PERCUTANEOUS KIRSCHNER WIRE VERSUS COMMERCIAL IMPLANT FOR HAMMERTOE REPAIR: RESULTS OF A COST-EFFECTIVENESS ANALYSIS

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A COMMON PROBLEM

**COMMON FOOT & ANKLE PROBLEMS TREATED BY PODIATRISTS**

- Amputation of Toe
- Ankle Fracture Open Fix
- Bunion Surgery
- Hammertoe Repair
- Metatarsal Fracture Open Fix
- Remove Ingrown Nail
- Repair Achilles Tendon
- Ulcer Debridement

Source: Thomson Reuters Market Scan survey data for 2010 commercial health insurance claims
THE OPPONENTS

**INTRAMEDULLARY IMPLANT**

**PROS:**
- Possibly higher union rates
- Lower risk of infection
- Better aesthetics
- Good results

**CONS:**
- Cost
difficulty of removal

**K-WIRE FIXATION**

**PROS:**
- Simple
- Low cost
- Well tolerated by patients
- Good results

**CONS:**
- Risk of infection
The use of these devices seem to provide good results; however, the dilemma tied to their high price is not negligible. For this reason, cost-benefit studies that are still lacking in the literature seem necessary to justify the supremacy and the use of the new devices in the future as standard treatment for hammertoes.
TO DETERMINE WHETHER COMMERCIAL IMPLANTS ARE MORE COST-EFFECTIVE OVER A PATIENT’S LIFETIME, DESPITE THE HIGHER UPFRONT COSTS IN COMPARISON TO K-WIRE FIXATION FOR ARTHRODESIS OF THE PIP JOINT IN HAMMERTOE SURGERY
METHODS

• All available literature reporting on outcomes following hammertoe surgery performed with K-wire or commercial implant was included.

• A Decision Tree Analysis was performed comparing the 2 strategies; Markov model performed for lifetime outcomes after 3 years post-op.

• Primary Outcomes: Quality Adjusted Life Years (QALYs) and health-care costs—reported as ICER.

• Base Case: An individual with hammertoe deformity of the 2nd, 3rd, or 4th toes that required surgical management.
METHODS

RELEVANT COSTS:
- Cost of Index Surgery
- Cost of Complications
- Outpatient Follow-up Visits
- Radiographs
- Prescription Costs
- Revision Surgery Costs
- Supportive Inserts
- Commercial Implant

OUTPATIENT FOLLOW-UP
- Hardware Failure
  - Implant Infection
    - Toe Amputation
  - Post-Operative
    - Resolved
  - Hardware Recurrence
    - Resolved

REVISION SURGERY
- Symptomatic
  - Revision Surgery
    - Still Symptomatic
  - Resolved
- No Revision
  - Resolved
- Symptomatic
  - Revision Surgery
    - Still Symptomatic
  - Resolved

COST OF INDEX SURGERY
- Commercial Implant

FOLLOW-UP
- Hardware Failure
  - Implant Infection
    - Toe Amputation
  - Post-Operative
    - Resolved
  - Hardware Recurrence
    - Resolved

REVISION SURGERY
- Symptomatic
  - Revision Surgery
    - Still Symptomatic
  - Resolved
- No Revision
  - Resolved
- Symptomatic
  - Revision Surgery
    - Still Symptomatic
  - Resolved
RESULTS

Cost-Effectiveness Analysis

COMMERCIAL IMPLANT ICER = $146,667 --- WELL ABOVE THE $50,000 THRESHOLD!
• COMMERCIAL IMPLANT WOULD NEED TO COST LESS THAN OR EQUAL TO $300 TO BE DEEMED COST-EFFECTIVE

• THE K-WIRE WOULD NEED TO HAVE A RECURRENCE RATE OF 18% OR HIGHER FOR THE IMPLANT TO BE DEEMED COST-EFFECTIVE (RECURRENCE RATE IN LITERATURE = 12%)

• IF THE RECURRENCE RATE FOR K-WIRE DROPPED TO 6%, THE IMPLANT WOULD BE STRONGLY DOMINATED AND SERVE NO FINANCIAL OR FUNCTIONAL BENEFITS IN THE HEALTHCARE SYSTEM
LIMITATIONS

• Can only be interpreted from the healthcare system standpoint

• Limited by current available literature

• Direct health care costs only

• It’s possible complications were underestimated in the implant group
CONCLUSIONS

• FROM A HEALTHCARE SYSTEM STANDPOINT, K-WIRE FIXATION IS THE PREFERRED TREATMENT

• IF IMPLANTS COST LESS THAN $300, THEY WOULD BE CONSIDERED COST-EFFECTIVE

COMMERCIAL IMPLANTS FAILED TO PROVE THEIR FUNCTIONAL BENEFIT WAS ENOUGH TO OUTWEIGH THEIR HIGH COSTS WHEN CONSIDERING OTHER AVAILABLE TECHNIQUES
THANK YOU!!

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