

### Cartilage Regrowth:

- With pressure relieved in the knee by the HTO a hybrid cartilage called “fibrocartilage” routinely regrows.
- It is notable that only HTO, microfracture & joint distraction arthroplasty have been shown to result in new cartilage growth – something that does not occur even with stem cell treatment alone.

### Risks and Complications:

- There is a theoretical risk of deep infection, fracture, nerve injury and stiffness requiring further surgery, although I have never had a patient have any of these.
- However, about half the patients will have superficial skin infections around the pins at some point. These are usually easily treated with oral antibiotics.
- Non-union, failure to heal, requiring further surgery can occur, but it is exceedingly rare in patients who do not smoke.
- Pain relief may be complete, although, as with total knee replacement, some residual discomfort may remain.

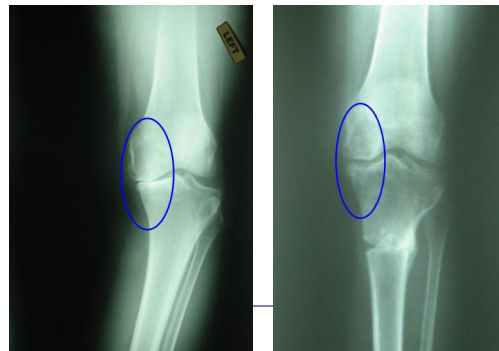
**Associated procedures:** We perform simultaneous arthroscopic microfracture, putting small perforations into exposed bone in the knee to increase cartilage regrowth.

**Options if HTO fails:** If HTO fails then either a unicompartmental (partial) or total knee replacement may be performed. HTO is generally not a permanent cure for arthritis, although it can provide many years of excellent pain relief & increased function and allow knee replacement to be postponed to an age when it will likely not have to be re-done.

### Why I use the external fixator method:

HTO also can be performed by cutting the bone and inserting a plate. I use the external fixator method instead for four reasons.

1. The fixator method permits the patient to reach an optimal alignment that can be checked with precise standing X-rays in the office. With the plate method, the bone is cut, a wedge of cadaver bone is added and the tibia is straightened all at once at surgery where precise standing X-rays cannot be taken & either too much or too little correction can occur.
2. Complications related to the plate and cadaver bone method cannot occur with the fixator method I use.
3. The external fixator method does not compromise future knee replacement, whereas the plate method is performed near the knee joint and makes future knee replacement more difficult and the ultimate result possibly less successful.
4. The fixator method is less invasive and less painful than the plate method.



Pre-Surgery

3.5 Months Post-Op

The tibia is not yet fully healed but note the increased space between the bones where new cartilage has already formed. Note also the improved alignment.

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## High Tibial Osteotomy (HTO)



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# High Tibial Osteotomy

**HTO is a minimally invasive alternative to total knee replacement (TKA) resulting in cartilage regrowth, corrected alignment, high safety and results that may be comparable to TKA.**

## My expertise with HTO

- Thirty Years of Experience performing the procedure
- Selected by American Academy of Orthopaedic Surgeons to teach course at annual meeting on HTO for Orthopaedic Surgeons; and write chapter on HTO for their Instructional Course Lectures.
- Performed award winning research at Rush that predicted success after HTO based on gait characteristics.
- Developed a minimally invasive outpatient technique for this procedure described below.

## Definitions:

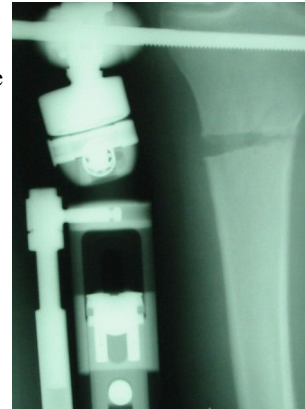
**Varus knee:** The knee of a bowlegged person.

**Medial arthritis:** Painful degeneration of the medial or inside compartment of the knee, the most common type.



## HTO is:

- Performed on people with “Varus” knee arthritis with medial knee pain.
- Effective even in bone on bone knees
- Not effective if you smoke or if body mass index is above 30.



## Purpose of HTO:

- Provide many years of pain relief and improved function.
- Allow heavier use of the knee than is prudent with total knee replacement.
- Provide an answer for patients too young to be optimal candidates for knee replacement.
- Allow easy conversion to knee replacement later if necessary (unlike knee replacement which must be converted to another, more invasive knee replacement if it fails).

## Surgical Technique

- Performed in a hospital or Surgicenter as outpatient.
- The tibia (shinbone) is cut and straightened through a tiny incision.
- Pins are inserted above and below the bone cut. A small device called an external fixator connects the pins.

**Distal Femoral Osteotomy:** A related procedure used instead of HTO for patients with “Valgus” or “knock-knees” & lateral compartment arthrosis.

## After Surgery

- The patient turns a small lever at home to gently and painlessly straighten the knee over 1 – 2 weeks.
- X-rays are taken in the office to check alignment.
- Once correct alignment is achieved, the fixator is locked while the bone heals.
- During healing, patients bear weight gradually progressing their activities as tolerated. Walking, travel and light work are allowed.
- 3 months after the procedure pins are removed in the hospital or office.

**Success rate:** About 80% of patients will have significant improvement for 10 years, some for 15 years or longer. If pain returns knee replacement can easily be performed. The “survivorship” of HTO is almost as long as total knee replacement in many studies.

## Durability-Manual Labor

Heavy manual labor is allowable after HTO if there is no pain, whereas it is not advisable after knee replacement because it can lead to loosening and failure.

