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Editorial

High Tibial Osteotomy in the Modern Era - A Renaissance in Joint Preservation

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The evolution of knee surgery over the last half-century has been marked by a striking shift in philosophy. From an era where high tibial osteotomy (HTO) was the workhorse for medial compartment osteoarthritis (MCOA) [1], the orthopaedic pendulum swung heavily towards arthroplasty. The allure of predictable pain relief, early mobility, and reproducible outcomes with unicompartmental and total knee arthroplasty (TKA) led many to declare osteotomy a fading chapter in knee surgery. Yet, the story has taken an unexpected turn.

Recent years have witnessed a renaissance of interest in HTO, fuelled by advances in surgical planning, fixation technology, and a paradigm shift towards joint preservation in younger, active patients [2,3]. In a time when the average age of knee osteoarthritis onset is trending downward and patients increasingly demand sustained high function, HTO is reclaiming its place - not as an alternative to arthroplasty, but as a strategic phase in a long-term joint management plan.

Why the resurgence?

HTO addresses the fundamental biomechanical pathology in varus MCOA - abnormal load concentration in the medial compartment [4,5]. By shifting the mechanical axis laterally towards the Fujisawa point [6], the procedure redistributes forces, alleviates pain, and slows cartilage degeneration [5]. Unlike arthroplasty, which replaces damaged structures, HTO preserves the native joint, proprioception, and bone stock. This preservation is not trivial; when future arthroplasty becomes necessary, conversion is technically easier, and long-term outcomes are more favourable compared to revision scenarios.

Evidence from our clinical experience

In our series of eighteen patients (twenty knees) followed for three years, functional improvements were not only statistically significant but also clinically meaningful. Mean Visual Analogue Scale (VAS) scores improved from 7.8 to 2.8, and Oxford Knee Scores (OKS) from 21.05 to 33.3. The proportion of patients in the “severe” functional category dropped from 40% preoperatively to 10% at follow-up. Complication rates were low - two superficial wound infections resolved with conservative care, one implant prominence, and a single conversion to TKA due to under-correction.

These results mirror the robust evidence in literature. Floerkemeier., *et al*. reported favourable mid-term outcomes after valgus HTO even in older patients with advanced cartilage damage [7]. Akizuki., *et al*. demonstrated survival rates of 97.6% at 10 years and 90.4% at 15 years [8], while Bode., *et al*. reported survival over 96% at five years with stable functional outcomes [9]. Our findings are also in line with Haviv., *et al*. who found significant OKS improvement from 22.4 to 37.2 at final follow-up [10].

Refinements that matter

The modern success of HTO rests on three pillars:

1. Meticulous patient selection: Age under 50, BMI under 30, isolated medial compartment disease, full range of motion, and absence of inflammatory arthritis remain gold-standard indicators [11].
2. Precision in planning: Digital long-leg radiographs, weight-bearing axis mapping, and the Miniaci or Fujisawa point method ensure accurate correction angles, avoiding the pitfalls of under- or over-correction.
3. Advances in fixation: The transition from bulky plates to low-profile, angular-stable constructs such as TomoFix has enhanced stability, reduced the need for bone grafts, and allowed earlier mobilisation [12,13].

Caveats and the road ahead

While the enthusiasm is justified, HTO is not without its challenges. Technical errors, poor postoperative compliance, or inappropriate patient selection can lead to suboptimal results [14,15]. Residual pain during high-impact activity is not uncommon and should be part of preoperative counselling [16]. Furthermore, long-term comparative data against modern unicompartmental knee arthroplasty in high-demand patients remain sparse, warranting ongoing prospective research.

A contemporary orthopaedic perspective

In many ways, HTO embodies the principles of precision orthopaedics - addressing the root biomechanical problem, preserving the joint, and tailoring the intervention to patient lifestyle and expectations. As we navigate an era of increasing life expectancy and activity demands, the "one-size-fits-all" arthroplasty model is giving way to staged, individualised pathways. HTO, far from being a relic, is a vital tool in this strategy [17,18].

The orthopaedic community should not view HTO as competing with arthroplasty, but rather as an upstream intervention that complements it. A knee that has enjoyed a decade or more of pain-free, natural function before requiring replacement is a success not just in surgical terms, but in the lived experience of the patient.

In the final analysis, high tibial osteotomy stands as a testament to the enduring value of biomechanical thinking in orthopaedics. In the right hands, for the right patient, it is more than an operation - it is a promise of mobility, preserved function, and time bought before the final chapter of arthroplasty begins.

Key clinical insights

- HTO is best suited for physiologically young, active patients with isolated medial compartment OA and varus malalignment.
- Long-term survival exceeds 90% at 10 years in well-selected cases.
- Accurate correction to the Fujisawa point is critical to outcome durability.
- Modern fixation systems (TomoFix, PEEK plates) enable early mobilisation without grafting in many cases.
- Preserves bone stock, making future arthroplasty technically easier and with better outcomes than revision TKA after implant failure.

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