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LIBRA™ AND *e*LIBRA™ FLEXION-GAP AND LIGAMENT BALANCING MADE EASY, ACCURATE, AND REPEATABLE

A New Standard of Care

Several factors influence successful and prolonged results in primary knee replacement surgery. It is well known in reconstructive orthopedics that flexion-gap symmetry developed by femoral implant rotation and ligament balancing are vital elements in achieving acceptable postoperative stability. Even with today's advanced standards of total knee arthroplasty (TKA), surgeons are finding that if not balanced appropriately, not only will the knee not function correctly, there is a risk of the tibial insert dislocating or impinging upon the surrounding soft tissue. Results from one recent study revealed that in 2006 the most frequent cause for revision knee replacement surgery within five years after the primary procedure was symptomatic instability.[1,2,3]

While the anatomy of each patient differs slightly, the condition of each patient's soft-tissue envelope can differ greatly. Difficult deformities often present ligament contracture on the deformed side, and ligament laxity contra. The importance of achieving stability through ligament balancing cannot be overemphasized[2] and a surgeon needs every intra-operative option in his armamentarium to surgically address each specific paradigm. The **LIBRA™ Dynamic Knee Balancer** and the ***e*LIBRA™ Soft-tissue Force Sensing System by Synvasive Technology, Inc.** (El Dorado Hills, CA), afford surgeons the premiere intra-operative option to easily and accurately achieve optimal flexion-gap and ligament balance along with proper patellar tracking. The result is a dynamically balanced knee reconstruction that minimizes indifferent results, and improves patient satisfaction.[4] According to Stefan Kreuzer, MD, of Memorial Bone & Joint (Houston, TX), "the LIBRA and *e*LIBRA will help change the standard of care in TKA."

The LIBRA, along with the eLIBRA *soft-tissue force sensor, allows patient-specific, dynamic balancing with digital confirmation of medial-lateral forces in the flexion space—all prior to performing the A/P bone resection.*

Current techniques rely on anatomic landmarks such as the transepicondylar axis, the A/P axis (Whiteside's line), and the posterior condylar axis to establish rotational alignment of the femoral implant to develop flexion gap symmetry. These empirical landmarks provide reference points, but are known to produce inconsistencies. One study by Drs. Olcott and Scott demonstrated anatomical landmarks cannot be fully relied upon to achieve flexion-gap symmetry, with errors of greater than 3 degrees of asymmetry reported between 10% and 50% of the time.[5] A second study also demonstrated that computer navigation techniques based on digitizing empirical anatomical landmarks are no more accurate than manual methods in achieving flexion-gap symmetry.[6] The LIBRA, along with the *e*LIBRA soft-tissue force sensor, allows patient-specific, dynamic balancing with digital confirmation of medial-lateral forces in the flexion space—all prior to performing the A/P bone resection.

Russell T. Nevins, MD, of the Nevada Orthopedic & Spine Center (Las Vegas, NV), finds one of the biggest challenges faced by surgeons is the subtle levels of instability that can be missed when doing primary joints. "The best way to guarantee a successful outcome is by having gaps that are balanced and avoiding flexion instability. That's the whole goal of LIBRA." Dr. Nevins continues, "We want to know that our flexion space is accurate without doing a lot of extra work to find that out. That's what all surgeons are looking for." Dr. Nevins notes that he has enjoyed better outcomes using *e*LIBRA with the LIBRA device. "The LIBRA tells you before you make your cuts if the knee is balanced. With the *e*LIBRA, in essence, you have a mathematical way of knowing that you're right. It takes out the ambiguity of differences between doctors."

Dr. Kreuzer explains that in his opinion, "proper rotation of the femoral component continues to be one of the most illusive outcomes to be achieved in knee replacements because it affects two things: patellar tracking and the flexion gap. The LIBRA allows you to balance the flexion gap and check patellar tracking so you can make any necessary adjustments *before* you commit to femoral rotation." Dr. Kreuzer further observes a unique characteristic of the *e*LIBRA, "it incorporates numeric feedback on soft tissue tensioning, which until now we've just done with tactile feedback." *The Journal of the American Academy of Orthopaedic Surgeons* published a study by Drs. Malo and Vince in late 2003 which stated, in part, "Patellofemoral instability likely results most frequently from internal malrotation of the femoral or tibial components."[7] This study points out incorrect internal rotation of the femoral component is generally the result of using instrumentation that references from the posterior femoral articular surfaces when there are unrecognized deficiencies of the posterior lateral femoral condyle (e.g., valgus knee). Drs. Malo and Vince go on to sum up: "Patellofemoral instability is a major complication in TKA and remains a common reason for revision surgery. Accurate component implantation is imperative for a successful outcome in knee replacement."[7] Dr. Nevins agrees, maintaining that "having a balanced force across the joints is the most accurate way to achieve this. Clearly, LIBRA is the first device with which this can be done quickly, effectively and reproducibly."

Looking to the future, Dr. Nevins remarks that Synvasive is developing a revision LIBRA, which he believes "is going to revolutionize the way revisions are done." Dr. Nevins points out that when performing revision surgery years later, you lose the anatomic landmarks. "Here is the way we will be able to balance the knee that's never been done before. I really think revisions are going to change dramatically. When you are using this technology, it's amazing with primary. It makes primaries reproducible and easy and it's going to make revisions so much easier." M

To Learn More

The LIBRA™ Dynamic Knee Balancer and *e*LIBRA™ Force Sensing Tibial Spacer will enhance your primary TKR technique. For more information concerning these products, please call 1-916-939-3913, or visit the Web site at www.synvasive.com.

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4. In a study of 407 patients, researchers found that knees, which remain unbalanced postoperatively, showed the least change in outcome scores, while those that where balanced showed the most improvement. "Better TKA Outcomes Recorded After Tissue Balancing," Linda Unitt, MCSP, SRP, 7th ERORT Congress.
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