit of improved gait kinematics offered by an SCO in therapy.

CONCLUSION
The use of an IF-SCO in the two cases of war wounds proved to be an effective means of establishing mobility during the acute locomotive rehabilitation. Long-term habituation of incorrect gait kinematics through the use of a static KAFO was avoided.

REFERENCES
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